

YUKON ENERGY CORPORATION

2017/2018 GENERAL RATE APPLICATION
ROUND 1 INTERROGATORY RESPONSES FILED

APPENDIX A – LARGE ATTACHMENTS

September 22, 2017

John Maissan-YEC-1-37 Attachment 1

February 2016

REPORT

Facility Lifecycle Assessment Power Plant/Office Building and Staff House Aishihik YT

Submitted to:
Yukon Energy Corporation
P.O. Box 5920
Whitehorse, YT Y1A 6S7

REPORT

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Golder Associates



FLA: POWER PLANT/OFFICE BUILDING AND STAFF HOUSE, AISHIHIK YT

EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Power Plant/Office Building (Building A) and Staff House (Building B). Building A and Building B are located at approximately 20 km north from Otter Falls and 120 km west of Whitehorse in Aishihik YT.

Building A covering approximately 205 m² (2,210 ft²) gross floor area (GFA) consists of a two-storey Office Facility, including a mezzanine originally constructed in approximately 1976, and Power Plant section that was added on the west of the Office Building section in approximately 2011. Building B is a single-storey Staff House with developed basement covering a footprint area of approximately 222 m^2 (2,385 ft^2) gross floor area (GFA) built in approximately 1985. The buildings are located on approximately 2.80 hectares (6.92 acres) of land. Access to the Site is provided via a gravel roadway located at approximately 20 km north from Otter Falls and 120 km west of Whitehorse in Aishihik YT.

Based on the findings of this FLA, the following conclusions are made:

Building A - Power Plant/Office Building:

- The site and building were developed in approximately 1976. A major addition has been completed in approximately 2011 when Power Plant section was constructed on the west of Office Building section. Graded gravel is provided throughout the site, and the site is secured by a chain-link fence along the property line. The building is located on the same site as Staff House (Building B), as well other ancillary buildings and an electrical substation.
- The building is primarily clad with prefinished corrugated metal panels, with painted concrete foundation walls along the base of the building. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows consist of insulated glazed units set in Plastic Vinyl Composite (PVC) frames. Exterior doors are painted metal units set in painted metal frames. The bay is provided with a prefinished metal, sectional overhead door with motorized opener. Interior walls are typically steel framed with galvanized steel finishes, with painted gypsum wall board finished on wood studs provided around the office and washroom areas. Interior doors are a combination of painted metal units with glass inserts, and wood doors set in painted wood frames. The ceilings are exposed to the structure throughout the building and include corrugated metal decking supported by steel beams. The flooring throughout the building is generally painted concrete slab, with some painted metal plate at mezzanine. Unfinished storage shelving is provided in the office area. A residential grade washing machine is provided. The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage which dissipates directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs. The architectural components are in overall acceptable condition.

- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings and a CIP concrete foundation walls. The building floor is a slab on grade throughout. The superstructure is composed of structural steel I-beams with tension-only cross bracing along exterior walls. Wood studs with gypsum wallboard coverings frame the interior partitions around the office space and washroom. The roof construction consists of corrugated metal decking supported by structural steel I-beams, with tension-only cross bracing for lateral resistance. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from a water well located on site and is distributed via copper piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface drainage. Hot water is provided by an electric domestic hot water heater located in Office Building section. Plumbing fixtures include a wall-mounted vitreous china lavatory and a floor-mounted, flush tank water closet in the washroom, and a plastic utility sink located adjacent to the residential washing machine. Heating oil fuel is supplied by a steel storage tank on site. The building is primarily heated by suspended radiant hydronic unit heaters located throughout the building. Supplementary heating is provided to the washroom and office area from hydronic baseboard heaters. Building ventilation is provided by rooftop mounted vents, and building exhaust is handled by through-wall exhaust fans. The mechanical components are in acceptable overall condition.
- Electrical service is provided via buried cables from the on-site substation located adjacent to the building. Copper wiring is reported to be present throughout the building. Primary electrical distribution to the building is provided by an electrical switchboard and motor control centre. Secondary distribution is provided by electrical sub panels rated at 120/240 V, 100 A, 1 Phase, 3 Wire and 240 V, 225 A, 3 Phase, 4 Wire in Office Building section; 347/600 V, 250 A, 3 Phase, 4 Wire and 240/480 V, 225 A, 3 Phase, 4 Wire in Power Plant section. Interior lighting is provided by a combination of T-12 tubular fluorescent lamps and HID bay lamps all controlled by line voltage switches. Exterior lighting is provided by wall-mounted HID fixtures controlled by photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include bells, pull stations, CO2 detectors, and smoke/heat detectors. The electrical components are in acceptable overall condition.

Building B – Staff House:

- The site and building were developed in approximately 1985. No major additions or renovations were reported since the original construction. A wooden structure shed is located at the southwest corner of the property and a garage is provided on the west side of staff house. Graded gravel is provided throughout the site, and the site is secured by a chain-link fence along the property line. The building is located on the same site as Power Plant/Office Building (Building A), as well other ancillary buildings and an electrical substation.



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- The Staff House and garage are primarily clad with wood siding along all elevations. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows consist of insulated glazed units set in PVC frames. Exterior doors are a vinyl clad wood entrance door and a painted utility door set in painted wood frames. The garage is provided with two prefinished metal, sectional overhead doors with motorized opener. Interior walls are typically framed with wood studs and are generally sheeted with painted gypsum wallboard, with PVC wall panels and ceramic tile finishes in some areas. Interior doors are wood swing and bi-folding units set in stained wood frames. The ceilings are finished with a combination of painted drywall and acoustic ceiling tiles. Flooring finishes are a combination of sheet and vinyl composite tiles (VCT), broadloom carpet, laminate hardwood, and some quarry tile. Plastic laminate counters and cabinets are provided in the kitchen and washroom. Residential appliances include a refrigerator, a washing machine and clothes dryer, an electric range, a range hood, a microwave, and a dishwasher. The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground for absorption. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs. The architectural components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip footings and a CIP concrete foundation walls. The building basement and garage floor is a slab on grade throughout. Suspended floors are constructed of plywood sub flooring supported by dimensional lumber joists. The superstructure is composed of wood stud framing with gypsum wallboard coverings at interior and exterior walls. The roof construction consists of plywood decking supported by dimensional lumber rafters. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from a water well located on site and is distributed via copper piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface drainage. Hot water is provided by an electric domestic hot water heater located in furnace room. Plumbing fixtures include countertop-mounted enameled iron lavatories, and floor-mounted, flush tank, vitreous china water closets in the washroom, a counter-mounted stainless steel sink in the kitchen. Heating oil fuel is supplied by a steel storage tank located on the south side of Building B. The building is primarily heated by an oil-fired forced air furnace located in the furnace room. Air is distributed throughout the building by a galvanized metal ductwork system. Building ventilation is provided by the furnace and operable windows, and building exhaust is handled by the range hood in the kitchen and a ceiling-mounted exhaust fan in the washroom. The mechanical components are in acceptable overall condition.



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- Electrical service is provided via buried cables from the on-site substation located adjacent to the building. Copper wiring is reported to be present throughout the building. Electrical distribution in staff house is provided by a sub panel rated at 240 V, 200 A, 1 Phase, 4 Wire and garage is provided with a sub-panel rated at 240 V, 100 A, 1 Phase, 3 Wire. Interior lighting is provided by a combination of incandescent fixtures and T12 tubular fluorescent lamps, all controlled by line voltage switches. Exterior lighting is provided by a combination of wall-mounted HID light fixtures, soffit-recessed/mounted incandescent lights around the staff house. Wall-mounted HID light fixtures are provided around the garage. The exterior lightings are controlled by line voltage switches and photocells. Emergency lighting is provided by battery packs with integral heads. Smoke detectors are provided in the building. The electrical components are in acceptable overall condition.

Given the year of original construction of each building (~1976, ~1985, and ~2011), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) may be present.

Immediate investigation / action items identified pertain to exterior stair, boiler, and exit sign of Building A and domestic water supply, septic system, insulation, and furnace of Building B. Deficiencies and Capital Reserve Items have been identified within the 10-year time frame of this report with respect to architectural, structural, mechanical and electrical components and systems. The Immediate Repairs and Capital Reserve Analysis are included in Appendix D. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.

Table 1: Summary of Immediate and 10 Year Capital Reserve Expenditures by Section (Uninflated)/Office Building (Site A)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2021)	Reserve Years 5 to 10 (2022 to 2026)	10 Year Reserve Total
1	Architectural	$0	$301,200	$3,600	$304,800
2	Structural	$0	$0	$0	$0
3	Mechanical	$0	$14,300	$0	$14,300
4	Electrical	$1,600	$25,600	$10,700	$36,300
TOTALS		**$1,600**	**$341,100**	**$14,300**	**$355,400**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 2: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)/ Office Building (Site A)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$1,600	$59,100	$13,000	$0	$3,300	$265,700	$0	$0	$0	$14,300	$0



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Table 3: Summary of Immediate and 10 Year Capital Reserve Expenditures by Section (Uninflated)/Staff House (Site B)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2021)	Reserve Years 5 to 10 (2022 to 2026)	10 Year Reserve Total
1	Architectural	$0	$41,400	$139,900	$181,000
2	Structural	$0	$0	$0	$0
3	Mechanical	$8,000	$12,400	$0	$12,400
4	Electrical	$0	$33,700	$0	$33,700
TOTALS		**$8,000**	**$87,200**	**$139,900**	**$227,100**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 4: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)/ Staff House (Site B)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$8,000	$64,300	$8,000	$0	$7,400	$7,500	$0	$0	$0	$139,900	$0



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1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Power Plant/Office Building (Building A) and Staff House (Building B). Building A and Building B are located at approximately 20 km north from Otter Falls and 120 km west of Whitehorse in Aishihik YT.

Building A covering approximately 205 m² (2,210 ft²) gross floor area (GFA) consists of a two-storey office facility including a mezzanine originally constructed in approximately 1976 and Power Plant section was added on the west of the Office Building section in approximately 2011. Building B is a single-storey Staff House with developed basement covering a footprint area of approximately 222 m^2 (2,385 ft^2) gross floor area (GFA) built in approximately 1985. The buildings are located on approximately 2.80 hectares (6.92 acres) of land. Access to the Site is provided via a gravel roadway located at approximately 20 km north from Otter Falls and 120 km west of Whitehorse in Aishihik YT.

Written authorization to proceed with the work was provided by Sean Munro, Manager, Property & Risk Management from Yukon Energy Corporation. It is understood that this FLA is required for capital planning.

1.2 Objectives

The objective of the FLA was to document the Site conditions at the time of the Site reconnaissance and, based on available sources of information and observations of surface conditions during the Site reconnaissance, to identify the exterior Site improvements as well as the building structure, envelope, interior finishes, mechanical systems, electrical systems, fire/life safety systems, conveyance devices and visually obvious signs of non-compliance with respect to building code and barrier free accessibility. Due to the age of the buildings, it is possible that hazardous building materials are present.

1.3 Methodology

Site Escort and general building information was provided by Austin Osborne, Plant Operator (hereafter referred to as the “Site Representative”). Site reconnaissance was conducted by Brian Levy and Adriana Almeida of Golder on November 18, 2015. The weather at the time of assessment was -18 °C and overcast, with no conditions limiting access to or around each Site. Snow coverage prevented observational assessment of the roof or and Site components.

The scope of work did not include sampling or testing to identify the potential presence of hazardous building construction materials such as asbestos-containing materials (ACMs), lead-based paints (LBPs), PCB-containing electrical equipment or other hazardous materials. Due to the age of the buildings (~1976, ~1985, and ~2011), it is possible that hazardous building construction materials are suspected to be present on Site.

1.4 Evaluation Criteria

The FLA was completed in general accordance with accordance with the YEC stated scope of work as documented in *Request for Proposals Building Condition Reports* (hereafter referred to as the "RFP"). The scope of the FLA was limited to identifying components, systems and potential concerns by visual examination of surface features and operating practices, and from available documented information sources. Only those items identified as being above the specified Capital Threshold will be addressed in the Capital Reserve Table. The Condition Rating system (CR) used throughout this report is based on the YEC RFP:

Code	Description
1	**Critical Unsafe**, high risk of injury or critical system failure.
2	**Poor** - does not meet requirements, has significant deficiencies. May have high operating / maintenance costs.
3	**Marginal** - Meets minimum requirements, has significant deficiencies. May have above average operating maintenance costs.
4	**Acceptable** - Meets present requirements, minor deficiencies. Average operating/maintenance costs.
5	**Good** - Meets all present requirements. No deficiencies.
6	**Excellent** - As new/state of the art, meets present and foreseeable requirements.

The capital expenditures identified with respect to deficiencies or deferred maintenance shall be identified by the following Categories ("Cat#"):

Category	Description
1	Code & Safety
2	Repair & Maintenance
3	Capital Expenditure
4	Modernization / Improvements
5	Other

Items identified with a CR rating of 1 and/or Cat1, shall be treated as "Immediate" action items, considered to have conditions that include deficiencies that require action in the next 60 to 90 days. Items identified with a CR of 2 or 3 and/or Cat2 shall be considered to have conditions that include deficiencies that can be addressed within the next five years (2016 to 2020 in the Capital Reserve Table). Preventative Maintenance (PM) items may have been identified. These PM items are items anticipated to be required to maintain specific components/systems through to the end of their Expected Useful Life (EUL) and are considered to have CR of 4 or better that can be addressed at any time within the 10 year time frame of this report (2016 to 2025 in the Capital Reserve Table).

Other non-urgent conditions identified with a CR of 4 to 6, are prioritized by their identification as Cat2 to Cat4 and are included in the Capital Reserve Table in an appropriate year. For items with no observed or reported deficiencies, a lifecycle replacement (LCR) cost estimate has been provided in the Capital Reserve Table spreadsheet in the year equal to the year of original installation plus that component's EUL. If an item with no observed or reported deficiencies is nearing or has surpassed its EUL in the next 5 years (i.e., 2016 to 2020), an LCR cost estimate has been provided in the Lifecycle Plan spreadsheet in year 2021.

For similar components that have been replaced/installed at different times but where the age difference is equal to or less than 20% of the component's EUL, the average install year has been used in calculating the next lifecycle replacement event (i.e., for similar vinyl floor tile installed in 1999 versus 2002, each having a 20 year TDL, an average install year of 2001 has been used to calculate a single lifecycle replacement event in 2021).

No building material sampling or testing was conducted as part of this assessment.

1.5 Recommendations for Additional Investigation or Action

- Conduct a study and complete repairs related to inadequate heating issues identified at Building A.
- Conduct a study and complete repairs related to domestic water supply and septic system issues identified at Building B.
- Conduct a study and complete repairs related to inadequate basement heating issues identified at Building B.

1.6 Desktop Data Collection

Architectural drawings and any previous condition reports or hazardous materials reports for the Site were requested. No drawings or previous reports were provided by YEC related to the Building A; however, the followings are a list of drawings provided for Building B:

- Floor Plan, # AHOD, Yukon Energy Corporation, June 1999.
- Site Plan & Building Elevation, # DRG A-4-2, R.E.Witherspoon Architect, August 1984.
- Plans & Sections, # DRG A-4-3, R.E.Witherspoon Architect, August 1984.
- Building Sections & Details, # DRG A-4-4, R.E.Witherspoon Architect, August 1984.
- Structural Sections & Details, # DRG A-4-5, R.E.Witherspoon Architect, August 1984.
- Sections & Details, # DRG A-4-6, R.E.Witherspoon Architect, August 1984.

1.7 Outstanding Information

All information that has been requested has been provided at the time of the completion of this report.

1.8 Building & Fire Code Compliance Overview

The Site Representative advised that he was not aware of any other outstanding work orders, building code violations, building code infractions, building ordinances and municipal health and fire safety by-laws violations.

1.9 Evidence of Mould Presence

No mould was identified at the time of site assessment.



1.10 Outline of the Report

The report that follows this section contains a summary description of the Site and building systems/components along with a detailed listing and description of systems/components. Furthermore, current, imminent or anticipated deficiencies above the Capital Threshold (if any) and excluding normal operating maintenance are presented with a CR, including a description of the risk/consequence of deferral, probability of imminent/anticipated failure and/or a further description of any failure if it has already occurred.

A more detailed Capital Reserve Table is presented in Appendix D outlining the specific systems/components, EUL, Install Date, Remaining Useful Life (RUL), replacement event type, basis of estimate and specific years for Capital Reserve planning.

1.11 Mandate and Report Resources

Please refer to Appendix A for the report mandate for this project and for additional resources related to the assumptions used in preparing this report such as:

- Operating and Maintenance Items; and
- Discussions of Overall Concepts and Terminology.

2.0 SITE DESCRIPTION

2.1 Site Location and Setting

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Power Plant/Office Building (Building A) and Staff House (Building B). Building A and Building B are located at approximately 20 km north from Otter Falls and 120 km west of Whitehorse in Aishihik YT.

Building A covering approximately 205 m² (2,210 ft²) gross floor area (GFA) consists of a two-storey office facility including a mezzanine originally constructed in approximately 1976 and Power Plant section was added on the west of the Office Building section in approximately 2011. Building B is a single-storey Staff House with developed basement covering a footprint area of approximately 222 m^2 (2,385 ft2) gross floor area (GFA) built in approximately 1985. The buildings are located on approximately 2.80 hectares (6.92 acres) of land. Access to the Site is provided via a gravel roadway located at approximately 20 km north from Otter Falls and 120 km west of Whitehorse in Aishihik YT.

2.2 Site Physical Description

Table 5: Power Plant/Office Building (Building A) Site Physical Description

Topic	Data
Site Area	~2.80 hectares (~6.92 acres)
Number of Buildings on the Site	Three
Approximate Footprint Area of Building	~205 m² (~2,210 ft²)
Levels above grade	Two and a mezzanine
Levels below grade	None
Date of Building Construction	~1976
Date of Major Renovation/Addition	~2011
Percentage Site Coverage by Building	~5%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~95% bare/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	N/A



Power Plant/Office Building (Building A).

Table 6: Staff House (Building B) Site Physical Description

Topic	Data
Site Area	~2.80 hectares (~6.92 acres)
Number of Buildings on the Site	Three
Approximate Footprint Area of Building	~222 m² (~2,385 ft²)
Levels above grade	One
Levels below grade	None
Date of Building Construction	~1985
Date of Major Renovation/Addition	None
Percentage Site Coverage by Building	~5%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~95% bare/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	N/A



Staff House (Building B).

3.0 ARCHITECTURAL

Power Plant/Office Building (Building A)

The site and building were developed in approximately 1976. A major addition has been completed in approximately 2011 when Power Plant section was constructed on the west of Office Building section. Graded gravel is provided throughout the site, and the site is secured by a chain-link fence along the property line. The building is located on the same site as Staff House (Building B), as well other ancillary buildings and an electrical substation.

The building is primarily clad with prefinished corrugated metal panels, with painted concrete foundation walls along the base of the building. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows consist of insulated glazed units set in PVC frames. Exterior doors are painted metal units set in painted metal frames. The bay is provided with a prefinished metal, sectional overhead door with motorized opener. Interior walls are typically steel framed with galvanized steel finishes, with painted gypsum wall board finished on wood studs provided around the office and washroom area. Interior doors are a combination of painted metal units with glass inserts, and wood doors set in painted wood frames. The ceilings are exposed to the structure throughout the building and include corrugated metal decking supported by steel beams. The flooring throughout the building is generally painted concrete slab, with some painted metal plate at mezzanine. Unfinished storage shelving is provided in the office area. A washing machine is provided.

The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.

Capital expenditures with respect to the gravel parking lot and drive aisles, exterior stair and railing, metal cladding, interior doors, and exterior stair are anticipated within the 10-year time frame of this report.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall acceptable condition.

Staff House (Building B)

The site and building were developed in approximately 1985. No major additions or renovations were reported since the original construction. A wooden structure shed is located at the southwest corner of the property and a garage is provided on the west side of Staff House. Graded gravel is provided throughout the site, and the site is secured by a chain-link fence along the property line. The building is located on the same site as Power Plant/Office Building (Building A), as well other ancillary buildings and an electrical substation.



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The Staff House and garage are primarily clad with wood siding along all elevations. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows consist of insulated glazed units set in PVC frames. Exterior doors are a vinyl coated wood entrance door and a painted utility door set in painted wood frames. The garage is provided with two prefinished metal, sectional overhead doors with motorized opener. Interior walls are typically framed with wood studs and are generally sheeted with painted gypsum wallboard, with PVC wall panels and ceramic tile finishes in some areas. Interior doors are wood swing and bi-folding units set in stained wood frames. The ceilings are finished with a combination of painted drywalls and acoustic ceiling tiles. Flooring finishes are a combination of sheet vinyl and VCT, broadloom carpet, laminate hardwood, and some quarry tile. Plastic laminate counters and cabinets are provided in the kitchen and washroom. Residential appliances include a refrigerator, a washing machine and clothes dryer, an electric range, a range hood, a microwave, and a dishwasher.

The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.

Capital expenditures with respect to the site servicing, on-site shed, wood cladding, insulation, interior doors, exterior utility doors, and acoustic ceiling tiles are anticipated within the 10-year time frame of this report.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall acceptable condition.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.01a	**Site Servicing**	**Water**: Domestic water is supplied by on-site water well. **Sanitary Sewer**: Sanitary waste is fed to an on-site septic field. **Oil**: Heating oil fuel is supplied by an aboveground steel storage tank on Site. **Electrical**: Power is fed to the building via underground cables from three pole-mounted transformers located on the southeast corner of Building A.	**3**	-	Issue was reported in regard to unreliable power supply to the Building A. Costing for this issue has been included in Electrical section of this report. No other concerns were reported.
A01.01b	**Site Servicing**	**Water**: Domestic water is supplied by on-site water well. **Sanitary Sewer**: Sanitary waste is fed to an on-site septic field. **Oil**: Heating oil fuel is supplied by an aboveground steel storage tank located on the south side of Building B. **Electrical**: Power is fed to the building via underground cables from three pole-mounted transformers located on the southeast corner of Building A. Power meter is located on the north elevation of Building B.	**3**	2	Issues regarding inadequate domestic water pressure and outdated on-site septic system were reported. Costing for this issue has been included in Mechanical section of this report. No other concerns were reported.
A01.02a	**Parking Lots & Drive Aisles**	**~1976:** Gravel drive aisles and parking areas are provided on the site.	**4**	3	The site was snow-covered at the time of assessment so the condition of the gravelled surfaces was not observed. No issues reported. An allowance to re-grade and gravel refresh at the Site has been included in the timeframe of this report.
A01.02b	**Parking Lots & Drive Aisles**	**~1985:** Gravel drive aisles and parking areas are provided on the site.	**4**	3	The site was snow-covered at the time of assessment so the condition of the gravelled surfaces was not observed. No issues reported. An allowance to re-grade and refresh the gravel at the Site has been included in the timeframe of this report.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.03a	**Parking bumpers**	**~2011:** Some precast concrete traffic barriers are located on the south of Building A.	**4**	-	No concerns were reported.
A01.03b	**Parking bumpers**	N/A	**-**	-	N/A
A01.04a	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No concerns observed or reported.
A01.04b	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No concerns observed or reported.
A01.05a	**Grassed Areas**	Grassed areas are provided around all elevations of the building.	**4**	-	The site was snow-covered at the time of assessment and was not directly reviewed. No concerns were reported.
A01.05b	**Grassed Areas**	Grassed areas are provided around all elevations of the building.	**4**	-	The site was snow-covered at the time of assessment and was not directly reviewed. No concerns were reported.
A01.06a	**Fencing**	**~1976**: Chain-link fencing is provided around the entire site. Barbed wire is provided atop the fence and a swing gate is provided at the site entrance.	**4**	3	The fence has surpassed its EUL and should be replaced; however, it is still in overall acceptable condition and thus costing for the replacement of the fence has been included in Year 5 of the timeframe of this report. No other concerns observed or reported.
A01.06b	**Fencing**	**~1985**: Chain-link fencing is provided around the entire site. Barbed wire is provided atop the fence and a swing gate is provided at the site entrance.	**4**	3	The fence will reach its EUL within the timeframe of this report and the replacement cost has been included in Capital Reserve Table. No other concerns observed or reported.
A01.07a	**Retaining Walls**	**~2011**: A wooden retaining wall is provided at the southwest corner of Building A.	**4**	-	No concerns observed or reported.
A01.07b	**Retaining Walls**	N/A	**-**	-	N/A
A01.08a	**Signage**	**~2000**: Plastic site signage is provided on the fence at the entrance and on the building wall.	**4**	-	No concerns observed or reported.
A01.08b	**Signage**	**~2000**: Plastic site signage is provided on the fence at the entrance and on the building wall.	**4**	-	No concerns observed or reported.
A01.09a	**Amenities**	N/A	**-**	-	N/A

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A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.09b	**Amenities**	**~1985:** A wooden decking area including a barbeque and two plastic chairs is provided on the west elevation of Building B.	**4**	-	No concerns observed or reported.
A01.10a	**Ancillary Buildings**	**~1976:** There are three metal containers and one trailer on the south of Building A. A metal framed modular building is located at the southwest corner of the property.	**4**	-	Not included for capital costing as it is considered out of the scope of work for this report.
A01.10b	**Ancillary Buildings**	**~1985:** A wood framed garage is located directly west of Building B. A wood shed is located at the southwest corner of the property.	**4**	-	Costing for the garage is incorporated into the Staff House, and the shed is considered out of the scope of work for this report. No concerns observed or reported.
A01.11a	**Decks and Terraces**	N/A	**-**	-	N/A
A01.11b	**Decks and Terraces**	**~1985:** A wood decking area including a barbeque and two plastic chairs is provided on the west elevation of Building B.	**4**	-	No concerns observed or reported.
A01.12a	**Railings**	**~1976:** Painted metal railings are provided along the metal stairs located on the east elevation of Building A.	**4**	3	Paints on the railings were generally peeled off and discolored. The majority of exposed metal areas were rusted and thus will require repainting to avoid water infiltration. It was also noted that ground level metal railing was bent. It is recommended to repaint the metal railings and stairs concurrently with the repairs to the damaged railing. Costing for the replacement of metal railing has been included in Capital Reserve Table. No other concerns observed or reported.
A01.12b	**Railings**	N/A	**-**	-	N/A
A01.13a	**Fire Hydrants**	None observed on site.	**-**	-	N/A
A01.13b	**Fire Hydrants**	None observed on site.	**-**	-	N/A

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1a	**Metal Cladding**	**~1976**: Brown-tone prefinished corrugated metal panels are provided around the exterior of Office Building section. **~2011**: Blue-tone prefinished corrugated metal panels are provided around the exterior of Power Plant section.	**4/5**	3	The metal cladding installed in ~1976 has surpassed its EUL; however, it is still in overall acceptable condition. The replacement cost has been included within 5 years of timeframe on this report. No other concerns observed or reported.
A02.1b	**Metal Cladding**	N/A	**-**	-	N/A
A02.2a	**Wood Cladding**	N/A	**-**	-	N/A
A02.2b	**Wood Cladding**	**~1985**: The exterior of the staff house and garage is primarily clad with wood siding.	**3**	2/3	The wood cladding is approaching its EUL within timeframe of this report. Costing for the replacement of the cladding has been included in Capital Reserve Table. No other concerns observed or reported.
A02.3a	**Exterior Paint**	**~1976:** The metal stair and handrails located on the east elevation of Building A are painted.	**3**	3	The exterior paint has surpassed its EUL and should be repainted. Costing for repainting exterior components has been included in Capital Reserve Table. No other concerns observed or reported.
A02.3b	**Exterior Paint**	**~1985:** The exterior wood door and the overhead door of the garage located on the west side of Building B are painted.	**4**	3	The exterior paint has surpassed its EUL and should be repainted. Costing for repainting exterior components has been included in Capital Reserve Table. No other concerns observed or reported.
A02.4a	**Joint Sealers**	None observed.	**-**	-	No joint sealers were observed. Exterior penetrations should be re-caulked as part of regular maintenance as required. (See Note **3A**)
A02.4b	**Joint Sealers**	**~2000:** Joint sealers were observed around door and window openings.	**4**	-	The joint sealers are currently in acceptable condition, but will require replacing within the timeframe of this report. (See Note **3A**)
A02.5a	**Louvers**	**~2011:** A prefinished metal louver is provided on the west elevations of Building A.	**4**	-	No concerns observed or reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.5b	**Louvers**	**~1985:** Prefinished metal louvers are provided on the north and south elevations of Building B and garage.	**4**	-	The louvers are currently in acceptable condition, but will require replacing within the timeframe of this report. (See Note **3A**) No other concerns observed or reported.
RFI1.a/ A02.6a	**Insulation**	**~1976/2011:** Insulation was concealed and not directly reviewed, but likely consists of batt insulation.	**3**	2	It was reported that Building A is too cold in the winter. A study to determine any remedial measure for upgrading insulation should be performed. Cost for the study and replacement allowance has been included in Capital Reserve Table.
RFI2.b/ A02.6b	**Insulation**	**~1985:** According to the drawings, insulation consists of R-20 batt insulation on the walls; R-30 and R-40 batt insulation on the ceilings.	**3**	2	Issues regarding inadequate insulation of both Building A and B were reported. In case of Building B, the lower level is excessively cold during winter time and it brings domestic water pipes freeze and burst. A study for this issue should be conducted beforehand and the replacement or insulation upgrading work should be performed based on the result of the study. Cost for the study has been included in Capital Reserve Table.
A02.7a	**Vapour Barrier**	**~1976/2011:** The vapour barrier was concealed and not directly reviewed, but likely consists of polyethylene sheets.	**4**	-	No concerns reported.
A02.7b	**Vapour Barrier**	**~1985:** The vapour barrier consists of polyethylene sheets.	**4**	-	No concerns reported.

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A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1a	**Exterior Windows**	**~2000**: Insulated glazed units set in vinyl frames are provided at the building exterior. It was noted that the windows were upgraded approximately 15 years ago since the original construction.	**4**	-	No concerns observed or reported.
A03.1b	**Exterior Windows**	**~2000**: Insulated glazed units set in vinyl frames are provided at the building exterior. It was noted that the windows were upgraded approximately 15 years ago since the original construction.	**4**	-	No concerns observed or reported.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1a	**Main Entrance Door**	**~1976**: A painted metal entrance door set in a painted metal frame is provided at the main entrance of Office Building section. **~2011**: A painted metal entrance door set in a prefinished metal frame is provided at the main entrance of Power Plant section.	**4/5**	-	The main entrance door installed in ~1976 is currently in acceptable condition, but will require replacing within the timeframe of this report. (See Note **3A**) No other concerns observed or reported. The doors are not barrier free in their current condition. Due to the function of the building, no costing has been included for barrier free upgrades.
A04.1b	**Main Entrance Door**	**~1985**: A vinyl wood entrance door set in a coated pine wood frame is provided at the main entrance.	**4**	3	The main entrance door is currently in acceptable condition, but will require replacing within the timeframe of this report. Cost for the replacement of the door has been included in Capital Reserve Table. No other concerns observed or reported. The door is not barrier free in its current condition. Due to the function of the building, no costing has been included for barrier free upgrades.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.2a	**Utility Doors**	**~2011**: A painted single metal utility door is provided on the south elevation of Office Building section and a painted double metal utility door is located on the west elevation of Power Plant section. The doors are insulated and set in metal frames.	**4**	-	No concerns observed or reported.
A04.2b	**Utility Doors**	**~1985**: A painted wood entrance door set in a coated pine wood frame is provided at the east elevation of staff house.	**4**	-	The paint on the door was peeled off at the bottom and the door will reach its EUL within the timeframe of this report. The doors should be replaced; however, it was not included in Capital Reserve Table since the costing will be below threshold ($3,000). No other concerns observed or reported.
A04.3a	**Overhead Doors**	**~1976**: A painted metal, sectional overhead door with motorized opener is provided.	**4**	3	It was reported that the overhead door has some operational issues and has been surpassed its EUL. Costing for the replacement of the overhead door has been included in Year 1 of the timeframe of Capital Reserve Table.
A04.3b	**Overhead Doors**	**~1985**: Two painted metal, sectional overhead doors with motorized opener are provided to the garage.	**3**	-	No concerns observed or reported.

A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1a	**Fascia**	**~1976/2011**: Prefinished metal fascia is provided along the roof perimeter.	**4**	-	The fascia has surpassed its EUL and should be replaced; however, costing for replacement has not been included in Capital Reserve Table since the cost will be below the threshold of this report. No other concerns observed or reported.

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A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1b	**Fascia**	**~1985**: Coated wood fascia is provided along the roof perimeter.	**4**	-	The fascia has surpassed its EUL and should be replaced; however, costing for replacement has not been included in Capital Reserve Table since the cost will be below the threshold of this report. No other concerns observed or reported.
A05.2a	**Soffit**	**~1976**: Prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.	**4**	-	The fascia has surpassed its EUL and should be replaced; however, costing for replacement has not been included in Capital Reserve Table since the cost will be below the threshold of this report. No other concerns observed or reported.
A05.2b	**Soffit**	**~1985**: Coated wood soffits are provided along the underside of the roof overhangs.	**4**	-	The fascia has surpassed its EUL and should be replaced; however, costing for replacement has not been included in Capital Reserve Table since the cost will be below the threshold of this report. No other concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1a	**Fixed Partitions**	**~1976**: Interior partitions are a combination of painted concrete masonry unit (CMU) and unfinished wood walls with corrugated galvanized steel coverings. Some painted gypsum board finishes are provided in the washroom. **~2011**: Interior partitions are steel beam frames with corrugated galvanized steel coverings.	**4**	-	No concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1b	**Fixed Partitions**	**~1985**: Interior partitions are framed with wood studs and are sheeted with gypsum wallboards and PVC wall panels.	**4**	-	No concerns observed or reported.
A06.2a	**Metal**	**~1976/2011**: Galvanized steel corrugated panel wall finishes are provided throughout the majority of the building.	**4**	-	No concerns observed or reported.
A06.2b	**Metal**	N/A	**-**	-	N/A
A06.3a	**Gypsum Board**	**~1976**: Painted gypsum board finishes are provided in the washroom of Office Building section.	**4**	-	No concerns observed or reported.
A06.3b	**Gypsum Board**	**~1985**: The majority of the interior walls in staff house and garage are finished with painted gypsum board.	**3/4**	-	Damaged gypsum wallboards were observed on the lower level of Staff House. The damaged area should be repaired. (See Note **3A**)
A06.4a	**Wood**	**~1976**: Unfinished and painted wood wall finishes (inside face of exterior wood) are provided in Office Building section.	**4**	-	No concerns observed or reported.
A06.4b	**Wood**	**~1985**: One section of plywood wall finish is provided in lower level corridor of staff house.	**4**	-	No concerns observed or reported.
A06.5a	**Concrete**	**~2013**: Concrete foundation walls are painted along the base of some of the interior walls.	**4**	-	No concerns observed or reported.
A06.5b	**Concrete**	N/A	**-**	-	N/A
A06.6a	**Interior Paint**	**~2013**: The interior gypsum wallboards, CMU wall, wood wall boards, and some concrete ceilings are finished with paint in Office Building section. The concrete foundation walls and concrete floors are finished with paint in Power Plant section.	**4**	-	The wall is reportedly painted regularly. It is believed that Building A's interior finishes were repainted concurrently with Building B in approximately 2013 after flood damage on the basement. No other concerns observed or reported. Costing for interior finish repainting has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.

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A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.6b	**Interior Paint**	**~2013**: The interior gypsum wallboards of staff house and garage are generally finished with paint. Some of the gypsum board ceilings are also finished with paint.	**4**	-	It was noted that the basement areas got flooded approximately two years ago. It is believed that the majority of interior finishes were repainted after flood. It was also observed that the paints on the corner wall in the upper level washroom were damaged by moisture. No other concerns observed or reported. It is assumed wall paintings will occur concurrently with painting of the floors and ceilings, or as needed. Costing for interior finish repainting has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.
A06.7a	**Ceramic Tile**	N/A	**-**	-	N/A
A06.7b	**Ceramic Tile**	**~1985**: Ceramic wall tile, 4”X4” size, is provided in the washroom bathtub.	**4**	-	The ceramic wall tile is currently in acceptable condition, but will require replacing within the timeframe of this report. (See Note **3A**) No other concerns observed or reported.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1a	**Interior Doors**	**~1976**: Office Building section is provided with wood doors set in painted wood frames. **~2011**: Power Plant section is provided with one painted metal utility door with glass insert set in painted metal frame and one painted metal utility door.	**4**	3	The interior doors installed in ~1976 have surpassed their EUL; however, it is still in overall acceptable condition. The replacement cost has been included within 5 years of timeframe on this report. No other concerns observed or reported.

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A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1b	**Interior Doors**	**~1985**: Building B is provided with wood interior doors and wood bi-folding doors.	**4**	3	The interior doors have surpassed their EUL; however, it is still in overall acceptable condition. The replacement cost has been included within 5 years of timeframe on this report. No other concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.1a	**Exposed Structure**	**~1976**: The ceilings throughout Office Building section are exposed structure consisting of sloped painted metal beams and engineered lumbers. **~2011**: The ceilings throughout Power Plant section are exposed structure consisting of corrugated metal decking supported by steel beams.	**4**	-	No concerns observed or reported.
A08.1b	**Exposed Structure**	**~1985**: The ceiling in the lower level storage is exposed to the structure, revealing OSB sub flooring supported by dimensional lumber floor I-joists.	**4**	-	No concerns observed or reported.
A08.2a	**Gypsum Board**	**~1976**: The ceilings over office areas and washroom in Office Building section are provided with gypsum board and finished with paint.	**4**	-	No concerns observed or reported.
A08.2b	**Gypsum Board**	**~1985**: The ceilings throughout the main level of the staff house and garage are generally provided with gypsum board and finished with paint.	**4**	-	No concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.3a	**Interior Paint**	**~2013**: The gypsum board ceilings over office areas and washroom are finished with paint.	**4**	-	The ceiling is reportedly painted regularly. It is assumed ceiling painting will occur concurrently with painting of the floors and walls, or as needed. Costing for interior finish repainting has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.
A08.3b	**Interior Paint**	**~2013**: The gypsum board ceilings throughout the main level of the staff house and garage are finished with paint.	**4**	-	The ceiling is reportedly painted regularly. It is assumed ceiling painting will occur concurrently with painting of the floors and walls, or as needed. Costing for interior finish repainting has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.
A08.4a	**Acoustic Ceiling Tile**	N/A	**-**	-	N/A
A08.4b	**Acoustic Ceiling Tile**	**~1985**: The majority of basement ceiling areas are finished with acoustic ceiling tiles.	**4**	3	The acoustic ceiling tiles have surpassed their EUL and it should be replaced within 1 year of the timeframe of this report since some damaged ceiling tiles were observed at the time of site assessment. Cost for the replacement of ceiling tiles has been included in Capital Reserve Table.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1a	**Concrete**	**~1976/2011**: Painted concrete slab flooring is provided throughout the majority of the building.	**4**	-	No concerns observed or reported.
A09.1b	**Concrete**	**~1985**: Painted concrete slab flooring is provided in staff house storage and garage.	**4**	-	No concerns observed or reported.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.2a	**Metal Plate**	**~1976:** Some painted metal walkways are provided in Office Building mezzanine.	**4**	-	No concerns observed or reported.
A09.2b	**Metal Plate**	N/A	**-**	-	N/A
A09.3a	**Interior Paint**	**~2013:** Interior paint is provided on the interior concrete flooring finishes.	**3/4**	-	The flooring is reportedly painted regularly and was in overall acceptable condition; however, it was observed that the paint on the small concrete flooring area in boiler room was lifted and peeled off. Repainting the damaged area is recommended as a way of regular maintenance. Costing for interior finish repainting has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.
A09.3b	**Interior Paint**	**~2013:** Interior paint is provided on the interior concrete flooring finishes.	**4**	-	No concerns observed or reported.
A09.4a	**Metal Grating**	**~1976:** Small painted metal grating walkways are provided in Office Building mezzanine.	**4**	-	No concerns observed or reported.
A09.4b	**Metal Grating**	N/A	**-**	-	N/A
A09.5a	**Vinyl**	N/A	**-**	-	N/A
A09.5b	**Vinyl**	**~2013:** Vinyl sheet and tile flooring is provided in the rooms, hallway, washroom, main entrance vestibule, and east stairwell in Building B.	**5**	-	It was noted that the vinyl flooring was installed in approximately 2013 after flood and the flooring was observed in generally good condition at the time of assessment. Costing for the replacement of the vinyl has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.
A09.6a	**Carpet**	N/A	**-**	-	N/A

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A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.6b	**Carpet**	**~2013:** Broadloom carpet flooring is provided in the south stairwell and adjacent hallway.	**4**	-	It was noted that the carpet was installed in approximately 2013 after flood and the flooring was observed in generally good condition at the time of assessment. Costing for the replacement of the carpet has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.
A09.7a	**Laminate**	N/A	**-**	-	N/A
A09.7b	**Laminate**	**~2000:** Laminate hardwood flooring is generally provided in the main floor.	**4**	-	No concerns observed or reported.
A09.8a	**Quarry Tile**	N/A	**-**	-	N/A
A09.8b	**Quarry Tile**	**~1985:** Small area of quarry tile flooring is provided near the fireplace in the living room.	**4**	-	No concerns observed or reported.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.1a	**Counters/Cabinets**	**~1976**: Unfinished storage shelving is provided in the office area.	**3**	-	The storage shelving has been surpassed its EUL. (See Note **3A**)
A10.1b	**Counters/Cabinets**	**~2000**: Plastic laminate counters and cabinets are provided in the kitchen and washrooms.	**4**	-	No concerns observed or reported.
A10.2a	**Interior Railing**	**~1976:** Painted steel railing is provided at the mezzanine and mezzanine stair.	**4**	-	No concerns observed or reported.
A10.2b	**Interior Railing**	**~1985:** Wood panel railing is provided at the west stair.	**4**	-	No concerns observed or reported.

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A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.3a	**Interior Signs**	**~1976**: Interior signs for hazard warnings, PPE requirements, and room identification are provided throughout the building in various types such as door-mounted laminate, sheet metals, and stickers.	**4**	-	No concerns observed or reported.
A10.3b	**Interior Signs**	N/A	**-**	-	N/A
A10.4a	**Washroom Accessories**	**~1976**: The washroom is provided with a mirror, a toilet paper hanger, a paper tower dispenser, a trash receptacle, and a towel hanger.	**4**	-	The washroom accessories have been surpassed their EUL and required to be replaced. (See Note **3A**)
A10.4b	**Washroom Accessories**	**~1985**: The washroom is provided with a mirror, a toilet paper hanger, a trash receptacle, and a towel hanger.	**4**	-	The washroom accessories have been surpassed their EUL and required to be replaced. (See Note **3A**)
A10.5a	**Appliances**	**~1976**: A residential washing machine is provided in the building.	**4**	-	The appliances are currently in acceptable condition, but will likely require replacement within the timeframe of this report. (See Note **3A**)
A10.5b	**Appliances**	**~2000**: Residential appliances include a refrigerator, a washing machine and clothes dryer, an electric range, a range hood, a microwave, and a dishwasher.	**4**	3	Costing for the replacement of the appliances has been included in Capital Reserve Table. No other concerns observed or reported.

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R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1a	**Metal Roofing**	**~2000**: Office Building section is provided with a pitched roof covered with prefinished corrugated metal panels. **~2011**: Power Plant section is provided with a pitched roof covered with prefinished corrugated metal panels.	**4**	-	The roof was snow-covered at the time of assessment and was not directly observed. No concerns were reported. Costing for the replacement of the metal roofing has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.
R01.1b	**Metal Roofing**	**~2000**: Building B is provided with a pitched roof covered with prefinished corrugated metal panels.	**4**	-	The roof was snow-covered at the time of assessment and was not directly observed. No concerns were reported. Costing for the replacement of the metal roofing has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report.
R01.2a	**Gutters and Downspouts**	**~2000**: Prefinished metal gutters and downspouts provide roof drainage directly to the ground. **~2011**: Prefinished metal gutters and downspouts provide roof drainage directly to the ground.	**4**	-	No concerns observed or reported.
R01.2b	**Gutters and Downspouts**	**~2000**: Prefinished metal gutters and downspouts provide roof drainage directly to the ground.	**4**	-	Issues were reported regarding the roof eavestrough. (See Note 3**A**) Heavy snowfalls can create issues for external gutter systems including eavestrough, which is the reported existing issue on the roof. In case of metal roofing system, most systems are not sufficiently able to stand the weight of live loads such as heavy snow, shedding ice, heavy storm, and frozen water coming from the harsh weather condition in Aishihik. Therefore, the metal gutters and downspouts are required to be maintained regularly and any remedial measures need to be followed if problems are observed.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.1a	**Mould**	None.	**-**	-	No concerns observed or reported.
A99.1b	**Mould**	None.	**-**	-	It was noted that the lower level of staff house was damaged by flood in approximately 2013 and since then the mould and required remediation was reportedly completed. At the time of the site investigation, issues related to mould were not identified.
A99.2a	**Elevators**	One ThyssenKrupp passenger elevator is located in Building A.	**4**	-	It was observed that the elevator has been isolated due to shaft repairs at the time of site assessment, Golder was unable to complete a full assessment on the condition of the elevator and its components, no issues were reported.
A99.2b	**Elevators**	N/A	**-**	-	N/A
A99.3a	**Exterior Stairs and Ramps**	**~1976:** A exterior painted metal stair is located on the east elevation of Building A.	**3**	-	Paints on the railing and stair were generally peeled off and discolored. The majority of exposed metal areas were rusted and thus will require repainting to avoid water infiltration. It was also noted that ground level metal railing is bent. Costing for the replacement of the metal stair and railing has been included in Item **A01.12a** above.
A99.3b	**Exterior Stairs and Ramps**	**~1985:** A cast-in-place (CIP) concrete stair is provided at the west entrance to Building B.	**4**	-	The concrete pads were mostly snow-covered at the time of assessment and not directly reviewed. No concerns observed or reported.
A99.4a	**Interior Stairs**	**~1976**: There are two interior stairs in Building A. A steel-framed stair completed with steel solid treads and painted steel railing is provided up to the mezzanine. A painted concrete stair completed with painted metal handrails is located between the mezzanine and the bay.	**4**	-	No concerns observed or reported.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.4b	**Interior Stairs**	**~1985**: Access between the ground and lower level of the building is provided by two wood-framed staircases finished with broadloom carpet (north stair, 14 Risers & 13 Runs) and linoleum (south stair, 14 Risers & 12 Runs).	**4**	-	Costing for the replacement of the carpet has not been included in Capital Reserve Table since this item will reach its EUL beyond the timeframe of this report. No concerns observed or reported.
A99.5a	**Crane**	**~1976**: One Hepborn industrial crane is located in the bay area of Building A.	**4**	-	The crane will reach its EUL within the timeframe of this report; however, costing for the replacement has not been included in this report since the crane is part of the bay and is process related. No concerns observed or reported.
A99.5b	**Crane**	N/A	**-**	-	N/A

NOTES:
3A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold ($3,000); as such, costing has not been included in the Capital Reserve Table.

IMMEDIATE ITEMS:
No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:
RFI.1a) Study insulation in Building A.
RFI.2b) Study insulation in Building B.



Photo #A1a: General view of the Power Plant / Office Building (Building A).



Photo #A2a: Main entrance door of the Office Building section.



Photo #A3a: Main entrance door of the Power Plant section.



Photo #A4a: Exterior metal stair of the Office Building section.

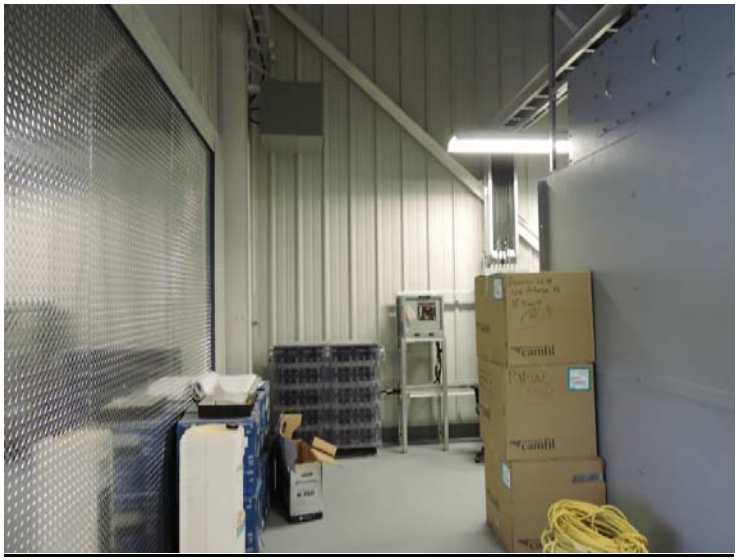


Photo #A5a: Interior finishes of the Power Plant area.



Photo #A6a: Interior finishes of the office area.

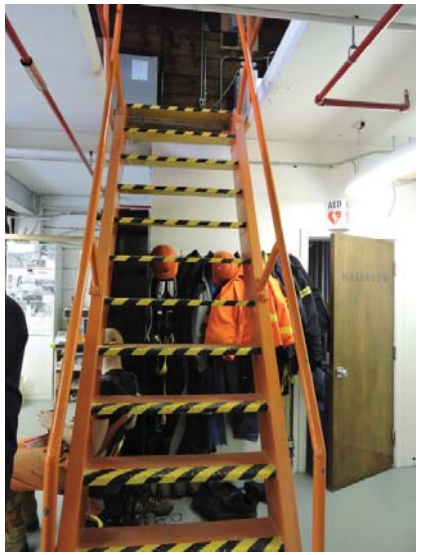


Photo #A7a: Interior stair to the Office Building mezzanine.



Photo #A8a: Interior finishes of the mezzanine.

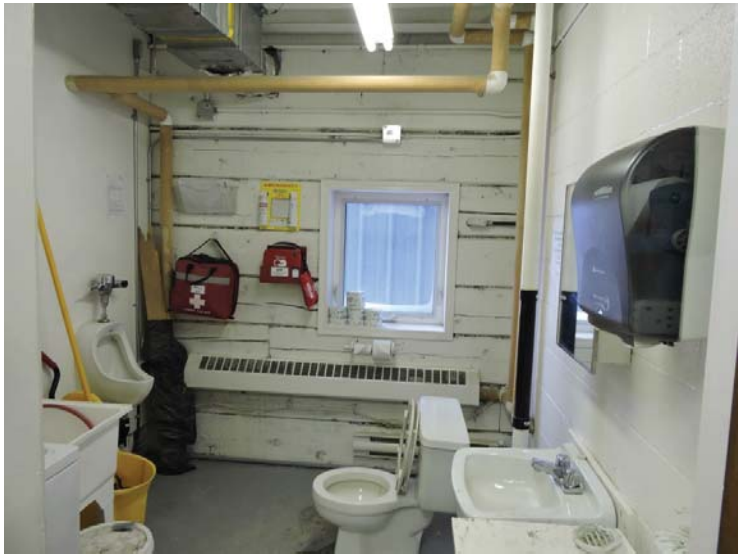


Photo #A9a: Interior finishes in the washroom.



Photo #A10a: Interior painted wood door.



Photo #A11b: General view of the Staff House (Building B).



Photo #A12b: General view of the garage.



Photo #A13b: Main entrance door of the staff house.



Photo #A14b: Overhead doors of the garage.



Photo #A15b: Typical interior finishes of the room.



Photo #A16b: Typical interior finishes of the washroom.



Photo #A17b: Damaged drywall in the lower level.

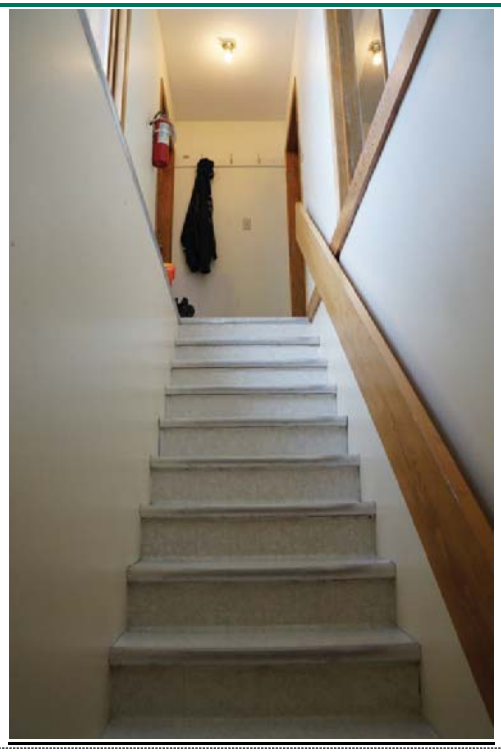


Photo #A18b: Interior stair.

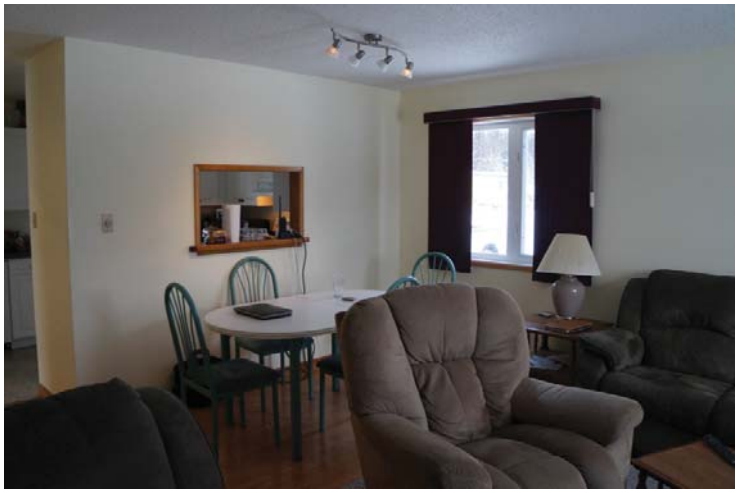


Photo #A19b: Interior finishes of the living room.



Photo #A20b: Typical kitchen cabinet.

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4.0 STRUCTURAL

Building A – Power Plant/Office Building

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings and a CIP concrete foundation walls. The building floor is a slab on grade throughout. The superstructure is composed of structural steel I-beams with tension-only cross bracing along exterior walls. Wood studs with gypsum wallboard coverings frame the interior partitions around the office space and washroom. The roof construction consists of corrugated metal decking supported by structural steel I-beams, with tension-only cross bracing for lateral resistance.

No capital expenditures with respect to the structural elements of the building were identified.

A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Building B – Staff House

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip footings and a CIP concrete foundation walls. The building basement floor and garage is a slab on grade throughout. Suspended floors are constructed of plywood sub flooring supported by dimensional lumber joists. The superstructure is composed of wood stud framing with gypsum wallboard coverings at interior and exterior walls. The roof construction consists of plywood decking supported by dimensional lumber rafters.

No capital expenditures with respect to the structural elements of the building were identified.

A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S01.1a	**Footings**	**~1976**: The substructure is mostly concealed; therefore, was not directly reviewed. Based upon standard construction methods and observations made on Site, it is estimated that the substructure consists of CIP strip and spread footings. **~2011**: The substructure is mostly concealed; therefore, was not directly reviewed. Based upon standard construction methods and observations made on Site, it is estimated that the substructure consists of CIP strip and spread footings.	**4**	-	No concerns observed or reported.
S01.1b	**Footings**	**~1985**: The substructure is mostly concealed; therefore, was not directly reviewed. Based upon standard construction methods and observations made on Site, it is estimated the substructure consists of CIP strip footings.	**4**	-	No concerns observed or reported.
S01.2a	**Foundation Walls**	**~1976**: CIP concrete foundation walls are provided around the perimeter of the building. **~2011**: CIP concrete foundation walls are provided around the perimeter of the building.	**4**	-	No concerns observed or reported.
S01.2b	**Foundation Walls**	**~1985**: CIP concrete foundation walls are provided around the perimeter of the building.	**4**	-	No concerns observed or reported.

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S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1a	**Slab on Grade**	**~1976**: A CIP slab on grade is provided throughout the building. **~2011**: A CIP slab on grade is provided throughout the building.	**4**	-	No concerns observed or reported.
S02.1b	**Slab on Grade**	**~1985**: A CIP 3" slab on grade is provided throughout the building and garage.	**4**	-	No concerns observed or reported.

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.1a	**Suspended Floor**	**~1976**: The mezzanine and second floor of Office Building section consist of concrete composite floor supported by steel I- beams and girders.	**4**	-	N/A
S03.1b	**Suspended Floor**	**~1985**: The main floor of the building is constructed of OBS sub flooring supported by dimensional lumber joists.	**4**	-	No concerns observed or reported.
S03.2a	**Stairs**	**~1976**: There are two interior stairs in Building A. The stair between the second floor office area and mezzanine is comprised of painted steel-framed with steel solid treads and painted steel handrails. The stair between the mezzanine and the bay area consists of painted concrete treads with painted metal handrails.	**4**	-	No concerns observed or reported.
S03.2b	**Stairs**	**~1985**: The interior stairs are wood-framed.	**4**	-	No concerns observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1a	**Framing**	**~1976**: The roof structure is framed with painted structural steel I-beams. **~2011**: The roof structure is framed with structural steel I-beams.	**4**	-	No concerns observed or reported. (See Note **4B**)
S04.1b	**Framing**	**~1992**: The roof structure is framed with dimensional lumber.	**4**	-	No concerns observed or reported.
S04.2a	**Decking**	**~1976**: Roof decking is provided by engineered lumber and corrugated metal panels. **~2011**: Roof decking is provided by corrugated metal panels.	**4**	-	No concerns observed or reported.
S04.2b	**Decking**	**~1992**: Roof decking is provided by plywood sheeting and corrugated metal panels.	**4**	-	No concerns observed or reported.
S04.3a	**Lateral Resistance**	**~1976**: Tension-only cross bracing is provided for lateral resistance in the roof structure. **~2011**: Tension-only cross bracing is provided for lateral resistance in the roof structure.	**4**	-	No concerns observed or reported.
S04.3b	**Lateral Resistance**	**~1985**: Lateral resistance is achieved by the roof decking.	**4**	-	No concerns observed or reported.

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S05 INTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S05.1a	**Interior Walls**	**~1976:** The interior partition of the mezzanine is comprised of painted CMUs. The partitioning around the office space and washroom consists of wood studs sheeted with painted gypsum wallboard. The transition interior walls between Power Plant and Office Building consist of unfinished wood panels.	**4**	-	No concerns observed or reported.
S05.1b	**Interior Walls**	**~1992:** Interior walls are framed with wood studs and sheeted with gypsum wallboard.	**4**	-	No concerns observed or reported.

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.1a	**Exterior Load-bearing Walls**	**~1976**: Exterior load-bearing walls consist of structural steel I-section columns with no interior wall coverings. **~2011**: Exterior load-bearing walls consist of structural steel I-section columns with no interior wall coverings	**4**	-	No concerns observed or reported.
S06.1b	**Exterior Load-bearing Walls**	**~1985**: Exterior load-bearing walls consist of wood stud framing sheeted with plywood at the exterior and gypsum board on the interior.	**4**	-	No concerns observed or reported.
S06.2a	**Lateral Resistance**	**~1976:** Tension-only cross bracing is provided for lateral resistance in the exterior walls. **~2011:** Tension-only cross bracing is provided for lateral resistance in the exterior walls.	**4**	-	N/A

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.2b	**Lateral Resistance**	**~1985:** Lateral resistance is achieved in the exterior walls by shear wall construction.	**4**	-	N/A

S99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S99.1a	**Specially Engineered Construction**	N/A	**-**	-	N/A
S99.1b	**Specially Engineered Construction**	N/A	**-**	-	N/A

NOTES:

4A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

4B) Due to the age of Building A – Office Building (~1976 construction), there is potential for lead paint to have been used on the structural steel members. No lead sampling has been conducted on the buildings discussed in this report. If modifications are to be made where lead paints may be present, it is recommended to test the suspect materials and proceed with work accordingly.

IMMEDIATE ITEMS:

No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.

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Photo #S1a: Exterior view of the foundation wall of the Power Plant section.



Photo #S2a: General view of the slab-on-grade.



Photo #S3a: Roof structure of the Power Plant section.



Photo #S4a: Cross-braced exterior wall structure.



Photo #S5a: Interior transition wall between Power Plant section and Office Building section.



Photo #S6a: Roof structure of Office Building section.

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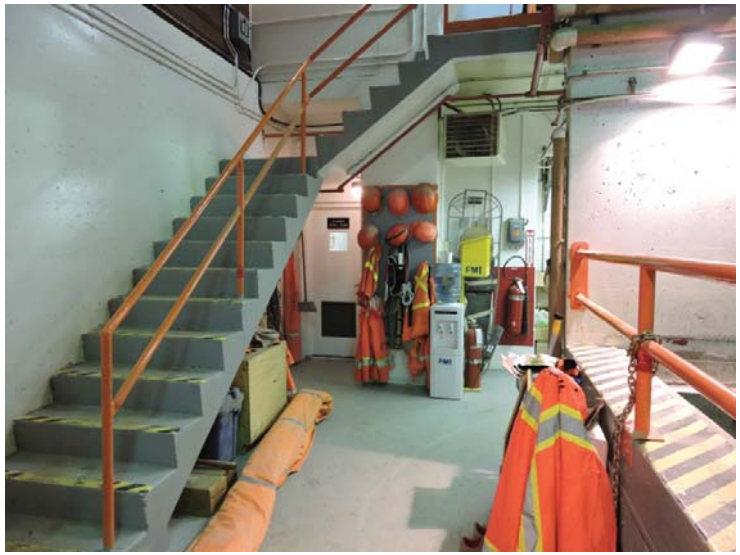


Photo #S7a: Interior stair of the Office Building section.



Photo #S8a: CMU wall in the mezzanine.



Photo #S9b: Upper floor structure of the staff house.

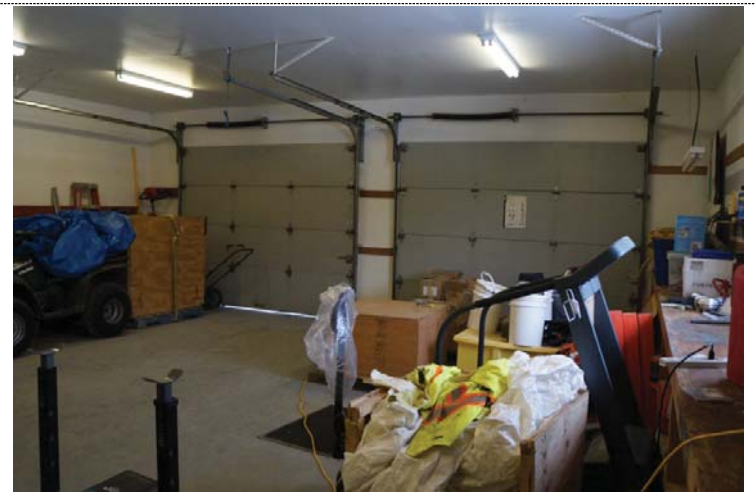


Photo #S10b: Concrete floors and gypsum board sheeted walls/ceilings in the garage.

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5.0 MECHANICAL

Building A – Power Plant/Office Building

The building is supplied with domestic water from a water well located on site and is distributed via copper piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface drainage. Hot water is provided by an electric domestic hot water heater located in Office Building section. Plumbing fixtures include a wall-mounted vitreous china lavatory and a floor-mounted, flush tank water closet in the washroom, and a plastic utility sink located adjacent to the residential washing machine.

Heating oil fuel is supplied by a steel storage tank on site. The building is primarily heated by suspended radiant hydronic unit heaters located throughout the building. Supplementary heating is provided to the washroom and office area from hydronic baseboard heaters. Building ventilation is provided by rooftop mounted vents, and building exhaust is handled by through-wall exhaust fans.

Capital expenditures with respect to the domestic water heater, washroom fixtures, and boiler are anticipated to be required within the 10-year time frame of this report.

The mechanical components are in acceptable overall condition.

Building B – Staff House

The building is supplied with domestic water from a water well located on site and is distributed via copper piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface drainage. Hot water is provided by an electric domestic hot water heater located in furnace room. Plumbing fixtures include countertop-mounted enameled iron lavatories, and floor-mounted, flush tank, vitreous china water closets in the washroom, a counter-mounted stainless steel sink in the kitchen.

Heating oil fuel is supplied by a steel storage tank located on the south side of Building B. The building is primarily heated by an oil-fired forced air furnace located in the furnace room. Air is distributed throughout the building by a galvanized metal ductwork system. Building ventilation is provided by the furnace and operable windows, and building exhaust is handled by the range hood in the kitchen and a ceiling-mounted exhaust fan in the washroom.

Capital expenditure with respect to the domestic water heater, washroom fixtures, and furnace is anticipated to be required within the 10-year time frame of this report.

The mechanical components are in acceptable overall condition.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M01.1a	**Domestic Water Supply**	The building is supplied with domestic potable water through a well located on site.	**4**	-	The site was snow-covered at the time of assessment so the location of the water well was not observed. No concerns observed or reported.
IMM1.b/ M01.1b	**Domestic Water Supply**	The building is supplied with domestic potable water through a well located on site and the water is cleaned by GE Homespring central water filtration system. The water purifier is located in the basement.	**3**	5	The site was snow-covered at the time of assessment so the location of the water well was not observed. Issues regarding the domestic water supply were reported including inadequate water pressure in the lower level water closet. A study for this issue is recommended beforehand and any remedial measure and actual cost will depend on the result of the study. Costing for study has been included in Capital Reserve Table. No others concerns observed or reported.
M01.2a	**Sanitary Sewer**	Sanitary waste is fed to an on-site septic field.	**4**	-	No concerns observed or reported.
IMM2.b/ M01.2b	**Sanitary Sewer**	Sanitary waste is fed to an on-site septic field.	**3**	5	It was reported that on-site septic system has been outdated and there was a septic tank odor in staff house. (See Note **5B**) A study to determine any remedial measure is recommended and the actual costing will depend on the result of the study. Costing for study has been included in Capital Reserve Table. No others concerns observed or reported.
M01.3a	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3b	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.4a	**Oil Supply**	Heating oil fuel is supplied by an aboveground steel storage tank located on site.	**4**	-	No concerns observed or reported.
M01.4b	**Oil Supply**	Heating oil fuel is supplied by an aboveground steel storage tank located on the south side of Building B.	**4**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.1a	**Water Distribution**	**~1976:** Copper domestic water distribution piping is provided in Building A.	**4**	-	No concerns observed or reported.
M02.1b	**Water Distribution**	**~1985:** Copper domestic water distribution piping is provided in Building B.	**4**	-	No concerns observed or reported.
M02.2a	**Backflow Prevention**	None observed.	**-**	-	N/A
M02.2b	**Backflow Prevention**	None observed.	**-**	-	N/A
M02.3a	**Domestic Hot Water Heaters**	**~1995:** One residential, electric domestic hot water heater is located in the building. Technical specifications for the unit are given below: Manufacturer: John Wood Model Number: JW12SEB Serial Number: 9505524803 Capacity: 43 L Input: double element (1,500 W each)	**4**	3	The domestic hot water heater has surpassed its EUL; however, it is still in overall acceptable condition. The replacement cost has been included within 5 years of timeframe on this report. No other concerns observed or reported.
M02.3b	**Domestic Hot Water Heaters**	**~2000:** One residential, electric domestic hot water heater is located in the furnace room. Technical specifications for the unit are given below: Manufacturer: Bradford White Corporation Model Number: M150560513 Serial Number: WA8419569 Capacity: 189.3 L Input: double element (3,000 W each)	**4**	3	The domestic hot water heater will reach its EUL and the replacement cost has been included in Capital Reserve Table. No other concerns observed or reported.
M02.4a	**Waste Water Piping**	**~1976**: ABS plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4b	**Waste Water Piping**	**~1985**: ABS plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.5a	**Washroom Fixtures**	**~1976**: The washroom is provided with a wall-mounted vitreous china lavatory, a floor-mounted and flush tank water closet, and a vitreous china urinal.	**3**	3	The washroom fixtures have surpassed theirs EUL; however, these are still in overall acceptable condition. The replacement cost has been included within 4 years of timeframe on this report. It was observed that water closets were damaged by water stain and should be cleaned with detergents regularly. No other concerns observed or reported.
M02.5b	**Washroom Fixtures**	**~1985**: The washroom is provided with countertop-mounted enameled iron lavatories and floor-mounted, flush tank, vitreous china water closets.	**4**	3	The washroom fixtures will reach their EUL and the replacement cost has been included in Capital Reserve Table. Low water pressure of the water closet in the basement washroom was noted and this has been described in detail in Item **M01.1b** above. It was observed that water closets were damaged by water stains and should be cleaned with detergents regularly. No other concerns observed or reported.
M02.6a	**Sinks**	**~1976**: A plastic utility sink is located adjacent to the washing machine.	**4**	-	No concerns observed or reported. (See Note **5A**)
M02.6b	**Sinks**	**~2000**: The kitchen is provided with a counter-mounted, stainless steel sink.	**4**	-	The sink will reach its EUL beyond the timeframe of this report. No concerns observed or reported.

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.1a	**Boilers**	**~1976**: Two unknown capacity oil-fired boilers manufactured by Underwriters' Laboratories of Canada, model V-79, are located in the boiler room of Building A.	**3**	3	The boilers have surpassed theirs EUL and inadequate heating in Building A was reported during site interview. Thus, the boiler should be replaced immediately. The replacement cost has been included in Capital Reserve Table. No concerns observed or reported.
M03.1b	**Boilers**	N/A	**-**	-	N/A

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.2a	**Unit Heaters**	**~2011**: One unlabelled suspended electrical unit heater manufactured by Ruffneck is provided in Power Plant section. **~2007**: There are two hydronic unit heaters in the Office Building section. One unlabelled suspended unit heater is in diesel room. Another suspended unit heater is provided near stairwell and technical specifications for the unit are provided below: Manufacturer: Ouellet Model Number: Unknown Serial Number: OAS15036 Capacity: Unknown	**4**	-	The unit heaters are in overall acceptable condition and the replacement cost has not been included in Capital Reserve Table since the unit heaters will reach their EUL beyond the timeframe of this report. No other concerns observed or reported.
M03.2b	**Unit Heaters**	N/A	**-**	-	N/A
M03.3a	**Burners**	**~1976**: A Riello burner is connected to the oil-fired furnace.	**4**	-	The boilers have surpassed theirs EUL and the replacement cost has been combined into Item **M03.1a** above. No concerns observed or reported.
M03.3b	**Burners**	**~2008**: An Underwriters' Laboratories of Canada burner is connected to the oil-fired furnace.	**4**	-	It is recommended that the burner is replaced concurrently with furnace described in Item **M03.6b** below. No concerns observed or reported.
M03.4a	**Heat Exchanger**	N/A	**-**	-	N/A
M03.4b	**Heat Exchanger**	N/A	**-**	-	N/A
M03.5a	**Baseboard Heaters**	**~1976**: Hydronic baseboard heaters are provided in the washroom and office area.	**4**	-	The unit heaters are currently in acceptable condition, but will reach their EUL within the timeframe of this report. Costing for the replacement will be below threshold of this report.
M03.5b	**Baseboard Heaters**	N/A	**-**	-	N/A
M03.6a	**Furnace**	N/A	**-**	-	N/A

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.6b	**Furnace**	**~2008**: An oil-fired forced air furnace is located in the furnace room. Technical specifications for the unit are given below: Manufacturer: Kerr Energy Systems Model Number: COMPACT-MULTI K4C-090 31 Serial Number: 1006382	**3**	4	It was noted that the basement is too cold in the winter. A study for adequate heating in the basement is required to be conducted and the actual cost for upgrading heating equipment or insulation on exterior walls will depend on the result of the study. Cost for the study has been included in Capital Reserve Table. No concerns observed or reported.
M03.7a	**Fireplace**	N/A	**-**	-	N/A
M03.7b	**Fireplace**	**~1985**: A fireplace is present in the living room.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1a	**Air Distribution**	**~1976/2011**: The forced air heating is distributed throughout the building by a galvanized metal ductwork system.	**4**	-	No concerns observed or reported.
M04.1b	**Air Distribution**	**~1985**: The forced air heating is distributed throughout the building by a galvanized metal ductwork system.	**4**	-	No concerns observed or reported.
M.02.2a	**Ventilation**	**~1976/2011**: General building ventilation is provided by rooftop mounted vents, louvers, and operable windows.	**4**	-	No concerns observed or reported.
M.02.2b	**Ventilation**	**~1985**: General building ventilation is provided by the furnace, rooftop mounted louvers, and operable windows.	**4**	-	No concerns observed or reported.
M04.3a	**Air Outlets & Inlets**	**~1976/2011**: Metal grilles with covers are provided at the exhaust vents along the west and east elevations of the building.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.3b	**Air Outlets & Inlets**	**~1985**: Prefinished metal grilles are provided throughout the building for the forced air heating system.	**4**	-	No concerns observed or reported.
M04.4a	**Exhaust Fans**	**~1976**: Wall or ceiling-mounted exhaust fans are provided throughout the Office Building area. **~2011**: Wall-mounted fans are provided on the east elevation of Power Plant section to provide fresh air to the building.	**4**	-	The exhaust fans have surpassed their EUL; however, the replacement of the exhaust fans Will be completed below the threshold of this report. No other concerns observed or reported.
M04.4b	**Exhaust Fans**	**~1985**: General building exhaust is handled by the range hood located in the kitchen and a ceiling-mounted exhaust fan in the washroom.	**4**	-	The exhaust fans have surpassed their EUL; however, the replacement of the exhaust fans Will be completed below the threshold of this report. No other concerns observed or reported.

M05 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M05.1a	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building A.	**4**	-	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
M05.1b	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building B.	**4**	-	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.

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M06 CONTROLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M06.1a	**Electric and Electronic Controls**	**~1976/2011**: Manual thermostats were observed in the building.	**4**	-	No concerns observed or reported.
M06.1b	**Electric and Electronic Controls**	**~1985**: Manual thermostats were observed in the building.	**4**	-	No concerns observed or reported.

M99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M99.1a	**Humidifiers**	N/A	**-**	-	N/A
M99.1b	**Humidifiers**	N/A	**-**	-	N/A

NOTES:

5A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

5B) It was reported that on-site septic system has been outdated and there was a septic tank odor in staff house. The obnoxious odor also can be caused by leaks or other defects in the building drains or sewer line and the leaks make sewage smells or sewer gas smells or "gas odors" in Building B with a private on-site septic tank. Furthermore, considering the weather condition in Aishihik, it is recommended to check a plumbing vent regularly not being blocked by frost or by snow-cover.

IMMEDIATE ITEMS:

IMM1.b) Study domestic water supply in Building B.

IMM2.b) Study septic system in Building B.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.



Photo #M1a: Domestic hot water heater.



Photo #M2a: Baseboard heater.

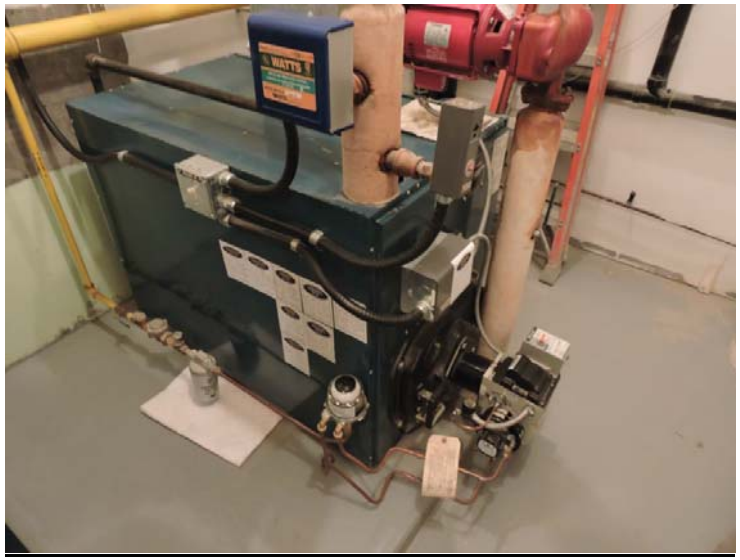


Photo #M3a: Oil-fired boiler.



Photo #M4a: Typical washroom fixtures.



Photo #M5a: Suspended hydronic unit heater in the diesel room.



Photo #M6a: Suspended exhaust fan in the Office Building section.



Photo #M7b: Water filtering system in the staff house.



Photo #M8b: Domestic hot water heater.



Photo #M9b: Furnace in the furnace room.



Photo #M10b: Fireplace in the living room.



Photo #M11b: Typical washroom fixtures.



Photo #M12b: Oil tank in the staff house.



6.0 ELECTRICAL

Building A – Power Plant/Office Building

Electrical service is provided via buried cables from the on-site substation located adjacent to the building. Copper wiring is reported to be present throughout the building. Primary electrical distribution to the building is provided by an electrical switchboard and motor control centre. Secondary distribution is provided by electrical sub panels rated at 120/240 V, 100 A, 1 Phase, 3 Wire and 240 V, 225 A, 3 Phase, 4 Wire in Office Building section; 347/600 V, 250 A, 3 Phase, 4 Wire and 240/480 V, 225 A, 3 Phase, 4 Wire in Power Plant section. Interior lighting is provided by a combination of T-12 tubular fluorescent lamps and HID bay lamps all controlled by line voltage switches. Exterior lighting is provided by wall-mounted HID fixtures controlled by photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include bells, pull stations, CO2 detectors, and smoke/heat detectors.

Capital expenditures with respect to the interior transformers, interior lighting, exit sing and fire alarm panel are anticipated within the 10-year time frame of this report.

The electrical components are in acceptable overall condition.

Building B – Staff House

Electrical service is provided via buried cables from the on-site substation located adjacent to the building. Copper wiring is reported to be present throughout the building. Electrical distribution in staff house is provided by a sub panel rated at 240 V, 200 A, 1 Phase, 4 Wire and garage is provided with a sub-panel rated at 240 V, 100 A, 1 Phase, 3 Wire. Interior lighting is provided by a combination of incandescent fixtures and T12 tubular fluorescent lamps, all controlled by line voltage switches. Exterior lighting is provided by a combination of wall-mounted HID light fixtures, soffit-recessed/mounted incandescent lights around the staff house. Wall-mounted HID light fixtures are provided around the garage. The exterior lightings are controlled by line voltage switches and photocells. Emergency lighting is provided by battery packs with integral heads. Smoke detectors are provided in the building.

Capital expenditures with respect to the secondary distribution panels are anticipated within the 10-year time frame of this report.

The electrical components are in acceptable overall condition.

E01 INCOMING SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E01.1a	**Exterior Transformer**	A substation is located on the north side of Building A which is responsible for transforming the electrical voltage from high to low. Three pole-mounted transformers are also provided on the northeast corner of Building A.	**4**	-	The substation and related equipment were not directly reviewed. No concerns reported or observed.
E01.1b	**Exterior Transformer**	A substation is located on the north side of Building A which is responsible for transforming the electrical voltage from high to low. Three pole-mounted transformers are also provided on the northeast corner of Building A.	**4**	-	The substation and related equipment were not directly reviewed. No concerns reported or observed.
E01.2a	**Cables**	Power is estimated to be fed to the building through buried cables at the south elevation.	**4**	-	Concealed and not directly reviewed. No concerns reported or observed.
E01.2b	**Cables**	Power is estimated to be fed to the building through buried cables at the north elevation.	**4**	-	Concealed and not directly reviewed. No concerns reported or observed.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.1a	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~2011**: There are eight 15 KV automatic transfer switchgears rated at 1200 A or 2000 A and connected to a remote control panel in Power Plant section. **~1976**: The building is provided with electrical switchboards and a central motor control centres.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.1b	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1985**: One Square D sub panel was observed in staff house and the panel is rated at 240 V, 200 A, 1 Phase, 4 Wire. The panel currently occupies 35 of the 42 circuits. Furthermore,	**3**	3	The electrical sub panel has surpassed its EUL and should be replaced. In addition, the panels are at or near full capacity. It was noted that breaker was disconnected at maximum capacity and thus it is recommended to replace the main panels with larger unit to accommodate additional circuits if needed. The replacement cost has been included within 1 year timeframe of this report. No other concerns observed or reported.
E02.2a	**Interior Transformers**	**~1976**: There are three dry-type transformers stepping down from 600 V to 120/208 V in Office Building section: Hammond Manufacturing transformer (37.5 kVA), Marr Electric Ltd. Transformer (30 kVA), and Canadian General Electric (30 kVA). **~2011**: One REX Power Magnetics dry-type 45 kVA transformer stepping down from 600 V to 120/208 V is located in Power Plant section.	**4**	3	The transformers installed in ~1976 have surpassed their EUL and the replacement cost has been included within 1 year timeframe of this report. No other concerns observed or reported.
E02.2b	**Interior Transformers**	N/A	**-**	-	N/A
E02.3a	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1976**: There are three sub-panels and two I-Line circuit breaker power distribution panels in the boiler room, electrical room, and diesel room in Office Building section. The two Square D sub-panels are rated at 120/240 V, 100 A, 1 Phase, 3 Wire and one Federal Pioneer is 240 V, 225 A, 3 Phase, 4 Wire. The two Square D I-Line circuit breaker power distribution panels are rated at 250/600 V, 225 A. **~2011**: There are two Square D sub-panels in Power Plant section. One is rated at 347/600 V, 250 A, 3 Phase, 4 Wire and another is 240/480 V, 225 A, 3 Phase, 4 Wire. One GE sub-panel rated at 250 V, 125 A is also provided.	**3/4**	3	The electrical sub panels installed in ~1976 have surpassed their EUL and the replacement cost has been included within 1 year timeframe of this report. In addition, the panels are at or near full capacity. It is recommended to replace the sub panels with larger units to accommodate additional circuits if needed. No other concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.3b	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1985**: One Square D sub panel was observed in the garage and the panel is rated at 240 V, 100 A, 1 Phase, 3 Wire. The panel currently occupies 11 of the 12 circuits.	**3**	-	The electrical sub panel has surpassed its EUL and should be replaced. The replacement cost has been combined into Item **E02.1b** above.
E02.4a	**Branch Wiring**	**~1976/2011**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.4b	**Branch Wiring**	**~1985**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.5a	**Receptacles**	**~1976/2011**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.
E02.5b	**Receptacles**	**~1985**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.
E02.6a	**Surge Protection**	**~1976/2011**: Surge protections are provided on uninterruptible power supply (UPS) and power bars.	**4**	-	No concerns observed or reported.
E02.6b	**Surge Protection**	None observed.	**-**	-	N/A

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1a	**Interior Lighting**	**~1976**: Ceiling-mounted/suspended and wall-mounted tubular fluorescent lamps with T-12 bulbs are provided throughout the Office Building section. A suspended incandescent light fixture is also provided near the diesel room. **~2011**: Ceiling and wall-mounted tubular fluorescent lamps with T-12 bulbs are provided throughout the Power Plant section.	**4**	3	The interior lighting installed in ~1976 is currently in acceptable condition, but will require replacement within the timeframe of this report. The replacement cost has been included within 1 year timeframe of this report. No other concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1b	**Interior Lighting**	**~1985**: Interior lighting in staff house is provided by a combination of incandescent fixtures and T-12 tubular fluorescent lamps. There are ceiling-mounted/suspended T-12 tubular fluorescent lamps in the garage.	**4**	3	The interior lighting is currently in acceptable condition, but will require replacement within the timeframe of this report. The replacement cost has been included within 1 year timeframe of this report. No other concerns observed or reported.
E03.2a	**Lighting Controls**	**~1976/2011**: Interior lighting is controlled by line voltage switches. Exterior lighting is reportedly controlled by photocells	**4**	-	No concerns observed or reported. (See Note **6A**)
E03.2b	**Lighting Controls**	**~1985**: Interior lighting is controlled by line voltage switches. Exterior lighting is reportedly controlled by a combination of photocells and switches.	**4**	-	No concerns observed or reported. (See Note **6A**)
E03.3a	**Emergency Lighting**	**~2007/2011:** Emergency lightings are provided with battery packs or tied to generator and completed with integral lighting heads.	**4**	-	The emergency lighting is currently in acceptable condition and it will reach its EUL beyond the timeframe of this report. The emergency lighting is tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
E03.3b	**Emergency Lighting**	**~1985:** Battery packs with integral lighting heads are provided throughout the building.	**4**	-	The emergency lighting is currently in acceptable condition, but will likely require replacement within the timeframe of this report. (See Note **6A**) The emergency lighting is tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
IMM.3a/ E03.4a	**Exit Lighting**	**~1976**: No illuminated exit sign is provided in Office Building section. **~2011**: A LED exit sign is provided at west emergency exits in Power Plant section.	**2/4**	1	The illuminated exit sign should be installed in Office Building section immediately in accordance with Fire Code. Costing for this item has been included in Capital Reserve Table.
E03.4b	**Exit Lighting**	N/A	**-**	-	N/A

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.5a	**Exterior Lighting**	**~2011**: Wall-mounted HID and LED light fixtures are provided around the building exterior.	**4**	-	No concerns observed or reported.
E03.5b	**Exterior Lighting**	**~2011**: There is a combination of wall-mounted HID light fixtures, soffit-recessed/mounted incandescent lights around the staff house. Wall-mounted HID light fixtures are provided around the garage.	**4**	-	No concerns observed or reported.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1a	**Grounding**	**~1976/2011**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.
E04.1b	**Grounding**	**~1985**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E05.1a	**Fire Alarm Panel**	**~2000**: A remote annunciator manufactured by ComAp is located in Building A.	**4**	3	The fire alarm panel is reportedly original to the building and will surpass its EUL within the timeframe of this report. The replacement cost has been included in Capital Reserve Table. The fire alarm panel is tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
E05.1b	**Fire Alarm Panel**	N/A	**-**	-	N/A
E05.2a	**Devices**	**~2000**: Fire alarm and detection devices include bells, pull stations, CO2 detectors, and smoke/heat detectors.	**4**	3	The fire alarm and detection devices have surpassed their EUL and should be replaced. The replacement cost of the fire alarm devices has been included in Capital Reserve Table.
E05.2b	**Devices**	**~2000**: Smoke detectors are provided in Building B.	**4**	-	The detection devices will surpasses their EUL within the timeframe of this report and should be replaced. Costing for the replacement of this item has not been included in Capital Reserve Table since the cost will be below threshold.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.1a	**Telephone**	**~1976**: Telephone services are provided by Northern Telcom.	**4**	-	No concerns observed or reported.
E06.1b	**Telephone**	**~1985**: Telephone services are provided in the building, likely by Northern Telcom.	**4**	-	No concerns observed or reported.
E06.2a	**LAN Systems**	**~2005**: Wireless internet services are provided in the building.	**4**	-	No concerns observed or reported.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.2b	**LAN Systems**	**~2005**: Wireless internet services are provided in the building.	**4**	-	No concerns observed or reported.

E99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E99.1a	**Emergency Generator**	**~2000**: One Generac emergency generator is provided with a ~ 5,000 L diesel tank in Building A.	**4**	-	No concerns observed or reported.
E99.1b	**Emergency Generator**	N/A	**-**	-	N/A

NOTES:
6A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

IMMEDIATE ITEMS:
IMM.6a) Install new exit lightings in Office Building section.

RECOMMENDED FURTHER INVESTIGATION:
No further investigation recommended at this time.

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Photo #E1a: View of the substation located on the site of Building A and Building B.



Photo #E2a: Pole-mounted transformers.



Photo #E3a: Suspended tubular fluorescent lamps.



Photo #E4a: Incandescent lights near the diesel room.



Photo #E5a: HID exterior light.



Photo #E6a: LED exit sign, pull station, emergency light/battery pack in the Power Plant section.

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Photo #E7a: Automatic transfer switchgears.



Photo #E8a: Electrical sub-panel.



Photo #E9a: Dry-type transformer.



Photo #E10a: Emergency generator.



Photo #E9b: Electrical sub-panel.



Photo #E10b: Ceiling-mounted tubular fluorescent lamps.



Photo #E11b: Exterior HID light.



Photo #E12b: Exterior soffit-recessed incandescent light.



Photo #E13b: Interior ceiling-mounted tubular fluorescent lamps in the garage.



Photo #E14b: Electrical sub-panel in the garage.



7.0 HAZARDOUS MATERIAL REPORTS

No previous hazardous materials reports were made available by the YEC. Based on the year of the construction of the Office Building section (Building A) and Staff House (Building B) outlined in this report (~1976 and ~1985), hazardous building construction materials such as ACMs (asbestos containing materials), and/or PCBs (polychlorinated biphenyls) are possible to be present in the building, while Power Plant section (Building A) constructed in approximately 2011 is not suspected to be present of any of them. Site representative reported that other hazardous materials are present within Building A such as various chemicals and some flammable material, and stored or treated properly. No other hazardous materials were observed to be present or within the Aishihik facilities.

8.0 CLOSURE

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

GOLDER ASSOCIATES LTD.



Dave Ayriss, B.Sc., CIH, CRSP
on behalf of
Lawrence P. McSorley, M.Arch., M.C.P., RA
Senior Building Condition Specialist

LPM/rp

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APPENDIX A

Mandate & Report Resources



FLA: POWER PLANT/OFFICE BUILDING AND STAFF HOUSE, AISHIHIK YT

MANDATE AND REPORT RESOURCES

Authorization

Written Notice of Award of Building Assessment Reports for Yukon Energy Corporation (YEC) was provided on November 1st, 2015. A Facility Lifecycle Report (FLA) of the Site identified in the Introduction section of the report was subsequently conducted. The Site is currently owned and managed by Yukon Energy Corporation (YEC).

Purpose

The primary objective of the FLA was to visually examine and evaluate the present condition of the property elements, buildings and related structures. The FLA process is being undertaken to assist YEC in capital planning and evaluating the potential financial liabilities associated with the condition of the site elements, building and related structures on the sites. Golder understands that YEC will rely on this report for capital planning.

Scope

The FLA was conducted in general accordance with the American Society for Testing and Materials (ASTM) "Standard Guide for Property Condition Assessments: Baseline Property Condition Process E 2018-08", as locally applicable. The Golder Assessors (identified on the first page of the report) conducted the sites reconnaissance on the date shown. The Site reconnaissance was limited to a walk around the sites, a walk-through of the buildings and interview with personnel listed in the Introduction section of the report (referred to as the "Point of Contact" in this report). Copies of selected photographs documenting conditions at the time of the visit are provided throughout the report.

The purpose of the report is to communicate identified physical deficiencies, future capital projects, and the associated opinions of estimated costs where the cost is greater than the Capital Threshold and expected to occur within the time frame used for the report. In accordance with this agreed mandate, assumptions were required to delineate between capital items and routine maintenance. Please refer to the "Operating and Maintenance Item" list below. Also please refer to the attached "Discussions of Overall Concepts and Terminology" for additional explanation of assumptions used.

The review of the structural elements was limited to a visual review of the accessible, exposed portions of the buildings and related structures during our visit to the building. The roofs, walls, floors and ceilings were visually reviewed to collect information in this regard.

The review of the mechanical, electrical and fire safety systems was performed by non-specialists in conjunction with discussions with the Point of Contact. A detailed assessment by a mechanical or electrical professional consultant should be conducted if further information regarding the condition, durability and/or expected future capital expenditures related to these systems is required.

Compliance with national and provincial building codes and/or fire codes is not part of the scope of this assessment.



FLA: POWER PLANT/OFFICE BUILDING AND STAFF HOUSE, AISHIHIK YT

The estimated costs outlined in this report are based on the conditions encountered and observations made during the reconnaissance. Estimates of quantities and areas are based on information supplied, field observations and/or interviews. Item repair/replacement costs are approximate only. Restoration costs are sensitive to local and overall economic factors and therefore, specific quotations from qualified contractors should be obtained when a specific deficiency is addressed or a capital project is to be implemented.

Operating and Maintenance Items

Golder assumes the following items will be maintained under normal operating budgets and are therefore not included in the Capital Reserve Table.

SITE

- Buried services
- Landscaping

STRUCTURE

- Foundations and footings

ROOF

- Periodic maintenance

WALLS AND WINDOWS

- Local periodic repairs and needle glazing
- Weather-stripping

INTERIORS

- Various common furnishings, specialty equipment
- Small residential appliances

MECHANICAL

- Motors, ductwork and in-duct equipment
- Oil supply systems
- HVAC distribution piping
- Air inlets and outlets

ELECTRICAL

- Disconnects and breakers
- Buried conductors



FLA: POWER PLANT/OFFICE BUILDING AND STAFF HOUSE, AISHIHIK YT

Discussions of Overall Concepts and Terminology

Evaluation Period

The period of evaluation used for this report is 10 years. Capital repairs and replacement that are reasonably expected to be required within this evaluation period and that cost in excess of the Capital Threshold are included in the Capital Reserve Table.

Capital Threshold

The Capital Threshold used for this report is $3,000. This threshold is used to determine whether a capital repair item is to be included in the Capital Reserve Table. Capital repairs identified and estimated to cost less than the threshold, or that will likely to be performed in phases, as a part of routine maintenance as required, at a cost less than the threshold are not included in the Capital Reserve Table.

Costs

Costs presented in this study for future capital repairs and replacement projects are our Opinions of Probable Budgets and are intended to include taxes, permit fees, contingency and where appropriate, Engineering fees for design, specifications, tendering, project management and construction monitoring. We have generally assumed replacement will occur on a like-for-like basis except where obsolescence or technological advancements logically dictates an upgrade. More accurate costing in the future will require a condition assessment, choice and development of an appropriate repair option, designing and tendering the work to qualified contactors.

Immediate Items

Immediate repairs include deficiencies that require action in the next 60 to 90 days as a result of (i) existing or potentially unsafe conditions, (ii) negative conditions significantly impacting marketability or habitability, (iii) material building code violations, (iv) poor or deteriorated condition of a critical element or system, or (v) a condition that if left “as is” with extensive delay in addressing same, would result in or contribute to critical element or system failure within 12 months or a significant escalation in the repair cost.

Capital Reserve Analysis

The Capital Reserve Table includes a section that provides the average annual capital costs per square foot. Replacement Reserves include (i) deficiencies that may not warrant immediate attention, but require repair or replacement that should be undertaken on a priority basis over routine preventive maintenance work and (ii) components or systems that have realized or exceeded their Expected Useful Life (EUL) during the evaluation period (realization of EUL alone does not constitute an immediate repair). Replacement reserve costs are included in Appendix D.



FLA: POWER PLANT/OFFICE BUILDING AND STAFF HOUSE, AISHIHIK YT

Opinions of probable costs are provided for material physical deficiencies and not for repairs or improvements that could be classified as:

- cosmetic or decorative;
- part or parcel of a building renovation program or tenant improvement/finishes;
- enhancements to reposition the asset in the marketplace;
- for warranty transfer purposes;
- routine or normal preventative maintenance;
- less than the capital threshold for this report; and
- are expected to occur beyond the time frame of this report.

Cost Inflation Rate

We have presented the costs in current year (2016) values. We have used 3% in the capital reserve table attached. Further sensitivity analysis using other inflation assumptions should be tested when projecting future cash-flows.

Life Expectancies

Our estimates of the life expectancy of common element components, systems and sub-systems are based on our opinion of the observed condition during our Site visit, experience with similar material at other buildings, published industry standards, articles and recommendations made by material suppliers and manufacturers. For some materials or systems, the history of use is not sufficient to predict life expectancy accurately. Monitoring and adjustments to the assumptions are required.

The year in which the capital work is required is estimated on the basis of the current observed conditions, or the construction methods and materials used. This may be shorter or longer than the remaining time in the standard estimated life cycle based on the current age of the item. Our estimates of life cycles reflect our understanding of the standards that the prudent long-term owners would maintain. Deferring and phasing of work is often possible keeping in mind that doing so could reduce building standards, increase disruption to residents, increase costs and risks.

APPENDIX B

Limitations and Use of the Report



LIMITATIONS

This report is intended to provide an assessment of the property conditions at the subject property, at the time of the site visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, Golder may be contacted to extend reliance to such parties. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, which result from reporting the factual information contained herein.

The conclusions as presented represent the judgement of Golder based on the visual observations of the accessible, exposed building elements, supplemented by information and data obtained by Golder and discussions with the Point of Contact and other representatives of the owner identified. Except as otherwise may be requested, Golder disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the FLA. No physical testing or intrusive investigations were conducted, and no samples of building materials were collected to substantiate the observations made.

In evaluating the Site, Golder has relied in good faith on information provided by other individuals noted in this report. Golder in certain instances has been required to assume that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Point of Contact. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, thus any parties making use of this report should review these issues with appropriate legal counsel.

Should additional information become available with respect to the building elements or systems, Golder requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

APPENDIX C

Capital Reserve Table

Appendix D - Capital Reserve Table (Site A)

Project Information

			Office Bldg.	Power Plant		
					Threshold	$3,000
Total Gross Sq. m.	427	Year Built	1976	2011	Reserve Term (years)	10
Number of Buildings	3	Age	40	5	Assumed Inflation	3%

Identified Costs

Report Section	Building Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year											RESERVE TOTAL
									Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)					
										2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
3	**ARCHITECTURAL**																			
A01	**Site Improvements**																			$
A01.02a	Parking Lots & Drive Aisles	-	-	-	-	Allowance		LCR						$3,000						$3,000
A01.06a	Fencing	1976	40	40	0	~100 m	$195/m	LCR						$195,300						$195,300
A01.12a	Exterior Staris & Railings	-	-	-	-	Allowance		Replace/Safety		$3,000										$3,000
																				$
A02	**Exterior Walls**																			$
A02.1a	Metal Cladding (Office Building)	1976	40	40	0	~700 m²	$88/m²	LCR						$62,000						$62,000
A02.6a	Study Insulation	-	-	-	-	Allowance		Study		$3,000										$3,000
	Replace Insulation	1976	75	31	39	Allowance		Replacemet			$8,000									
																				$
A03	**Exterior Windows**																			$
	No Capital Items Identified																			$
																				$
A04	**Exterior Doors**																			$
A04.3a	Overhead Doors	1976	30	40	0	1	$3,500/unit	LCR		$3,500								$3,600		$7,100
																				$
A05	**Fascia and Soffits**																			$
	No Capital Items Identified																			$
																				$
A06	**Interior Walls and Partitions**																			$
	No Capital Items Identified																			$
																				$
A07	**Interior Doors**																			$
A07.1a	Interior Doors (Office Building)	1976	30	40	0	~6	$900/unit	LCR						$5,400						$5,400
																				$
A08	**Ceilings**																			$
A08.4b	Acoustic Ceiling Tile	1985	25	31	0	180 m²	$50/m²	LCR		$9,000										$9,000
																				$
A09	**Flooring**																			$
	No Capital Items Identified																			$
																				$
A10	**Fixtures**																			$
	No Capital Items Identified																			$
																				$
R01	**Roofing**																			$
	No Capital Items Identified																			$
																				$
A99	**Other (Stairs Conveyance Devices)**																			$
A99.3a	Exterior Stair	1976	30	40	0	180 m²	$50/m²	LCR		$9,000										$9,000
																				$
4	**STRUCTURAL**																			$
S01	**Foundations**																			$
	No Capital items identified																			$
																				$
S02	**Floors on Grade**																			$
	No Capital items identified																			$
																				$
S03	**Suspended Floors and Stairs**																			$
	No Capital items identified																			$
																				$
S04	**Roof Structures**																			$
	No Capital items identified																			$
																				$
																				$

Identified Costs

Report Section	Building Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year										RESERVE TOTAL
									Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)				
										2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
S05	**Interior Walls and Columns**																			
	No Capital items identified																			
S06	**Exterior Walls and Columns**																			
	No Capital items identified																			
S99	**Other**																			
	No Capital items identified																			
5	**MECHANICAL**																			
M01	**Site Services**																			
	No Capital Items Identified																			
M02	**Plumbing**																			
M02.3a	Domestic Hot Water Haters	1995	20	21	0	1	$900/unit	LCR		$3,000										**$3,000**
M02.5a	Washroom Fixtures	1976	35	40	0	3	$1,100/unit	LCR					$3,300							**$3,300**
M03	**Heating**																			
M03.1a	Study Heating System	-	-	-	-	Allowance		Study		$3,000										**$3,000**
	Replace Boilers	1976	35	40	0	2	$2,500/ea.	Replacement			$5,000									**$5,000**
M04	**Ventilation**																			
	No Capital Items Identified																			
M05	**Fire Protection**																			
	No Capital Items Identified																			
M06	**Controls**																			
	No Capital Items identified																			
M99	**Other**																			
	No Capital Items identified																			
4	**ELECTRICAL**																			
E01	**Incoming Services**																			
	No Capital Items identified																			
E02	**Distribution Equipment**																			
E02.2a	Interior Transformer	1976	30	40	0	3	$3,100/ea.	LCR		$9,300										**$9,300**
E02.3a	Secondary Distribution	1976	30	40	0	3	$3,000/ea.	LCR/Improv.		$3,000										**$3,000**
E03	**Lighting and Power**																			
E03.1a	Interior Lighting	1976	20	40	0	205 m² GFA	$65/m² GFA	LCR		$13,300										**$13,300**
IMM.3a/E03.4a	Install Exit Signs	-	-	-	-	Allowance		Safety	$1,600											
E04	**Grounding**																			
	No Capital Items Identified																			
E05	**Fire Alarm**																			
E05.1a	Fire Alarm Panel	2000	25	16	9	1	$3,000/unit	LCR										$3,000		**$3,000**
E05.1a	Fire Alarm Devices	2000	25	16	9	7	$1,100/unit	LCR										$7,700		**$7,700**
E06	**Communications and Security**																			
	No Capital Items Identified																			

Capital Reserve Analysis

	Inflated	*Uninflated*
Average Cost / Year	$16,202	$14,216
Average Cost / Year / Sq. Ft.	$37.94	$33.29

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Reserve Totals
$CAD	$1,600	$59,100	$13,000	$	$3,300	$265,700	$	$	$	$14,300	$	$355,400
$CAD	$1,600	$60,873	$13,792	$	$3,714	$308,019	$	$	$	$18,658	$	$405,056

Notes
LCR = Lifecycle Replacement
FR = Failure Replacement

Completed by: **JH**
Reviewed by: **LPM**

Appendix D - Capital Reserve Table (Site B)

Project Information

				Threshold	$3,000
Total Gross Sq. m.	427	Year Built	1985	Reserve Term (years)	10
Number of Buildings	3	Age	31	Assumed Inflation	3%

Identified Costs

Report Section	Building Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year											RESERVE TOTAL
									Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)					
										2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
3	**ARCHITECTURAL**																			
A01	**Site Improvements**																			$
A01.02b	Parking Lots & Drive Aisles	-	-	-	-	Allowance		LCR						$3,000						$3,000
A01.06b	Fencing	1985	40	31	9	~20 m	$195/m	LCR										$3,900		$3,900
																				$
A02	**Exterior Walls**																			$
A02.2b	Wood Cladding	1985	40	31	9	~480 m²	$138/m²	LCR										$66,200		$66,200
A02.3b	Exterior Paint	1985	15	31	0	~200 m²	$23/m²	LCR		$4,600								$66,200		$70,800
A02.6b	Study Insulation	-	-	-	-	Allowance		Study		$3,000										$3,000
	Replace Insulation	1985	75	40	35	Allowance		Replacemet			$8,000									
																				$
A03	**Exterior Windows**																			$
	No Capital Items Identified																			$
																				$
A04	**Exterior Doors**																			$
A04.2b	Main Entrance Door/Utility Door	1985	40	31	9	2	$1,800/unit	LCR										$3,600		$3,600
																				$
A05	**Fascia and Soffits**																			$
	No Capital Items Identified																			$
																				$
A06	**Interior Walls and Partitions**																			$
	No Capital Items Identified																			$
																				$
A07	**Interior Doors**																			$
A07.1b	Interior Doors	1985	30	31	0	~5	$900/unit	LCR						$4,500						$4,500
																				$
A08	**Ceilings**																			$
A08.4b	Acoustic Ceiling Tile	1985	25	31	0	180 m²	$50/m²	LCR		$9,000										$9,000
																				$
A09	**Flooring**																			$
	No Capital Items Identified																			$
																				$
A10	**Fixtures**																			$
	No Capital Items Identified																			$
																				$
R01	**Roofing**																			$
	No Capital Items Identified																			$
																				$
A99	**Other (Stairs Conveyance Devices)**																			$
A99.3a	Exterior Stair	1976	30	40	0	180 m²	$50/m²	LCR		$9,000										$9,000
																				$
4	**STRUCTURAL**																			$
S01	**Foundations**																			$
	No Capital items identified																			$
																				$
S02	**Floors on Grade**																			$
	No Capital items identified																			$
																				$
S03	**Suspended Floors and Stairs**																			$
	No Capital items identified																			$
																				$
S04	**Roof Structures**																			$
	No Capital items identified																			$
																				$
																				$

Yukon Energy Corporation
2017 – 2018 General Rate Application
John Maissan-YEC-1-37 Attachment 1

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Identified Costs

Report Section	Building Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024	2025	RESERVE TOTAL
S05	**Interior Walls and Columns**																			
	No Capital items identified																			
S06	**Exterior Walls and Columns**																			
	No Capital items identified																			
S99	**Other**																			
	No Capital items identified																			
5	**MECHANICAL**																			
M01	**Site Services**																			
IMM1.b/M01.1b	Study Domestic Water Supply	-	-	-	-	Allowance		Study	$3,000											
IMM2.b/M01.2b	Study Septic System	-	-	-	-	Allowance		Study	$5,000											
M02	**Plumbing**																			
M02.3b	Domestic Hot Water Haters	2000	20	16	4	1	$900/unit	LCR					$3,000							**$3,000**
M02.5b	Washroom Fixtures	1985	35	31	4	4	$1,100/unit	LCR					$4,400							**$4,400**
M03	**Heating**																			
M03.6b	Furnace	2008	25	8	17	Allowance		Study		$5,000										**$5,000**
M04	**Ventilation**																			
	No Capital Items Identified																			
M05	**Fire Protection**																			
	No Capital Items Identified																			
M06	**Controls**																			
	No Capital Items identified																			
M99	**Other**																			
	No Capital Items identified																			
4	**ELECTRICAL**																			
E01	**Incoming Services**																			
	No Capital Items identified																			
E02	**Distribution Equipment**																			
E02.1b	Secondary Distribution	1985	30	31	0	2	$3,000/ea.	LCR/Improv.		$6,000										**$6,000**
E03	**Lighting and Power**																			
E03.1a	Interior Lighting	1976	20	40	0	205 m² GFA	$65/m² GFA	LCR		$13,300										**$13,300**
E03.1b	Interior Lighting	1985	20	31	0	222 m² GFA	$65/m² GFA	LCR		$14,400										**$14,400**
E04	**Grounding**																			
	No Capital Items Identified																			
E05	**Fire Alarm**																			
	No Capital Items Identified																			
E06	**Communications and Security**																			
	No Capital Items Identified																			

Capital Reserve Analysis

	Inflated	*Uninflated*
Average Cost / Year	$10,971	$9,084
Average Cost / Year / Sq. Ft.	$25.69	$21.27

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Reserve Totals
$CAD	$8,000	$64,300	$8,000	$	$7,400	$7,500	$	$	$	$139,900	$	$227,100
$CAD	$8,000	$66,229	$8,487	$	$8,329	$8,695	$	$	$	$182,538	$	$274,277

Notes
LCR = Lifecycle Replacement
FR = Failure Replacement

Completed by: **JH**
Reviewed by: **LPM**

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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February 2016

REPORT

Facility Lifecycle Assessment Dawson Facilities Various Locations, Dawson City, YT

Submitted to:
Yukon Energy Corporation
P.O. Box 5920
Whitehorse, YT Y1A 6S7

REPORT

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Report Number: 1541813

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Golder Associates



EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Dawson Diesel Plan Envelope (henceforth known as Site A), Office Building (henceforth known as Site B), Staff House 1 (henceforth known as Site C), Staff House 2 (henceforth known as Site D) and Staff House 3 (henceforth known as Site E), located in various locations as it will be described below, in the Town of Dawson City, Yukon Territory.

Site A Diesel Plant (Envelope) is comprised of a one storey diesel power plant with approximately 224 m² (2,412 ft²) on approximately 0.13 hectares (0.33 acres) of land. The building is located on 112 5th Avenue and Dugas Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1975. The site is shared with the Mayo Office Building and site size is referred to the building's immediate surroundings. As per the Client's request assessment for this building is limited to the building envelope and related components. Therefore, evaluation of the interior finishes, structure, mechanical and electrical components is not included.

Site B Office Building consists of a two storey office building with approximately 186 m^2 (2,000 ft^2) gross floor area (GFA) on approximately 0.22 hectares (0.53 acres) of land. The building is located on 112 Fifth Avenue and Dugas Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1980. The site is shared with the Mayo Diesel Plant and site size is referred to the building's immediate surroundings.

Site C Staff House 1 building is a two storey dwelling with approximately 180 m^2 (1,938 ft^2) gross floor area (GFA) on approximately 0.05 hectares (0.11 acres) of land. The site is located at 833 Sixth Avenue, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1996 based on drawings provided.

Site D Staff House 2 building is a one storey dwelling with approximately 89 m^2 (956 ft^2) gross floor area (GFA) on approximately 0.08 hectares (0.20 acres) of land. The site is located at 1136 Fifth Avenue and York Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1999.

Site E Staff House 3 building is a two storey dwelling with approximately 270 m^2 (2,906 ft^2) gross floor area (GFA) on approximately 0.08 hectares (0.20 acres) of land. The site is located at 817 Sixth Avenue, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1996 based on drawings provided.

The buildings generally do not meet barrier free guidelines. However, Golder assumes is not deemed to be required at this time due to function.

Based on the findings of this FLA, the following conclusions are made for Site A- Diesel Plant:

- The Site was developed in approximately ~1975. As per the scope of work, evaluation for this building was limited to the envelope components. Therefore, no description or opinion is given as to the other building systems and components.



FLA: DAWSON FACILITIES, DAWSON CITY, YT

- The exterior of the building is finished with pre-finished corrugated metal cladding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are painted wood windows with insulated glazing units provided in the office building section, several openings for windows were observed throughout the remainder of the building but units have been removed and openings have been sealed. Exterior wall insulation and air/vapour barrier are not provided for the diesel plant section, but for the office it was mostly concealed and not directly reviewed and assumed to be batt insulation and poly air/vapour barrier. A painted metal insulated door set in painted metal frames is provided for the main entrance. One painted wood sectional overhead door is provided on the north elevation. Utility doors are generally insulated painted metal doors with insulated glazing units and provided with panic bar hardware in painted metal frames. The roof was mostly covered by snow, limiting visibility but is assumed to be a gable sloped roof covered with a metal sheet roofing system. Pre-finished galvanized metal fascia is provided along the roof perimeter. Roof overhangs are finished with pre-finished corrugated metal soffits. The exterior components are in overall marginal condition.
- The mechanical elements of the building are outside the scope of this report and were not directly reviewed.
- The electrical elements of the building are outside the scope of this report and were not directly reviewed.
- Given the year of the original construction (~1975), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are possible to be present.

Immediate investigation / action items identified pertain to ice dams on the eaves. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural components and systems.

The following conclusions are made for Site B- Office Building:

- The building was constructed in ~1980. Access to the site is provided from a gravelled driveway. Site components include grassed areas, fence, signage and car plug-ins. Grounds were mostly covered with snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- The exterior of the building is primarily finished with a combination of prefinished metal cladding and painted wood siding. Joint sealers are provided at material transitions and openings. Exterior windows are polyvinyl chloride (PVC) frame type windows with double insulated glazing units provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and poly air/vapor barrier. The main entrance door is a painted insulated metal door set in painted wood frames with insulated glazing unit. Access to the garage bay is through two painted wood sectional overhead doors set in painted wooden frames with single pane glazing units. Utility doors are generally painted metal doors set in painted metal frames with and without glazing units; both including panic bar hardware. The roof for the building was mostly covered with snow at the time of the assessment but it is assumed to be a sloped gable roof covered with metal sheet roofing. Painted wood fascia boards are provided along the roof perimeter. The exterior components are in overall acceptable condition.



FLA: DAWSON FACILITIES, DAWSON CITY, YT

- The interior doors are typically stained wood doors set in stained wood frames throughout. Interior partitions consist of interior wood stud frame partitions with gypsum wallboard (GWB) coverings finished with paint. The ceilings for the building are a combination of GWB ceiling panels finished with a stipple texture and suspended acoustic tiles on a T-bar grid. Building floor finishes are resilient floor sheet and painted concrete floors. One washroom is provided for the building equipped with laminated countertop and laminated lower cabinets. The interior components are in overall acceptable condition.
- No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods it is assumed to consist of cast in-place (CIP) strip and spread foundations. The building floor is a reinforced CIP concrete slab on grade. Second floor structure is a wood frame structure comprised of timber wood floor joists, beams and decking. The superstructure is comprised of load-bearing wood frame stud walls supporting wood trusses. Interior walls are wood framed partitions with wood studs covered with GWB. The roof is assumed to be covered with plywood panels.
- The building is supplied with domestic water from the town's local service provider. Sanitary sewer running on PVC plastic pipes is disposed to the town's sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via hot water boilers located in the Diesel Plant (A) and distributed through hot water baseboard heaters throughout. The garage bay area is heated by hot water unit heaters connected to the hydronic system. Cooling is provided by one split air conditioner unit in the offices main floor. Ventilation is assumed to be accomplished through attic vents and exhaust ventilation. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and one wall mounted unit in the garage bay. Plumbing fixtures for the washroom are vitreous china tank type water closet and a counter mounted enamel lavatory. Portable ABC fire extinguishers were observed throughout for fire protection. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via overhead line conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Power is metered and then fed into the building to a main Square D distribution panelboard located in the office main floor. Equipment is rated at rated at 225 amp, 120/240 V and is provided with 42 circuits. Panel was observed to be 100% full. Secondary distribution panels is provided by one Square D panelboard assumed to be rated at 200 amp 120/240 V with 24 circuits, and it was observed to be 100% in use. Interior lighting is a combination of recessed, pendant and suspended fluorescent light fixtures fitted with T8 lamps and incandescent light fixtures fitted with CFL lamps. Exterior lighting is accomplished by wall mounted HID light fixtures throughout the building's elevations. Emergency lighting is provided by emergency battery packs throughout. The building is controlled by a fire alarm system including a Notifier fire alarm panel connected to smoke/heat detectors, pull stations and strobe/horn lights throughout. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~1980), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are possible to be present. Point of Contact reported that they were not aware of any hazardous materials present such as ACMs.



FLA: DAWSON FACILITIES, DAWSON CITY, YT

Immediate investigation / action items identified pertain to resilient stair finish, heating, and exit lighting. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural, mechanical and electrical components and systems.

The following conclusions are made for Site C- Staff House 1:

- The building was constructed in ~1996. A gravelled driveway is provided from the back service street. Site components include grassed areas, wood fence, a storage shed and a detached garage. Exterior wooden stairs are also provided for the building different access points. Grounds were mostly covered with snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- Exterior finish is primarily painted wood siding and lattice skirting. Joint sealers are provided at material transitions and openings throughout the building exterior. The exterior windows are PVC frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. Main entrance door is painted insulated metal unit set in painted wood frames with insulated glazing units. Secondary entrance doors are insulated painted metal doors with and without glazing units set in painted wood frames. The roof for the building is a sloped gable roof covered with metal sheets according to drawings provided. Prefinished metal fascia and painted wood soffit are provided along the roof perimeter and at roof overhangs. The exterior components are in overall acceptable condition.
- The interior doors are typically stained wood doors set in stained wood frames. Interior wall partitions are generally wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and laminate floors. The building includes two washrooms one on the main floor and one in the second floor hallway, both including laminated countertops and painted wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and stained wood upper and lower cabinetry. Standard residential grade appliances are provided. The interior components are in overall acceptable condition.
- Some structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and according to drawings provided the foundation system consists of permanent wood foundations (PWF) sitting on a compacted granular base supporting a torque tube steel foundation. The building floors are wood frame structures comprised of wood flat trusses with a plywood decking. The superstructure is composed of load-bearing wood frame stud walls supporting wood roof trusses. Interior walls are wood framed partitions with wood studs covered with GWB. The roof is covered with plywood panels. The structural components are in overall acceptable condition.



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- The building is supplied with domestic water from the town's local service provider and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to the town's sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. One domestic hot water heater is provided for the building completed with a recirculation system from the boiler. Heating for the building is accomplished via one hot water boiler also located in the mechanical room. The boiler is connected to fan coils and heating is distributed through galvanized metal ductwork. The hydronic system is completed with water pumps and expansion tank. Ventilation is presumably accomplished through heat recovery ventilators (HRV). Localized digital thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by ceiling mounted units and one range hood in the kitchen. Plumbing fixtures are vitreous china tank type water closets, counter mounted enamel lavatories and fiberglass bathtub insert. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via overhead line conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished through a main Commander Panelboard located in the mechanical room. Equipment is rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 60% full. Interior and exterior lighting is provided by interior incandescent light fixtures fitted with CFL lamps. Three battery packs with integral heads provide emergency lighting. Smoke/heat detectors are also provided throughout. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~1996), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present.

Immediate investigation / action items identified pertain to the substructure. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural components and systems.

The following conclusions are made for Site D- Staff House 2:

- The unit was manufactured in ~1999 according to Point of Contact. The site access is provided from a gravelled driveway. Site components include grassed area, a garage, wooden deck entrance porch and patio. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- The building exterior is primarily finished with painted wood siding. Joint sealers are provided at material transitions and openings throughout the building exterior. The exterior windows are vinyl frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. Main entrance door on the southeast elevation is comprised of a painted insulated wood unit set in painted wood frames with insulated glazing unit. Secondary entrance door on the northwest elevation is an insulated painted wood door with glazing unit. The roof for the building is a sloped gable roof covered with metal sheets according to Point of Contact. Painted wood fascia and painted wood soffit are provided along the roof perimeter and at roof overhangs. The exterior components are in overall acceptable condition.



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- Interior doors are mostly painted wood doors set in painted wood frames. Interior wall partitions are generally wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are acoustic ceiling tiles. Building floor finishes are a combination of resilient floor sheets and carpet floors. The building includes one washroom completed with a plastic solid countertop and a painted wood lower cabinet. The kitchen furnishing includes plastic laminate countertops and painted wood upper and lower cabinetry. Standard residential grade appliances are provided for the building. The interior components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods, the building foundation is a PWF. The building floor is a suspended wood floor structure comprised of wood beams and floor joists and plywood decking. The garage is provided with a CIP slab on grade. The superstructure is composed of load-bearing wood frame stud walls supporting wood trusses. Interior walls are wood framed partitions with wood studs covered with GWB. The roof structure is composed of wood rafters and joists presumably covered by plywood panels. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from the town service provider and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to the town sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via one oil-fired furnace also located in the furnace room Ventilation is assumed to be accomplished through HRV connected to galvanized metal ductwork. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and through a range hood in the kitchen. Plumbing fixtures for the washroom are vitreous china tank type water closet, counter solid plastic lavatory and fiberglass shower inserts. One portable ABC fire extinguisher is provided in the building for fire protection. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via overhead line conductors from an exterior pole-mounted transformer. Copper wiring is reported to be present throughout the building. Primary distribution is accomplished through a Square D main panelboard located in the furnace room. The panel is rated at 200 amp, 120/240 V and is provided with 32 circuits, with at least 80% in use. Secondary distribution panels are provided for the garage. Interior and exterior lighting is provided by incandescent light fixtures fitted with CFL lamps. Two battery-powered emergency lightings were observed for the building. Smoke/heat detectors are provided throughout. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~1999), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present.

Immediate investigation / action items identified pertain to substructure, furnace, receptacles, and emergency lighting within the building. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural, structural, mechanical and electrical components and systems.



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The following conclusions are made for Site E- Staff House 3:

- The site was developed with the building in ~1996. Access to the site is provided from a gravelled driveway. Site components include grassed areas, fencing, and a storage shed. The building includes additionally a wooden deck area with painted wood stairs and handrails from ground level. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- The exterior of the building is primarily finished with painted wood siding. Joint sealers are provided at material transitions and openings. The exterior windows are fiberglass frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. The main entrance door is a painted insulated metal door set in painted wood frames completed with a painted metal screen door with acrylic panes. Access to the shed is made through a painted wood door. The roof for the building was mostly covered with snow at the time of the assessment but it is assumed to be a sloped gable roof covered with metal sheets. Painted wood fascia is provided along the roof perimeter and pre-finished vented metal soffit is provided at roof overhangs. The exterior components are in overall acceptable condition.
- Interior doors are typically stained wood doors set in stained wood frames throughout. Interior wall partitions consist of wood stud frame partitions with GWB coverings finished with paint. The ceilings are GWB ceiling panels finished with a stipple texture. Building floor finishes are a combination of resilient floor sheet and laminate. Two full washrooms are provided one for the master bedroom and one on the second floor hallway both equipped with laminated countertops and stained wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and stained wood upper and lower cabinetry. The kitchen is also equipped with standard grade residential appliances. The interior components are in overall acceptable condition.
- Some structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and according to drawings provided, the foundation system consists of PWF sitting on a compacted granular base. The building floor is a wood frame structure comprised of Type B wood flat trusses with a plywood decking. The upper floor is a wood frame structure with wood beams, floor joists and decking. The superstructure is composed of load-bearing wood frame stud walls supporting wood roof trusses. Interior walls are wood framed partitions with wood studs covered with GWB. The roof for the house is covered with plywood panels. The roof is covered with plywood panels. The structural components are in overall acceptable condition.



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- The building is supplied with domestic water from the town's local service provider. Sanitary sewer running on PVC plastic pipes is disposed to the town's sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via hot water boilers located in the Diesel Plant (A) and distributed through hot water baseboard heaters throughout. The garage bay area is heated by hot water unit heaters connected to the hydronic system. Cooling is provided by one split air conditioner unit in the offices main floor. Ventilation is assumed to be accomplished through attic vents and exhaust ventilation. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and one wall mounted unit in the garage bay. Plumbing fixtures for the washroom are vitreous china tank type water closet and a counter mounted enamel lavatory. Portable ABC fire extinguishers were observed throughout for fire protection. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via overhead line conductors from an exterior pole-mounted transformer. Copper wiring is reported to be present throughout the building. Power is metered and then fed into the building to a Commander main panelboard located in the furnace room. Equipment is rated at rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 60% full. Interior lighting is provided by a combination of incandescent fixtures and surface mounted fluorescent fixtures. Exterior lighting is accomplished by incandescent light fixtures. No emergency light battery pack with integral heads was observed in the building. Smoke/heat detectors are provided throughout. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~1996), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present. Site Representative reported that they were not aware of any hazardous materials present such as ACMs.

Immediate investigation / action items identified pertain to mould, substructure, furnace, receptacles, and emergency lighting. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural, mechanical, structural and electrical components and systems.

The Immediate Repairs and Capital Reserve Analysis identified for each site are included in Appendix D. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.



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Table 1: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/Diesel Plant Envelope (Site A)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$3,000	$205,815	$0	$205,815
2	Structural	$0	$0	$0	$0
3	Mechanical	$0	$0	$0	$0
4	Electrical	$0	$0	$0	$0
TOTALS		**$3,000**	**$205,815**	**$0**	**$205,815**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 2: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ Diesel Plant Envelope (Site A)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$3,000	$175,150	$21,600	$9,065	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$0	$0	$0

Table 3: Summary of Immediate and 10 Year Capital Reserve Expenditures by Section (Uninflated)/Office Building (Site B)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$1,875	$242,490	$25,700	$268,190
2	Structural	$0	$0	$0	$0
3	Mechanical	$2,000	$13,750	$3,200	$16,950
4	Electrical	$4,000	$37,100	$13,020	$50,120
TOTALS		**$7,875**	**$293,340**	**$41,920**	**$335,260**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 4: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)/Office Building (Site B)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$7,875	$121,350	$65,740	$4,500	$0	$101,750

Year 6	Year 7	Year 8	Year 9	Year 10
$3,200	$0	$0	$0	$38,720



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Table 5: Summary of Immediate and 10 Year Capital Reserve Expenditures by Section (Uninflated)/ Staff House 1 (Site C)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$0	$18,900	$12,000	$30,900
2	Structural	$3,000	$10,000	$0	$10,000
3	Mechanical	$0	$0	$0	$0
4	Electrical	$0	$0	$0	$0
TOTALS		**$3,000**	**$28,900**	**$12,000**	**$40,900**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 6: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)/ Staff House 1 (Site C)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$3,000	$20,000	$8,900	$0	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$0	$0	$12,000

Table 7: Summary of Immediate and 10 Year Capital Reserve Expenditures by Section (Uninflated)/Staff House 2 (Site D)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$0	$29,000	$7,200	$36,200
2	Structural	$5,000	$10,000	$0	$10,000
3	Mechanical	$3,000	$3,000	$0	$3,000
4	Electrical	$1,800	$6,200	$0	$6,200
TOTALS		**$9,800**	**$48,200**	**$7,200**	**$55,400**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 8: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)/ Staff House 2 (Site D)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$9,800	$35,300	$0	$12,900	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$0	$0	$7,200



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Table 9: Summary of Immediate and 10 Year Capital Reserve Expenditures by Section (Uninflated)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$5,000	$19,700	$12,000	$31,700
2	Structural	$0	$0	$0	$0
3	Mechanical	$3,000	$3,000	$0	$3,000
4	Electrical	$2,800	$18,900	$0	$18,900
TOTALS		**$10,800**	**$41,600**	**$12,000**	**$53,600**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 10: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$10,800	$38,000	$0	$3,600	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$0	$0	$12,000



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1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Dawson Diesel Plan Envelope (henceforth known as Site A), Office Building (henceforth known as Site B), Staff House 1 (henceforth known as Site C), Staff House 2 (henceforth known as Site D) and Staff House 3 (henceforth known as Site E), located in various locations as it will be described below, in the Town of Dawson City, Yukon Territory.

Site A is comprised of a one storey diesel power plant with approximately 224 m² (2,412 ft²) on approximately 0.13 hectares (0.33 acres) of land. The building is located on 112 5th Avenue and Dugas Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1975. The site is shared with the Mayo Office Building and site size is referred to the building immediate surroundings. As per the Client's request assessment for this building is limited to the building envelope and related components. Therefore, evaluation of the interior finishes, structure, mechanical and electrical components is not included.

Site B building consists of a two storey office building with approximately 186 m^2 (2,000 ft^2) gross floor area (GFA) on approximately 0.22 hectares (0.53 acres) of land. The building is located on 112 Fifth Avenue and Dugas Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1980. The site is shared with the Mayo Diesel Plant and site size is referred to the building immediate surroundings.

Site C building is a two storey dwelling with approximately 180 m^2 (1,938 ft^2) gross floor area (GFA) on approximately 0.05 hectares (0.11 acres) of land. The site is located at 833 Sixth Avenue, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1996 based on drawings provided.

Site D building is a one storey dwelling with approximately 89 m^2 (956 ft^2) gross floor area (GFA) on approximately 0.08 hectares (0.20 acres) of land. The site is located at 1136 Fifth Avenue and York Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1999.

Site E building is a two storey dwelling with approximately 270 m^2 (2,906 ft^2) gross floor area (GFA) on approximately 0.08 hectares (0.20 acres) of land. The site is located at 817 Sixth Avenue, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1996 based on drawings provided.

Written authorization to proceed with the work was provided by Sean Munro, Manager, Property & Risk Management from Yukon Energy Corporation. It is understood that this FLA is required for capital planning.



1.2 Objectives

The objective of the FLA was to document the Site conditions at the time of the Site reconnaissance and, based on available sources of information and observations of surface conditions during the Site reconnaissance, to identify the exterior Site improvements as well as the building structure, envelope, interior finishes, mechanical systems, electrical systems, fire/life safety systems, conveyance devices and visually obvious signs of non-compliance with respect to building code and barrier free accessibility. Due to the age of some of the building, it is possible that hazardous materials are present in the building A & B.

1.3 Methodology

Site Escort and general building information was provided by John Ewing (Site A), Kathy Krehbiel (Site B), Walter Tindall (Site C and D), and Jeremy Germaine (Site E) (hereafter referred to as the "Point of Contact"). Site reconnaissance was conducted by Brian Levy and Adriana Almeida of Golder on December 2nd and December 1st, 2015. In addition to the Site visit, documents identified in Section 1.6 were reviewed in completing the FLA.

At the time of the Site reconnaissance, the weather was overcast; with most of the grounds and roof covered by snow limiting visibility on the Site.

The scope of work did not include sampling or testing to identify the potential presence of hazardous building construction materials such as ACMs, lead-based paints (LBPs), PCB-containing electrical equipment or other hazardous materials. Due to the age of the buildings, it is possible that hazardous building construction materials are to be present on Site A & B. An asbestos management plan was not reported to be in place for any of the sites and asbestos materials identified and reported are based solely on observations.

1.4 Evaluation Criteria

The FLA was completed in general accordance with accordance with the Yukon Energy Corporation stated scope of work as documented in *Request for Proposals Building Condition Reports* (hereafter referred to as the "RFP"). The scope of the FLA was limited to identifying components, systems and potential concerns by visual examination of surface features and operating practices, and from available documented information sources. Only those items identified as being above the specified Capital Threshold will be addressed in the Capital Reserve Table. The Condition Rating system (CR) used throughout this report is based on the submitted proposal as per Yukon Energy Corporation RFP:

Code	Description
1	**Critical Unsafe**, high risk of injury or critical system failure.
2	**Poor** - does not meet requirements, has significant deficiencies. May have high operating / maintenance costs.
3	**Marginal** - Meets minimum requirements, has significant deficiencies. May have above average operating maintenance costs.
4	**Acceptable** - Meets present requirements, minor deficiencies. Average operating/maintenance costs.
5	**Good** - Meets all present requirements. No deficiencies.
6	**Excellent** - As new/state of the art, meets present and foreseeable requirements.

The capital expenditures identified with respect to deficiencies or deferred maintenance shall be identified by the following Categories ("Cat#"):

Category	Description
1	Code & Safety
2	Repair & Maintenance
3	Capital Expenditure
4	Modernization / Improvements
5	Other

Items identified with a CR rating of 1 and/or Cat1, shall be treated as "Immediate" action items, considered to have conditions that include deficiencies that require action in the next 60 to 90 days. Items identified with a CR of 2 or 3 and/or Cat2 shall be considered to have conditions that include deficiencies that can be addressed within the next five years (2016 to 2020 in the Capital Reserve Table). Preventative Maintenance (PM) items may have been identified. These PM items are items anticipated to be required to maintain specific components/systems through to the end of their Expected Useful Life (EUL) and are considered to have CR of 4 or better that can be addressed at any time within the 10 year time frame of this report (2016 to 2025 in the Capital Reserve Table).

Other non-urgent conditions identified with a CR of 4 to 6, are prioritized by their identification as Cat2 to Cat4 and are included in the Capital Reserve Table in an appropriate year. For items with no observed or reported deficiencies, a lifecycle replacement (LCR) cost estimate has been provided in the Capital Reserve Table spreadsheet in the year equal to the year of original installation plus that component's EUL. If an item with no observed or reported deficiencies is nearing or has surpassed its EUL in the next 5 years (i.e., 2016 to 2020), an LCR cost estimate has been provided in the Lifecycle Plan spreadsheet in year 2020.

For similar components that have been replaced/installed at different times but where the age difference is equal to or less than 20% of the component's EUL, the average install year has been used in calculating the next lifecycle replacement event (i.e., for similar vinyl floor tile installed in 1999 versus 2002, each having a 20 year TDL, an average install year of 2001 has been used to calculate a single lifecycle replacement event in 2021).

No building material sampling or testing was conducted as part of this assessment.

1.5 Recommendations for Additional Investigation or Action

RAI.1A) Study ice dams on eaves.

RAI.2E) Study mould growth.

RAI.3C) Study building settlement.

RAI.4D) Study building settlement.

RAI. 5B) Heating study for the office area.

RAI. 6D) Heating study.

RAI. 7E) Heating study.

No other additional investigations are recommended at this time.



1.6 Desktop Data Collection

Architectural drawings and any previous condition reports or hazardous materials reports for the Site were requested. The following are a list of drawings provided:

- Two Housing Units Dawson City Yukon, Site Plan, drawing number A1, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Floor Plans and Schedule House “A”, drawing number A2, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Framing Plans and Details, House “A”, drawing number A3, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Sections House “A”, drawing number A4, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Millwork House “A”, drawing number A5, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Elevations House “A”, drawing number A6, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Garage Plans and Elevations Garage “A”, drawing number A6, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Floor Plans and Schedules House “B”, drawing number A8, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Sections and Details House “B”, drawing number A9, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Millwork House “B”, drawing number A10, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Elevations House “B”, drawing number A11, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Garage Plan Section and Elevations Garage “B”, drawing number A12, prepared by Sinclair &Associates and provided by YEC, dated March 1996.
- Two Housing Units Dawson City Yukon, Mechanical Layout, drawing number M1, prepared by Sinclair &Associates and provided by YEC, dated May 1996.
- Residence Yukon Energy Corp. Dawson, Main Floor Plan, drawing number DAW-A001-1, prepared and provided by YEC, dated September 1999.
- Building Elevations, drawing number DAW-A001-1, prepared and provided by YEC, dated February 2001.
- Window Details and Notes, drawing number DAW-A001-2, prepared and provided by YEC, dated February 2001.
- Pre-Site questionnaires were sent out by Golder and returned by the designated Site Representatives for review.



1.7 Outstanding Information

All information that has been requested has been provided at the time of the completion of this report.

1.8 Building & Fire Code Compliance Overview

The Site Representative advised that they were not aware of any other outstanding work orders, building code violations, building code infractions, building ordinances and municipal health and fire safety by-laws violations.

Additional emergency lighting should be installed in buildings D and E and adequate exit lighting is recommended to be installed in building B. Non-GFCI receptacles were observed within less than a meter from kitchen sink in buildings D and E.

1.9 Evidence of Mould Presence

Suspected mould growth was observed on the window frame in the second floor bedroom. Details and recommendations are included in the architectural section (Section 3.0) of this report.

1.10 Outline of the Report

The report that follows this section contains a summary description of the Site and building systems/components along with a detailed listing and description of systems/components. Furthermore, current, imminent or anticipated deficiencies above the Capital Threshold (if any) and excluding normal operating maintenance are presented with a CR, including a description of the risk/consequence of deferral, probability of imminent/anticipated failure and/or a further description of any failure if it has already occurred.

A more detailed Capital Reserve Table is presented in Appendix D outlining the specific systems/components, EUL, Install Date, Remaining Useful Life (RUL), replacement event type, basis of estimate and specific years for Capital Reserve planning.

1.11 Mandate and Report Resources

Please refer to Appendix A for the report mandate for this project and for additional resources related to the assumptions used in preparing this report such as:

- Operating and Maintenance Items; and
- Discussions of Overall Concepts and Terminology.



2.0 SITE DESCRIPTION

2.1 Site Location and Setting

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Dawson Diesel Plan Envelope (henceforth known as Site A), Office Building (henceforth known as Site B), Staff House 1 (henceforth known as Site C), Staff House 2 (henceforth known as Site D) and Staff House 3 (henceforth known as Site E), located in various locations as it will be described below, in the Town of Dawson City, Yukon Territory.

Site A – Diesel Plant (Envelope) is comprised of a one storey diesel power plant with approximately 224 m² (2,412 ft²) on approximately 0.13 hectares (0.33 acres) of land. The building is located on 112 5th Avenue and Dugas Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1975. The site is shared with the Mayo Office Building and site size is referred to the building immediate surroundings. As per the Client's request assessment for this building is limited to the building envelope and related components. Therefore, evaluation of the interior finishes, mechanical and electrical components is not included.

Site B – Office Building consists of a two storey office building with approximately 186 m^2 (2,000 ft^2) gross floor area (GFA) on approximately 0.22 hectares (0.53 acres) of land. The building is located on 112 Fifth Avenue and Dugas Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1980. The site is shared with the Mayo Diesel Plant and site size is referred to the building immediate surroundings.

Site C – Staff House 1 building is a two storey dwelling with approximately 180 m^2 (1,938 ft^2) gross floor area (GFA) on approximately 0.05 hectares (0.11 acres) of land. The site is located at 833 Sixth Avenue, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1996 based on drawings provided.

Site D – Staff House 2 building is a one storey dwelling with approximately 89 m^2 (956 ft^2) gross floor area (GFA) on approximately 0.08 hectares (0.20 acres) of land. The site is located at 1136 Fifth Avenue and York Street, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1999.

Site E – Staff House 3 building is a two storey dwelling with approximately 270 m^2 (2,906 ft^2) gross floor area (GFA) on approximately 0.08 hectares (0.20 acres) of land. The site is located at 817 Sixth Avenue, in the Town of Dawson City, Yukon Territory. The site building year of construction is unknown, but estimated to be in approximately 1996 based on drawings provided.

2.2 Site Physical Description(s)

Table 11: Site Physical Description Diesel Plant (Envelope) (Building/Site A)

Topic	Data
Site Area	~0.13 hectares (0.33 acres)
Number of Buildings on the Site	Two (Sites A and B)
Approximate Footprint Area of Building (s) (m^2)	~224 m² (2,412 ft²)
Levels above grade	One
Levels below grade	None
Date of Building (s) Construction	~1975
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~15%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~80% grassed/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~5%



General view of the building on site A Diesel Plant



FLA: DAWSON FACILITIES, DAWSON CITY, YT

Table 12: Site Physical Description Office Building (Building/Site B)

Topic	Data
Site Area	~0.22 hectares (0.53 acres)
Number of Buildings on the Site	Two (Sites A and B)
Approximate Footprint Area of Building (s) (m^2)	~180 m^2 (1,937 ft^2)
Levels above grade	Two
Levels below grade	None
Date of Building (s) Construction	~1980
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~8%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~92%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~0%



General view of the building on site B Office Building.

Table 13: Site Physical Description Staff House 1 (Building/Site C)

Topic	Data
Site Area	~0.05 hectares (0.11 acres)
Number of Buildings on the Site	Three (House plus sheds)
Approximate Footprint Area of Building (s) (m^2)	~90 m² (969 ft²)
Levels above grade	Two
Levels below grade	None
Date of Building (s) Construction	~1996
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~20%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~75%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~5%



General view of the building on Site C Staff House 1.



FLA: DAWSON FACILITIES, DAWSON CITY, YT

Table 14: Site Physical Description Staff House 2 (Building/Site D)

Topic	Data
Site Area	~0.08 hectares (0.20 acres)
Number of Buildings on the Site	Two (house plus detached garage)
Approximate Footprint Area of Building (s) (m^2)	~89 m² (956 ft²)
Levels above grade	One
Levels below grade	None
Date of Building (s) Construction	~1999
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~15%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~85%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~0%



General view of the building on Site D Staff House 2.

Table 15: Site Physical Description Staff House 3 (Building/Site E)

Topic	Data
Site Area	~0.08 hectares (0.20 acres)
Number of Buildings on the Site	Two (house plus shed)
Approximate Footprint Area of Building (s) (m^2)	~135 m² (1,453 ft²)
Levels above grade	Two
Levels below grade	None
Date of Building (s) Construction	~1996
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~20%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~80%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~1%



General view of the building on Site E Staff House 3.



3.0 ARCHITECTURAL

Site A: Diesel Plant (Envelope)

The exterior finish is primarily pre-finished corrugated metal cladding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are painted wood frame type windows with insulated glazing units provided in the office building section, several openings for windows were observed throughout the buildings elevations but units have been removed. Exterior wall insulation and air/vapour barrier are not provided for the diesel plant section, for the office it was mostly concealed and not directly reviewed but assumed to be batt insulation and poly air/vapour barrier. A painted metal insulated door set in painted metal frames is provided for the main entrance. One painted wood sectional overhead door is provided on the north elevation. Utility doors are generally insulated painted metal doors with insulated glazing units and provided with panic bar hardware. The roof was mostly covered by snow, limiting visibility but is assumed to be a gable sloped roof covered with a metal sheet roofing system. Pre-finished galvanized metal fascia is provided along the roof perimeter. Roof overhangs are finished with pre-finished corrugated metal soffits.

Capital expenditures with respect to the siding, joint sealers, overhead doors, metal fascia, metal soffit, metal roof and gutters and downspouts, are anticipated within the 10 year time frame of this report.

The envelope components are in overall marginal condition.

Site B: Office Building

The building was constructed in ~1980. Access to the site is provided from a gravelled driveway. Site components include grassed areas, fence, signage, and car plug-ins. Grounds were mostly covered with snow, limiting visibility of some of the site components.

The exterior of the building is finished with a combination of painted metal cladding and wood siding. Joint sealers are provided at material transitions and openings. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior on the main floor and pre-finished metal windows with insulated glazing units on the second floor. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and a poly air/vapor barrier. The main entrance door is a painted insulated metal door set in painted wood frames with insulated glazing unit. Access to the garage bay is through two painted wood sectional overhead doors set in painted wooden frames with single pane glazing units. Utility doors are generally painted metal doors set in painted metal frames with and without glazing units; both including panic bar hardware. Interior doors are typically stained wood doors set in stained wood frames throughout. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings are a combination of GWB ceiling panels finished with a stipple texture and suspended acoustic tiles on a T-bar grid. Building floor finishes are a combination of resilient floor sheet and painted concrete floors. One washroom is provided for the building equipped with laminated countertop and laminated lower cabinets. The office spaces are equipped in some areas with fixed casework which generally includes laminated countertops, laminated upper and lower cabinets and shelves.



The roof for the building was mostly covered with snow at the time of the assessment but it is assumed to be a sloped gable roof covered with metal sheet roofing. Painted wood fascia boards are provided along the roof perimeter.

Capital expenditures with respect to the fencing, car plug-ins, metal cladding, wood siding, joint sealers, exterior windows, overhead doors, utility doors, interior paint, interior doors, ceiling tiles, resilient floors, concrete floors, and roof, are anticipated within the 10 year time frame of this report.

The architectural components are in overall acceptable condition.

Site C: Staff House 1

The building was constructed in ~1996. A gravelled driveway is provided from the back service street. Site components include grassed areas, wood fence, a storage shed and a detached garage. Exterior wooden stairs are also provided for the building different accesses.

The exterior of the building is primarily finished with painted wood siding and lattice skirting. Joint sealers are provided at material transitions and openings throughout the building exterior. The exterior windows are PVC frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. Main entrance door is a painted insulated metal unit set in painted wood frames with insulated glazing units. Secondary entrance doors are insulated painted metal doors with and without glazing units set in painted wood frames. Interior doors are mostly stained wood doors set in stained wood frames. Interior wall partitions are generally wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and laminate floors. The building includes two washrooms one on the main floor and one in the second floor hallway, both including laminated countertops and painted wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and stained wood upper and lower cabinetry. Standard residential grade appliances are provided.

The roof for the building is a sloped gable roof covered with metal sheets according to drawings provided. Prefinished metal fascia and painted wood soffit are provided along the roof perimeter and at roof overhangs.

Capital expenditures with respect to the site drainage, joint sealers, interior paint, resilient floor sheets, and appliances are anticipated within the 10 year time frame of this report.

The architectural components are in overall acceptable condition.

Site D: Staff House 2

The unit was manufactured in ~1999 according to Point of Contact. The site access is provided from a gravelled driveway. Site components include grassed area, a garage, wooden deck entrance porch and patio.

The building exterior is primarily finished with painted wood siding. Joint sealers are provided at material transitions and openings throughout the building exterior. The exterior windows are vinyl frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. Main entrance door on the southeast elevation is comprised of a painted



insulated wood unit set in painted wood frames with insulated glazing unit. Secondary entrance door on the northwest elevation is an insulated painted wood door with glazing unit. Interior doors are mostly painted wood doors set in painted wood frames. Interior wall partitions are generally wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are asbestos ceiling tiles. Building floor finishes are a combination of resilient floor sheets and carpet floors. The building includes one washroom completed with a plastic solid countertop and a painted wood lower cabinet. The kitchen furnishing includes plastic laminate countertops and painted wood upper and lower cabinetry. Standard residential grade appliances are provided for the building.

The roof for the building is a sloped gable roof covered with metal sheets according to Point of Contact. Painted wood fascia and painted wood soffit are provided along the roof perimeter and at roof overhangs.

Capital expenditures with respect to exterior paint, wood siding, joint sealers, interior paint, ceiling tiles, resilient

The architectural components are in overall acceptable condition.

Site E: Staff House 3

The site was developed with the building in ~1996. Access to the site is provided from a gravelled driveway. Site components include grassed areas, fencing, and a storage shed. The building includes additionally a wooden deck area with painted wood stairs and handrails from ground level.

The exterior of the building is primarily finished with painted wood siding. Joint sealers are provided at material transitions and openings. The exterior windows are fiberglass frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. The main entrance door is a painted insulated metal door set in painted wood frames completed with a painted metal screen door with acrylic panes. Access to the shed is made through a painted wood door. Interior doors are typically stained wood doors set in stained wood frames throughout. Interior wall partitions consist of wood stud frame partitions with GWB coverings finished with paint. The ceilings are GWB ceiling panels finished with a stipple texture. Building floor finishes are a combination of resilient floor sheet and laminate. Two full washrooms are provided one for the master bedroom and one on the second floor hallway both equipped with laminated countertops and stained wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and stained wood upper and lower cabinetry. The kitchen is also equipped with standard grade residential appliances.

The roof for the building was mostly covered with snow at the time of the assessment but it is assumed to be a sloped gable roof covered with metal sheets. Painted wood fascia is provided along the roof perimeter and pre-finished vented metal soffit is provided at roof overhangs.

Capital expenditures with respect to the joint sealers, interior paint, resilient floor sheet, appliances, and mould are anticipated within the 10 year time frame of this report.

The architectural components are in overall acceptable condition.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.1B	**Site Servicing**	**Water**: Water is supplied from the town's local service provider. **Sanitary Sewer**: Sanitary sewage is disposed to the town's sewage system. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via overhead line conductors.	**4**	-	No concerns observed or reported.
A01.1C	**Site Servicing**	**Water**: Water is supplied from the town's local service provider. **Sanitary Sewer**: Sanitary sewage is disposed to the town's sewage system. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via overhead line conductors. **Oil**: Oil for the furnace is provided from a storage tank on site, recharged when required by a local provider.	**4**	-	No concerns observed or reported.
A01.1D	**Site Servicing**	**Water**: Water is supplied from the town service provider. **Sanitary Sewer**: Sanitary sewage is disposed to the town sewage system. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via overhead line conductors. **Oil**: Oil for the heating appliance is provided from a storage tank located on the northeast elevation of the building, recharged when required by a local provider.	**4**	-	No concerns observed or reported.

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A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.1E	**Site Servicing**	**Water**: Water is supplied from the town service provider. **Sanitary Sewer**: Sanitary sewage is disposed to the town sewage system. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via overhead line conductors. **Oil**: Oil for the heating appliance is provided from a storage tank located on the north elevation of the building, recharged when required by a local provider.	**4**	-	No concerns observed or reported.
A01.2B	**Parking Lots & Drive Aisles**	**~1980:** Gravelled parking lot and driveway is provided east and west of the site.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. No issues or concerns were reported.
A01.3C	**Driveway**	**~1996**: A graveled driveway is provided.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. No concerns observed or reported.
A01.3D	**Driveway**	**~1999**: A graveled driveway is provided to access the lot.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. No concerns observed or reported.
A01.3E	**Driveway**	**~1996**: A graveled driveway is provided to access the lot.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. No concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.4B	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.4C	**Site Drainage**	Overland soil absorption and drainage.	**3**	2	It was reported that due to frost heave settlement some ponding was observed. Reportedly this issue is ongoing and it was previously repaired. (See Note **3B**). No other issues or concerns were reported regarding the site drainage.
A01.4D	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.4E	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.5B	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in some areas of the site.	**4**	-	No concerns observed or reported.
A01.5C	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No other concerns observed or reported.
A01.5D	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No other concerns observed or reported.
A01.5E	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No other concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.6B	**Fencing**	**~1975**: Chain link fence is provided along the perimeter of the site including the Diesel Plant (A) area. The fence includes two gates one east and one west of the site.	**3**	3	Sections of fence were observed to be severely damaged. Compromising security within the Dawson plant compound. It is recommended to replace the existing fence as it has surpassed its EUL. Replacement costs includes section of fence belonging to the Diesel Plant (A), since site components for this site are not being directly assessed since evaluation was limited to the building envelope. No other concerns observed or reported.
A01.6C	**Fencing**	**~1996**: A painted wood fence with gates is provided along the perimeter of the site.	**4**	-	No concerns observed or reported.
A01.6D	**Fencing**	**~1999**: Painted wooden fencing is provided around the entire site.	**4**	-	No concerns observed or reported.
A01.6E	**Fencing**	**~1996**: Painted wooden fencing is provided around the entire site and a small area enclosed by chain-link fencing is located on west side of the site.	**4**	-	No concerns observed or reported.
A01.7A	**Amenities – Signage**	**~1975**: One wall mounted painted metal sign was observed on the south elevation identifying the building.	**4**	-	No concerns observed or reported.
A01.7B	**Amenities – Signage**	**~1980**: One carved wood sign was observed on the south elevation identifying the building.	**4**	-	No concerns observed or reported.
A01.8C	**Amenities – Ancillary Buildings**	**~1996:** Site amenities include one storage shed and one detached garage.	**4**	-	No concerns observed or reported.
A01.8D	**Amenities – Ancillary Buildings**	**~1999:** A wood framed garage is located on the southeast side of the site.	**4**	-	No concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.8E	**Amenities – Ancillary Buildings**	**~1996:** A wood structure storage shed is provided for the site.	**4**	-	No concerns observed or reported.
A01.9B	**Car Plug-ins**	**~1980**: Car plug-in is provided on the north elevation by the garage bay area access. Car plug-ins on the east parking lot are limited to electrical extension cords hanged from wall mounted hooks.	**-**	4	Golder assumes that the extension cords provided for the east parking lot are a temporary solution to the need of car plug-ins in this area. We recommend replacing the existing system with better and more suitable system, like wall mounted receptacles with lids. No other concerns observed or reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1D	**Exterior Paint**	**~1999:** Garage's exterior wood cladding, wood decks, wood stairs and handrails are generally finished with paint.	**3**	3	The exterior paint was observed in overall marginal condition and is generally faded, lifted, and peeled off in several places and should be repainted. Considering the weather condition of Dawson, paint on the exterior wall has been peeling off due seeping melted water from roof overhang ice-dam on the eaves and down the walls. Therefore, exterior wall should be finished with oil based paint or any improved freeze/thaw resistant paint. No other concerns observed or reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1E	**Exterior Paint**	**~2015:** Exterior wood cladding, wood decks, wood stairs and handrails are generally finished with paint.	**5**	-	No concerns observed or reported.
A02.2A	**Metal Cladding**	**~1975:** The exterior of the building on the east, south and north elevation is finished with pre-finished corrugated metal cladding throughout.	**4**	3	No concerns or issues were reported.
A02.2B	**Metal Cladding**	**~1980:** The exterior of the building is finished with pre-finished corrugated metal cladding throughout.	**2**	3	Metal cladding finish is generally in poor condition and requires replacement within the timeframe of this report as paint is flaking in several sections and insulation is reportedly insufficient. Costs for replacement are included in the Capital Reserve Table. No other concerns or issues were reported.
A02.3B	**Wood Siding**	**~1980:** Painted wood siding is provided for the south elevation.	**4**	3	No concerns or issues were reported.
A02.3C	**Wood Siding**	**~1996:** Painted wood siding is provided for the south elevation.	**4**	-	Reportedly the exterior wood siding was refinished in 2015. No concerns or issues were reported.
A02.3D	**Wood Siding**	**~1999:** Painted wood cladding is provided throughout the building and garage.	**3**	2	The wood siding still has 23 Year of its remaining useful lifetime; however, it is in overall marginal condition. An allowance has been included in Capital Reserve Table for repairs. No concerns or issues were reported.
A02.3E	**Wood Siding**	**~1996:** Wood cladding is provided throughout the Staff house 3 and shed.	**4**	-	No concerns or issues were reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.4A	**Joint Sealers**	**~1975**: Sealant at material transitions and openings.	**3**	3	The joint sealers have already surpassed their EUL and should be replaced. Work has been scheduled along with the cladding replacements in the Capital Reserve Table. No other concerns observed or reported.
A02.4B	**Joint Sealers**	**~1980**: Joint sealers are provided at material transitions and openings.	**3**	3	Joints sealers are generally cracked and rigid. No other concerns observed or reported.
A02.4C	**Joint Sealers**	**~1996**: Joint sealers are provided at material transitions and openings.	**4**	3	No concerns observed or reported.
A02.4D	**Joint Sealers**	**~1999**: Joint sealers are provided at material transitions and openings.	**4**	3	The joint sealers will reach its EUL within the timeframe of this report and the cost for replacement has been included in Capital Reserve Table. No concerns observed or reported.
A02.4E	**Joint Sealers**	**~1996**: Joint sealers are provided at material transitions and openings.	**4**	3	The joint sealers will reach its EUL within the timeframe of this report and the cost for replacement has been included in Capital Reserve Table. No concerns observed or reported.
A02.5C	**Skirting**	**~1996:** Painted wood diagonal lattice is provided to conceal the crawlspace.	**4**	-	Some broken sections were reported. Repairs can be completed at a cost below the Capital Threshold; therefore no costs are included. No concerns observed or reported.
A02.5D	**Skirting**	**~1999:** Painted wood siding is provided for the skirting to conceal the crawlspace.	**4**	-	No other concerns observed or reported.
A02.5E	**Skirting**	**~1996:** Painted wood siding is provided for the skirting to conceal the crawlspace.	**4**	-	No other concerns observed or reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.6A	**Louvers**	**~1975**: Anodized aluminum metal louvers are provided at the exterior walls.	**4**	-	No concerns observed or reported.
A02.6B	**Louvers**	**~1980**: Painted wood gable louvers are provided at the exterior walls to vent the attic.	**4**	-	No concerns observed or reported.
A02.6C	**Louvers**	**~1996**: Painted wood gable louvers are provided at the exterior walls to vent the attic.	**4**	-	No concerns observed or reported.
A02.6D	**Louvers**	**~1999**: Prefinished metal gable louvers are provided at the exterior walls to vent the attic.	**4**	-	No concerns observed or reported.
A02.6E	**Louvers**	**~1996**: Prefinished metal gable louvers are provided at the exterior walls to vent the attic.	**4**	-	No concerns observed or reported.
A02.7C	**Handrails and Guardrails**	**~1996**: Exterior stairs are provided with painted wood guardrails and handrails.	**4**	-	No concerns observed or reported.
A02.7D	**Handrails and Guardrails**	**~1999**: Exterior wooden decks and stairs are provided with painted wood guardrails and handrails on the southeast elevation and northwest elevation.	**4**	-	No concerns observed or reported.
A02.7E	**Handrails and Guardrails**	**~1996**: Exterior wooden decks and stairs are provided with painted and unfinished wood guardrails and handrails on the east and west elevations.	**3**	-	The handrails and guardrail are in overall acceptable condition; however, one wood balustrade located in the wood deck of the west elevation was damaged at the bottom. A new balustrade should be installed. The repair will be completed below the Capital Threshold of this report. No concerns observed or reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1A	**Exterior Windows**	**~1975**: The windows are painted wood frame type insulated windows. Painted metal wired mesh is provided on some windows, primarily ones that were boarded up from the inside with plywood and insulation presumably due to air infiltration issues.	**3**	3	The windows have surpassed their EUL and require replacement by Year 1. Replacement costs for all windows including the ones removed are included in the Capital Reserve Table. No other concerns were observed or reported.
A03.1B	**Exterior Windows**	**~1980**: Pre-finished metal window with insulated glazing units are provided on the second floor and the garage bay. **~2010**: PVC windows with insulated glazing units are provided for the main floor.	**4**	3	Reportedly the older window units tend to condensate during winter. No evidence of condensation was detected at the time of the site visit. No other concerns were observed or reported.
A03.1C	**Exterior Windows**	**~2011**: The windows are PVC windows with insulated double glazing units.	**4**	-	No concerns were observed or reported.
A03.1D	**Exterior Windows**	**~2010**: Double glazed vinyl windows are provided throughout the building.	**5**	-	It was reported that exterior doors and windows were replaced approximately 5 years ago. The windows will reach their EUL beyond the timeframe of this report and thus the replacement cost has not been included in Capital Reserve Table. No other concerns observed or reported.
A03.1E	**Exterior Windows**	**~2010**: Double glazed fiberglass windows are provided throughout the building.	**5**	-	It was reported that exterior doors and windows were replaced approximately 5 years ago. The windows will reach their EUL beyond the timeframe of this report and thus the replacement cost has not been included in Capital Reserve Table. No other concerns observed or reported.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1A	**Main Entrance Door**	**~1975**: Painted insulated metal doors set in painted metal frames with and without insulated glazing inserts are provided at the main entrance for the office and the plant.	**3**	3	Metal doors have an estimated EUL of 40 years. Existing doors are 41 years old and should be replaced. Costs for replacements are included in the Capital Reserve Table. No other concerns were observed or reported.
A04.1B	**Main Entrance Door**	**~1980**: Main entrance door is a painted insulated metal entrance door set in painted wood frames with insulated glazing units.	**3**	3	It is recommended to replace the main entrance door by Year 4 as it will surpass its EUL. Costs for replacements are included in the Capital Reserve Table. No concerns were observed or reported.
A04.1C	**Main Entrance Door**	**~2011**: Main entrance door is a painted insulated metal entrance door set in painted wood frames with insulated glazing units.	**4**	-	No concerns were observed or reported.
A04.1D	**Main Entrance Door**	**~2010**: Main entrance door is painted wood entrance door set in painted wood frames with insulated glazing unit. The entrance doors are completed with painted insulated metal screen door.	**3/5**	-	It was reported that exterior doors and windows were replaced approximately 5 years ago; however, the wood door frames were in poor condition with peeled paints off and cracks in several places. Therefore, the door frames should be replaced at a cost below the Capital Threshold of this report. No other concerns observed or reported.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1E	**Main Entrance Door**	**~2010**: The main entrance door is a painted insulated metal door set in painted wood frames completed with a painted metal screen door with acrylic panes.	**5**	-	It was reported that exterior doors and windows were replaced approximately 5 years ago. The main entrance door will reach their EUL beyond the timeframe of this report and thus replacement cost has not been included in Capital Reserve Table. No other concerns observed or reported.
A04.2A	**Overhead Doors**	**~1975**: One painted wood sectional overhead door set in painted wood frames is provided on the north elevation. The door is provided on the outside with a painted metal wired mesh swing gate.	**2**	3	Operational issues were reported regarding the overhead door. It was also reported that the door is not sealing properly. No other concerns or issues were reported.
A04.2B	**Overhead Doors**	**~1980**: Two painted wood sectional overhead doors set in painted wood frames and with single pane glazing units are provided on the north elevation.	**3**	3	According to the Point of Contact one of the doors was repaired in 2014. One glass pane was observed to be damaged. No other concerns or issues were reported.
A04.2D	**Overhead Doors**	**~1999**: One painted wood sectional overhead door set in painted wood frames is provided in the garage.	**4**	-	The overhead doo will reach its EUL beyond the timeframe of this report and thus the replacement cost has not been included in Capital Reserve Table. No other concerns or issues were reported.
A04.3A	**Utility Doors**	**~1975:** Insulated painted metal doors with insulated glazing units and set in painted metal frames are provided. Doors are additionally completed with panic bar hardware.	**4**	3	Doors have surpassed their EUL and will require replacement within the timeframe of this report. Costs for replacement have been combined with line item A03.1A to meet the Capital Threshold. No concerns or issues were reported.

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A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.3B	**Utility Doors**	**~1980:** Insulated painted metal doors with and without glazing units are provided. Doors are additionally completed with panic bar hardware.	**3**	-	The door on the north elevation by the garage bay area is generally in poor condition. Paint finish has faded and is flaking and operational issues have been reported by users. (See Note **3A**) No concerns or issues were reported.
A04.3C	**Utility Doors**	**~2011:** Insulated painted metal doors with and without glazing units are provided for secondary entrances in the building and sheds.	**4**	-	No concerns or issues were reported.
A04.3D	**Utility Doors**	**~1999:** A utility door located in the garage is a painted wood door set in painted wood frames with insulated glazing unit. The utility door was completed with painted, insulated metal screen door.	**3**	-	The door should be replaced since it is in overall marginal condition. Paint on the door was cracked, lifted, and discolored. Costs associated with repairs/replacement are estimated below the Capital Threshold. No other concerns observed or reported.
A04.3E	**Utility Doors**	**~1996:** A utility door located in the shed is a painted wood door set in painted wood frames with insulated glazing unit.	**4**	-	No concerns observed or reported.

A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1A	**Metal Fascia**	**~1975:** Pre-finished metal fascia is provided along the perimeter of the roof.	**4**	3	No concerns observed or reported.
A05.1C	**Metal Fascia**	**~1975:** Pre-finished metal fascia is provided along the perimeter of the roof.	**4**	3	No concerns observed or reported.

A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.2B	**Wood Fascia**	**~1980:** Painted wood fascia boards are installed along the perimeter of the roof.	**4**	-	No concerns observed or reported.
A05.2D	**Wood Fascia**	**~1999:** Painted wood fascia boards are installed along the perimeter of the roof.	**4**	-	The fascia of the building was snow-covered at the time of assessment so the condition of the fascia could not be determined; however, it is believed that the fascia will reach its EUL within the timeframe of this report. In addition, the fascia is recommended to be replaced concurrently with metal roofing system and thus the fascia replacement cost has been combined into Item **R01.1D** below. No other concerns observed or reported.
A05.2E	**Wood Fascia**	**~1996:** Painted wood fascia boards are installed along the perimeter of the roof.	**4**	-	The fascia of the building was snow-covered at the time of assessment so the condition of the fascia could not be determined; however, it is believed that the fascia will reach its EUL within the timeframe of this report. In addition, the fascia is recommended to be replaced concurrently with metal roofing system and thus the fascia replacement cost has been combined into Item **R01.1E** below. No other concerns observed or reported.
A05.3A	**Metal Soffit**	**~1975:** Pre-finished corrugated metal soffit is provided at roof overhangs.	**4**	3	No concerns observed or reported.
A05.4C	**Wood Soffit**	**~1996:** Painted wood soffit is provided for roof overhangs.	**4**	-	No concerns observed or reported.
A05.4D	**Wood Soffit**	**~1999:** Painted wood soffit is provided for roof overhangs.	**4**	-	The soffit will reach its EUL within the timeframe of this report and the replacement cost has combined into Item **R01.1D** below. No other concerns observed or reported.

A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.4E	**Wood Soffit**	**~1996:** Painted wood soffit is provided for roof overhangs.	**4**	-	The soffit will reach its EUL within the timeframe of this report and the replacement cost has combined into Item **R01.1E** below. No other concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1B	**Fixed Partitions**	**~1980**: Interior partitions are wood stud frame walls with GWB coverings.	**4**	-	No issues or concerns were reported.
A06.1C	**Fixed Partitions**	**~1996**: Interior partitions are wood stud frame walls with GWB panels.	**4**	-	No issues or concerns were reported.
A06.1D	**Fixed Partitions**	**~1999**: Interior partitions are wood stud frame walls with GWB panels.	**4**	-	No issues or concerns were reported.
A06.1E	**Fixed Partitions**	**~1996**: Interior partitions are wood stud frame walls with GWB panels.	**4**	-	No issues or concerns were reported.
A06.2B	**Interior Paint**	**~2010**: Interior walls are generally finished with paint.	**4**	3	No issues or concerns were reported.
A06.2C	**Interior Paint**	**~2010**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	3	No issues or concerns were reported.
A06.2D	**Interior Paint**	**~2010**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	3	No issues or concerns were reported.
A06.2E	**Interior Paint**	**~2010**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	3	No issues or concerns were reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.3C	**Wall Coverings**	**~1996:** The entrance vestibules walls are finished with wallpaper coverings.	**4**	-	Wall paper generally looks outdated but it is in acceptable condition. Wallpaper has surpassed its EUL and requires replacement at a cost below the Capital Threshold. It is recommended to replace all wall paper with a painted wall finish. No other concerns observed or reported.
A06.4B	**Wall Panelling**	**~1980:** Interior walls on the reception area are provided with stained pine wood boards, floor to ceiling height.	**4**	-	No other concerns observed or reported.
A06.4D	**Wall Panelling**	**~1999:** Interior walls in the furnace room are provided with stained pine wood boards.	**4**	-	No other concerns observed or reported.
A06.5B	**Interior Partitions**	**~1980**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.
A06.5C	**Interior Partitions**	**~1996**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.
A06.5D	**Interior Partitions**	**~1999**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.
A06.5E	**Interior Partitions**	**~1996**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1B	**Interior Doors**	**~1980**: Interior doors are a combination of stained wood doors set in stained wood frames and painted metal doors set in painted metal frames. Some of the doors include insulated glass inserts.	**4**	3	No concerns observed or reported.
A07.1C	**Interior Doors**	**~1996**: Interior doors are typically stained wood solid doors set in stained wood frames.	**4**	-	No concerns observed or reported.
A07.1D	**Interior Doors**	**~1999**: Interior doors are typically painted wood doors set in painted wood frames.	**4**	-	No concerns observed or reported.
A07.1E	**Interior Doors**	**~1996**: Interior doors are typically stained wood doors set in stained wood frames.	**4**	-	No concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.1B	**Ceiling Tiles**	**~1980:** Ceilings for the office spaces on the main floor are comprised of acoustic ceiling tiles on a suspended T-bar grid.	**4**	3	No concerns observed or reported.
A08.1D	**Ceiling Tiles**	**~1999:** The ceiling in the building is finished with painted ceiling tiles.	**3**	3	Ceiling tiles over the building are in overall poor condition including several collateral water damages due to leak from overlying mechanical or roof asset, wet, and buckled. No other concerns observed or reported.
A08.2B	**Gypsum Wall Board (GWB)**	**~1980:** The ceiling in the washroom, garage bay and offices on the second floor are finished with painted GWB ceilings throughout.	**4**	-	No concerns observed or reported.
A08.3C	**Textured Ceiling**	**~1996:** Ceilings are finished with GWB finished with stipple texture.	**4**	-	No concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.3E	Textured Ceiling	**~1999:** Ceilings are finished with GWB finished with stipple texture. The basement is not provided with a ceiling finish.	4	-	No concerns observed or reported.
A08.4D	Wood Board Ceiling	**~1999:** The detached garage ceiling is finished with painted wood boards.	4	-	No concerns observed or reported.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1B	Resilient Floor Sheet	**~1980:** Floors in the second floor and service areas in the first floor are finished with resilient floor sheet installed in ~1980.	4	3	The resilient flooring will reach its EUL within the timeframe of this report. No concerns observed or reported.
		~2005: Floors in the main floor, entrance vestibule and washroom are finished with resilient floor sheet installed in ~2005.	4	-	
A09.1C	Resilient Floor Sheet	**~1996:** Floor in the entrance vestibule, kitchen, dining room, mechanical room, laundry room and washrooms are finished with resilient floor sheet.	4	3	The resilient flooring will reach its EUL within the timeframe of this report. No concerns observed or reported.
A09.1D	Resilient Floor Sheet	**~1999:** Floor in the furnace room, washroom, walk-in closet, and kitchen are finished with resilient floor sheet.	4	3	The resilient flooring will reach its EUL within the timeframe of this report. No concerns observed or reported.
A09.1E	Resilient Floor Sheet	**~1996:** Floor in the entrance vestibule, washrooms, kitchen, and laundry room, are finished with resilient floor sheet.	4	3	The resilient flooring will reach its EUL within the timeframe of this report. No concerns observed or reported.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.2D	**Carpet**	**~1999:** Floors for the living room, hallway, and bedrooms are finished with carpet.	**4**	3	The carpet will reach its EUL within the timeframe of this report. No concerns observed or reported.
A09.3B	**Concrete Floors**	**~1980:** Painted concrete floors are found in the garage bay.	**3**	3	Paint finished is mostly faded. No concerns observed or reported.
A09.3D	**Concrete Floors**	**~1999:** Unfinished concrete floors are provided for the detached garage.	**4**	-	No concerns observed or reported.
A09.4C	**Laminate Floor**	**~2012:** The living room and second floor areas are finished with laminate flooring.	**4**	-	No concerns observed or reported.
A09.4E	**Laminate Floors**	**~2010:** The living room and second floor corridor are finished with laminate floors.	**4**	-	No concerns observed or reported.
A09.5C	**Carpet Stair Finish**	**~1996:** Carpet is provided for the stairs.	**4**	-	No concerns observed or reported.
A09.5E	**Carpet Stair Finish**	**~2010:** Floor for the stairwell is finished with carpet.	**4**	-	No concerns observed or reported.
Imm.1B **A09.6B**	**Resilient Stair Finish**	**~1980:** Resilient floor finish is provided for the stairs treads that lead to the second floor.	**2**	3/1	Stair finish is generally outdated. It is recommended to replace the stair finish immediately as some sections of floor and nosing are lifting and it represents a tripping hazard. No concerns observed or reported.

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A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.1B	**Fixed Casework**	**~1980**: The office spaces are equipped in some areas with fixed casework which generally includes laminated upper and lower cabinets, shelves and laminated countertops.	**4**	3	No concerns were observed or reported.
A10.2B	**Counters**	**~1980**: Laminated countertop is provided for the washroom with a lower laminated cabinet. One laminated counter is provided for the reception with lower stained wood cabinet.	**4**	3	No concerns were observed or reported.
A10.2C	**Counters**	**~2005**: Laminated countertops are provided for the washrooms with stained wood lower cabinets.	**4**	-	No concerns were observed or reported.
A10.2D	**Counters**	**~2010**: A plastic solid surface counter with painted wood lower cabinet is provided for the washrooms.	**4**	-	No concerns were observed or reported.
A10.2E	**Counters**	**~1996**: Laminated countertops are provided for the washroom with stained wood lower cabinets.	**4**	-	No concerns were observed or reported.
A10.3C	**Kitchen Cabinets**	**~1996**: The kitchen is equipped with stained wood upper and lower cabinets and laminated countertops.	**4**	-	No concerns were observed or reported.
A10.3D	**Kitchen Cabinets**	**~2010**: The kitchen is equipped with kitchen cabinets with painted wood upper and lower cabinets and laminated countertops.	**4**	-	No concerns were observed or reported.
A10.3E	**Kitchen Cabinets**	**~1996**: The kitchen is equipped with kitchen cabinets with stained wood upper and lower cabinets and laminated countertops.	**4**	-	No concerns were observed or reported.

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A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.4B	**Blinds**	**~1980**: Prefinished metal horizontal blinds are installed on some of the windows throughout the building.	**4**	-	The blinds have already surpassed its EUL and will require replacement within the timeframe of this report. However, costs are estimated to fall below the Capital Threshold; therefore, no costs have been included. No concerns were observed or reported.
A10.4C	**Blinds**	**~1996**: Prefinished metal horizontal blinds are installed on some of the windows throughout the building.	**4**	-	The blinds have already surpassed its EUL and will require replacement within the timeframe of this report. However, costs are estimated to fall below the Capital Threshold; therefore, no costs have been included. No concerns were observed or reported.
A10.4D	**Blinds**	**~1996**: Prefinished metal horizontal blinds are installed on the windows in the living room and bedrooms throughout the building.	**4**	-	The blinds have already surpassed its EUL and will require replacement within the timeframe of this report. However, costs are estimated to fall below the Capital Threshold; therefore, no costs have been included. No other concerns observed or reported.
A10.5B	**Washroom Accessories**	**~1980**: The washroom accessories include mirror and paper towel dispenser.	**4**	-	The accessories have already surpassed its EUL and will require replacement within the timeframe of this report. However, costs are estimated to fall below the Capital Threshold; therefore, no costs have been included. No concerns were observed or reported.
A10.5C	**Washroom Accessories**	**~1996**: The washroom accessories are standard residential accessories and include mirrors and paper towel holders.	**4**	-	No concerns were observed or reported.
A10.5D	**Washroom Accessories**	**~1999**: The washroom accessories are standard residential accessories and include mirrors and paper towel holders.	**4**	-	No concerns were observed or reported.

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A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.5E	**Washroom Accessories**	**~1996**: The washroom accessories are standard residential accessories and include mirrors and paper towel holders.	**4**	-	No concerns were observed or reported.
A10.6C	**Appliances**	**~1996:** Residential grade appliances are provided for the building including: refrigerator, freezer, cooking range, washer and dryer.	**4**	3	No concerns were observed or reported.
A10.6D	**Appliances**	**~1999:** Residential grade appliances are provided for the building including: refrigerator, cooking range, dishwasher, washer and dryer.	**4**	3	No concerns were observed or reported.
A10.6E	**Appliances**	**~1996:** Residential grade appliances are provided for the building including: refrigerator, cooking range, dishwasher, washer and dryer.	**4**	3	No concerns were observed or reported.
A10.7E	**Curtains**	**~1996:** Windows for the building are provided with curtains.	**4**	-	The curtains will reach its EUL within the timeframe of this report; however, the replacement cost has not been included in Capital Reserve Table since it will be completed below the Capital Threshold. No other concerns were observed or reported.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.2A R01.1A	**Metal Roofing**	**~1975**: The roof is finished with sheet metal roofing throughout.	**3**	3	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Leaks were reported around vents penetrations. Ice dams on the gutters on the east and west elevations were observed. (See Note **3C**) No other concerns or issues were reported.
R01.1B	**Metal Roofing**	**~1980**: Roof is mostly concealed and not directly reviewed but assumed to be a metal sheet roofing system throughout.	**4**	3	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Roof finish could not be determined and information provided is based on assumptions. No concerns or issues were reported regarding active leaks.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1C	**Metal Roofing**	**~1996**: According to drawings provided the roof is comprised of a metal sheet roofing system.	**4**	-	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Roof finish is based on reports and drawings provided. No concerns or issues were reported regarding active leaks.
R01.1D	**Metal Roofing**	**~1999**: According to the Point of Contact the roof is finished with sheet metal roofing throughout the staff house and garage.	**4**	-	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Roof finish is based on reports. No concerns or issues were reported regarding active leaks.
R01.1E	**Metal Roofing**	**~1996**: According to the Point of Contact the roof is finished with sheet metal roofing on Staff house 3 and the roofs over the shed consists of corrugated metal.	**4**	-	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Roof finish is based on reports. No concerns or issues were reported regarding active leaks.
R01.2A	**Gutters and Downspouts**	**~1975**: Rainwater is discharged through galvanized steel gutters and downspouts.	**-**	4	The roof is not provided with gutters and downspouts allowing water to drain on the ground. (See Note **3D**) No concerns or issues were observed or reported.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.2B	**Gutters and Downspouts**	**~1980**: Prefinished metal gutters and downspouts are provided for the west elevation.	**4**	-	The gutters and downspouts have reach their EUL require replacement. Replacement is recommended as a preventative maintenance item at a cost below the Capital Threshold. No concerns or issues were observed or reported.
R01.2C	**Gutters and Downspouts**	**~1996**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	-	No concerns or issues were observed or reported.
R01.2D	**Gutters and Downspouts**	**~1999**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	-	A few leaks were reported by the Point of Contact, possibly due to lack of maintenance on gutters. Costs for cleaning gutters are assumed to fall below the Capital Threshold; therefore no costs are included. No other concerns or issues were observed or reported.
R01.2E	**Gutters and Downspouts**	**~1996**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	-	Issue regarding leaks on the downspouts was reported and installing new downspout or repairing downspout joints is required to be conducted. Costing for this issue will be completed below the Capital Threshold of this report. No other concerns or issues were observed or reported.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.1B	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	No concerns observed or reported
A99.1C	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	No concerns observed or reported
A99.1D	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	No concerns or issues were reported.
Imm.3E/ A99.1E	**Mould**	Potential Mould growth was observed on the bedroom window in the second floor.	**4**	3/5	During the site assessment, several grey color potential mould areas were observed at the corner of the bedroom window frames. The contaminated area was temporarily covered by blankets. It is estimated that the mould was grown by moisture created by the excessive indoor and outdoor temperature difference created by the blanket. It is also considered an indication of potential mould contamination in other areas in that same indoor environment. The discovered growing mould can cause a significant occupational health and safety issue and destroy the window frame. The mold should be cleaned up with along with mould remediation. Costing for a study to identify any remedial measure has been included in Capital Reserve Table. No concerns or issues were reported.
A99.2C	**Exterior Stairs**	**~1996:** Painted wood structure stairs with wood handrails and guardrails are provided for the building entrances.	**4**	-	No concerns or issues were reported.

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A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.2D	**Exterior Stairs**	**~1996:** Painted wood structure stairs with wood handrails and guardrails are provided for the southeast and northwest entrance porch and deck. The southeast deck consists of cedar railing posts, cedar balustrades, cedar side rails and caps. The stair's railing and landing were built the same style as deck.	**3**	-	The northwest stair was covered by snow and therefore the evaluation of the exterior is based on the status of southeast stair. The paint on the wood handrails was generally peeled and discolored. Considering the weather condition of Dawson, paint on the exterior stair can easily peel off due to seeping melted water into wooden stair component. Therefore, exterior wall should be finished with oil based paint or any improved freeze/thaw resistant paint. No concerns or issues were reported.
A99.2E	**Exterior Stairs**	**~1999:** Wood structure stairs with wood handrails and guardrails are provided for the main entrances.	**4**	-	No concerns or issues were reported.

NOTES:

3A) Metal entrance doors generally have an estimated EUL of 40 years. Existing units are currently 36 years old but one of them is in poor condition and requires replacement as operational issues are starting to become a concern. The door on the south elevation is in acceptable condition but will require replacement soon. We recommend replacing the two existing units within the timeframe of this report. Costs are included in the Capital Reserve Table combined with line item A03.1B.

3B) Location and severity of settlement and ponding could not be determined. An allowance is included in the Capital Reserve Table for repairs. Costs for repairs will rely on the extension of the work required.

3C) These ice formations are generally caused by improper insulation or ventilation on higher sections of the roof, causing the roof to warm up enough to melt layers of snow which then go downslope and freeze in colder sections of the roof (typically the eaves). As this freeze-thaw cycle recurs, a ridge of ice develops and traps water on the roof, causing water to leak into the building affecting several systems and components including the walls, roof, ceilings and insulation, and also causing ice build-up on ground areas. It is possible as other issues were reported regarding the building insulation that the main issue is caused by improper insulation on the roof. A study is recommended to confirm the definite cause and to provide a permanent solution to this issue. An allowance is included in the Capital Reserve for both the study and potential repairs triggered by the study. Costs for repairs will rely solely on the results of the study. Since the roof have surpassed its expected useful life and will require replacement within the timeframe of this report we recommend addressing this issue along with the roof replacement.

Issues with leaks through vents and roof penetrations should be repaired along with the joint sealers replacements (See line item A02.5A).

3D) No rainwater drainage system was observed on site at the time of the assessment. Water appears to drain freely from the roof top and on the ground. This issue at low freezing temperatures is causing ice to build-up along the eaves. It was also noted that water is penetrating the metal soffit and most likely the exterior walls potentially affecting these building components. We recommend installing a proper drainage system for the roof to allow for rainwater to be drained strategically to areas where it won't affect the building other building systems or cause severe erosion on the grounds surrounding the building. Costs for improvements are included in the Capital Reserve Table.

It is possible that a larger than normal amount of ice on the eaves is being caused by the metal sheet roofing being warmer than expected, this issue is being covered in line item R01.1A. It is expected that with improvements on the roof and a proper rainwater drainage system, ice build-up on the eaves will most likely be minimized.

IMMEDIATE ITEMS:

Imm.1B) Replace resilient stair finish.

Imm.2A) Study for ice dams on eaves.

Imm.3E) Study for mould growth.

No other immediate items were identified.

RECOMMENDED FURTHER INVESTIGATION:

RAI.1A) Study ice dams on eaves.

RAI.2E) Study mould growth.

DIESEL PLANT (SITE A):



Photo #A1A: General overview of the metal cladding condition.



Photo #A2A: Exterior overhead door reported to have operational issues (behind security swing gates).



Photo #A3A: Ice formations on the eaves.



Photo #A4A: Evidence of water coming out of the metal soffit.

OFFICE BUILDING (SITE B):



Photo #A5B: Typical metal cladding.



Photo #A6B: Wood siding detail and window's poor caulking condition.



Photo #A7B: Exterior utility door.



Photo #A8B: Resilient stair finish.

STAFF HOUSE 1 (SITE C):



Photo #A9C: Shed and detached garage.



Photo #A10C: Typical exterior finishes



Photo #A11C: Interior finishes living room.

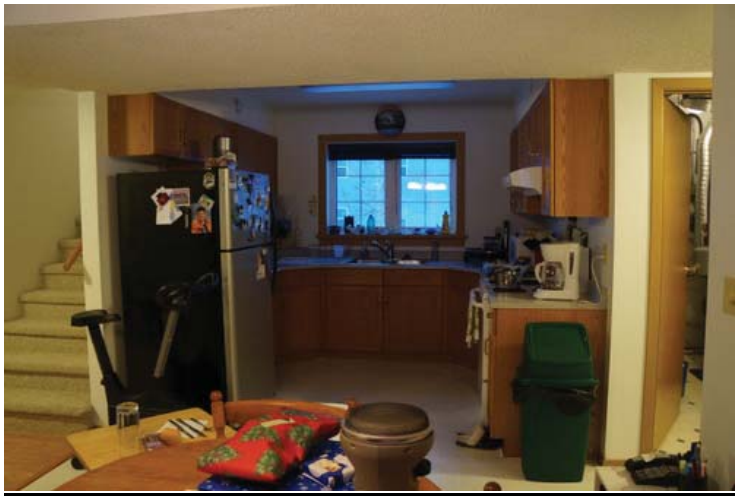


Photo #A12C: Interior finishes kitchen area.

STAFF HOUSE 2 (SITE D):



Photo #A13D: Typical exterior finishes.



Photo #A14D: Wood soffit and window.



Photo #A15D: Typical interior finishes.



Photo #A16D: Damaged ceiling tiles.

STAFF HOUSE 3 (SITE E):



Photo #A17E: Typical exterior finishes.



Photo #A18E: Wood soffit and windows.

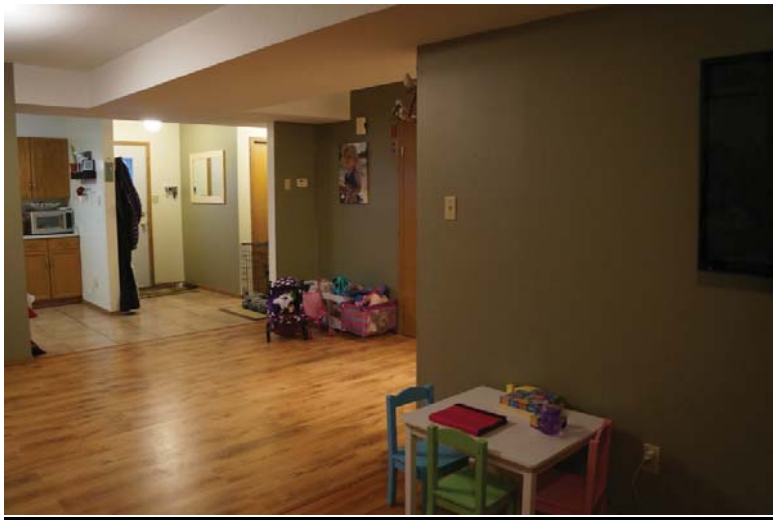


Photo #A19E: Typical interior finishes.



Photo #A20E: Potential Mould growth on the window frames.



4.0 STRUCTURAL

Site A: Diesel Plant

No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods it is assumed to consist of CIP strip and spread footing foundations. The building floor is a reinforced CIP concrete slab on grade. The superstructure is a steel frame structure comprised of wide flange columns, beams, wall girts and purlins. Interior walls are wood framed partitions with wood studs covered with GWB for the office area. The roof is steel beams and purlins with metal decking.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site B: Office Building

No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods it is assumed to consist of CIP strip and spread footing foundations. The building floor is a reinforced CIP concrete slab on grade. Second floor structure is a wood frame structure comprised of timber wood floor joists, beams and decking. The superstructure is comprised of load-bearing wood frame stud walls supporting wood trusses. Interior walls are wood framed partitions with wood studs covered with GWB. The roof is assumed to wood trusses covered with plywood panels.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site C: Staff House 1

Some structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and according to drawings provided the foundation system consists of permanent wood foundations (PWF) sitting on a compacted granular base supporting a torque tube steel foundation. The building floors are wood frame structures comprised of wood flat trusses with a plywood decking. The superstructure is composed of load-bearing wood frame stud walls supporting wood roof trusses. Interior walls are wood framed partitions with wood studs covered with GWB. The roof for the house is covered with plywood panels. The garage roof structure is comprised of wood trusses covered with metal decking.

Capital expenditures with respect to the substructure were identified within the timeframe of this report.



A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site D: Staff House 2

The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods, the building foundation is a wood foundation (PWF) pads. The building floor is a suspended wood floor structure comprised of wood beams and floor joists and plywood decking. The superstructure is composed of load-bearing wood frame stud walls supporting wood trusses. Interior walls are wood framed partitions with wood studs covered with GWB.

The roof structure is composed of wood rafters and joists presumably covered by plywood panels.

Capital expenditures items were not identified within the timeframe of this report. Further investigation related to building's substructure is recommended to be conducted.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site E: Staff House 3

Some structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and according to drawings provided, the foundation system consists of permanent wood foundations (PWF) sitting on a compacted granular base. The building floor is a wood frame structure comprised of Type B wood flat trusses with a plywood decking. The upper floor is a wood frame structure with wood beams, floor joists and decking. The superstructure is composed of load-bearing wood frame stud walls supporting wood roof trusses. Interior walls are wood framed partitions with wood studs covered with GWB. The roof for the house is covered with plywood panels.

The roof structure is composed of wood rafters and joists presumably covered by plywood panels.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S01.1A	**Substructure**	**~1975:** The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made and standard construction methods it is assumed to consist of CIP strip and spread footing foundations.	**4**	-	No concerns observed or reported.
S01.1B	**Substructure**	**~1980**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made and standard construction methods it is assumed to consist of CIP strip and spread footing foundations.	**4**	-	No structural drawings were provided. No concerns observed or reported.
Imm.4C **S01.1C**	**Substructure**	**~1996**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made and according to drawings provided on site it consist of permanent wood foundation (PWF) supporting a torque tube steel foundation.	**2**	1	Settlement was reported by the Point of Contact. Some cracks were observed on the interior walls and above doors thresholds possibly indicating settlement on the building. (See Note **4A**) No other concerns observed or reported.
Imm.5D **S01.1D**	**Substructure**	**~1999**: The substructure is mostly concealed; therefore, was not directly reviewed. Based upon the structural drawing provided by YEC, the building is sitting on hollow steel section (HSS) beams based on six permanent wood foundation (PWF) pads.	**4**	5	It was observed that approximately ¼" vertical cracking on interior load-bearing walls in the kitchen and some minor wall cracks in some rooms. A structural study is recommended to identify the settlement causes or roof framing deterioration due to excessive live loads. In addition, if the study verifies that the building structure is sound, repairing the damages area should be followed in addition to any needed structural remediation required based on the result of the study. No concerns or issues were observed or reported.

S01.1E	**Substructure**	**~1996**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made on site and according to drawings provided, the foundation system consists of permanent wood foundations (PWF) sitting on a compacted granular base.	**4**	-	No other concerns observed or reported.

S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1A	**Slab on Grade**	The building is constructed on a CIP slab on grade.	**4**	-	No concerns were observed or reported.
S02.1B	**Slab on Grade**	The building is constructed on a CIP slab on grade.	**4**	-	No concerns were observed or reported.
S02.1C	**Slab on Grade**	The garage is constructed on a CIP slab on grade.	**4**	-	No concerns were observed or reported.

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.1B	**Stairs**	**~1980**: The stair structure is mostly concealed and not directly reviewed it is assumed to be comprised of wood strings, risers and treads.	**4**	-	No concerns were observed or reported.
S03.1C	**Stairs**	**~1996**: The stairs to access the second floor are comprised of wood strings, risers and treads.	**4**	-	No concerns were observed or reported.
S03.1E	**Stairs**	**~1996**: The stairs to access the second floor are comprised of wood strings and treads.	**4**	-	No concerns were observed or reported.
S03.2B	**Suspended Floors**	**~1980:** The second floor structure is a wood frame structure comprised of timber wood beams, floor joists and decking according to observations made on site.	**4**	-	No concerns were observed or reported.

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.2C	**Suspended Floors**	**~1996:** The floors for the building are wood frame structures comprised of wood flat trusses with plywood decking.	**4**	-	No concerns were observed or reported.
S03.2D	**Suspended Floors**	**~1999:** The floor for the building D is a wood frame structure comprised of wood beams and floor joists.	**4**	-	No concerns were observed or reported.
S03.2E	**Suspended Floors**	**~1996:** The floors for the main and second floors are wood frame structures comprised of timber wood beams and floor joists.	**4**	-	No concerns were observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1A	**Framing**	**~1975**: The building structure is a steel frame construction comprised of wide flange columns, beams and purlins. Steel wall girts are also provided for horizontal support.	**4**	-	No concerns or issues were observed or reported.
S04.1B	**Framing**	**~1980**: The building structure is comprised of load-bearing wood frame stud walls supporting wood trusses and decking.	**4**	-	No concerns or issues were observed or reported.
S04.1C	**Framing**	**~2005**: The building structure is comprised of load-bearing wood frame stud walls supporting wood roof trusses and decking.	**4**	-	No concerns or issues were observed or reported.
S04.1D	**Framing**	**~1999**: The building structure is comprised of load-bearing wood frame stud walls supporting wood trusses and decking.	**4**	-	No concerns were observed or reported.
S04.1E	**Framing**	**~1996**: The building structure is comprised of load-bearing wood frame stud walls supporting wood beams, ceiling joists and roof rafters and decking.	**4**	-	No concerns or issues were observed or reported.

S05 INTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S05.1A	**Interior Walls**	**~1975:** Interior walls are wood frame partitions with GWB coverings for the office area. Where present in the diesel plant area they are comprised of stud frame partitions with metal sheet coverings.	**4**	-	No concerns observed or reported.
S05.1B	**Interior Walls**	**~1980:** Interior walls are wood frame partitions with GWB coverings.	**4**	-	No concerns observed or reported.
S05.1C	**Interior Walls**	**~1996:** Interior walls are wood frame partitions with wood studs and GWB coverings.	**4**	-	No concerns observed or reported.
S05.1D	**Interior Walls**	**~1999:** Interior walls are wood frame partitions with wood studs and GWB coverings.	**4**	-	No concerns observed or reported.
S05.1E	**Interior Walls**	**~1996:** Interior walls are wood frame partitions with wood studs and GWB coverings.	**4**	-	No concerns observed or reported.
S05.2A	**Interior Columns**	**~1975:** Interior columns are steel wide flange columns.	**4**	-	No concerns observed or reported.
S05.2B	**Interior Columns**	**~1980:** Mostly concealed. Based on observations interior wood timber columns are assumed to be provided for vertical support.	**4**	-	No concerns observed or reported.
S05.2C	**Interior Columns**	**~2005:** Mostly concealed. Based on observations interior wood timber columns are provided.	**4**	-	No concerns observed or reported.
S05.2D	**Interior Columns**	**~2005:** Mostly concealed. Based on observations interior wood timber columns are provided.	**4**	-	No concerns observed or reported.
S05.2E	**Interior Columns**	**~1993:** Mostly concealed. Based on observations interior wood timber columns are assumed to be provided for vertical support.	**4**	-	No concerns observed or reported.

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.1B	**Exterior Load-bearing Walls**	**~1980**: Exterior load-bearing walls are wood stud framed walls with GWB covering the interior and wood/metal siding on the exterior.	**4**	-	No concerns observed or reported.
S06.1C	**Exterior Load-bearing Walls**	**~1996**: Exterior load-bearing walls are wood stud farmed walls with GWB covering the interior and plywood vinyl siding on the exterior.	**4**	-	No concerns observed or reported.
S06.1D	**Exterior Load-bearing Walls**	**~1999**: Exterior load-bearing walls are wood stud farmed walls with GWB covering the interior and wood siding on the exterior.	**4**	-	No concerns observed or reported.
S06.1E	**Exterior Load-bearing Walls**	**~1996**: Exterior load-bearing walls are wood stud farmed walls with GWB covering the interior and wood siding on the exterior.	**4**	-	No concerns observed or reported.

S99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S99.1D	**Deck**	**~1999:** The building is provided with a wood structure deck accessible through the dining room.	**4**	-	Decks were mostly covered in snow and a comprehensive evaluation could not be completed. No concerns were observed or reported.
S99.1E	**Deck**	**~1996:** The building is provided with a wood structure deck on the west elevation of the building.	**4**	-	Decks were mostly covered in snow and a comprehensive evaluation could not be completed. No concerns were observed or reported.

NOTES:

4A) It is recommended to conduct a structural study to address this issue and conduct permanent repairs. An allowance is included in the Capital Reserve Table for both the study and the repairs. Costs for repairs will rely solely on the results of the study.

IMMEDIATE ITEMS:

Imm.4C) Study building settlement for Building C.
Imm.4D) Study building settlement for Building D.

No other immediate items were identified.

RECOMMENDED FURTHER INVESTIGATION:

RAI.3C) Study building settlement.
RAI.4D) Study building settlement.

No additional recommended investigation is required at this time.

Yukon Energy Corporation
2017 – 2018 General Rate Application
John Maissan-YEC-1-37 Attachment 1

DIESEL PLANT (SITE A):



Photo #S1A: Exterior structure.



Photo #S2A: Interior overall view of the structure components.

OFFICE BUILDING (SITE B):



Photo #S3B: Exterior general view.



Photo #S4B: Interior overall view from the garage bay.

STAFF HOUSE 1 (SITE C):



Photo #S5C: North elevation.



Photo #S6C: Cracked observed due to potential settlement.

STAFF HOUSE 2 (SITE D):



Photo #S7D: Building exterior wood deck and stair.



Photo #S8D: Interior wall cracking.

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STAFF HOUSE 3 (SITE E):



Photo #S9E: Exterior wood deck.



Photo #S10E: Damaged wood balustrade.

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John Maissan-YEC-1-37 Attachment 1



5.0 MECHANICAL

Site A: Diesel Plant

The mechanical elements of the Diesel Plant (Building A) are outside the scope of this report and were not directly reviewed.

Site B: Office Building

The building is supplied with domestic water from the town's local service provider. Sanitary sewer running on PVC plastic pipes is disposed to the town's sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via hot water boilers located in the Diesel Plant (Building A) and distributed through hot water baseboard heaters throughout. The garage bay area is heated by hot water unit heaters connected to the hydronic system. Cooling is provided by one split air conditioner unit in the offices main floor. Ventilation is assumed to be accomplished through attic vents and exhaust ventilation. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and one wall mounted unit in the garage bay. Plumbing fixtures for the washroom are vitreous china tank type water closet and a counter mounted enamel lavatory. Portable ABC fire extinguishers were observed throughout for fire protection.

Capital expenditures with respect to the boiler, baseboard heaters and unit heaters are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

Site C: Staff House 1

The building is supplied with domestic water from the town's local service provider and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to the town's sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. One domestic hot water heater is provided for the building completed with a recirculation system from the boiler. Heating for the building is accomplished via one hot water boiler also located in the mechanical room. The boiler is connected to fan coils and heating is distributed through galvanized metal ductwork. The hydronic system is completed with water pumps and expansion tank. Ventilation is presumably accomplished through heat recovery ventilators (HRV). Localized digital thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by ceiling mounted units and one range hood in the kitchen. Plumbing fixtures are vitreous china tank type water closets, counter mounted enamel lavatories and fiberglass bathtub insert.

Capital expenditures are not anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.



Site D: Staff House 2

The building is supplied with domestic water from the town service provider and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to the town sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via one oil-fired furnace also located in the furnace room Ventilation is assumed to be accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and through a range hood in the kitchen. Plumbing fixtures for the washroom are vitreous china tank type water closet, counter solid plastic lavatory and fiberglass shower inserts. One portable ABC fire extinguisher is provided in the building for fire protection.

Capital expenditures items were not identified within the timeframe of this report. Further investigation related to heating is recommended to be conducted.

The mechanical components are in acceptable overall condition.

Site E: Staff House 3

The building is supplied with domestic water from the town service provider and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to the town sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided through one electric heater located in the furnace room. Heating for the building is accomplished via one oil-fired furnace also located in the furnace room. Ventilation is accomplished through a heat recovery ventilator (HRV) connected to the ductwork and the unit is located in the furnace room. Localized analog thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by ceiling mounted units and one range hood in the kitchen. Plumbing fixtures are vitreous china tank type water closets, and counter mounted vitreous china lavatories. The washroom is additionally provided with fiberglass shower inserts. Three portable ABC fire extinguishers were observed in the furnace room for fire protection.

Capital expenditures items were not identified within the timeframe of this report. Further investigation related to heating is recommended to be conducted.

The mechanical components are in acceptable overall condition.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M01.1B	**Domestic Water Supply**	Water is supplied from the town service provider	**4**	-	No concerns observed or reported.
M01.1C	**Domestic Water Supply**	Water is supplied from the town service provider	**4**	-	No other concerns observed or reported.
M01.1D	**Domestic Water Supply**	Water is supplied from the town service provider.	**4**	-	No concerns observed or reported.
M01.1E	**Domestic Water Supply**	Water is supplied from the town service provider.	**4**	-	No concerns observed or reported.
M01.2B	**Sanitary Sewer**	Sanitary sewage is assumed to be disposed to the town sewage system.	**4**	-	No concerns observed or reported.
M01.2C	**Sanitary Sewer**	Sanitary sewage is assumed to be disposed to the town sewage system.	**4**	-	No concerns observed or reported.
M01.2D	**Sanitary Sewer**	Sanitary sewage is disposed to the town sewage system.	**4**	-	No concerns observed or reported.
M01.2E	**Sanitary Sewer**	Sanitary sewage is disposed to the town sewage system.	**4**	-	No concerns observed or reported.
M01.3B	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3C	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3D	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3E	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.4B	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.
M01.4C	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.
M01.4D	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.
M01.4E	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.1B	**Water Distribution**	**~1980:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No concerns observed or reported.
M02.1C	**Water Distribution**	**~1996:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No other concerns observed or reported.
M02.1D	**Water Distribution**	**~1996:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No other concerns observed or reported.
M02.1E	**Water Distribution**	**~1999:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No other concerns observed or reported.
M02.2B	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2C	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2D	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2E	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.3B	**Domestic Hot Water Heaters**	**2008:** One electric water heater is provided for the building. Unit is located in the storage room below the stairs. Data label information is as follow: Make: GSW Series 6 Model: 6G50SDE1 Serial Number: S0710 523649 Capacity: 184 L	**4**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.3C	**Domestic Hot Water Heaters**	**~1996:** One domestic hot water heater is provided for the building completed with a recirculation system from the boiler. No data label was available.	**4**	-	Domestic hot water heaters generally have a EUL of 20 years, at which time they should be replaced as a preventative maintenance item and to guarantee domestic hot water supply. (See Note **5B**) No concerns observed or reported.
M02.3D	**Domestic Hot Water Heaters**	**~2010:** One electric domestic hot water heater is provided for the Building D. Unit is located in the furnace room. The entire hot water was insulated so the data label was not accessible.	**4**	-	No concerns observed or reported.
M02.3E	**Domestic Hot Water Heaters**	**~2010:** One electric domestic hot water heater is provided for the building. Unit is located in the furnace room. Data label information is as follow: Make: Moffat Model: 6G50SDE1 Serial Number: S1240 F702376 Capacity: 184 Litres.	**4**	-	No concerns observed or reported.
M02.4B	**Waste Water Piping**	**~1980**: PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4C	**Waste Water Piping**	**~1996:** PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4D	**Waste Water Piping**	**~1996:** PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4E	**Waste Water Piping**	**~1999:** PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.5C	**Water Pumps**	**~1996:** One water pump is provided connected to the hydronic system. The pump is ½ HP.	**4**	-	No concerns were observed or reported.
M02.6B	**Washroom Fixtures**	**~1980**: The washroom is provided with vitreous china flush tank water closet and enamel steel counter mounted lavatory.	**4**	3	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.6C	**Washroom Fixtures**	**~1996**: The washrooms are provided with vitreous china flush tank water closets, enamel steel counter mounted lavatories and fiberglass bathtub insert.	**4**	-	It was reported that the bathtub tabs were replaced in 2015. No concerns observed or reported.
M02.6D	**Washroom Fixtures**	**~2010**: The washroom is provided with vitreous china flush tank water closet, plastic solid counter lavatories, and fiberglass shower insert.	**4**	-	No concerns observed or reported.
M02.6E	**Washroom Fixtures**	**~1999**: The washrooms are provided with vitreous china flush tank water closets, counter mounted lavatories and fiberglass shower and bathtub inserts.	**3**	-	The washroom fixtures will reach their EUL beyond the timeframe of this report and thus costing for the replacement has not been included in Capital Reserve Table. However, issue regarding to the flush valve of the water closet located on the main floor washroom was reported. The flush valve should be replaced for washroom users. In addition, it was generally observed that water closets were damaged by water stains and should be cleaned with detergents regularly. No concerns observed or reported.
M02.7B	**Sinks**	**~1980**: Stainless steel single basin sink is provided on the second floor office. One enamel steel stand-alone service sink in also provided on the main floor.	**4**	3	No concerns observed or reported.
M02.7C	**Sinks**	**~1996**: One stainless steel double basin sink is provided for the kitchen and one enamel steel stand-alone service sink in also provided on the mechanical.	**4**	-	No concerns observed or reported.
M02.7D	**Sinks**	**~2010**: One stainless steel double basin sink is provided for the kitchen.	**4**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.9E	**Sinks**	**~1999**: A stainless steel double basin sink is provided for the kitchen and a plastic utility sink is located in the furnace room.	**3/4**	-	The utility sink was observed to be damaged by hot water. The top coating was peeled off and basin was discolored. The damaged sink can cause water leaks on the floor of the furnace room, as well as not aesthetically pleasing, and therefore it should be replaced at a cost will below the Capital Threshold. No concerns observed or reported.
M02.10A	**Floor Drains**	The garage bay and washroom include floor drains.	**4**	-	No concerns observed or reported.
M02.11E	**Water Filtration System**	**~1999:** The building is provided with a water filtration system.	**4**	-	No concerns observed or reported.
M02.12B	**Expansion Tank**	**~1980:** One Amtrol Threm-X-Trol expansion tank is provided for the hydronic heating system.	**4**	-	No concerns observed or reported.
M02.12C	**Expansion Tank**	**~1996:** One expansion tank is provided for the hydronic heating system.	**4**	-	No concerns observed or reported.

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.6B M03.1B	**Boiler**	**~2002**: The building is heated from the Diesel Plan (A) through a series of hot water boilers manufactured by Weil-McLain. The units have a heating capacity of 303 MBH each. A total of four boilers were observed.	**4**	2	Inadequate heating was reported on the main office floor. According to the Point of Contact portable heaters are required to accomplish a comfortable indoor temperature. (See Note **5A**) No other concerns observed or reported.
M03.1C	**Boiler**	**~2013**: The building is heated by a hot water boiler manufactured by Biasi. The unit have a heating capacity of 110 MBH.	**4**	-	No other concerns observed or reported.

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.7D M03.2D	**Furnace**	~**2007**: Building D is mainly heated through an oil-fired furnace, manufactured by Lennox. Data label is as follows: Make: Lennox Model: OHR2303-105/120-3B Serial: 8499A17750 Capacity: Max. 97,000 BTUH ~**1996**: Garage is mainly heated through an oil-fired furnace, manufactured by Airco. Data label is as follows: Make: Airco Products Ltd. Model: Unknown Serial: Unknown Capacity: Max. 105,000 BTUH	**3/4**	5	Issue regarding excessively cold floor in the winter time was reported. The reasons for this issue are estimated on filthy furnace filter, blocked air flow, improperly handled ductwork dampers. The furnace has not reached its EUL yet and thus a study for the existing furnace and improving indoor heating is recommended beforehand and any remedial measure should be followed based on the result of the study. Costing for the study has been included in Capital Reserve Table. No concerns observed or reported.
Imm.8E M03.2E	**Furnace**	~**2008**: The building is heated through an oil fired furnace, manufactured by Kerr. Data label information is as follows: Model: Compact Multi K4C-090 31 Serial: 1006189	**3/4**	5	Issue regarding excessively cold floor in the winter time was reported. The reasons for this issue are estimated on filthy furnace filter, blocked air flow, improperly handled ductwork dampers. The furnace has not been reached its EUL yet and thus a study for the existing furnace and improving indoor heating is recommended beforehand and any remedial measure should be followed based on the result of the study. Costing for the study has been included in Capital Reserve Table. No concerns observed or reported.
M03.3B	**Baseboard Heaters**	**~1980**: Hydronic baseboard heaters are provided for the office area.	**4**	3	No concerns observed or reported.

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.4B	**Unit Heaters**	**~1980:** Hydronic suspended unit heaters are provided for the garage bay.	**4**	3	No concerns observed or reported.
M03.5B	**Force Flow Heater**	**~2000:** One electric force flow heater is installed in the washroom.	**4**	-	No concerns observed or reported.
M03.6C	**Fan Coils**	**~1996:** Fan coils are provided connected to the hydronic system.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1C	**Air Distribution**	**~1996**: Air distribution is provided by galvanized metal ductwork distributed within the ceiling space.	**4**	-	No concerns observed or reported.
M04.1D	**Air Distribution**	**~1996**: The forced air heating is distributed throughout the building by a galvanized metal ductwork system.	**4**	-	It is recommended that the existing duct be cleaned for improving heating to the building at a cost below the Capital Threshold. No concerns observed or reported.
M04.1E	**Air Distribution**	**~1999**: Air distribution is provided by galvanized metal ductwork.	**4**	-	It is recommended that the existing duct be cleaned for improving heating to the building at a cost below the Capital Threshold. . No concerns observed or reported.
M.04.2B	**Ventilation**	**~1980:** Ventilation is accomplished through attic vents and exhaust ventilation.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M.04.2C	**Ventilation**	**~1996:** Ventilation is assumed to be accomplished through a heat recovery ventilator connected to the ductwork.	**4**	-	No concerns observed or reported.
M.04.2D	**Ventilation**	**~1996:** Ventilation is assumed to be accomplished through a heat recovery ventilator connected to the ductwork and concealed within the ceiling space.	**4**	-	No concerns observed or reported.
M.04.2E	**Ventilation**	**~1999:** Ventilation is accomplished through a heat recovery ventilator connected to the ductwork. Unit is located in the furnace room.	**4**	-	No concerns observed or reported.
M04.3C	**Air Outlets & Inlets**	**~1996**: The air outlets and inlets are comprised of supply and return air diffusers.	**4**	-	No concerns observed or reported.
M04.3D	**Air Outlets & Inlets**	**~1996**: Prefinished metal grilles are provided throughout the building for the forced air heating system. The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.
M04.3E	**Air Outlets & Inlets**	**~1999**: Prefinished metal grilles are provided throughout the building for the forced air heating system. The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.
M04.4B	**Exhaust Fans**	**~1980**: Ceiling mounted exhaust units are provided in the washroom and on the main floor. One wall mounted unit was observed in the garage bay.	**4**	-	No concerns observed or reported. (See Note **5B**)
M04.4C	**Exhaust Fans**	**~1996**: Recessed exhaust fans are provided in the washrooms. Exhaust ventilation in the kitchen is accomplished by a range hood.	**4**	-	No concerns observed or reported.
M04.4D	**Exhaust Fans**	**~1996**: A ceiling mounted exhaust fans are provided in the washroom. Exhaust ventilation in the kitchen is accomplished by a range hood.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.4E	**Exhaust Fans**	**~1999**: Ceiling mounted exhaust fans are provided in the washrooms. Exhaust ventilation in the kitchen is accomplished by a range hood.	**4**	-	No concerns observed or reported.
M04.5B	**Damper**	**~1980:** Mechanically operated dampers are provided in the garage bay.	**4**	-	No concerns observed or reported.
M04.5C	**Damper**	**~1996:** Mechanically operated damper is provided in the mechanical room.	**4**	-	No concerns observed or reported.

M05 COOLING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M05.1B	**Split Air Conditioner**	**~1980**: Cooling in the main floor office space is accomplished by a split air conditioning unit. The unit is provided with one outdoor condenser unit and one indoor evaporating unit. Equipment was manufactured by Mitsubishi. Cooling capacity is estimated in 8,800 BTU/h. Portable air conditioning units were observed on the second floor.	**4**	**-**	No concerns observed or reported.

M06 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M06.1B	**Fire Extinguishers**	Portable ABC fire extinguishers are provided throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M06.1C	**Fire Extinguishers**	Portable ABC fire extinguishers are provided throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M06.1D	**Fire Extinguishers**	One portable ABC fire extinguisher is provided for the building.	**4**	-	Fire extinguishers are reportedly inspected on yearly. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M06.1E	**Fire Extinguishers**	Three portable ABC fire extinguishers are provided for the building and they are all located in the furnace room.	**4**	-	Fire extinguishers are reportedly inspected on yearly. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.

M07 CONTROLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M07.1B	**Electric and Electronic Controls**	**~1980**: Local analog thermostats were observed throughout the building.	**4**	-	No concerns observed or reported. (See Note **5B**)
M07.1C	**Electric and Electronic Controls**	**~1996**: Local analog thermostats were observed throughout the building.	**4**	-	No concerns observed or reported.
M07.1D	**Electric and Electronic Controls**	**~1996**: Local analog thermostats were observed throughout the building.	**4**	-	No concerns observed or reported.
M07.1E	**Electric and Electronic Controls**	**~1999**: Local analog thermostats were observed throughout the building.	**4**	-	No concerns observed or reported.

NOTES:

5A) It is possible that the boilers capacity is not sufficient to heat the building or that not enough heating equipment is installed in this area. Golder recommends conducting a study and repairs to address this issue. Costs are included in the Capital Reserve Table. Final costs for repairs will rely solely on the results of the study.

5B) This component requires repair or replacement; however, the cost associated with repairing or replacing it is anticipated to fall below the Capital Threshold, therefore it has not been included in the Capital Reserve Table.

IMMEDIATE ITEMS:

Imm.6B) Heating study.
Imm.7D) Heating study.
Imm.8E) Heating study.

No other immediate items were identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

RAI. 5B) Heating study for the office area.
RAI. 6D) Heating study Staff House 2.
RAI. 7E) Heating study Staff House 3.

No additional further investigation recommended at this time.

OFFICE BUILDING (SITE B):



Photo #M1B: Domestic Water Heater.



Photo #M2B: Boilers located in the Diesel Plant (A) providing heat to the Main Office Building (Site B).



Photo #M3B: Hydronic unit heater in the garage bay.



Photo #M4B: Evaporating cooling unit.

STAFF HOUSE 1 (SITE C):



Photo #M5C: Hot water heater.



Photo #M6C: Hot water boiler.



Photo #M7C: Hydronic system.



Photo #M8C: Fan coil.

STAFF HOUSE 2 (SITE D):



Photo #M9D: Domestic hot water heater.



Photo #M10D: Oil-fired furnace.



Photo #M11D: Typical shower insert and shower head.



Photo #M12D: Furnace in the garage.

STAFF HOUSE 3 (SITE E):



Photo #M13E: Domestic water heater.



Photo #M14E: Water filtering system.

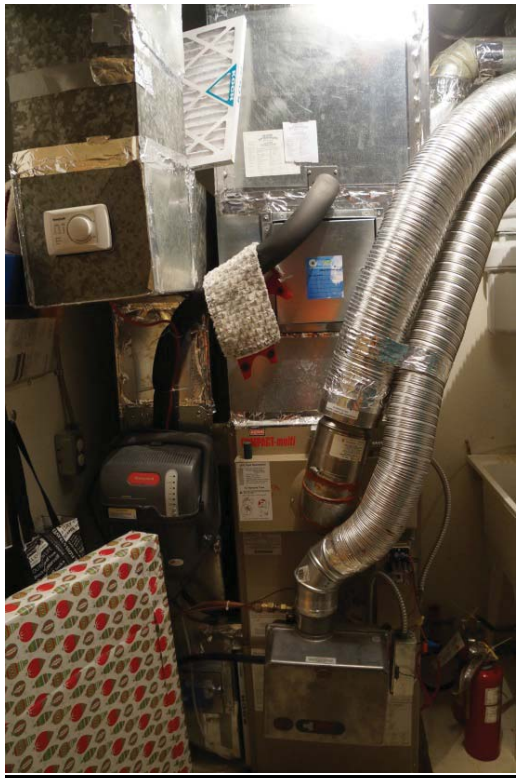


Photo #M15E: Furnace.

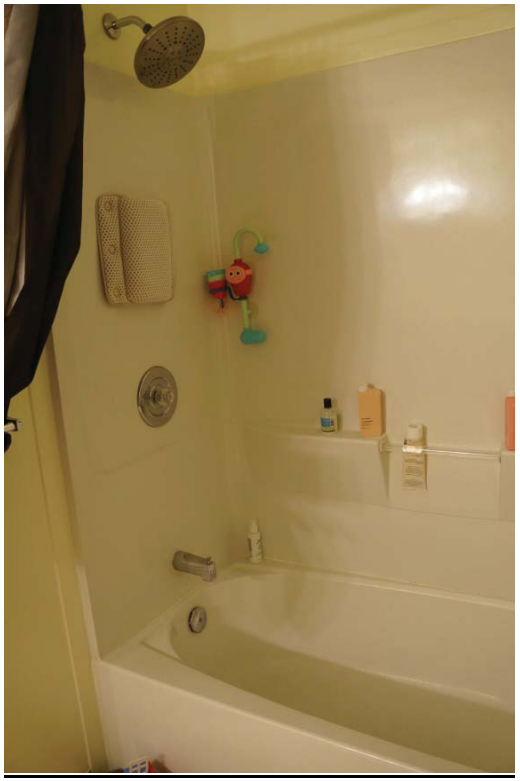


Photo #M16E: Typical shower insert and shower head.

6.0 ELECTRICAL

Site A: Diesel Plant

The electrical elements of the Diesel Plant (Building A) are outside the scope of this report and were not directly reviewed.

Site B: Office Building

Electrical service is provided to the building via overhead line conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Power is metered and then fed into the building to a main Square D distribution panelboard located in the office main floor. Equipment is rated at rated at 225 amp, 120/240 V and is provided with 42 circuits. Panel was observed to be 100% full. Secondary distribution panels is provided by one Square D panelboard assumed to be rated at 200 amp 120/240 V with 24 circuits, and it was observed to be 100% in use. Interior lighting is a combination of recessed, pendant and suspended fluorescent light fixtures fitted with T8 lamps and incandescent light fixtures fitted with CFL lamps. Exterior lighting is accomplished by wall mounted HID light fixtures throughout the building's elevations. Emergency lighting is provided by emergency battery packs throughout. The building is controlled by a fire alarm system including a Notifier fire alarm panel connected to smoke/heat detectors, pull stations and strobe/horn lights throughout.

Capital expenditures with respect to the primary distribution, interior lighting, emergency lighting, fire alarm panel, detector and intrusive system are anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

Site C: Staff House 1

Electrical service is provided to the building via overhead line conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished through a main Commander Panelboard located in the mechanical room. Equipment is rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 60% full. Interior and exterior lighting is provided by interior incandescent light fixtures fitted with CFL lamps. Three battery packs with integral heads provide emergency lighting. Smoke/heat detectors are also provided throughout.

Capital expenditures items were not identified within the timeframe of this report.

The electrical components are in acceptable overall condition.

Site D: Staff House 2

Electrical service is provided to the building via overhead line conductors from an exterior pole-mounted transformer. Copper wiring is reported to be present throughout the building. Primary distribution is accomplished through a Square D main panelboard located in the furnace room. The panel is rated at 200 amp, 120/240 V and is provided with 32 circuits, with at least 80% in use. Secondary distribution panels are provided for the garage. Interior and exterior lighting is provided by incandescent light fixtures fitted with CFL lamps. Two battery-powered emergency lightings were observed for the building. Smoke/heat detectors are provided throughout.

Capital expenditures items with respect to the interior lighting were not identified within the timeframe of this report.

The electrical components are in acceptable overall condition.



Site E: Staff House 3

Electrical service is provided to the building via overhead line conductors from an exterior pole-mounted transformer. Copper wiring is reported to be present throughout the building. Power is metered and then fed into the building to a Commander main panelboard located in the furnace room. Equipment is rated at rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 60% full. Interior lighting is provided by a combination of incandescent fixtures and surface mounted fluorescent fixtures. Exterior lighting is accomplished by incandescent light fixtures. No emergency light battery pack with integral heads was observed in the building. Smoke/heat detectors are provided throughout.

Capital expenditures items with respect to the interior lighting were not identified within the timeframe of this report.

The electrical components are in acceptable overall condition.

E01 INCOMING SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E01.1B	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.1C	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.1D	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.1E	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.2B	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's main panelboard through a service meter located in the garage bay.	**4**	-	No concerns observed or reported.
E01.2C	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's main panelboard through a service meter located on the north elevation.	**4**	-	No concerns observed or reported.
E01.2D	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's main panelboard through a service meter located on the north elevation.	**4**	-	No concerns observed or reported.
E01.2E	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's main panelboard through a service meter located on the north elevation.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.1B	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1980**: Primary distribution is accomplished through a main Square D panelboard located in the office main floor. Equipment is rated at 225 amp, 120/240 V and is provided with 42 circuits. Panel was observed to be 100% full.	**4**	3/4	Additional space may be required for new circuit additions. It is recommended to install a secondary panel or replace the existing panel with one with more capacity. No concerns observed or reported.
E02.1C	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1996**: Primary distribution is accomplished through a main panelboard located in the mechanical room manufactured by Commander. Equipment is rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 60% full.	**4**	-	No concerns observed or reported.
E02.1D	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~2010**: One Square D main panel was observed in Staff House 2. The panel is rated at 120/240 V, 200 A, 3 phase, 4 wire. The panel currently occupies 25 of the 32 circuits.	**4**	-	No concerns observed or reported.
E02.1E	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1996**: Primary distribution is accomplished through a Commander main panel board located in the furnace room. Equipment is rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 60% full.	**4**	-	No concerns observed or reported.
E02.2B	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~2013**: One secondary panelboard is provided manufactured by Square D. No data was found on the label. Equipment is assumed to be rated at 200 amp 120/240 V with 24 circuits. Panel was observed to be 100% full.	**4**	-	No concerns observed or reported.
E02.2D	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1999**: One Square D sub-panel was observed in garage. The panel was unlabelled and occupied 14 of the 18 circuits.	**4**	-	No concerns observed or reported.
E02.3B	**Branch Wiring**	**~1980**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.3C	**Branch Wiring**	**~1996**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.3D	**Branch Wiring**	**~1999**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.3E	**Branch Wiring**	**~1996**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.4B	**Receptacles**	**~1980**: Electrical receptacles are provided throughout the building.	**4**	-	No other concerns observed or reported.
E02.4C	**Receptacles**	**~1996**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.
Imm.9D E02.4D	**Receptacles**	**~1999**: Electrical receptacles are provided throughout the building.	**4**	1	The Canadian Electric Code (CE Code) requires that any kitchen countertop at least 12 inches wide and 24 inches deep must be equipped with electrical outlets and the outlets shall be equipped with GFCI receptacles in the kitchen of dwelling unit where the receptacles are installed to serve the countertop surfaces to protect against electrical shock while working in the kitchen. No other concerns observed or reported.
Imm.10E E02.4E	**Receptacles**	**~1996**: Electrical receptacles are provided throughout the building.	**4**	1	The Canadian Electric Code (CE Code) requires that any kitchen countertop at least 12 inches wide and 24 inches deep must be equipped with electrical outlets and the outlets shall be equipped with GFCI receptacles in the kitchen of dwelling unit where the receptacles are installed to serve the countertop surfaces to protect against electrical shock while working in the kitchen. No other concerns observed or reported.
E02.5B	**Surge Protection**	**~2012:** Battery UPS backup are provided for computers.	**4**	-	No concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1B	**Interior Lighting**	**~2010**: Interior lighting is a combination of recessed, pendant and surface mounted tubular fluorescent lamps with T8 lamps. Incandescent fixtures are also provided throughout the second floor fitted with CFL lamps.	**4**	3	Lighting fixtures will surpass their EUL within the timeframe of this report and will require replacement. No other concerns observed or reported.
E03.1C	**Interior Lighting**	**~2005**: Interior lighting is provided by incandescent fixtures fitted with CFL lamps.	**4**	-	No concerns observed or reported.
E03.1D	**Interior Lighting**	**~1999**: Interior lighting is provided by incandescent fixtures fitted with CFL lamps.	**4**	3	No concerns observed or reported.
E03.1E	**Interior Lighting**	**~1996**: Interior lighting is provided by a combination of incandescent fixtures and surface mounted fluorescent fixtures.	**4**	3	No concerns observed or reported.
E03.2B	**Lighting Controls**	**~1980**: Interior and exterior lighting is operated by in-line voltage switches located throughout the building.	**4**	-	Lighting controls will reach the end of their EUL and will require replacement during the timeframe of this report. Costs for replacement are considered to be below the capital threshold. No other concerns observed or reported.
E03.2C	**Lighting Controls**	**~1996**: Interior and exterior lighting is operated by in-line voltage switches located throughout the building.	**4**	-	No concerns observed or reported.
E03.2D	**Lighting Controls**	**~1996**: Exterior and Interior lighting is operated by in-line voltage switches located throughout the building.	**4**	-	No concerns observed or reported.
E03.2E	**Lighting Controls**	**~1993**: Interior and exterior lighting is operated by in-line voltage switches and a dimmer located throughout the building. Exterior lighting is controlled by switches.	**4**	-	No concerns observed or reported.
E03.3B	**Emergency Lighting**	**~1980**: Emergency lighting is provided by battery packs throughout.	**4**	3	Emergency lighting appears to be original to the building and requires replacement. No concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.3C	**Emergency Lighting**	**~1996**: Emergency lighting is provided by three battery packs located throughout.	**4**	-	No concerns observed or reported.
Imm.11D E03.3D	**Emergency Lighting**	**~1996**: Two battery-powered emergency lightings with integral lighting heads are provided in the furnace room and corridor.	**3**	1	The emergency lighting located in the corridor was installed on the corridor's floor due to the limited length of power line; however, the lighting should be mounted not less than 2 m above the floor wherever practicable and thus it should be reinstalled immediately by Fire Code. No concerns observed or reported.
Imm.12E E03.3E	**Emergency Lighting**	**~1999**: Emergency lighting is not provided in the building.	**-**	1	Battery-powered emergency lightings should be provided on each floor immediately. Costing for installing emergency lighting has been included in Capital Reserve Table. No other concerns observed or reported.
Imm.14B E03.4B	**Exit Lighting**	Non-powered exit signs are provided at emergency exits.	**3**	1	Based on observations made on site Golder concludes that the exit signs provided are inadequate. Size appears to be too small and they are most likely non visible in the event of a power shut down or fire. We recommend replacing the existing signs with powered and more adequate signs immediately. An allowance is included in the Capital Reserve Table. No concerns observed or reported.
E03.5B	**Exterior Lighting**	**~2005**: Exterior lighting is provided by HID light fixtures throughout the buildings elevations.	**4**	-	No concerns observed or reported.
E03.5C	**Exterior Lighting**	**~1996**: Exterior lighting is provided by incandescent light fixtures fitted with CFL lamps.	**4**	-	Exterior lights have surpassed their EUL and require replacement. Costs for replacement are estimated below the Capital Threshold; therefore no costs are included. No concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.5D	**Exterior Lighting**	**~1996**: Exterior lighting is provided by incandescent fixtures fitted with CFL lamps.	**4**	-	Exterior lights have surpassed their EUL and require replacement. Costs for replacement are estimated below the Capital Threshold; therefore no costs are included. No concerns observed or reported.
E03.5E	**Exterior Lighting**	**~1999**: Exterior lighting is provided by incandescent light fixtures.	**4**	-	Exterior lights have surpassed their EUL and require replacement. Costs for replacement are estimated below the Capital Threshold; therefore no costs are included. No concerns observed or reported.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1B	**Grounding**	**~1980**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1C	**Grounding**	**~1996**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1D	**Grounding**	**~1996**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1E	**Grounding**	**~1999**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E05.1A	**Fire Alarm Panel**	**~2000**: The building is controlled by a Notifier fire alarm panel located in the entrance vestibule. The panel monitors detection devices throughout the building including: smoke/heat detectors, horn/strobes and pull stations.	**4**	3	No concerns observed or reported.
E05.2B	**CO2 Alarm System**	No CO2 detector was observed on site.	**4**	-	Golder recommends installing a plug-in CO2 alarm device at a cost below the Capital Threshold. No concerns observed or reported.
E05.2C	**CO2 Alarm System**	No CO2 detector was observed on site.	**4**	-	Golder recommends installing a plug-in CO2 alarm device at a cost below the Capital Threshold. No concerns observed or reported.
E05.2D	**CO2 Alarm System**	No CO2 detector was observed on site.	**4**	-	Golder recommends installing a plug-in CO2 alarm device at a cost below the Capital Threshold. No concerns observed or reported.
E05.2E	**CO2 Alarm System**	No CO2 detector was observed on site.	**4**	-	Golder recommends installing a plug-in CO2 alarm device at a cost below the Capital Threshold. No concerns observed or reported.
E05.3B	**Detectors**	**~2000**: Detection and alarm equipment for the fire alarm system include smoke/heat detectors, pull stations and strobe lights.	**4**	3	No concerns observed or reported.
E05.3C	**Detectors**	**~1996**: Detection and fire alarm devices include smoke/heat detectors.	**4**	-	Smoke detectors have surpassed their EUL and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.

E05.3D	**Detectors**	**~1996**: Detection and fire alarm devices include smoke/heat detectors.	**4**	-	Smoke detectors have surpassed their EUL and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.
E05.3E	**Detectors**	**~1999**: Detection and fire alarm devices include smoke/heat detectors.	**4**	-	Smoke detectors have surpassed their EUL and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.1B	**Telephone**	The building is provided with a phone system.	**-**	-	No concerns observed or reported.
E06.1C	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.1D	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.1E	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.2B	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.2C	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.2D	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.2E	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.3B	**Intrusive Systems**	**~2000**: The building is protected by a security system with intrusion detection. The system is being monitored and detection devices include door contacts and motion sensors. Access to the building is controlled by a FOB system.	**4**	-	No concerns observed or reported.
E06.3C	**Intrusive Systems**	No intrusive system is provided for the building.	**4**	-	None appears to be required for this building. No other concerns observed or reported.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.3D	**Intrusive Systems**	No intrusive system is provided for the building.	**4**	-	None appears to be required for this building. No other concerns observed or reported.
E06.3E	**Intrusive Systems**	No intrusive system is provided for the building.	**4**	-	None appears to be required for this building. No other concerns observed or reported.

NOTES:
None.

IMMEDIATE ITEMS:
Imm. 9D) Install GFCI receptacles.
Imm. 10E) Install GFCI receptacles.
Imm. 11D) Install emergency lighting.
Imm. 12E) Install emergency lighting.
Imm. 13B) Install exit lighting.

No immediate items were identified.

RECOMMENDED FURTHER INVESTIGATION:
No further investigation recommended at this time.

OFFICE BUILDING (SITE B):



Photo #E1B: Service meter in the garage bay.



Photo #E2B: Main electrical equipment.



Photo #E3B: Fire alarm panel in the entrance vestibule.



Photo #E4B: Typical emergency lighting.

STAFF HOUSE 1 (SITE C):



Photo #E5C: Service meter.



Photo #E6C: Main electrical panel.



Photo #E7C: Typical interior lighting.



Photo #E8C: Emergency lighting.

STAFF HOUSE 2 (SITE D):



Photo #E9D: Service meter.



Photo #E10D: Battery-powered emergency lighting in the corridor.

Yukon Energy Corporation
2017 – 2018 General Rate Application
John Maissan-YEC-1-37 Attachment 1



Photo #E11D: Secondary panel.



Photo #E12D: Non GFCI receptacle.

STAFF HOUSE 3 (SITE E):



Photo #E13E: Service meter.



Photo #E14E: Main electrical panel.

Yukon Energy Corporation
2017 – 2018 General Rate Application
John Maissan-YEC-1-37 Attachment 1



Photo #E15E: Non GFCI receptacle.



Photo #E16E: Interior lighting fixtures in the living room.



7.0 HAZARDOUS MATERIAL REPORTS

Based on the year of the original development for all sites, A (~1975), B (~1980), C (~1996), D (~1999) and E (~1996), hazardous building construction materials such as ACMs (asbestos containing materials), and/or PCBs (polychlorinated biphenyls) are possible to be present in buildings A and B. Hazardous materials were not observed or reported. If items are found through other investigations, and/or suspect or identified materials become damaged, or renovations/demolition activities are planned that may disturb these materials, they should be tested and handled in accordance with applicable regulations.

8.0 CLOSURE

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

GOLDER ASSOCIATES LTD.



Dave Ayriss, B.Sc., CIH, CRSP
on behalf of
Lawrence P. McSorley, M.Arch., M.C.P., RA
Senior Building Condition Specialist

LPM/rp

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APPENDIX A

Mandate & Report Resources



MANDATE AND REPORT RESOURCES

Authorization

Written Notice of Award of Building Assessment Reports for Yukon Energy Corporation (YEC) was provided on November 1st, 2015. A Facility Lifecycle Report (FLA) of the Sites identified in the Introduction section of the report was subsequently conducted. The Sites are currently owned and managed by YEC.

Purpose

The primary objective of the FLA was to visually examine and evaluate the present condition of the property elements, buildings and related structures. The FLA process is being undertaken to assist YEC in capital planning and evaluating the potential financial liabilities associated with the condition of the Site elements, building and related structures on the Sites. Golder understands that YEC will rely on this report for capital planning.

Scope

The FLA was conducted in general accordance with the American Society for Testing and Materials (ASTM) "Standard Guide for Property Condition Assessments: Baseline Property Condition Process E 2018-08", as locally applicable. The Golder Assessors (identified on the first page of the report) conducted the Sites reconnaissance on the date shown. The Sites reconnaissance was limited to a walk around the Sites, a walk-through of the buildings and interview with personnel listed in the Introduction section of the report (referred to as the "Point of Contact" in this report). Copies of selected photographs documenting conditions at the time of the visit are provided throughout the report.

The purpose of the report is to communicate identified physical deficiencies, future capital projects, and the associated opinions of estimated costs where the cost is greater than the Capital Threshold and expected to occur within the time frame used for the report. In accordance with this agreed mandate, assumptions were required to delineate between capital items and routine maintenance. Please refer to the "Operating and Maintenance Item" list below. Also please refer to the attached "Discussions of Overall Concepts and Terminology" for additional explanation of assumptions used.

The review of the structural elements was limited to a visual review of the accessible, exposed portions of the buildings and related structures during our visit to the building. The roofs, walls, floors and ceilings were visually reviewed to collect information in this regard.

The review of the mechanical, electrical and fire safety systems was performed by non-specialists in conjunction with discussions with the Point of Contact. A detailed assessment by a mechanical or electrical professional consultant should be conducted if further information regarding the condition, durability and/or expected future capital expenditures related to these systems is required.

Compliance with national and provincial building codes and/or fire codes is not part of the scope of this assessment.



The estimated costs outlined in this report are based on the conditions encountered and observations made during the reconnaissance. Estimates of quantities and areas are based on information supplied, field observations and/or interviews. Item repair/replacement costs are approximate only. Restoration costs are sensitive to local and overall economic factors and therefore, specific quotations from qualified contractors should be obtained when a specific deficiency is addressed or a capital project is to be implemented.

Operating and Maintenance Items

Golder assumes the following items will be maintained under normal operating budgets and are therefore not included in the Capital Reserve Table.

SITE

- Buried services
- Landscaping
- Fences

STRUCTURE

- Foundations and footings

ROOF

- Periodic maintenance

WALLS AND WINDOWS

- Local periodic repairs and needle glazing
- Weather-stripping

INTERIORS

- Various common furnishings, specialty equipment
- Small residential appliances

MECHANICAL

- Sump Pits
- Irrigation System
- Motors, ductwork and in-duct equipment
- Gas supply systems
- Roof drains
- HVAC distribution piping
- Air inlets and outlets



ELECTRICAL

- Disconnects and breakers
- Buried conductors

Discussions of Overall Concepts and Terminology

Evaluation Period

The period of evaluation used for this report is 10 years. Capital repairs and replacement that are reasonably expected to be required within this evaluation period and that cost in excess of the Capital Threshold are included in the Capital Reserve Table.

Capital Threshold

The Capital Threshold used for this report is $3,000. This threshold is used to determine whether a capital repair item is to be included in the Capital Reserve Table. Capital repairs identified and estimated to cost less than the threshold, or that will likely to be performed in phases, as a part of routine maintenance as required, at a cost less than the threshold are not included in the Capital Reserve Table.

Costs

Costs presented in this study for future capital repairs and replacement projects are our Opinions of Probable Budgets and are intended to include taxes, permit fees, contingency and where appropriate, Engineering fees for design, specifications, tendering, project management and construction monitoring. We have generally assumed replacement will occur on a like-for-like basis except where obsolescence or technological advancements logically dictates an upgrade. More accurate costing in the future will require a condition assessment, choice and development of an appropriate repair option, designing and tendering the work to qualified contactors.

Immediate Items

Immediate repairs include deficiencies that require action in the next 60 to 90 days as a result of (i) existing or potentially unsafe conditions, (ii) negative conditions significantly impacting marketability or habitability, (iii) material building code violations, (iv) poor or deteriorated condition of a critical element or system, or (v) a condition that if left “as is” with extensive delay in addressing same, would result in or contribute to critical element or system failure within 12 months or a significant escalation in the repair cost.

Capital Reserve Analysis

The Capital Reserve Table includes a section that provides the average annual capital costs per square foot. Replacement Reserves include (i) deficiencies that may not warrant immediate attention, but require repair or replacement that should be undertaken on a priority basis over routine preventive maintenance work and (ii) components or systems that have realized or exceeded their Expected Useful Life (EUL) during the evaluation period (realization of EUL alone does not constitute an immediate repair). Replacement reserve costs are included in Appendix C.



Opinions of probable costs are provided for material physical deficiencies and not for repairs or improvements that could be classified as:

- cosmetic or decorative;
- part or parcel of a building renovation program or tenant improvement/finishes;
- enhancements to reposition the asset in the marketplace;
- for warranty transfer purposes;
- routine or normal preventative maintenance;
- less than the capital threshold for this report; and
- are expected to occur beyond the time frame of this report.

Cost Inflation Rate

We have presented the costs in current year (2016) values. We have used 3% in the capital reserve table attached. Further sensitivity analysis using other inflation assumptions should be tested when projecting future cash-flows.

Life Expectancies

Our estimates of the life expectancy of common element components, systems and sub-systems are based on our opinion of the observed condition during our Site visit, experience with similar material at other buildings, published industry standards, articles and recommendations made by material suppliers and manufacturers. For some materials or systems, the history of use is not sufficient to predict life expectancy accurately. Monitoring and adjustments to the assumptions are required.

The year in which the capital work is required is estimated on the basis of the current observed conditions, or the construction methods and materials used. This may be shorter or longer than the remaining time in the standard estimated life cycle based on the current age of the item. Our estimates of life cycles reflect our understanding of the standards that the prudent long-term owners would maintain. Deferring and phasing of work is often possible keeping in mind that doing so could reduce building standards, increase disruption to residents, increase costs and risks.



APPENDIX B

Limitations and Use of the Report

LIMITATIONS

This report is intended to provide an assessment of the property conditions at the subject properties, at the time of the Sites visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, Golder may be contacted to extend reliance to such parties. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, which result from reporting the factual information contained herein.

The conclusions as presented represent the judgement of Golder based on the visual observations of the accessible, exposed building elements, supplemented by information and data obtained by Golder and discussions with the Point of Contact and other representatives of the owner identified. Except as otherwise may be requested, Golder disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the FLA. No physical testing or intrusive investigations were conducted, and no samples of building materials were collected to substantiate the observations made.

In evaluating the Sites, Golder has relied in good faith on information provided by other individuals noted in this report. Golder in certain instances has been required to assume that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Point of Contact. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, thus any parties making use of this report should review these issues with appropriate legal counsel.

Should additional information become available with respect to the building elements or systems, Golder requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.



APPENDIX C

Capital Reserve Table

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				Threshold	$3,000
Gross Sq. m.	224	Year Built	1975	Reserve Term (years)	10
r of Buildings	1	Age	41	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024
tified																	
	1975	40	41	0	285 m²	$50/m²	LCR		$14,250								
	1975	20	41	0	300 m	$40/m	LCR		$12,000								
	1975	40	41	0	12 m²	$1,300/m²	LCR			$15,600							
	1975	40	41	0	4	$1,500/each.	LCR			$6,000							
	1975	30	41	0	1	$5,500/each,	LCR		$5,500								
	1975	40	41	0	100 m	$56/m	LCR				$5,600						
	1975	40	41	0	45 m²	$77/m²	LCR				$3,465						
artitions																	
tified																	
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tified																	
tified																	
tified																	
	-	-	-	-	Allowance		Study	$3,000									
	1975	40	41	0	390 m²	$360/m²	LCR/Repair		$140,400								
uts	-	-	-	-	Allowance		Improvement		$3,000								
yance Devices)																	
tified																	
tified																	
nd Stairs																	
tified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
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	Inflated	*Uninflated*
	$8,529	$8,233
/ Sq. Ft.	$38.08	$36.75

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$3,000	$175,150	$21,600	$9,065	$	$	$	$	$	$
$CAD	$3,000	$180,405	$22,915	$9,906	$	$	$	$	$	$

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				Threshold	$3,000
Gross Sq. m.	186	Year Built	1980	Reserve Term (years)	10
r of Buildings	1	Age	36	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
	1975	40	41	0	250 m	$195/m	LCR		$48,750								
	-	-	-	-	Allowance		Improvement		$3,000								
	1980	40	36	4	225 m²	$50/m²	LCR						$11,250				
	1980	40	36	4	100 m²	$55/m²	LCR						$5,500				
	1980	20	36	0	250 m	$40/m	LCR		$10,000								
	1980	40	36	4	10 m²	$1,300/m²	LCR						$13,000				
	1980	40	36	2	3	$1,500/each.	LCR				$4,500						
	1980	30	36	0	2	$5,500/each,	LCR		$11,000								
tified																	
artitions																	
	2010	15	6	9	500 m²	$40/m²	LCR										
	1980	30	36	0	10	$850/each	LCR		$8,500								
	1980	25	36	0	60 m²	$65/m²	LCR			$3,900							
	1980	20	36	0	50 m²	$95/m²	LCR			$4,750							
	2005	20	11	9	60 m²	$95/m²	LCR										
	1980	25	36	0	140 m²	$235/m²	LCR			$32,900							
	1980	20	36	0	15 m²	$125/m²	LCR	$1,875									
	1980	35	36	0	8 m	$1,120/m	LCR			$8,960							
	1980	35	36	0	4 m	$1,120/m	LCR			$4,480							
	1980	40	36	4	200 m²	$360/m²	LCR						$72,000				
yance Devices)																	
tified																	
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nd Stair																	
tified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
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	1980	30	36	0	2	$2,300/each	LCR			$4,600							
	1980	30	36	0	1	$3,150/each	LCR			$3,150							
	-	-	-	-	Allowance		Study	$2,000									
	-	-	-	-	Allowance		Repair		$3,000								
	1980	40	36	4	10 m	$320/m	LCR							$3,200			
	1980	30	36	0	2	$1,500/ea.	LCR		$3,000								
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ent																	
	1980	30	36	0	1	$3,000 ea.	LCR			$3,000							
	2005	20	11	9	186 m² GFA	$70/m² GFA	LCR		$8,350								
	1980	20	36	0	5	$1,670/ea.	LCR		$8,350								
	-	-	-	-	Allowance		Safety	$4,000									
tified																	
	2000	15	16	0	Allowance		LCR		$3,000								
	2000	15	16	0	180 m² GFA	$40/m² GFA	LCR		$7,200								
d Security																	
	2000	15	16	0	180m² GFA	$40/m² GFA	LCR		$7,200								

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Inflated	*Uninflated*
$14,939	$13,410
$80.32	$72.10

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$7,875	$121,350	$65,740	$4,500	$	$101,750	$3,200	$	$	$
$CAD	$7,875	$124,991	$69,744	$4,917	$	$117,956	$3,821	$	$	$

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				Threshold	$3,000
Gross Sq. m.	180	Year Built	1996	Reserve Term (years)	10
r of Buildings	1	Age	20	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
	-	-	-	-	Allowance		Repair		$5,000								
	1996	20	20	0	80 m	$40/m	LCR			$3,200							
tified																	
tified																	
tified																	
artitions																	
	2010	15	6	9	300 m²	$40/m²	LCR										
tified																	
tified																	
	1996	20	20	0	60 m²	$95/m²	LCR			$5,700							
	1996	10	20	0	5	$1,000/each	LCR		$5,000								
tified																	
yance Devices)																	
	-	-	-	-	Allowance		Study	$3,000									
	-	-	-	-	Allowance		Repair		$10,000								
tified																	
nd Stairs																	
tified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
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	Inflated	Uninflated
	$1,847	$1,636
Sq. Ft.	$10.26	$9.09

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$3,000	$20,000	$8,900	$	$	$	$	$	$	$
$CAD	$3,000	$20,600	$9,442	$	$	$	$	$	$	$

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				Threshold	$3,000
Gross Sq. m.	89	Year Built	1999	Reserve Term (years)	10
r of Buildings	1	Age	17	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024
tified																	
	1999	15	17	0	135 m²	$23/m²	LCR		$3,100								
	1999	40	17	23	Allowance		Repair		$3,000								
	1999	20	20	0	80 m	$40/m	LCR		$3,200								
tified																	
tified																	
tified																	
artitions																	
	2010	15	1	14	180 m²	$40/m²	LCR										
tified																	
tified																	
	1999	20	17	3	70 m²	$95/m²	LCR				$6,700						
	1999	15	17	0	100 m²	$80/m²	LCR		$8,000								
	1999	10	17	0	5	$1,000/each	LCR		$5,000								
tified																	
yance Devices)																	
tified																	
	-	-	-	-	Allowance		Study	$5,000									
	-	-	-	-	Allowance		Repair		$10,000								
tified																	
nd Stairs																	
tified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
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	-	-	-	-	Allowance		Study	$3,000									
	-	-	-	-	Allowance		Repair		$3,000								
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tified																	
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	-	-	-	-	Allowance		Code	$800									
	1999	20	17	3	89 m² GFA	$70/m² GFA	LCR				$6,200						
	-	-	-	-	Allowance		Safety/Code	$1,000									
tified																	
tified																	
d Security																	
tified																	

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	Inflated	*Uninflated*
	$2,405	$2,216
/ Sq. Ft.	$27.03	$24.90

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$9,800	$35,300	$	$12,900	$	$	$	$	$	$
$CAD	$9,800	$36,359	$	$14,096	$	$	$	$	$	$

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				Threshold	$3,000
Gross Sq. m.	270	Year Built	1996	Reserve Term (years)	10
r of Buildings	1	Age	20	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
tified																	
	1996	20	17	3	90 m	$40/m	LCR				$3,600						
tified																	
tified																	
tified																	
artitions																	
	2010	15	1	14	300 m²	$40/m²	LCR										
tified																	
tified																	
	1996	20	20	0	85 m²	$95/m²	LCR		$8,100								
	1996	10	20	0	5	$1,000/each	LCR		$5,000								
tified																	
yance Devices)																	
	-	-	-	-	Allowance		Study	$5,000									
	-	-	-	-	Allowance		Repair		$3,000								
tified																	
tified																	
nd Stairs																	
tified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
tified																	
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tified																	
	-	-	-	-	Allowance		Study	$3,000									
	-	-	-	-	Allowance		Repair		$3,000								
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tified																	
ent																	
	-	-	-	-	Allowance		Code	$800									
	1996	20	20	0	270 m² GFA	$70/m² GFA	LCR		$18,900								
	-	-	-	-	Allowance		Safety/Code	$2,000									
tified																	
tified																	
d Security																	
tified																	

nalysis

	Inflated	*Uninflated*
	$2,368	$2,144
/ Sq. Ft.	$8.77	$7.94

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$10,800	$38,000	$	$3,600	$	$	$	$	$	$
$CAD	$10,800	$39,140	$	$3,934	$	$	$	$	$	$

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ment

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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February 2016

REPORT

Facility Lifecycle Assessment
Office Building & Diesel Plant
100 Campbell Street, Faro YT
Staff House
120 Kitza Avenue, Faro, YT

Submitted to:
Yukon Energy Corporation
P.O Box 5920
Whitehorse, YT Y1A 6S7

REPORT

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Golder Associates

FLA: OFFICE BUILDING, DIESEL PLANT, AND STAFF HOUSE, FARO, YT

EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as the Faro Office Building (Building A), Faro Diesel Plant (Building B), and Faro Staff House (Building C). Building A and B are located at 100 Campbell Street, Faro YT, approximately 250 metres (m) southeast of Bell Ave. Building C is located at 120 Kitza Avenue, Faro YT, approximately 365 m south of Dawson Drive.

Building A is a single-storey building constructed circa ~1970 and houses a diesel generator and an office space. Building B is a single-storey building constructed circa 1992 and also houses a diesel generator. Building A and B have a gross floor area (GFA) of approximately 376 square metres (m²) (4,047 square feet [ft²]) and 239 m² (2,573 ft²) respectively, and are situated on a Site covering approximately 1.47 hectares (3.63 acres) of land. Building C is a two-storey staff house constructed circa 1980 with an approximate GFA of 300 square metres (m²) (3,229 ft²) situated on a Site covering approximately 0.09 hectares (ha) (0.22 acres) of land.

Based on the findings of this FLA, the following conclusions are made:

Building A – Faro Office Building:

- The site and building were developed circa 1970. No major addition or renovations have been completed since the original construction. Graded gravel is provided throughout the site, and the site is secured by a chain-link fence along the property line. The building is located on the same site as Building B, as well other ancillary buildings and an electrical substation. The site components are in overall acceptable condition.
- The building is primarily clad with prefinished corrugated metal panels, with painted concrete foundation walls along the base of the building. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows consist of insulated glazed units set in vinyl frames. Exterior doors are insulated, painted metal units set in painted metal frames. The engine room is provided with an insulated, prefinished metal, sectional overhead door with motorized opener. Interior walls are typically steel framed with galvanized steel finishes, with painted gypsum wall board finishes on wood studs provided around the office and washroom areas. Interior doors are a combination of painted metal units with glass inserts, and wood doors with stained wood veneer. The ceilings are exposed to the structure throughout the building and include corrugated metal decking supported by steel beams. The flooring throughout the building is generally painted concrete slab, with painted diamond plate metal flooring at walkways. Plastic laminate counters and cabinets are provided in the kitchen, and solid surface counters with stained wood cabinets are provided in the washroom. Residential appliances include a washing machine located next to the domestic water storage tank. The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs. The architectural components are in overall marginal condition.
- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings and a CIP concrete foundation walls. The building floor is a slab on grade throughout. The superstructure is composed of structural steel I-beams with tension-only cross bracing along exterior walls. Wood studs with gypsum wallboard coverings frame the interior partitions around the office space and washroom. The roof construction consists of corrugated metal decking supported by structural steel I-beams, with tension-only cross bracing for lateral resistance. The structural components are in overall acceptable condition.

- The building is supplied with domestic water from an above ground plastic storage stank located within the building and is distributed via copper piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface drainage. Domestic hot water is provided by a hot water heater located above the washroom. Plumbing fixtures include a solid surface lavatory and a floor-mounted, flush tank water closet in the washroom, and a plastic wash basin located adjacent to the water storage tank. Heating oil fuel is supplied by an aboveground steel storage tank. The building is primarily heated by suspended radiant hydronic unit heaters located throughout the building. Hot water for the units are provided from a boiler system located within Building B. Supplementary heating is provided to the washroom from an electric baseboard heater. Building ventilation is provided by rooftop mounted vents, and building exhaust is handled by through-wall exhaust fans. The mechanical components are in acceptable overall condition.

- Electrical service is provided via buried cables from the on-site substation located adjacent to the building. Copper wiring is reported to be present throughout the building. Primary electrical distribution to the building is provided by an electrical switchboard and motor control centre. Secondary distribution is provided by electrical sub panels rated at 120//208 V, 100 A, 3 phase, 4 wire. Interior lighting is provided by a combination of T12 tubular fluorescent lamps and HID bay lamps all controlled by line voltage switches. Exterior lighting is provided by wall-mounted HID fixtures controlled by a combination of line voltage switches and photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel, bells, pull stations, and smoke/heat detectors. The building is monitored by YEC's System Control Centre, with access control provided by a proximity card reader and magnetic lock on the main entrance door. The electrical components are in acceptable overall condition.

Building B – Faro Diesel Plant:

- The site was developed circa 1970 and the building was developed circa 1992. No major additions or renovations have been completed since the original construction. Graded gravel is provided throughout the site, and the site is secured by a chain-link fence along the property line. The building is located on the same site as Building A, as well other ancillary buildings and an electrical substation. The site components are in overall acceptable condition.

- The building is clad with prefinished corrugated metal panels along all elevations. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior doors are painted metal units, some with glass inserts, set in painted metal frames. The engine room is provided with an insulated, prefinished metal, sectional overhead door with glass inserts and motorized opener. Interior walls are typically steel framed with galvanized steel finishes. One painted metal interior door with glass insert and painted metal frame is provided between the engine room and electrical room. The ceilings are exposed to the structure throughout the building and include corrugated metal decking supported by steel beams. The flooring throughout the building is generally painted concrete slab, with metal grating at the mezzanine and part of the engine room, and painted diamond plate metal flooring at walkways. The mezzanine is accessible by a steel-frames stair with metal grating treads and painted steel pipe railings. The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter. The architectural components are in overall acceptable condition.

- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings. The building main floor is a slab on grade throughout. The mezzanine is framed with steel I-section beams and columns which support the metal grate decking. The superstructure is composed of structural steel I-beams with tension-only cross bracing along exterior walls. The roof construction consists of corrugated metal decking supported by structural steel I-beams, with tension-only cross bracing for lateral resistance. The structural components are in overall acceptable condition.

- The building is not provided with domestic water or sanitary sewer services. Storm water is drained through overland soil absorption and surface drainage. Heating oil fuel is supplied by an above ground steel storage tank. The building is primarily heated by suspended radiant hydronic unit heaters located throughout the building. Hot water for the units is provided from a boiler system which includes an oil-fired boiler and burner, and a metal heat exchanger. Building ventilation is provided by rooftop mounted vents and exterior wall louvers, and building exhaust is handled by ceiling-mounted exhaust fans. The mechanical components are in acceptable overall condition.

- Electrical service is provided via buried cables from the on-site substation located adjacent to the building. Copper wiring is reported to be present throughout the building. Primary electrical distribution to the building is provided by motor control centres located in the main electrical room. Secondary distribution is provided by an electrical sub panel rated at 120//240 V, 335 A, 3 phase, 4 wire. Interior lighting is provided by a combination of T12 tubular fluorescent lamps and HID bay lamps all controlled by line voltage switches. Exterior lighting is provided by wall-mounted HID fixtures controlled by a combination of line voltage switches and photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel, bells, pull stations, and smoke/heat detectors. The building is monitored by YEC's System Control Centre, with access control provided by a proximity card reader and magnetic lock on two of the building's entrance doors. The electrical components are in acceptable overall condition.

Building C – Faro Staff House:

- The site and building were developed circa 1980. No major additions or renovations were reported since the original construction. An asphalt driveway is provided at the east elevation of the building, and a small concrete pad is provided at the main entrance. The property is secured by a combination of stained wood fencing and metal chain-link fencing and gates. A retaining wall is provided at the east of the property, formed partially by CIP concrete and partially by stone and mortar. A wood-framed deck with steps to ground level and a wood pergola are provided at the rear of the building. The site components are in acceptable overall condition.

- The building is clad primarily clad with pained wood siding along all elevations. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows consist of insulated glazed units set in vinyl frames. Exterior doors are insulated, prefinished metal units set in painted wood frames. The garage is provided with an insulated, prefinished metal, sectional overhead door with motorized opener. Interior walls are typically framed with wood studs and are generally sheeted with painted gypsum wallboard, with wallpaper and ceramic tile finishes in some areas. Interior doors are wood doors with stained wood veneers. The ceilings typically gypsum board with stippling. Flooring finishes are a combination of painted and unfinished concrete, sheet vinyl, sheet carpet, and laminate hardwood. Plastic laminate counters and cabinets are provided in the kitchen and washroom. Residential appliances include a refrigerator in the garage, a washing machine and clothes dryer in the utility room, a refrigerator, electric



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range, range hood, microwave in the kitchen, and a mini fridge and water cooler in the dining room. The roof is pitched and is covered with asphalt shingles. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs. The architectural components are in overall marginal condition.

- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings and a CIP concrete foundation walls. The building main floor is a slab on grade throughout. Suspended floors are constructed of OSB or plywood sub flooring supported by dimensional lumber joists. The superstructure is composed of wood stud framing with gypsum wallboard coverings at interior and exterior walls. The roof construction consists of plywood decking supported by dimensional lumber rafters. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from the municipal mains and is distributed by plastic piping. Sanitary waste is fed to municipal sewer mains via ABS plastic piping. Storm water is drained through overland soil absorption and surface drainage. Domestic hot water is provided by an electric hot water heater located in the utility room. Plumbing fixtures include a counter-mounted enameled iron lavatory, and a floor-mounted, flush tank, vitreous china water closet in the kitchen, a counter-mounted stainless steel sink in the kitchen, and a fibre reinforced plastic wash basin in the utility room. Heating oil fuel is supplied by an aboveground steel storage tank. The building is primarily heated by an oil-fired forced air furnace located in the utility room. Air is distributed throughout the building by a galvanized metal ductwork system. Building ventilation is provided by the furnace and operable windows, and building exhaust is handled by the range hood in the kitchen and a ceiling-mounted exhaust fan in the washroom. The mechanical components are in acceptable overall condition.
- Electrical service is provided via overhead cables from a pole-mounted transformer located to the southeast of the property. Copper wiring is reported to be present throughout the building. Electrical distribution is provided by two sub panels rated at 120/240 V, 1200 A, 3 phase, 4 wire. Interior lighting is provided by a combination of incandescent fixtures and T12 tubular fluorescent lamps, all controlled by line voltage switches. Exterior lighting is provided by wall-mounted incandescent fixtures controlled by line voltage switches, some with motion sensors. Emergency lighting is provided by battery packs with integral heads. Smoke detectors are provided in the building. The electrical components are in acceptable overall condition.

Given the year of original construction of each building (~1970, ~1992, and ~1980), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) may be present.

Immediate investigation / action items identified pertain to railings in the stairwell of Building C, suspect mould in the washroom of Building C, and the fire alarm panel in Building A. Deficiencies and Capital Reserve Items have been identified within the 10-year time frame of this report with respect to architectural, structural, mechanical and electrical components and systems. The Immediate Repairs and Capital Reserve Analysis are included in Appendix C. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.

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Table 1: Summary of Immediate and 10-Year Capital Reserve Expenditures (uninflated)/ Office Building (Site A)

Section	Description	Immediate (2016)	Reserve Years 1 to 5 (2016 to 2020)	Reserve Years 6 to 10 (2021 to 2025)	10-Year Reserve Total
3.0	Architectural	$0	$418,900	$4,000	$422,900
4.0	Structural	$0	$3,000	$0	$3,000
5.0	Mechanical	$0	$35,000	$3,800	$38,800
6.0	Electrical	$0	$33,000	$21,000	$54,000
TOTALS		**$0**	**$486,900**	**$28,800**	**$515,700**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 2: Summary of Immediate 10-Year Capital Reserve Expenditures (uninflated)/ Office Building (Site A)

Immediate	Year 1	Year 2	Year 3	Year 4
$0	$440,300	$36,000	$0	$10,600

Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$3,000	$0	$21,000	$7,800	$0	$0

Table 3: Summary of Immediate and 10-Year Capital Reserve Expenditures (uninflated)/ Diesel Plant (Site B)

Section	Description	Immediate (2016)	Reserve Years 1 to 5 (2016 to 2020)	Reserve Years 6 to 10 (2021 to 2025)	10-Year Reserve Total
3.0	Architectural	$0	$25,600	$3,000	$28,600
4.0	Structural	$0	$0	$0	$0
5.0	Mechanical	$0	$0	$16,300	$16,300
6.0	Electrical	$0	$16,400	$24,000	$40,400
TOTALS		**$0**	**$42,000**	**$43,300**	**$85,300**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 4: Summary of Immediate 10-Year Capital Reserve Expenditures (uninflated)/ Diesel Plant (Site A)

Immediate	Year 1	Year 2	Year 3	Year 4
$0	$15,000	$4,000	$9,400	$10,600

Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$3,000	$0	$37,000	$6,300	$0	$0



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Table 5: Summary of Immediate and 10-Year Capital Reserve Expenditures (uninflated)/ Staff House (Site C)

Section	Description	Immediate (2016)	Reserve Years 1 to 5 (2016 to 2020)	Reserve Years 6 to 10 (2021 to 2025)	10-Year Reserve Total
3.0	Architectural	$2,000	$97,200	$21,300	$118,500
4.0	Structural	$0	$0	$0	$0
5.0	Mechanical	$0	$19,000	$0	$19,000
6.0	Electrical	$0	$8,400	$0	$8,400
TOTALS		**$2,000**	**$124,600**	**$21,300**	**$145,900**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 6: Summary of Immediate 10-Year Capital Reserve Expenditures (uninflated)/ Staff House (Site C)

Immediate	Year 1	Year 2	Year 3	Year 4
$2,000	$35,800	$20,000	$0	$5,800

Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$63,000	$7,500	$0	$6,300	$0	$7,500

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FLA: OFFICE BUILDING, DIESEL PLANT, AND STAFF HOUSE, FARO, YT

1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as the Faro Office Building (Building A), Faro Diesel Plant (Building B), and Faro Staff House (Building C). Building A and B are located at 100 Campbell Street, Faro YT, and Building C is located at 120 Kitza Avenue, Faro YT.

Building A is a single-storey building constructed circa ~1970 and houses a diesel generator and an office space. Building B is a single-storey building constructed circa 1992 and also houses a diesel generator. Building A and B have a gross floor area (GFA) of approximately 376 square metres (m²) (4,047 square feet [ft²]) and 239 m² (2,573 ft²) respectively, and are situated on a Site covering approximately 1.47 hectares (3.63 acres) of land. Building C is a two-storey staff house constructed circa 1980 with an approximate GFA of 300 m² (3,229 ft²) situated on a Site covering approximately 0.09 hectares (0.22 acres) of land.

Written authorization to proceed with the work was provided by Sean Munro, Manager, Property & Risk Management from YEC. It is understood that this FLA is required for capital planning.

1.2 Objectives

The objective of the FLA was to document the Site conditions at the time of the Site reconnaissance and, based on available sources of information and observations of surface conditions during the Site reconnaissance, to identify the exterior Site improvements as well as the building structure, envelope, interior finishes, mechanical systems, electrical systems, fire/life safety systems, conveyance devices and visually obvious signs of non-compliance with respect to building code and barrier free accessibility. Due to the age of the buildings, it is possible that hazardous building materials are present.

1.3 Methodology

Site Escort and general building information was provided by Bob Gringas, Faro Plant Operator (hereafter referred to as the “Site Representative”). Site reconnaissance was conducted by Brian Levy and Adriana Almeida of Golder on November 20, 2015. The weather at the time of assessment was -21°C and cloudy, with no conditions limiting access to or around each Site. Snow coverage prevented observational assessment of the roof or and Site components.

The scope of work did not include sampling or testing to identify the potential presence of hazardous building construction materials such as asbestos-containing materials (ACMs), lead-based paints (LBPs), PCB-containing electrical equipment or other hazardous materials. Due to the age of the buildings (~1970, ~1980, and ~1992), it is possible that hazardous building construction materials are suspected to be present on Site.

1.4 Evaluation Criteria

The FLA was completed in general accordance with accordance with the YEC stated scope of work as documented in *Request for Proposals Building Condition Reports* (hereafter referred to as the “RFP”). The scope of the FLA was limited to identifying components, systems and potential concerns by visual examination of surface features and operating practices, and from available documented information sources. Only those items identified as being above the specified Capital Threshold will be addressed in the Capital Reserve Table. The Condition Rating system (CR) used throughout this report is based on the YEC RFP:



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Code	Description
1	**Critical Unsafe**, high risk of injury or critical system failure.
2	**Poor** - does not meet requirements, has significant deficiencies. May have high operating / maintenance costs.
3	**Marginal** - Meets minimum requirements, has significant deficiencies. May have above average operating maintenance costs.
4	**Acceptable** - Meets present requirements, minor deficiencies. Average operating/maintenance costs.
5	**Good** - Meets all present requirements. No deficiencies.
6	**Excellent** - As new/state of the art, meets present and foreseeable requirements.

The capital expenditures identified with respect to deficiencies or deferred maintenance shall be identified by the following Categories ("Cat#"):

Category	Description
1	Code & Safety
2	Repair & Maintenance
3	Capital Expenditure
4	Modernization / Improvements
5	Other

Items identified with a CR rating of 1 and/or Cat1, shall be treated as "Immediate" action items, considered to have conditions that include deficiencies that require action in the next 60 to 90 days. Items identified with a CR of 2 or 3 and/or Cat2 shall be considered to have conditions that include deficiencies that can be addressed within the next five years (2016 to 2020 in the Capital Reserve Table). Preventative Maintenance (PM) items may have been identified. These PM items are items anticipated to be required to maintain specific components/systems through to the end of their Expected Useful Life (EUL) and are considered to have CR of 4 or better that can be addressed at any time within the 10 year time frame of this report (2016 to 2025 in the Capital Reserve Table).

Other non-urgent conditions identified with a CR of 4 to 6, are prioritized by their identification as Cat2 to Cat4 and are included in the Capital Reserve Table in an appropriate year. For items with no observed or reported deficiencies, a lifecycle replacement (LCR) cost estimate has been provided in the Capital Reserve Table spreadsheet in the year equal to the year of original installation plus that component's EUL. If an item with no observed or reported deficiencies is nearing or has surpassed its EUL in the next 5 years (i.e., 2016 to 2020), an LCR cost estimate has been provided in the Lifecycle Plan spreadsheet in year 2020.

For similar components that have been replaced/installed at different times but where the age difference is equal to or less than 20% of the component's EUL, the average install year has been used in calculating the next lifecycle replacement event (i.e., for similar vinyl floor tile installed in 1999 versus 2002, each having a 20 year TDL, an average install year of 2001 has been used to calculate a single lifecycle replacement event in 2021).

No building material sampling or testing was conducted as part of this assessment.

1.5 Recommendations for Additional Investigation or Action

- Conduct a study and complete repairs related to domestic water supply and septic system issues identified at Building A.
- Conduct a study and complete repairs related septic system issues identified at Building C.

1.6 Desktop Data Collection

No drawings or previous reports were provided by YEC related to the buildings outlined in this report.

1.7 Outstanding Information

All information that has been requested has been provided at the time of the completion of this report.

1.8 Building & Fire Code Compliance Overview

The Site Representative advised that he was not aware of any other outstanding work orders, building code violations, building code infractions, building ordinances and municipal health and fire safety by-laws violations.

1.9 Evidence of Mould Presence

Suspect mould was identified in the washroom at the sealant around the bathtub and water closet at Building C.

1.10 Outline of the Report

The report that follows this section contains a summary description of the Site and building systems/components along with a detailed listing and description of systems/components. Furthermore, current, imminent or anticipated deficiencies above the Capital Threshold (if any) and excluding normal operating maintenance are presented with a CR, including a description of the risk/consequence of deferral, probability of imminent/anticipated failure and/or a further description of any failure if it has already occurred.

A more detailed Capital Reserve Table is presented in Appendix C outlining the specific systems/components, EUL, Install Date, Remaining Useful Life (RUL), replacement event type, basis of estimate and specific years for Capital Reserve planning.

1.11 Mandate and Report Resources

Please refer to Appendix A for the report mandate for this project and for additional resources related to the assumptions used in preparing this report such as:

- Operating and Maintenance Items; and
- Discussions of Overall Concepts and Terminology.

2.0 SITE DESCRIPTION

2.1 Site Location and Setting

Golder was retained by YEC to conduct a FLA of the properties described as the Faro Office Building (Building A), Faro Diesel Plant (Building B), and Faro Staff House (Building C). Building A and B are located at 100 Campbell Street, Faro YT, and Building C is located at 120 Kitza Avenue, Faro YT.

Building A is a single-storey building constructed circa ~1970 and houses a diesel generator and an office space. Building B is a single-storey building constructed circa 1992 and also houses a diesel generator. Building A and B have a gross floor area (GFA) of approximately 376 m² (4,047 ft²) and 239 m² (2,573 ft²) respectively, and are situated on a Site covering approximately 1.47 hectares (ha) (3.63 acres) of land. Building C is a two-storey staff house constructed circa 1980 with an approximate GFA of 300 m² (3,229 ft²) situated on a Site covering approximately 0.09 hectares (0.22 acres) of land.

2.2 Site Physical Description

Table 7: Site Physical Description of the Faro Office Building (Building A)

Topic	Data
Site Area	~1.47 hectares (~3.63 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building	~376 m² (~4,047 ft²)
Levels above grade	One
Levels below grade	None
Date of Building Construction	~1970
Date of Major Renovation/Addition	None
Percentage Site Coverage by Building	~5%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~95% bare/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	N/A



Faro Office – Building A.

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Table 8: Site Physical Description of the Faro Diesel Building (Building B)

Topic	Data
Site Area	~1.47 hectares (~3.63 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building	~239 m² (~2,573 ft²)
Levels above grade	One
Levels below grade	None
Date of Building Construction	~1992
Date of Major Renovation/Addition	None
Percentage Site Coverage by Building	~5%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~95% bare/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	N/A



Faro Diesel Plant – Building B.

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Table 9: Site Physical Description of the Faro Staff House (Building C)

Topic	Data
Site Area	~0.09 hectares (~0.22 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building	~150 m² (~1,615 ft²)
Levels above grade	Two
Levels below grade	None
Date of Building Construction	~1980
Date of Major Renovation/Addition	None
Percentage Site Coverage by Building	~15%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~70% grassed/landscaped areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~15%



Faro Staff House – Building C.

3.0 ARCHITECTURAL

Building A – Faro Office Building:

The site and building were developed circa 1970. No major addition or renovations have been completed since the original construction. Graded gravel is provided throughout the site, and the site is secured by a chain-link fence along the property line. The building is located on the same site as Building B, as well other ancillary buildings and an electrical substation.

The building is primarily clad with prefinished corrugated metal panels, with painted concrete foundation walls along the base of the building. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows consist of insulated glazed units set in vinyl frames. Exterior doors are insulated, painted metal units set in painted metal frames. The engine room is provided with an insulated, prefinished metal, sectional overhead door with motorized opener. Interior walls are typically steel framed with galvanized steel finishes, with painted gypsum wall board finished on wood studs provided around the office and washroom area. Interior doors are a combination of painted metal units with glass inserts, and wood doors with stained wood veneer. The ceilings are exposed to the structure throughout the building and include corrugated metal decking supported by steel beams. The flooring throughout the building is generally painted concrete slab, with painted diamond plate metal flooring at walkways. Plastic laminate counters and cabinets are provided in the kitchen, and solid surface counters with stained wood cabinets are provided in the washroom. Residential appliances include a washing machine located next to the domestic water storage tank.

The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.

Capital expenditures with respect to the site servicing, gravel parking lot and drive aisles, site drainage, metal cladding, insulation, entrance and utility doors, floor paint, counters and cabinets, and metal roofing are anticipated within the 10-year time frame of this report.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall marginal condition.

Building B – Faro Diesel Plant:

The site was developed circa 1970 and the building was developed circa 1992. No major addition or renovations have been completed since the original construction. Graded gravel is provided throughout the site, and the site is secured by a chain-link fence along the property line. The building is located on the same site as Building a, as well other ancillary buildings and an electrical substation.

The building is clad with prefinished corrugated metal panels along all elevations. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior doors are insulated, prefinished metal units, some with glass inserts, set in prefinished metal frames. The engine room is provided with an insulated, prefinished metal, sectional overhead door with glass inserts and motorized opener. Interior walls are typically steel framed with galvanized steel finishes. One painted metal interior door with glass insert and painted metal frame is provided between the engine room and electrical room. The ceilings are exposed to the structure throughout the building and include corrugated metal decking supported by steel beams. The flooring throughout the building is generally painted concrete slab, with metal grating at the mezzanine and part of the engine room, and painted diamond plate metal flooring at walkways. The mezzanine is accessible by a steel-frames stair with metal grating treads and painted steel pipe railings.

The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter.

Capital expenditures with respect to the gravel parking lot and drive aisles, floor paint, and metal are anticipated within the 10-year time frame of this report.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall acceptable condition.

Building C – Faro Staff House:

The site and building were developed circa 1980. No major additions or renovations were reported since the original construction. An asphalt driveway is provided at the east elevation of the building, and a small concrete pad is provided at the main entrance. The property is secured by a combination of stained wood fencing and metal chain-link fencing and gates. A retaining wall is provided at the east of the property, formed partially by CIP concrete and partially by stone and mortar. A wood-framed deck with steps to ground level and a wood pergola are provided at the rear of the building.

The building is clad primarily clad with pained wood siding along all elevations. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows consist of insulated glazed units set in vinyl frames. Exterior doors are insulated, prefinished metal units set in painted wood frames. The garage is provided with an insulated, prefinished metal, sectional overhead door with motorized opener. Interior walls are typically framed with wood studs and are generally sheeted with painted gypsum wallboard, with wallpaper and ceramic tile finishes in some areas. Interior doors are hollow core wood doors with stained wood veneers. The ceilings typically gypsum board with stippling. Flooring finishes are a combination of painted and unfinished concrete, sheet vinyl, sheet carpet, and laminate hardwood. Plastic laminate counters and cabinets are provided in the kitchen and washroom. Residential appliances include a refrigerator in the garage, a washing machine and clothes dryer in the utility room, a refrigerator, electric range, range hood, microwave in the kitchen, and a mini fridge and water cooler in the dining room.

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The roof is pitched and is covered with asphalt shingles. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.

Capital expenditures with respect to the site servicing, asphalt driveway, wood fencing, wood cladding, exterior windows, entrance doors, gypsum board walls and paint, carpet flooring, residential appliances, and asphalt roofing shingles are anticipated within the 10-year time frame of this report.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall marginal condition.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.01a	**Site Servicing**	**Water**: Water is trucked in and stored in a tank within the building (approximately 500 gallons). **Sanitary Sewer**: Sanitary waste is fed to an on-site septic field. **Oil**: Heating oil fuel is supplied by a 1,111 L aboveground steel storage tank located at to the southwest of Building A. **Electrical**: Power is fed to the building through buried cables at the southeast corner.	**3**	2	Issues were reported regarding the domestic water supply and sanitary sewer system. See Items RAI.1a/M01.1a and M01.2a below for further information.
A01.01b	**Site Servicing**	**Water**: N/A **Sanitary Sewer**: N/A **Oil**: Heating oil fuel is supplied by an aboveground steel storage tank located on the north side of Building B. **Electrical**: Power is fed to the building through buried cables at the southwest corner.	**4**	-	No concerns observed or reported.
A01.01c	**Site Servicing**	**Water**: Water is supplied by municipal mains. **Sanitary Sewer**: Sanitary waste is fed to municipal sewer mains. **Oil**: Heating oil fuel is supplied by an aboveground steel storage tank located on the west side of Building C. **Electrical**: Power is fed to the building through overhead cables at the south of the building.	**3**	2	Issues were reported regarding the sanitary sewer services at the site. See Item RAI.2c/M01.2c below for further information.
A01.02a	**Parking Lots & Drive Aisles**	**~1970:** Gravel drive aisles and parking areas are provided on the site.	**4**	3	The site was snow-covered at the time of assessment so the condition of the gravelled surfaces was not observed. No issues reported. An allowance to re-grade the entire Site has been included in the timeframe of this report. Costing for this item has been combined with Item A01.02b below.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.02b	**Parking Lots & Drive Aisles**	**~1970:** Gravel drive aisles and parking areas are provided on the site.	**4**	3	The site was snow-covered at the time of assessment so the condition of the gravelled surfaces was not observed. No issues reported. Costing for this item has been combined with item A01.02a above.
A01.02c	**Parking Lots & Drive Aisles**	**~1980:** An asphalt driveway is provided at the east elevation of Building C.	**4**	3	The site was snow-covered at the time of assessment so the condition of the asphalt driveway was not observed. No issues reported. Due to the age of the driveway, the asphalt will likely require replacing within the timeframe of this report.
A01.03a	**Parking Lot Markings**	N/A	**-**	-	N/A
A01.03b	**Parking Lot Markings**	N/A	**-**	-	N/A
A01.03c	**Parking Lot Markings**	N/A	**-**	-	N/A
A01.04a	**Concrete Sidewalk**	N/A	**-**	-	N/A
A01.04b	**Concrete Sidewalk**	N/A	**-**	-	N/A
A01.04c	**Concrete Sidewalk**	N/A	**-**	-	N/A
A01.05a	**Concrete Curbs / Pads**	**~1970:** A small concrete pad is provided at the main entrance to the office.	**4**	-	The concrete pad was snow-covered at the time of assessment and not directly reviewed. No concerns were reported.
A01.05b	**Concrete Curbs / Pads**	**~1992:** Concrete pads are provided at the entrances to Building B.	**4**	-	The concrete pads were mostly snow-covered at the time of assessment and not directly reviewed. No concerns were reported.
A01.05c	**Concrete Curbs / Pads**	**~1980:** A CIP concrete pad is provided at the main entrance.	**3**	2	The pad has settled substantially revealing a large gap between the slab and the building. The pad should be jacked so it is level with the base of the building. See Note **3A**.
A01.06a	**Parking Islands**	N/A	**-**	-	N/A
A01.06b	**Parking Islands**	N/A	**-**	-	N/A
A01.06c	**Parking Islands**	N/A	**-**	-	N/A
A01.07a	**Parking bumpers**	N/A	**-**	-	N/A
A01.07b	**Parking bumpers**	N/A	**-**	-	N/A

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.07c	**Parking bumpers**	N/A	**-**	-	N/A
A01.08a	**Site Drainage**	Overland soil absorption and drainage.	**3**	2	Drainage issues were reported regarding water flowing into the plant of Building A during spring runoff. An allowance has been made to provide proper grading and drainage around the building.
A01.08b	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No concerns observed or reported.
A01.08c	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No concerns observed or reported.
A01.09a	**Grassed Areas**	N/A	**-**	-	N/A
A01.09b	**Grassed Areas**	N/A	**-**	-	N/A
A01.09c	**Grassed Areas**	Grassed areas are provided around all elevations of the building.	**-**	-	The site was snow-covered at the time of assessment and was not directly reviewed. No concerns were reported.
A01.10a	**Fencing**	**~1970**: Chain-link fencing is provided around the entire site. Barbed wire is provided atop the fence and a swing gate is provided at the site entrance.	**4**	-	No concerns observed or reported.
A01.10b	**Fencing**	**~1970**: Chain -link fencing is provided around the entire site. Barbed wire is provided atop the fence and a swing gate is provided at the site entrance.	**4**	-	No concerns observed or reported.
A01.10c	**Fencing**	**~1970**: A stained wood fence is provided along a portion of the south side of the property. Chain-link fencing is provided at the backyard along the north, west, and south sides of the property. Chain-link gates are provided on each side of Building C at the north and south elevations.	**3/4**	3	The wood fence has surpassed its EUL and should be replaced. No concerns were observed or reported regarding the chain-link fencing.
A1.11a	**Retaining Walls**	N/A	**-**	-	N/A
A1.11b	**Retaining Walls**	N/A	**-**	-	N/A
A1.11c	**Retaining Walls**	**~1980**: A retaining wall is provided at the front of the property (east elevation). A section of the wall is stone and mortar, and the remaining section is CIP concrete construction.	**-**	-	N/A

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A1.12a	**Signage**	**~2000**: Plastic site signage is provided on the fence at the entrance and on the building wall.	**4**	-	No concerns observed or reported.
A1.12b	**Signage**	**~2000**: Plastic site signage is provided on the fence at the entrance and on the building wall.	**4**	-	No concerns observed or reported.
A1.12c	**Signage**	N/A	**-**	-	N/A
A1.13a	**Amenities**	N/A	**-**	-	N/A
A1.13b	**Amenities**	N/A	**-**	-	N/A
A1.13c	**Amenities**	**~1980:** A wood pergola is provided at the west of the site.	**4**	-	No concerns observed or reported.
A01.14a	**Ancillary Buildings**	**~1970:** A metal structure is located directly south of Building A. A second metal structure is located at the southeast corner of the property. A wood framed shed is located to the northwest of Building A.	**4**	-	Not included for capital costing as it is considered out of the scope of work for this report.
A01.14b	**Ancillary Buildings**	See Item 01.14a above.	**-**	-	-
A01.14c	**Ancillary Buildings**	N/A	**-**	-	N/A
A01.15a	**Decks and Terraces**	N/A	**-**	-	N/A
A01.15b	**Decks and Terraces**	N/A	**-**	-	N/A
A01.15c	**Decks and Terraces**	**~1980:** A wood-framed deck with treated wood decking and painted wood railing is provided at the rear of the building. Access to ground level is provided by a wood-framed stair.	**4**	-	No concerns observed or reported.
A01.16a	**Railings**	N/A	**-**	-	N/A
A01.16b	**Railings**	N/A	**-**	-	N/A
A01.16c	**Railings**	**~1980:** Painted wood railings are provided around the deck and associated stair.	**4**	-	No concerns observed or reported.
A01.17a	**Bollards**	None provided.	**2**	4	Impact damage was observed at the corner of the building adjacent to the overhead door where no bollards are provided. An allowance to install a bollard at this corner to protect the building has been included in the Capital Reserve Table.

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A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.17b	**Bollards**	**~1992:** Painted steel, concrete-filled bollards are provided at the overhead door at the west elevation of building B.	**-**	-	N/A
A01.17c	**Bollards**	N/A	**-**	-	N/A
A01.18a	**Fire Hydrants**	None observed on site.	**-**	-	N/A
A01.18b	**Fire Hydrants**	None observed on site.	**-**	-	N/A
A01.18c	**Fire Hydrants**	None observed on site.	**-**	-	N/A

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1a	**Metal Cladding**	**~1970**: Prefinished corrugated metal panels are provided around the exterior of Building A.	**3**	3	The metal cladding has surpassed its EUL and should be replaced. Deficiencies with the metal cladding of Building A include impact damage above and adjacent to the overhead door, and punctures in the cladding were also noted at the north and west elevations. Water staining was observed on the interior of the concrete foundation wall coming from the seam at the metal cladding.
A02.1b	**Metal Cladding**	**~1992**: Prefinished corrugated metal panels are provided around the exterior of Building B.	**4**	-	The metal cladding is in overall acceptable condition. Impact damage was observed at the south corner of the building. See Note **3A**.
A02.1c	**Metal Cladding**	N/A	**-**	-	N/A
A02.2a	**Wood Cladding**	N/A		-	N/A
A02.2b	**Wood Cladding**	N/A		-	N/A

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A02 EXTERIOR WALLS

A02.2c	**Wood Cladding**	**~1980**: The building exterior is primarily clad with painted wood siding.	**3**	2/3	The wood cladding is approaching its EUL and is currently in marginal condition. An allowance to complete repairs including repainting has been included in year 1 to prolong the life of the cladding. Costing for the replacement of the cladding has been included at the end of its EUL.
A02.3a	**Exterior Paint**	**~2000:** The exposed concrete foundation walls along the base of Building A are painted.	**3**	-	The exterior paint has surpassed its EUL and should be repainted. See Note **3A**.
A02.3b	**Exterior Paint**	**~2008:** The bollards around the overhead door are painted.	**4**	-	The bollards will likely require repainting within the timeframe of this report. See Note **3A**.
A02.3c	**Exterior Paint**	**~1995:** The wood cladding and wood trim are finished with paint.	**3**	-	The exterior surfaces of the building require repainting. Costing for repainting has been included with the repairs on the wood cladding (see Item A02.2c above). It is recommended to repaint the wood trim concurrently with the repairs to the wood cladding.
A02.4a	**Joint Sealers**	**~1990:** Joint sealers were observed around some wall penetrations.	**3**	3	Joint sealers were observed around wall penetration, but appeared to be cracked and damaged. Exterior penetrations should be caulked as part of regular maintenance as required.
A02.4b	**Joint Sealers**	**~2005:** Joint sealers were observed around door openings.	**4**	-	The joint sealers are currently in acceptable condition, but will require replacing within the timeframe of this report. See Note **3A**.
A02.4c	**Joint Sealers**	**~2000:** Joint sealers were observed around door openings.	**3**	-	The joint sealers around the windows are either in marginal condition or are missing. It is recommended to replace existing joint sealers and install new caulking where required. See Note **3A**.
A02.5a	**Louvers**	N/A	**-**	-	N/A
A02.5b	**Louvers**	**~1992:** Prefinished metal louvers are provided on the east and west elevations of Building B.	**4**	-	No concerns observed or reported.
A02.5c	**Louvers**	**~1980:** A prefinished metal louver is provided for the attic space at the north elevation.	**4**	-	No concerns observed or reported.
A02.6a	**Insulation**	**~1970:** Insulation was concealed and not directly reviewed, but likely consists of batt insulation.	**4**	3	It was reported that Building A is too hot in the summer and too cold in the winter. It is recommended that the insulation be upgraded when the metal cladding is replaced.

A02 EXTERIOR WALLS

A02.6b	**Insulation**	**~1992:** Insulation was concealed and not directly reviewed, but likely consists of batt insulation.	**4**	-	It was reported that Building A is too hot in the summer and too cold in the winter. It is recommended that the insulation be upgraded when the metal cladding is replaced, which beyond the timeline of this report.
A02.6c	**Insulation**	**~1980:** Insulation was mostly concealed and not directly reviewed. Fibreglass batt insulation was observed in an opening in an exterior wall of the utility room.	**4**	-	No concerns reported.
A02.7a	**Vapour Barrier**	**~1970:** The vapour barrier was concealed and not directly reviewed, but likely consists of polyethylene sheets.	**4**	-	No concerns reported.
A02.7b	**Vapour Barrier**	**~1992:** The vapour barrier was concealed and not directly reviewed, but likely consists of polyethylene sheets.	**4**	-	No concerns reported.
A02.7c	**Vapour Barrier**	**~1992:** The vapour barrier was mostly concealed and not directly reviewed. Polyethylene sheets were observed in an opening in an exterior wall of the utility room.	**4**	-	No concerns reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1a	**Exterior Windows**	**~2005**: Insulated glazed units set in vinyl frames are provided at the building exterior.	**4**	-	No concerns observed or reported.
A03.1b	**Exterior Windows**	N/A	**-**	-	N/A
A03.1c	**Exterior Windows**	**~2005**: Insulated glazed units set in vinyl frames are provided at the building exterior.	**3**	2	Concerns with the exterior windows were reported including missing latches and improper sealing of the units. An allowance has been made to repair these issues.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1a	**Main Entrance Door**	**~1970**: An insulated, painted metal entrance door in a painted metal frame is provided at the main entrance of the office. The door is equipped with proximity card access and magnetic lock.	**3**	3	The door has surpassed its EUL and should be replaced. Costing for this replacement has been combined with Item A04.2a below. The door is not barrier free in its current condition. Due to the function of the building, no additional costing has been included for barrier free upgrades.
A04.1b	**Main Entrance Door**	**~1992**: An insulated, painted metal entrance door in a painted metal frame is provided at the main entrance. The door is equipped with proximity card access and magnetic lock.	**4**	-	The door is not barrier free in its current condition. Due to the function of the building, no costing has been included for barrier free upgrades.
A04.1c	**Main Entrance Door**	**~1980**: Insulated, prefinished metal entrance doors in painted wood frames are provided at the front and rear entrances.	**4**	-	The doors have surpassed their EUL but are currently in acceptable condition. Replacement of the doors is recommended in 2020. It was also noted that the door frames require repainting.
A04.2a	**Utility Doors**	**~1970**: Painted metal utility doors in painted metal frames are provided around the building exterior.	**3**	-	The doors have surpassed their EUL and should be replaced. Costing for this replacement has been combined with Item A04.1a above.
A04.2b	**Utility Doors**	**~1992**: Painted metal utility doors with glass inserts in painted metal frames are provided around the building exterior.	**4**	-	No concerns or issues were reported.
A04.2c	**Utility Doors**	N/A	**-**	-	N/A
A04.3a	**Overhead Doors**	**~2005**: An insulated, prefinished metal, sectional telescoping overhead door with motorized opener is provided to the engine room.	4	-	No concerns observed or reported.
A04.3b	**Overhead Doors**	**~1992**: An insulated, prefinished metal, sectional overhead door with glass inserts and motorized opener is provided to the engine room.	3	-	No concerns observed or reported. The door reportedly has issues sealing properly. A gap was observed between the door and frame at the time of assessment. It is recommended to install weather stripping or other appropriate seals to resolve the issue. See Note **3A**.
A04.3c	**Overhead Doors**	**~2005**: An insulated, prefinished metal, sectional overhead door with motorized opener is provided to the garage.	4	-	The overhead door is in an acceptable condition; however, the wood trim and frame require repainting. Costing for this has been included with repair of the wood cladding (see Item A02.2c above).

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A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1a	**Fascia**	**~1970**: Prefinished metal fascia is provided along the roof perimeter.	**4**	-	No concerns observed or reported.
A05.1b	**Fascia**	**~1992**: Prefinished aluminum fascia is provided along the roof perimeter.	**4**	-	No concerns observed or reported.
A05.1c	**Fascia**	**~1980**: Prefinished aluminum fascia is provided along the roof perimeter.	**4**	-	No concerns observed or reported.
A05.2a	**Soffit**	**~1970**: Prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.	**4**	-	A small section of soffit at the north side of the building is falling off and should be reattached. No other concerns observed or reported.
A05.2b	**Soffit**	N/A	**-**	-	N/A
A05.2c	**Soffit**	**~1980**: Prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs. Painted wood soffit is provided under the canopy at the main entrance.	**4**	-	No concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1a	**Fixed Partitions**	**~1970**: Interior partitions are steel column frames with corrugated galvanized steel coverings.	**4**	-	No concerns observed or reported.
A06.1b	**Fixed Partitions**	**~1992**: Interior partitions are steel column frames with corrugated galvanized steel coverings.	**4**	-	No concerns observed or reported.
A06.1c	**Fixed Partitions**	**~1980**: Interior partitions are framed with wood studs and are generally sheeted with gypsum wallboard.	**4**	-	No concerns observed or reported.
A06.2a	**Metal**	**~1970**: Galvanized steel corrugated panel wall finishes are provided throughout the majority of the building.	**4**	-	No concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

A06.2b	**Metal**	**~1992**: Galvanized steel corrugated panel wall finishes are provided throughout the majority of the building.	**4**	-	No concerns observed or reported.
A06.2c	**Metal**	N/A	**-**	-	N/A
A06.3a	**Gypsum Board**	**~1970**: Office partitioning with painted gypsum board finishes are provided in the office space.	**4**	-	No concerns observed or reported.
A06.3b	**Gypsum Board**	N/A	**-**	-	N/A
A06.3c	**Gypsum Board**	**~1980**: The majority of the interior walls are finished with painted gypsum board. Many of the interior gypsum board walls are also finished with a texture coat.	**3/4**	2	The unfinished gypsum wall board in the utility room has water staining, damage, and is dirty. Damages were also noted on the gypsum wall board in the garage. Costing has been included to repair and repaint the walls in these areas.
A06.4a	**Plywood**	**~1970**: Unfinished plywood wall finishes are provided behind the network and security housings.	**4**	-	No concerns observed or reported.
A06.4b	**Plywood**	N/A	**-**	-	N/A
A06.4c	**Plywood**	N/A	**-**	-	N/A
A06.5a	**Concrete**	**~1970**: Concrete foundation walls are exposed along the base of some of the interior walls.	**4**	-	No concerns observed or reported.
A06.5b	**Concrete**	N/A	**-**	-	N/A
A06.5c	**Concrete**	N/A	**-**	-	N/A
A06.6a	**Interior Paint**	**~2005**: The concrete foundation walls and some of the metal panels are finished with paint.	**4**	-	No concerns observed or reported. Due to the limited quantity of painted interior walls, costing has been excluded. It is assumed wall paintings will occur concurrently with painting of the floors, or as needed.
A06.6b	**Interior Paint**	N/A	**-**	-	N/A
A06.6c	**Interior Paint**	**~1980/2008**: The interior gypsum wall board is generally finished with paint.	**3/4**	3	The interior walls of the garage and utility room should be repainted once repaired. Costing for this has been included with Item A06.3c above. The interior paint in the living quarters is generally acceptable condition, but will require repainting within the timeframe of this report. No concerns observed or reported.
A06.7a	**Wallpaper**	N/A	**-**	-	N/A
A06.7b	**Wallpaper**	N/A	**-**	-	N/A

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A06 INTERIOR WALLS AND PARTITIONS

A06.7c	**Wallpaper**	**~1980**: Wallpaper is provided at the main entrance and hallway, and at the stairwell.	**-**	-	It is recommended to remove the wallpaper as it is very dated, and finish the underlying gypsum wallboard with paint when the remaining living quarters are repainted. Costing for this has been included with Item A06.6a above.
A06.8a	**Ceramic Tile**	N/A	**-**	-	N/A
A06.8b	**Ceramic Tile**	N/A	**-**	-	N/A
A06.8c	**Ceramic Tile**	**~2005**: Ceramic wall tile surround is provided at the bathtub and shower in the washroom.	**4**	-	No concerns observed or reported.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1a	**Interior Doors**	**~1970**: Building A is provided with one painted metal utility door with glass insert set in painted metal frame. One wood door set in stained wood frame is provided at the washroom.	**4**	-	No concerns observed or reported.
A07.1b	**Interior Doors**	**~1992**: Building B is provided with one painted metal utility door with glass insert set in painted metal frame.	**4**	-	No concerns observed or reported.
A07.1c	**Interior Doors**	**~1992**: Building C is provided with wood doors with stained wood veneer.	**4**	-	No concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.1a	**Exposed Structure**	**~1970**: The ceilings throughout Building A are exposed structure consisting of corrugated metal decking supported by steel beams.	**4**	-	No concerns observed or reported.

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A08 CEILINGS

A08.1b	**Exposed Structure**	**~1992**: The ceilings throughout Building B are exposed structure consisting of corrugated metal decking supported by steel beams.	**4**	-	No concerns observed or reported.
A08.1c	**Exposed Structure**	**~1992**: The ceiling in the utility room is exposed to the structure, revealing OSB sub flooring supported by dimensional lumber floor joists.	**4**	-	No concerns observed or reported.
A08.2a	**Gypsum Board**	N/A	**-**	-	N/A
A08.2b	**Gypsum Board**	N/A	**-**	-	N/A
A08.2c	**Gypsum Board**	**~1980**: The building is generally provided with gypsum board ceiling throughout, finished with either interior paint or stippling.	**3**	-	The main floor bedroom has a waterline that has been plumbed throughout the ceiling leaving a large gap in the gypsum board. It is recommended to re-plumbing of the line within the ceiling and wall space. See Item M02.1c below. No other concerns observed or reported.
A08.3a	**Interior Paint**	N/A	**-**	-	N/A
A08.3b	**Interior Paint**	N/A	**-**	-	N/A
A08.3c	**Interior Paint**	**~2008**: The ceilings throughout are provided with smooth and stipple finished painted ceilings.	**4**	-	It is recommended to repaint the ceiling at the vestibule concurrently with repainting of the interior walls. The cost for this has been included with Item A06.6c above. No concerns observed or reported.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1a	**Concrete**	**~1970**: Painted concrete slab flooring is provided throughout the majority of the building.	**4**	-	No concerns observed or reported.
A09.1b	**Concrete**	**~1992**: Painted concrete slab flooring is provided in the electrical room and approximately half of the engine room.	**4**	-	No concerns observed or reported.
A09.1c	**Concrete**	**~1992**: Painted concrete slab flooring is provided in the utility room. Unfinished concrete flooring is provided at the garage and in the storage space under the main staircase.	**4**	-	Although not observed at the time of assessment, it was reported efflorescence has been noted on the garage flooring. See note **3B**.

A09 FLOORING

A09.2a	**Metal Plate**	**~1970:** Painted diamond plate metal walkways are provided throughout the engine room.	**4**	-	No concerns observed or reported.
A09.2b	**Metal Plate**	**~1992:** Painted diamond plate metal flooring is provided in front of some of the electrical equipment in the electrical room.	**4**	-	No concerns observed or reported.
A09.2c	**Metal Plate**	N/A	**-**	-	N/A
A09.3a	**Interior Paint**	**~2009:** Interior paint is provided on the interior flooring finishes.	**5**	3	The flooring is reportedly painted regularly and was in good condition. Capital expenditure has been included for future painting projects and has been combined with painting the flooring in Building B (see Item A09.3b below).
A09.3b	**Interior Paint**	**~2005:** Interior paint is provided on the concrete and metal plate flooring finishes.	**4**	3	The flooring is reportedly painted regularly and was inacceptable condition. Capital expenditure has been included for future painting projects and has been combined with painting the flooring in Building A (see Item A09.3a above).
A09.3c	**Interior Paint**	**~2010:** Interior paint is provided on the concrete flooring in the utility room.	**4**	-	The flooring was inacceptable condition at the time of assessment. Repainting the flooring will likely be required within the timeframe of the report. See Note **3A**.
A09.4a	**Metal Grating**	N/A	**-**	-	N/A
A09.4b	**Metal Grating**	**~1992:** Metal grating floor finishes are provided on the main floor and in the mezzanine of the engine room.	**4**	-	No concerns observed or reported.
A09.4c	**Metal Grating**	N/A	**-**	-	N/A
A09.5a	**Vinyl**	N/A	**-**	-	N/A
A09.5b	**Vinyl**	N/A	**-**	-	N/A
A09.5c	**Vinyl**	**~1980:** Original sheet vinyl flooring is provided in the main entrance vestibule and hallway. **~2005:** Sheet vinyl flooring is provided in the kitchen, dining room, and washroom on the second floor.	**3/4**	-	The original sheet vinyl flooring has surpassed its EUL and should be replaced. See Note **3A**. The second floor sheet vinyl flooring was in generally acceptable condition at the time of assessment. A large gap was noted in flooring along the south edge of the dining room exposing the sub floor. See Note **3A**.
A09.6a	**Carpet**	N/A	**-**	-	N/A

A09 FLOORING

A09.6b	**Carpet**	N/A	**-**	-	N/A
A09.6c	**Carpet**	**~2001:** Sheet carpet flooring is provided in the stairwell, living room, and the second floor bedrooms and adjacent hallway.	**4**	2/3	The carpet was in generally acceptable condition at the time of assessment. Rippling was observed at the hallway adjacent to the second floor bedrooms. It is recommended to have the carpet stretched before being replaced at the end of its EUL.
A09.7a	**Laminate**	N/A	**-**	-	N/A
A09.7b	**Laminate**	N/A	**-**	-	N/A
A09.7c	**Laminate**	**~2005:** Laminate hardwood flooring is provided in the main floor bedroom.	**4**	-	No concerns observed or reported.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.1a	**Counters/Cabinets**	**~1970/2015**: Plastic laminate cabinets are provided in the kitchen area. The washroom is provided with stained wood cabinets and a solid surface counter with integral sink.	**3/4**	3	The washroom counters and cabinets are currently in acceptable condition. The washroom counter was reportedly replaced in 2015. The cabinets appear to be original and should be replaced. The kitchen counter and cabinets are in marginal condition and should be replaced concurrently.
A10.1b	**Counters/Cabinets**	N/A	**-**	-	N/A
A10.1c	**Counters/Cabinets**	**~2005**: Plastic laminate counters and cabinets are provided in the kitchen and washroom.	**4**	-	Some water damage was observed in the cabinet under the kitchen sink. No other concerns were observed or reported.
A10.2a	**Railing**	N/A	**-**	-	N/A
A10.2b	**Railing**	**~1992:** Painted steel railing is provided at the mezzanine and mezzanine stair.	**4**	-	No concerns observed or reported.
Imm.1c A10.2c	**Railing**	None provided.	**1**	1	No railing is provided at the staircase between the main and second floor. It is recommended to install a wall-mounted railing as a safety measure.
A10.3a	**Lockers**	N/A	**-**	-	N/A
A10.3b	**Lockers**	N/A	**-**	-	N/A
A10.3c	**Lockers**	N/A	**-**	-	N/A

A10 FIXTURES

A10.4a	**Interior Signs**	**~1970**: Sheet metal and sticker interior signage for hazard warnings and PPE requirements are provided throughout the building.	**4**	-	No concerns observed or reported.
A10.4b	**Interior Signs**	**~1992**: Sheet metal and sticker interior signage for hazard warnings and PPE requirements are provided throughout the building.	**4**	-	No concerns observed or reported.
A10.4c	**Interior Signs**	N/A	**-**	-	N/A
A10.5a	**Washroom Accessories**	**~1970**: The washroom is provided with a mirror, and toilet paper/paper tower/cleaner dispensers.	**4**	-	The washroom accessories will likely require replacement within the timeframe of this report. See Note **3A**.
A10.5b	**Washroom Accessories**	N/A	**-**	-	N/A
A10.5c	**Washroom Accessories**	**~2005**: The washroom is provided with a mirror, toilet paper dispenser, and trash receptacle.	**4**	-	No concerns observed or reported.
A10.6a	**Appliances**	**~1970**: A Maytag residential washing machine is provided in the building.	**3**	-	The washing machine has surpassed it EUL and should be replaced. See Note **3A**.
A10.6b	**Appliances**	N/A	**-**	-	N/A
A10.6c	**Appliances**	**~2005**: Residential appliances include a refrigerator in the garage, a washing machine and clothes dryer in the utility room, a refrigerator, electric range, range hood, microwave in the kitchen, and a mini fridge and water cooler in the dining room.	**4**	3	The appliances are currently in acceptable condition, but will require replacement within the timeframe of this report.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1a	**Metal Roofing**	**~1970**: Building A is provided with a pitched roof covered with prefinished corrugated metal panels.	**4**	3	The roof was snow-covered at the time of assessment and was not directly observed. No concerns were reported. The roof has surpassed its EUL and should be replaced.
R01.1b	**Metal Roofing**	**~1992**: Building B is provided with a pitched roof covered with prefinished corrugated metal panels.	**3**	2	The roof was snow-covered at the time of assessment and was not directly observed. The roof reportedly leaks along the seam between the electrical and engine rooms. Also, ice build-up reportedly occurs due to roof vents not closing properly. Costing for roof repair has been included in the Capital Reserve Table.
R01.1c	**Metal Roofing**	N/A	**-**	-	N/A
R01.2a	**Asphalt Shingles**	N/A	**-**	-	N/A
R01.2b	**Asphalt Shingles**	N/A	**-**	-	N/A
R01.2c	**Asphalt Shingles**	**~1980**: Building C is provided with a pitched roof covered with asphalt shingles.	**3**	3	The roof was snow-covered at the time of assessment and was not directly observed. The roof is reportedly original to the building. As such, replacement of the roof is recommended based on its current age, and the EUL of asphalt roofing shingles.
R01.3a	**Gutters and Downspouts**	**~1970**: Prefinished metal gutters and downspouts provide roof drainage directly to the ground.	**4**	3	No concerns observed or reported.
R01.3b	**Gutters and Downspouts**	**~1992**: Prefinished metal gutters and downspouts provide roof drainage directly to the ground.	**4**	3	Heat tracing was reportedly installed in the gutters and to repair ice build-up issues. No concerns observed or reported.
R01.3c	**Gutters and Downspouts**	**~1980**: Prefinished metal gutters and downspouts provide roof drainage directly to the ground.	**3**	-	Issues were reported regarding the roof gutters. A section at the southeast corner of the building was observed to be dislodged. The gutters and downspouts have surpassed their EUL and should be replaced. See Note **3A**.

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A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.1a	**Mould**	N/A	**-**	-	N/A
A99.1b	**Mould**	N/A	**-**	-	N/A
Imm.2c A99.1c	**Mould**	Suspect mould was identified in the washroom at the sealant around the bathtub and water closet.	**2**	1	Mould has the potential to cause adverse health effects. An allowance has been made to clean the suspect mould and replace any damaged materials such as caulking.
A99.2a	**Elevators**	N/A	**-**	-	N/A
A99.2b	**Elevators**	N/A	**-**	-	N/A
A99.2c	**Elevators**	N/A	**-**	-	N/A
A99.2a	**Exterior Stairs and Ramps**	N/A	**-**	-	N/A
A99.2b	**Exterior Stairs and Ramps**	N/A	**-**	-	N/A
A99.2c	**Exterior Stairs and Ramps**	**~1980**: A wood-framed stair with painted wood treads and painted wood railing provides access to the deck.	**4**	-	The stair was mostly concealed due to snow-covered at the time of assessment. No concerns observed or reported.
A99.3a	**Interior Stairs**	N/A	**-**	-	N/A
A99.3b	**Interior Stairs**	**~1992**: Access to the mezzanine is provided by a steel-framed stair with metal grate treads and painted steel railing.	**4**	-	No concerns observed or reported.
A99.3c	**Interior Stairs**	**~1980**: Access between the first and second floors of the building is provided by a wood-framed staircase with sheet carpet finishes.	**4**	-	No concerns observed or reported.
A99.4a	**Ladders**	N/A	**-**	-	N/A
A99.4b	**Ladders**	N/A	**-**	-	N/A
A99.4c	**Ladders**	N/A	**-**	-	N/A
A99.5a	**Crane**	**~1970**: A 2-ton industrial crane manufactured by Demag is located in the engine room.	**4**	-	No concerns observed or reported.
A99.5b	**Crane**	N/A	**-**	-	N/A
A99.5c	**Crane**	N/A	**-**	-	N/A

FLA: OFFICE BUILDING, DIESEL PLANT, AND STAFF HOUSE, FARO, YT

NOTES:

3A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

3B) Efflorescence in concrete flooring typically appears due to moisture in the concrete from groundwater or drainage. If the efflorescence is severe and of particular concern, a study may be conducted to determine if there are issues regarding site drainage or vapour barrier issues with the slab. As there are no concerns with efflorescence other than aesthetics, and the condition was not observed during our site recognisance, Golder is of the opinion that regular cleaning of the deposits is the best solution. Costing for cleaning is expected to fall below the minimum Capital Threshold and has been excluded from the Capital Reserve Table.

IMMEDIATE ITEMS:

1mm.1c) Install railing at the main interior staircase.

1mm.1c) Clean suspect mould in the washroom and replace any damaged materials.

No other immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.

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Photo #A1a: General view of the Office building (Building A).



Photo #A2a: Impact damage near the overhead door.

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Photo #A3a: Exterior window.



Photo #A4a: Main entrance door.

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Photo #A5a: Overhead door.



Photo #A6a: Soffit requiring repair.



Photo #A7a: Interior finishes of the office area.



Photo #A8a: Interior finishes of the engine room.

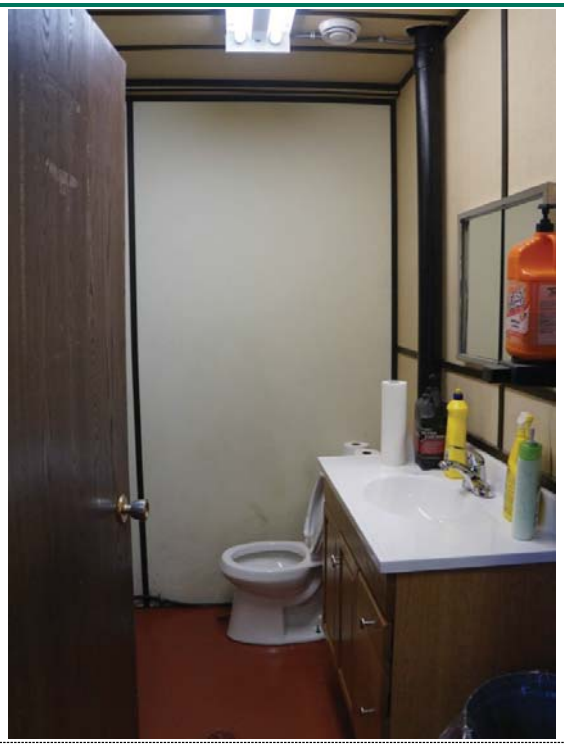


Photo #A9a: Interior finishes in the washroom.



Photo #A10a: Cabinets and counter requiring replacing in the kitchen area.



Photo #A11b: General view of the Diesel Plant (Building B).



Photo #A12b: Impact damage at the south corner of the building.



Photo #A13b: Exterior utility doors.



Photo #A14b: Overhead door.



Photo #A15b: Typical interior finishes of the electrical room.



Photo #A16b: Typical interior finishes of the engine room.



Photo #A17b: Stairs to the mezzanine in the engine room.



Photo #A18b: View of the mezzanine.



Photo #A19c: General view of Building C.



Photo #A20c: Wood fence along the south property line.



Photo #A21c: Damage to the wood cladding at the northwest corner.



Photo #A22c: Joint sealer failure at a window.



Photo #A23c: Main entrance door.



Photo #A24c: Interior finishes of the main entrance.

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Photo #A25c: Garage finishes with damaged drywall area shown.



Photo #A26c: Dirty, stained, and damaged wall in the utility room.

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Photo #A27c: Interior finishes of the main floor bedroom.



Photo #A28c: Interior finishes of the living room and dining area.



Photo #A29c: Gap in the vinyl flooring at the dining room.



Photo #A30c: Interior finishes and fixtures in the kitchen.



Photo #A31c: Rippling of the carpet in the hallway.



Photo #A32c: Suspect mould in the washroom.



Photo #A33c: Roof gutter requiring repair.



Photo #A34c: General view of the deck.

4.0 STRUCTURAL

Building A – Faro Office Building:

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings and a CIP concrete foundation walls. The building floor is a slab on grade throughout. The superstructure is composed of structural steel I-beams with tension-only cross bracing along exterior walls. Wood studs with gypsum wallboard coverings frame the interior partitions around the office space and washroom. The roof construction consists of corrugated metal decking supported by structural steel I-beams, with tension-only cross bracing for lateral resistance.

Capital expenditures with respect to the foundation walls are anticipated within the 10-year timeframe of this report.

A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Building B – Faro Diesel Plant:

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings. The building main floor is a slab on grade throughout. The mezzanine is framed with steel I-section beams and columns which support the metal grate decking. The superstructure is composed of structural steel I-beams with tension-only cross bracing along exterior walls. The roof construction consists of corrugated metal decking supported by structural steel I-beams, with tension-only cross bracing for lateral resistance.

No capital expenditures with respect to the structural elements of the building were identified.

A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Building C – Faro Staff House:

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings and a CIP concrete foundation walls. The building main floor is a slab on grade throughout. Suspended floors are constructed of OBS sub flooring supported by dimensional lumber joists. The superstructure is composed of wood stud framing with gypsum wallboard coverings at interior and exterior walls. The roof construction consists of plywood decking supported by dimensional lumber rafters.

No capital expenditures with respect to the structural elements of the building were identified.

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A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S01.1a	**Footings**	**~1970**: The substructure is mostly concealed; therefore, was not directly reviewed. Based upon standard construction methods and observations made on Site, it is estimated the substructure consists of CIP strip and spread footings.	**4**	-	No concerns observed or reported.
S01.1b	**Footings**	**~1992**: The substructure is mostly concealed; therefore, was not directly reviewed. Based upon standard construction methods and observations made on Site, it is estimated the substructure consists of CIP strip and spread footings.	**4**	-	No concerns observed or reported.
S01.1c	**Footings**	**~1992**: The substructure is mostly concealed; therefore, was not directly reviewed. Based upon standard construction methods and observations made on Site, it is estimated the substructure consists of CIP strip and spread footings.	**4**	-	No concerns observed or reported.
S01.2a	**Foundation Walls**	**~1970**: CIP concrete foundation walls are provided around the perimeter of the building.	**3**	2	The foundation walls were observed to be spalling and cracking in some locations. An allowance to repair the concrete has been included in the Capital Reserve Table.
S01.2b	**Foundation Walls**	N/A	**-**	-	N/A
S01.2c	**Foundation Walls**	**~1980**: CIP concrete foundation walls are provided around the perimeter of the building.	**4**	-	No concerns observed or reported.

S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1a	**Slab on Grade**	**~1970**: A CIP slab on grade is provided throughout the building.	**4**	-	No concerns observed or reported.
S02.1b	**Slab on Grade**	**~1992**: A CIP slab on grade is provided throughout the building. The slab is subgrade at the northeast end of the engine room to allow space for process piping.	**4**	-	Minor cracks were observed in some areas which should be repaired. See Note **4A**.
S02.1c	**Slab on Grade**	**~1992**: A CIP slab on grade is provided throughout the building.	**4**	-	No concerns observed or reported.

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.1a	**Suspended Floor**	N/A	**-**	-	N/A
S03.1b	**Suspended Floor**	**~1992**: The mezzanine is steel-framed with steel I-section beams and columns. The mezzanine is covered with metal grate flooring.	**4**	-	No concerns observed or reported.
S03.1c	**Suspended Floor**	**~1980**: The second floor of the building is constructed of OBS sub flooring supported by dimensional lumber joists.	**4**	-	No concerns observed or reported.
S.03.2a	**Crawlspace**	N/A	**-**	-	N/A
S.03.2b	**Crawlspace**	N/A	**-**	-	N/A
S.03.2c	**Crawlspace**	N/A	**-**	-	N/A
S03.3a	**Stairs**	N/A	**-**	-	N/A
S03.3b	**Stairs**	**~1992**: The mezzanine stairs are steel-framed with metal grate treads and painted steel handrails.	**-**	-	N/A

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.3c	Stairs	**~1980**: The interior and exterior stairs are wood-framed.	-	-	N/A

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1a	Framing	**~1970**: The roof structure is framed with structural steel I-beams.	4	-	No concerns observed or reported.
S04.1b	Framing	**~1992**: The roof structure is framed with structural steel I-beams.	4	-	No concerns observed or reported.
S04.1c	Framing	**~1980**: Concealed and not directly reviewed, but likely framed with dimensional lumber or pre-engineered trusses.	4	-	No concerns observed or reported.
S04.2a	Decking	**~1970**: Roof decking is provided by corrugated metal panels.	4	-	No concerns observed or reported.
S04.2b	Decking	**~1992**: Roof decking is provided by corrugated metal panels.	4	-	No concerns observed or reported.
S04.2c	Decking	**~1980**: Concealed and not directly reviewed, but roof decking likely consist of plywood sheeting.	4	-	No concerns observed or reported.
S04.3a	Lateral Resistance	**~1970**: Tension-only cross bracing is provided for lateral resistance in the roof structure.	4	-	No concerns observed or reported.
S04.3b	Lateral Resistance	**~1992**: Tension-only cross bracing is provided for lateral resistance in the roof structure.	4	-	No concerns observed or reported.
S04.3c	Lateral Resistance	**~1980**: Lateral resistance is achieved by the roof decking and wood bridging.	4	-	No concerns observed or reported.

S05 INTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S05.1a	**Interior Walls**	**~1970:** The interior partition between the engine room and remaining areas is steel framed with corrugated metal panel coverings. The partitioning around the office space and washroom consists of wood studs with painted gypsum wallboard.	**4**	-	No concerns observed or reported.
S05.1b	**Interior Walls**	**~1992:** The interior partition between the electrical and engine rooms is steel framed with corrugated metal panel coverings.	**4**	-	No concerns observed or reported.
S05.1c	**Interior Walls**	**~1992:** Interior walls are framed with wood studs and gypsum wallboard.	**4**	-	No concerns observed or reported.
S05.2a	**Interior Columns**	N/A	**-**	-	N/A
S05.2b	**Interior Columns**	N/A	**-**	-	N/A
S05.2b	**Interior Columns**	N/A	**-**	-	N/A

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.1a	**Exterior Load-bearing Walls**	**~1970**: Exterior load-bearing walls consist of structural steel I-section columns with no interior wall coverings	**4**	-	No concerns observed or reported.
S06.1b	**Exterior Load-bearing Walls**	**~1992**: Exterior load-bearing walls consist of structural steel I-section columns with no interior wall coverings	**4**	-	No concerns observed or reported.
S06.1c	**Exterior Load-bearing Walls**	**~1992**: Exterior load-bearing walls consist of wood stud framing with OSB at the exterior and gypsum board on the interior faces.	**4**	-	No concerns observed or reported.
S06.2a	**Exterior Columns**	N/A	**-**	-	N/A
S06.2b	**Exterior Columns**	N/A	**-**	-	N/A
S06.2c	**Exterior Columns**	N/A	**-**	-	N/A

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.3a	**Lateral Resistance**	**~1970:** Tension-only cross bracing is provided for lateral resistance in the exterior walls.	**-**	-	N/A
S06.3b	**Lateral Resistance**	**~1992:** Tension-only cross bracing is provided for lateral resistance in the exterior walls.	**-**	-	N/A
S06.3c	**Lateral Resistance**	**~1980:** Lateral resistance is achieved in the exterior walls by shear wall construction.	**-**	-	N/A

NOTES:

4A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

4B) Due to the age of Building A (~1970 construction), there is potential for lead paint to have been used on the structural steel members. No lead sampling has been conducted on the buildings discussed in this report. If modifications are to be made where lead paints may be present, it is recommended to test the suspect materials and proceed with work accordingly.

IMMEDIATE ITEMS:

No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.



Photo #S1a: Exterior view of the foundation wall with some spalling and cracking noted.



Photo #S2a: General view of the slab-on-grade.



Photo #S3a: Roof structure.



Photo #S4a: Exterior wall structure.



Photo #S5a: Interior office partitioning with wood studs.



Photo #S6b: Minor crack in the concrete slab.



Photo #S7b: Roof structure.



Photo #S8b: Exterior wall structure.

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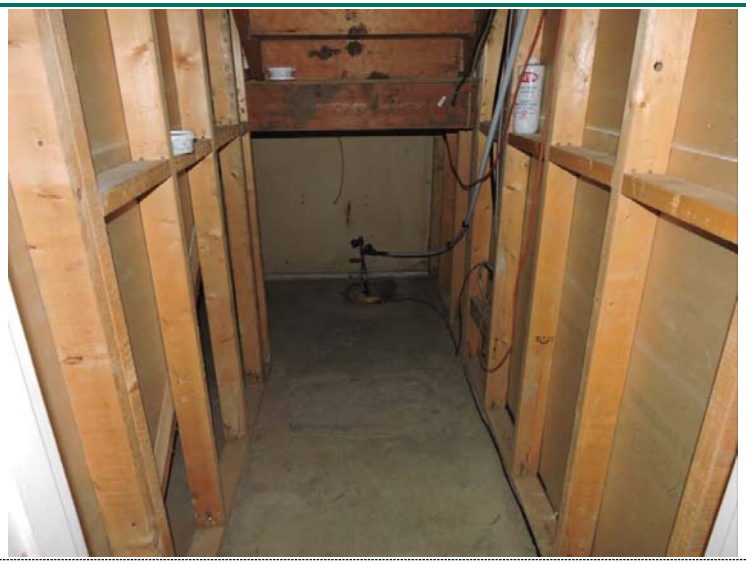


Photo #S9c: Concrete slab, and interior wall/stair construction.

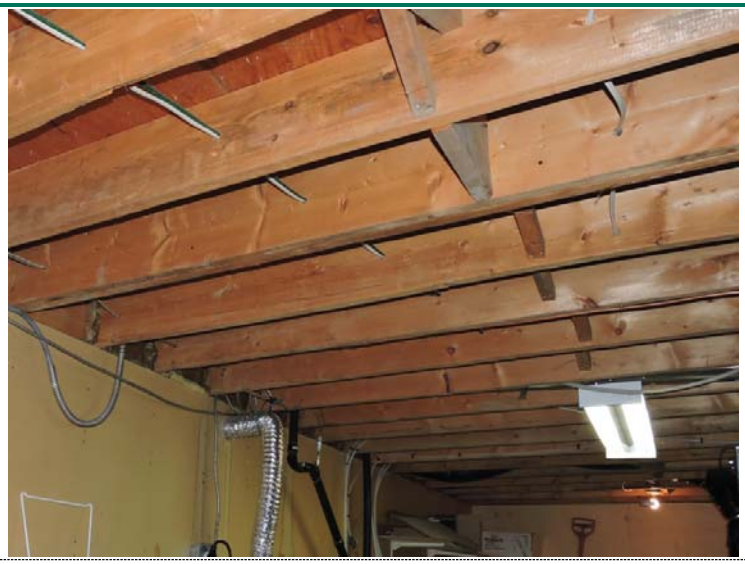


Photo #S10c: Suspended floor construction.

5.0 MECHANICAL

Building A – Faro Office Building:

The building is supplied with domestic water from an aboveground plastic storage stank located within the building and is distributed via copper piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface drainage. Domestic hot water is provided by a hot water heater located above the washroom. Plumbing fixtures include a solid surface lavatory and a floor-mounted, flush tank water closet in the washroom, and a plastic wash basin located adjacent to the water storage tank.

Heating oil fuel is supplied by an aboveground steel storage tank. The building is primarily heated by suspended radiant hydronic unit heaters located throughout the building. Hot water for the units are provided from a boiler system located within Building B. Supplementary heating is provided to the washroom from an electric baseboard heater. Building ventilation is provided by rooftop mounted vents, and building exhaust is handled by through-wall exhaust fans.

Capital expenditures with respect to the unit heaters and roof vents are anticipated to be required within the 10-year time frame of this report. Further investigation is recommended with respect to the domestic water and septic systems.

The mechanical components are in acceptable overall condition.

Building B – Faro Diesel Plant:

The building is not provided with domestic water or sanitary sewer services. Storm water is drained through overland soil absorption and surface drainage.

Heating oil fuel is supplied by an aboveground steel storage tank. The building is primarily heated by suspended radiant hydronic unit heaters located throughout the building. Hot water for the units is provided from a boiler system which includes an oil-fired boiler and burner, and a metal heat exchanger. Building ventilation is provided by rooftop mounted vents and exterior wall louvers, and building exhaust is handled by ceiling-mounted exhaust fans.

Capital expenditure with respect to the unit heaters and exhaust fans is anticipated to be required within the 10-year time frame of this report.

The mechanical components are in acceptable overall condition.

Building C – Faro Staff House:

The building is supplied with domestic water from the municipal mains and is distributed by plastic piping. Sanitary waste is fed to municipal sewer mains via ABS plastic piping. Storm water is drained through overland soil absorption and surface drainage. Domestic hot water is provided by an electric hot water heater located in the utility room. Plumbing fixtures include a counter-mounted enameled iron lavatory, and a floor-mounted, flush tank, vitreous china water closet in the kitchen, a counter-mounted stainless steel sink in the kitchen, and a fibre reinforced plastic wash basin in the utility room.

FLA: OFFICE BUILDING, DIESEL PLANT, AND STAFF HOUSE, FARO, YT

Heating oil fuel is supplied by an aboveground steel storage tank. The building is primarily heated by an oil-fired forced air furnace located in the utility room. Air is distributed throughout the building by a galvanized metal ductwork system. Building ventilation is provided by the furnace and operable windows, and building exhaust is handled by the range hood in the kitchen and a ceiling-mounted exhaust fan in the washroom.

Capital expenditure with respect to the water distribution system is anticipated to be required within the 10-year time frame of this report. Further investigation is recommended with respect to the septic system.

The mechanical components are in acceptable overall condition.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
RAI.1a M01.1a	**Domestic Water Supply**	Domestic water is trucked on-site to a ~500 gallon plastic aboveground storage tank located within the building.	**3**	2	Issues regarding the domestic water supply were reported including inadequate water pressure and unreliable water delivery. An allowance for a domestic water study has been included in the Capital Reserve Table. A preliminary cost for repair has also been included. Actual cost of repair will depend on the outcome of the study.
M01.1b	**Domestic Water Supply**	N/A	**-**	-	N/A
M01.1c	**Domestic Water Supply**	Domestic water is supplied by municipal mains.	**4**	-	No concerns observed or reported.
M01.2a	**Sanitary Sewer**	Sanitary waste is fed to an on-site septic field.	**3**	2	Concerns were reported with the septic system including drainage issues. An allowance for a domestic septic study has been included in the Capital Reserve Table. A preliminary cost for repair has also been included. Actual cost of repair will depend on the outcome of the study. Costing for this item has been included with Item M01.1a above.
M01.2b	**Sanitary Sewer**	N/A	**-**	-	N/A
RAI.2c M01.2c	**Sanitary Sewer**	Sanitary waste is fed to municipal sewer mains.	**3**	2	The site reportedly experiences sewer blow-back issues in the Spring. An allowance has been made to investigate the cause of the issue, with a repair allowance made in the following year. The actual cost of repair will depend on the result of the study.
M01.3a	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3b	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3c	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.4a	**Oil Supply**	Heating oil fuel is supplied by a 1,111 L aboveground steel storage tank located at to the southwest of Building A.	**4**	-	No concerns observed or reported.
M01.4b	**Oil Supply**	Heating oil fuel is supplied by an aboveground steel storage tank located on the north side of Building B.	**4**	-	No concerns observed or reported.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M01.4c	**Oil Supply**	Heating oil fuel is supplied by an aboveground steel storage tank located on the west side of Building C.	**4**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.1a	**Water Distribution**	**~1970:** Copper domestic water distribution piping is provided in Building A.	**4**	-	No concerns observed or reported.
M02.1b	**Water Distribution**	N/A	**-**	-	N/A
M02.1c	**Water Distribution**	**~1980:** Plastic water distribution piping is provided in Building C.	**3**	2	A water line feeding the hose bib near the front entrance was observed at the corner of the main floor bedroom. The line appears to have been installed retroactively and has left a large opening in the ceiling. An allowance has been made to properly plum the line to conceal it within the ceiling space and wall cavity.
M02.2a	**Backflow Prevention**	None observed.	**-**	-	N/A
M02.2b	**Backflow Prevention**	None observed.	**-**	-	N/A
M02.2c	**Backflow Prevention**	None observed.	**-**	-	N/A
M02.3a	**Domestic Hot Water Heaters**	**~2007:** One domestic hot water heater is located above the washroom.	**4**	3	The hot water heater was concealed and not directly reviewed. No concerns were reported.
M02.3b	**Domestic Hot Water Heaters**	N/A	**-**	-	N/A

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.3c	**Domestic Hot Water Heaters**	**~2007:** One residential, electric domestic hot water heater is located in the utility room. Technical specifications for the unit are given below: Manufacturer: GSW Water Heating Model Number: 6G50SDE1 Serial Number: S0712502371 Capacity: 184 L Input: double element (3000 W each)	**4**	-	Water staining was observed down the side walls of the tank. As no issues were reported, it is assumed the markings were from a previous leak that has since been fixed.
M02.4a	**Water Tank**	**~2000**: A plastic water tank with estimated volume of approximately 500 gallons is located within Building A. The tank is provided with a domestic water pump and captive air tank.	**4**	-	No concerns observed or reported.
M02.4b	**Water Tank**	N/A	**-**	-	N/A
M02.4c	**Water Tank**	N/A	**-**	-	N/A
M02.5a	**Waste Water Piping**	**~1970**: ABS plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.5b	**Waste Water Piping**	N/A	**-**	-	N/A
M02.5c	**Waste Water Piping**	**~1980**: ABS plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.6a	**Irrigation System**	N/A	**-**	-	N/A
M02.6b	**Irrigation System**	N/A	**-**	-	N/A
M02.6c	**Irrigation System**	N/A	**-**	-	N/A
M02.7a	**Washroom Fixtures**	**~2000/2015**: The washroom is provided with a solid surface lavatory integrated into the countertop, and a floor-mounted, flush tank water closet.	**4/5**	-	The lavatory was reportedly replaced in 2015, while the water closet appears to have been installed circa 2000. No concerns observed or reported.
M02.7b	**Washroom Fixtures**	N/A	**-**	-	N/A

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M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.7c	**Washroom Fixtures**	**~2005**: The washroom is provided with a counter-mounted enameled iron lavatory, and a floor-mounted, flush tank, vitreous china water closet.	**4**	-	No concerns observed or reported.
M02.8a	**Sinks**	**2011**: A plastic wash basin is located adjacent to the domestic water tank.	**4**	-	No concerns observed or reported.
M02.8b	**Sinks**	N/A	**-**	-	N/A
M02.8c	**Sinks**	**~1980**: A fibre reinforced plastic wash basin is provided in the utility room. **~2005**: The kitchen is provided with a counter-mounted, stainless steel sink.	**4**	-	The plastic wash basin will require replacement within timeframe of this report. See Note **5A**. No concerns observed or reported.
M02.9a	**Oil Interceptor**	N/A	**-**	-	N/A
M02.9b	**Oil Interceptor**	**~1992**: Building B is provided with an oil interceptor in the engine room.	**4**	-	No concerns observed or reported.
M02.9c	**Oil Interceptor**	N/A	**-**	-	N/A

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.1a	**Boilers**	N/A	**-**	-	No boilers are provided in Building A. The hydronic unit heaters are provided with hot water from a boiler system located in Building B.
M03.1b	**Boilers**	**~1992**: An oil-fired boiler is provided in the engine room of Building B. Technical specifications for the unit are provided below: Manufacturer: Weil-McLain Model Number: BL-888WF Serial Number: 920548 Capacity: 1,655 MBH	**4**	-	No concerns observed or reported. An additional electric hot water boiler is located in the engine room of Building B. However, this boiler is reportedly process-related and therefore beyond the scope of this report.
M03.1c	**Boilers**	N/A	**-**	-	N/A
M03.2a	**Pumps**	N/A	**-**	-	N/A
M03.2b	**Pumps**	**~1992**: Circulation pumps for the boiler system are provided throughout the building.	**4**	-	No concerns observed or reported.
M03.2c	**Pumps**	N/A	**-**	-	N/A
M03.3a	**Unit Heaters**	**~1992**: Suspended radiant hydronic unit heaters are provided throughout the building. A sample of the technical specifications of one of the units is provided below: Manufacturer: Trane Inc. Model Number: UHSA-090S-8C-AAE Serial Number: D92F34460 Capacity: 108 MBTU/hr	**4**	-	The unit heaters are currently in acceptable condition, but will reach their EUL within the timeframe of this report. Costing for this item has been combined with Item M03.2b below.
M03.3b	**Unit Heaters**	**~1992**: Suspended radiant hydronic unit heaters manufactured by Trane are provided throughout the building.	**4**	-	The unit heaters are currently in acceptable condition, but will reach their EUL within the timeframe of this report. Costing for this item has been combined with Item M03.2a above.
M03.3c	**Unit Heaters**	N/A	**-**	-	N/A
M03.4a	**Burners**	N/A	**-**	-	N/A

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.4b	**Burners**	**~1992**: An oil burner is provided in the engine room of Building B. Technical specifications for the unit are provided below: Manufacturer: Power Flame Inc. Model Number: CR2-OBC Serial Number: 089259342	**4**	-	No concerns observed or reported.
M03.4c	**Burners**	**~2007**: A Riello burner is connected to the oil-fired furnace.	**4**	-	No concerns observed or reported.
M03.5a	**Heat Exchanger**	N/A	**-**	-	N/A
M03.5b	**Heat Exchanger**	**~1992**: A metal heat exchanger manufactured by Karbate Vicarb is located in the engine room of Building B and is connected to the boiler system via a glycol loop.	**4**	-	No concerns observed or reported.
M03.5c	**Heat Exchanger**	N/A	**-**	-	N/A
M03.6a	**Baseboard Heaters**	**~1992**: An electric baseboard heater is provided in the washroom.	**4**	-	The baseboard heater will likely surpass its EUL within the timeframe of this report and should be replaced. See Note **5A**.
M03.6b	**Baseboard Heaters**	N/A	**-**	-	N/A
M03.6c	**Baseboard Heaters**	N/A	**-**	-	N/A
M03.7a	**Furnace**	N/A	**-**	-	N/A
M03.7b	**Furnace**	N/A	**-**	-	N/A
M03.7c	**Furnace**	**~2007**: An oil-fired forced air furnace is located in the utility room. Technical specifications for the unit are given below: Manufacturer: Kerr Energy Systems Model Number: COMPACT-MULTI K4C-090 31 Serial Number: 1000824	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1a	**Air Distribution**	N/A	**-**	-	N/A
M04.1b	**Air Distribution**	N/A	**-**	-	N/A
M04.1c	**Air Distribution**	**~1980**: The forced air heating is distributed throughout the building by a galvanized metal ductwork system.	**4**	-	No concerns observed or reported.
M04.2a	**Ventilation**	**~1970**: General building ventilation is provided by rooftop mounted vents.	**3**	-	The ventilation system is reportedly in marginal condition and is slated to be replacement between 2016 and 2019. Costing for these repairs has been included in the Capital Reserve Table.
M04.2b	**Ventilation**	**~1992**: General building ventilation is provided by rooftop mounted vents and louvers on the exterior walls of the building. Additional air circulation is provided by a ceiling-mounted rotary fan located in the engine room.	**4**	-	No concerns observed or reported.
M04.2c	**Ventilation**	**~1980**: General building ventilation is provided by the furnace and by operable windows.	**4**	-	No concerns observed or reported.
M04.3a	**Air Outlets & Inlets**	**~1970**: Metal grilles with covers are provided at the exhaust vents along the northwest and southeast elevations of the building.	**4**	-	No concerns observed or reported.
M04.3b	**Air Outlets & Inlets**	**~1970**: Metal louvers are provided at the exterior walls of the building which are provided with media air filters on the interior.	**4**	-	No concerns observed or reported.
M04.3c	**Air Outlets & Inlets**	**~1980**: Prefinished metal grilles are provided throughout the building for the forced air heating system	**4**	-	No concerns observed or reported.
M04.4a	**Exhaust Fans**	**~1970**: Wall-mounted fans are provided on the northwest and southeast elevations of the engine room to provide fresh air to the building. Flues for exhaust directly from the generator exit the southwest elevation of the building.	**3**	2	The exhaust fans are currently in marginal condition and are slated for replacement. See Item M04.2a above.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.4b	**Exhaust Fans**	**~1992**: Ceiling-mounted fans are provided in the engine room for general building exhaust. A flue for exhaust directly from the generator exits the northeast elevation of the building.	**4**	3	The exhaust fans are currently in acceptable condition but will surpass their EUL within the timeframe of this report and should be replaced.
M04.4c	**Exhaust Fans**	**~2005**: General building exhaust is handled by the range hood located in the kitchen and a ceiling-mounted exhaust fan in the washroom.	**4**	-	No concerns observed or reported.

M05 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M06.2a	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building A.	**4**	-	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
M06.2b	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building B.	**4**	-	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
M06.2c	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building C.	**4**	-	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.

M06 CONTROLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M07.1a	**Electric and Electronic Controls**	**~1970**: Manual thermostats were observed in the building.	**4**	-	No concerns observed or reported.
M07.1b	**Electric and Electronic Controls**	**~1992**: Manual thermostats were observed in the building.	**4**	-	No concerns observed or reported.
M07.1c	**Electric and Electronic Controls**	**~1992**: Manual thermostats were observed in the building.	**4**	-	No concerns observed or reported.

M99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M99.1a	**Humidifiers**	N/A	**-**	-	N/A
M99.1b	**Humidifiers**	N/A	**-**	-	N/A
M99.1c	**Humidifiers**	N/A	**-**	-	N/A

NOTES:
5A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.
5B) No boilers are provided in Building A. The hydronic unit heaters are provided with hot water from a boiler system located in Building B. Additionally it should be noted that the wrappings around the heating systems were previously found to contain asbestos. However, the material has since been abated.

IMMEDIATE ITEMS:
No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:
RAI.1a) Conduct a study related to domestic water and septic system concerns.
RAI.2c) Conduct a study related to septic system concerns.

No other further investigations recommended at this time.



Photo #M1a: Domestic hot water tank.



Photo #M2a: Fuel oil storage tank.



Photo #M3a: Floor-mounted, vitreous china, flush tank water closet.



Photo #M4a: Solid surface lavatory.

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Photo #M5a: Suspended hydronic unit heater in the office.



Photo #M6a: Wall-mounted exhaust fan in the engine room.



Photo #M7b: Oil-fired boiler in the engine room.



Photo #M8b: Oil-fire burner in the engine room.



Photo #M9b: Heat exchanger of the boiler system in the engine room with a Glycol loop.



Photo #M10b: Suspended hydronic unit heater in the engine room.



Photo #M11b: Ceiling exhaust fan in the engine room.

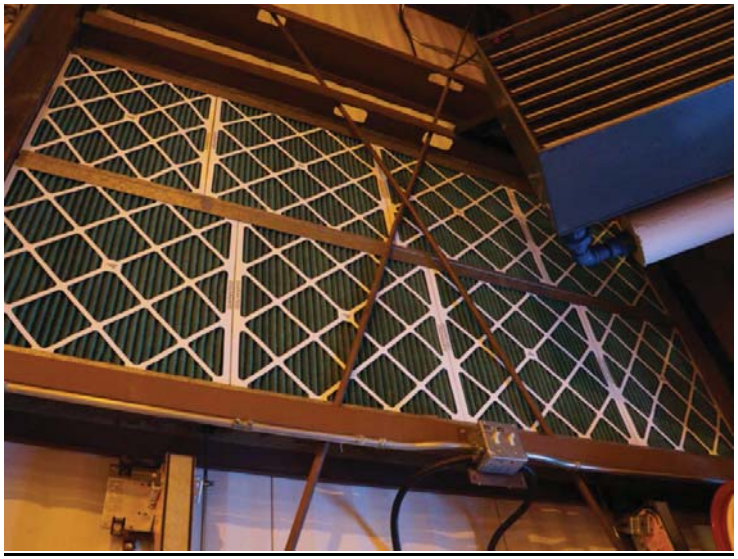


Photo #M12b: Media filters on the inside of an exterior wall louver.



Photo #M13c: Aboveground steel storage tank for the fuel oil.



Photo #M14c: Domestic hot water heater.



Photo #M15c: Exposed water line in the main floor bedroom.



Photo #M16c: Oil-fired forced air furnace.

6.0 ELECTRICAL

Building A – Faro Office Building:

Electrical service is provided via buried cables from the on-site substation located to the east of Building A. Copper wiring is reported to be present throughout the building. Primary electrical distribution to the building is provided by an electrical switchboard and motor control centre. Secondary distribution is provided by electrical sub panels rated at 120//208 V, 100 A, 3 phase, 4 wire. Interior lighting is provided by a combination of T12 tubular fluorescent lamps and HID bay lamps all controlled by line voltage switches. Exterior lighting is provided by wall-mounted HID fixtures controlled by a combination of line voltage switches and photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel, bells, pull stations, and smoke/heat detectors. The building is monitored by YEC's System Control Centre, with access control provided by a proximity card reader and magnetic lock on the main entrance door.

Capital expenditures with respect to the sub panels, interior lighting, emergency lighting, exit lighting, exterior lighting, and fire alarm panel are anticipated within the 10-year time frame of this report.

The electrical components are in acceptable overall condition.

Building B – Faro Diesel Plant:

Electrical service is provided via buried cables from the on-site substation located to the south of Building B. Copper wiring is reported to be present throughout the building. Primary electrical distribution to the building is provided by motor control centres located in the main electrical room. Secondary distribution is provided by an electrical sub panel rated at 120//240 V, 335 A, 3 phase, 4 wire. Interior lighting is provided by a combination of T12 tubular fluorescent lamps and HID bay lamps all controlled by line voltage switches. Exterior lighting is provided by wall-mounted HID fixtures controlled by a combination of line voltage switches and photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel, bells, pull stations, and smoke/heat detectors. The building is monitored by YEC's System Control Centre, with access control provided by a proximity card reader and magnetic lock on two of the building's entrance doors.

Capital expenditures with respect to the sub panels, interior lighting, emergency lighting, exit lighting, exterior lighting, and fire alarm panel are anticipated within the 10-year time frame of this report.

The electrical components are in acceptable overall condition.

Building C – Faro Staff House:

Electrical service is provided via overhead cables from a pole-mounted transformer located to the southeast of the property. Copper wiring is reported to be present throughout the building. Electrical distribution is provided by two sub panels rated at 120/240 V, 1200 A, 3 phase, 4 wire. Interior lighting is provided by a combination of incandescent fixtures and T12 tubular fluorescent lamps, all controlled by line voltage switches. Exterior lighting is provided by wall-mounted incandescent fixtures controlled by line voltage switches, some with motion sensors. Emergency lighting is provided by battery packs with integral heads. Smoke detectors are provided in the building.

Capital expenditures with respect to the interior lighting and emergency lighting are anticipated within the 10-year time frame of this report.

The electrical components are in acceptable overall condition.

E01 INCOMING SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E01.1a	**Exterior Transformer**	A substation is located on-site which is responsible for transforming the electrical voltage from high to low.	**4**	-	The substation and related equipment were not directly reviewed. No concerns reported.
E01.1b	**Exterior Transformer**	A substation is located on-site which is responsible for transforming the electrical voltage from high to low.	**4**	-	The substation and related equipment were not directly reviewed. No concerns reported.
E01.1c	**Exterior Transformer**	An exterior pole-mounted transformer is located to the southeast of the property.	**4**	-	No concerns observed or reported.
E01.2a	**Cables**	Power is estimated to be fed to the building through buried cables at the southeast corner.	**4**	-	Concealed and not directly reviewed. No concerns reported.
E01.2b	**Cables**	Power is estimated to be fed to the building through buried cables at the southwest corner.	**4**	-	Concealed and not directly reviewed. No concerns reported.
E01.2c	**Cables**	Power is estimated to be fed to the building through overhead cables at the south elevation.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.1a	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~2013**: The building is provided with an electrical switchboard and motor control centre.	**5**	-	The primary electrical distribution equipment was reportedly replaced within the last few years. No concerns observed or reported.
E02.1b	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1992**: Motor control centres are located in the main electrical room.	**4**	-	No concerns observed or reported.
E02.1c	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	N/A	**-**	-	N/A
E02.2a	**Interior Transformers**	N/A	**-**	-	N/A

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.2b	**Interior Transformers**	**~1992**: A number of interior transformers are located in the main electrical room.	**4**	-	No concerns observed or reported.
E02.2c	**Interior Transformers**	N/A	**-**	-	N/A
E02.3a	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1970**: One Westinghouse sub panel and one unlabelled sub panel were observed in Building A. The panels are rated at 120/208 V, 100 A, 3 phase, 4 wire. Panel sizes range from 24 to 30 circuits. **~2015**: One 600 V, 200 A, Square D heavy duty safety switch is located at the southwest exterior of Building A for the emergency generator.	**3/6**	3	The electrical sub panels have surpassed their EUL and should be replaced. In addition, the panels are at or near full capacity. It is recommended to replace the sub panels with larger units to accommodate additional circuits if needed.
E02.3b	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1992**: One Square D sub panel was observed in Building B. The panel is rated at 120/240 V, 225 A, 3 phase, 4 wire. The panel currently occupies 33 of the 42 circuits.	**4**	3	The electrical panel is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced.
E02.3c	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1980**: One Federal Pacific sub panel is located in the utility room. The pane label was illegible, but the unit is likely rated at 120/240 V, 100 A, 3 phase, 4 wire. The panel currently occupies 16 of the 16 circuits. **~2010**: One Square D sub panel is located in the utility room. The pane was, but the unit is likely rated at 120/240 V, 100 A, 3 phase, 4 wire. The panel currently occupies 7 of the 20 circuits.	**4**	-	The original electrical sub panel has surpassed its EUL and should be replaced. See Note **6A**.
E02.4a	**Branch Wiring**	**~1970**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns reported.
E02.4b	**Branch Wiring**	**~1992**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns reported.
E02.4c	**Branch Wiring**	**~1980**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns reported.
E02.5a	**Receptacles**	**~1970**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.5b	**Receptacles**	**~1992**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.
E02.5c	**Receptacles**	**~1980**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.
E02.6a	**Surge Protection**	None observed.	**-**	-	Surge protection was only observed for process-related equipment which is beyond the scope of this report.
E02.6b	**Surge Protection**	None observed.	**-**	-	N/A
E02.6c	**Surge Protection**	None observed.	**-**	-	N/A

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1a	**Interior Lighting**	**~1992**: Ceiling- and wall-mounted tubular fluorescent lamps with T12 bulbs are provided throughout the office area and the perimeter of the engine room. Ceiling mounted HID fixtures are provided in the engine room.	**4**	3	The interior lighting is currently in acceptable condition, but will require replacement within the timeframe of this report.
E03.1b	**Interior Lighting**	**~1992**: Ceiling-mounted tubular fluorescent lamps with T12 bulbs are provided in the electrical room. Ceiling mounted HID fixtures are provided in the engine room.	**4**	3	The interior lighting is currently in acceptable condition, but will require replacement within the timeframe of this report.
E03.1c	**Interior Lighting**	**~1980**: Interior lighting is provided by a combination of incandescent fixtures and T12 tubular fluorescent lamps.	**4**	3	The interior lighting is currently in acceptable condition, but has surpassed its EUL and should be replaced.
E03.2a	**Lighting Controls**	**~1970**: Interior lighting is controlled by line voltage switches. Exterior lighting is reportedly controlled by a combination of photocells and switches.	**4**	-	No concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.2b	**Lighting Controls**	**~1992**: Interior lighting is controlled by line voltage switches. Exterior lighting is reportedly controlled by a combination of photocells and switches.	**4**	-	No concerns observed or reported.
E03.2c	**Lighting Controls**	**~1980**: Interior lighting is controlled by line voltage switches. Exterior lighting is controlled by line voltage switches and motion sensors.	**4**	-	No concerns observed or reported.
E03.3a	**Emergency Lighting**	**~2000:** Battery packs with integral lighting heads are provided throughout the building.	**4**	3	The emergency lighting is currently in acceptable condition, but will likely require replacement within the timeframe of this report. The emergency lighting is tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
E03.3b	**Emergency Lighting**	**~2000:** Battery packs with integral lighting heads are provided throughout the building.	**4**	3	The emergency lighting is currently in acceptable condition, but will likely require replacement within the timeframe of this report. The emergency lighting is tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
E03.3c	**Emergency Lighting**	**~2000:** Battery packs with integral lighting heads are provided throughout the building.	**4**	-	The emergency lighting is currently in acceptable condition, but will likely require replacement within the timeframe of this report. See Note **6A**. The emergency lighting is tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
E03.4a	**Exit Lighting**	**~1992**: LED exit signs are provided at emergency exits.	**4**	-	The exit signs will likely reach the end of their EUL within the timeframe of this report and should be replaced. See Note **6A**.
E03.4b	**Exit Lighting**	**~1992**: LED exit signs are provided at emergency exits.	**4**	-	The exit signs will likely reach the end of their EUL within the timeframe of this report and should be replaced. See Note **6A**.
E03.4c	**Exit Lighting**	N/A	**-**	-	N/A

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E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.5a	**Exterior Lighting**	**~1992**: Wall-mounted HID light fixtures are provided around the building exterior.	**4**	-	The exterior lighting is currently in acceptable condition, but will require replacement within the timeframe of this report.
E03.5b	**Exterior Lighting**	**~1992**: Wall-mounted HID light fixtures are provided around the building exterior.	**4**	-	The exterior lighting is currently in acceptable condition, but will require replacement within the timeframe of this report.
E03.5c	**Exterior Lighting**	**~1992**: Exterior lighting is provided by incandescent fixtures.	**4**	-	The exterior lighting is currently in acceptable condition, but will require replacement within the timeframe of this report. See Note **6A**.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1a	**Grounding**	**~1970**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.
E04.1b	**Grounding**	**~1992**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.
E04.1c	**Grounding**	**~1992**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.3a E06.1a	**Fire Alarm Panel**	**~1970**: A Gemini fire alarm panel manufactured by Walter Kidde is provided near the main entrance of Building A.	**4**	3	The fire alarm panel is reportedly original to the building and has surpassed its EUL. Although the unit was observed to be in acceptable condition, it is recommended to replace the unit in Year 1 as it is a FLS device. The fire alarm panel is tested annually by Total Fire Protection. Inspections were up to date.
E06.1b	**Fire Alarm Panel**	**~1992**: A Notifier fire alarm panel manufactured by Honeywell is located in the electrical room of Building B.	**4**	3	The fire alarm panel is reportedly original to the building and will surpass its EUL within the timeframe of this report. The fire alarm panel is tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
E06.1c	**Fire Alarm Panel**	N/A	**-**	-	N/A
E06.2a	**Devices**	**~1970**: Fire alarm and detection devices include bells, pull stations, and smoke/heat detectors.	**4**	-	The fire alarm and detection devices have surpassed their EUL and should be replaced.
E06.2b	**Devices**	**~1992**: Fire alarm and detection devices include bells, pull stations, and smoke/heat detectors.	**4**	-	The fire alarm and detection devices will surpasses their EUL within the timeframe of this report and should be replaced.
E06.2c	**Devices**	**~1980**: Smoke detectors are provided throughout the building.	**4**	-	The fire alarm and detection devices will surpasses their EUL within the timeframe of this report and should be replaced. See Note **6A**.

E07 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E07.1a	**Telephone**	**~1970**: Telephone services are provided by Northern Telcom.	**4**	-	No concerns observed or reported.
E07.1b	**Telephone**	None observed.	**4**	-	No concerns observed or reported.

E07 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E07.1c	**Telephone**	**~1980**: Telephone services are provided in the building, likely by Northern Telcom.	**4**	-	No concerns observed or reported.
E07.2a	**LAN Systems**	N/A	**-**	-	N/A
E07.2b	**LAN Systems**	N/A	**-**	-	N/A
E07.2c	**LAN Systems**	**~2005**: Wireless internet services are provided in the building.	**4**	-	No concerns observed or reported.
E07.3a	**Intrusive Systems**	**~2000**: A Maxsys security system panel was observed in the electrical room. The building is monitored by YEC's System Control Centre.	**4**	-	No concerns observed or reported.
E07.3b	**Intrusive Systems**	**~2000**: A Maxsys security system panel was observed in the electrical room. The building is monitored by YEC's System Control Centre.	**4**	-	No concerns observed or reported.
E07.3c	**Intrusive Systems**	N/A	**-**	-	N/A
E07.4a	**Surveillance System**	N/A	**-**	-	N/A
E07.4b	**Surveillance System**	N/A	**-**	-	N/A
E07.4c	**Surveillance System**	N/A	**-**	-	N/A
E07.5a	**Access Control**	**~2015**: The main entrance door is equipped with proximity card access and magnetic lock.	**6**	-	No concerns observed or reported.
E07.5b	**Access Control**	**~2015**: Two of the building's entrance doors are equipped with proximity card access and magnetic lock.	**6**	-	No concerns observed or reported.
E07.5c	**Access Control**	N/A	**-**	-	N/A

E99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E99.1a	**Emergency Generator**	**~2015**: Building A is provided with a new black start emergency generator.	**6**	-	The unit is reportedly only used to run the engines and is process related. As such, costing for this unit has been excluded from the Capital Reserve Table.
E99.1b	**Emergency Generator**	N/A	**-**	-	N/A
E99.1c	**Emergency Generator**	N/A	**-**	-	N/A

NOTES:
6A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

IMMEDIATE ITEMS:
No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:
No further investigation recommended at this time.



Photo #E1a: View of the substation located on the site of Building A and Building B.



Photo #E2a: Electrical sub panel.



Photo #E3a: Wall-mounted tubular fluorescent lamps in the engine room.

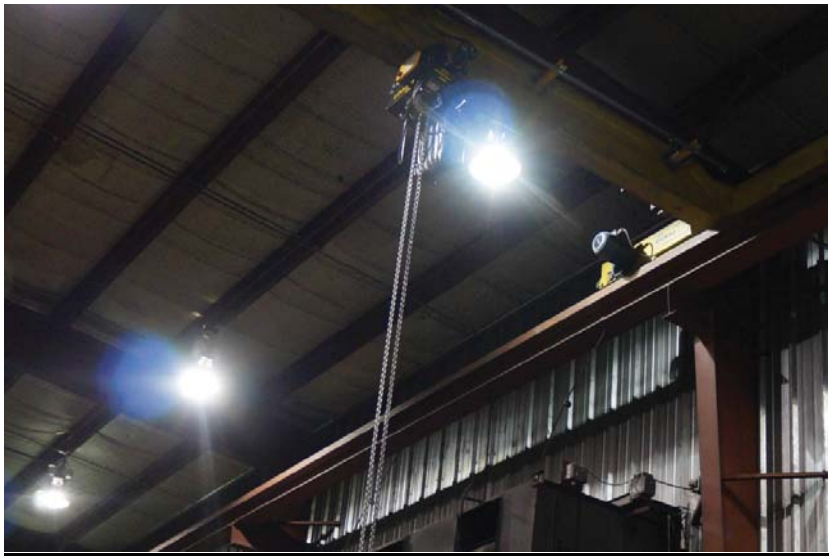


Photo #E4a: Ceiling-mounted HID bay lights in the engine room.



Photo #E5a: HID exterior light.



Photo #E6a: LED exit sign, emergency light/battery pack in the office.



Photo #E7a: Fire alarm panel in the office.



Photo #E8a: Proximity card reader at the main entrance.



Photo #E9b: Motor control center in the electrical room.



Photo #E10b: Electrical sub panel.

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Photo #E9b: HID bay light in the engine room.

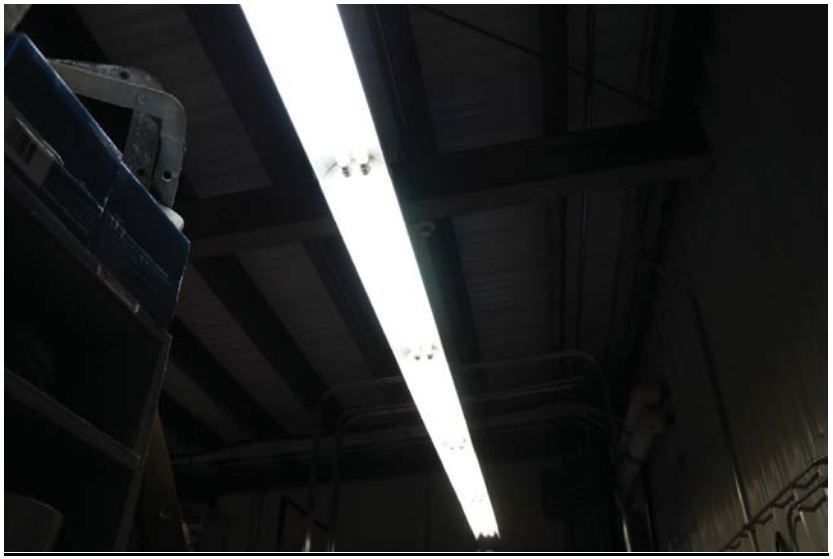


Photo #E10b: Suspended tubular fluorescent lamps.



Photo #E11b: Exterior HID light.

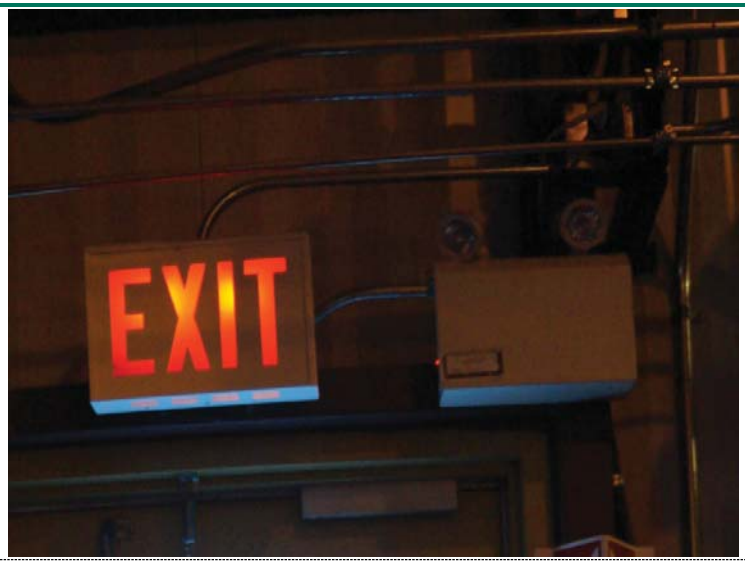


Photo #E12b: Emergency exit sign and emergency light/battery pack in the engine room.



Photo #E13b: Security system control panel (left) and fire alarm control panel (right).



Photo #E14b: Proximity card reader.



Photo #E15c: power meter and electrical transformer.



Photo #E16c: Electrical sub panels in the utility room.

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Photo #E17c: Tubular fluorescent lamp in the utility room.



Photo #E18c: Exterior light with motion sensor.



Photo #E19c: Emergency lighting with battery pack and integral heads.



Photo #E20c: Smoke detector in the utility room.

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7.0 HAZARDOUS MATERIAL REPORTS

No previous hazardous materials reports were made available by the YEC. Based on the year of the construction of the buildings outlined in this report (~1970, ~1992, and ~1980), hazardous building construction materials such as ACMs (asbestos containing materials), and/or PCBs (polychlorinated biphenyls) are possible to be present in the building. The site representative reported that wrappings around the boiler system piping in Building B were previously found to contain asbestos, but have since been abated. No known ACMs are reported to be present on any of the buildings within this report; however, Golder cannot confirm the accuracy of that statement.

Report Signature Page

GOLDER ASSOCIATES LTD.



Brian Levy, E.I.T.
Building Conditions Assessor



Dave Ayriss, B.Sc., CIH, CRSP
on behalf of
Lawrence P. McSorley, M.Arch., M.C.P., RA
Senior Building Condition Specialist

BL/LPM/rp

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APPENDIX A

Mandate and Report Resources



MANDATE AND REPORT RESOURCES

Authorization

Written Notice of Award of Building Assessment Reports for Yukon Energy Corporation (YEC) was provided on November 1, 2015. A Facility Lifecycle Assessment (FLA) of the Site identified in the Introduction section of the report was subsequently conducted. The Site is currently owned and managed by Yukon Energy Corporation (YEC).

Purpose

The primary objective of the FLA was to visually examine and evaluate the present condition of the property elements, buildings and related structures. The FLA process is being undertaken to assist YEC in capital planning and evaluating the potential financial liabilities associated with the condition of the site elements, building and related structures on the sites. Golder Associates Ltd. (Golder) understands that YEC will rely on this report for capital planning.

Scope

The FLR was conducted in general accordance with the American Society for Testing and Materials (ASTM) “Standard Guide for Property Condition Assessments: Baseline Property Condition Process E 2018-08”, as locally applicable. The Golder Assessors (identified on the first page of the report) conducted the sites reconnaissance on the date shown. The Site reconnaissance was limited to a walk around the sites, a walk-through of the buildings and interview with personnel listed in the Introduction section of the report (referred to as the “Point of Contact” in this report). Copies of selected photographs documenting conditions at the time of the visit are provided throughout the report.

The purpose of the report is to communicate identified physical deficiencies, future capital projects, and the associated opinions of estimated costs where the cost is greater than the Capital Threshold and expected to occur within the time frame used for the report. In accordance with this agreed mandate, assumptions were required to delineate between capital items and routine maintenance. Please refer to the “Operating and Maintenance Item” list below. Also please refer to the attached “Discussions of Overall Concepts and Terminology” for additional explanation of assumptions used.

The review of the structural elements was limited to a visual review of the accessible, exposed portions of the buildings and related structures during our visit to the building. The roofs, walls, floors and ceilings were visually reviewed to collect information in this regard.

The review of the mechanical, electrical and fire safety systems was performed by non-specialists in conjunction with discussions with the Point of Contact. A detailed assessment by a mechanical or electrical professional consultant should be conducted if further information regarding the condition, durability and/or expected future capital expenditures related to these systems is required.

Compliance with national and provincial building codes and/or fire codes is not part of the scope of this assessment.



FLA: OFFICE BUILDING, DIESEL PLANT, AND STAFF HOUSE, FARO, YT

The estimated costs outlined in this report are based on the conditions encountered and observations made during the reconnaissance. Estimates of quantities and areas are based on information supplied, field observations and/or interviews. Item repair/replacement costs are approximate only. Restoration costs are sensitive to local and overall economic factors and therefore, specific quotations from qualified contractors should be obtained when a specific deficiency is addressed or a capital project is to be implemented.

Operating and Maintenance Items

Golder assumes the following items will be maintained under normal operating budgets and are therefore not included in the Capital Reserve Table.

SITE

- Buried services
- Landscaping

STRUCTURE

- Foundations and footings

ROOF

- Periodic maintenance

WALLS AND WINDOWS

- Local periodic repairs and needle glazing
- Weather-stripping

INTERIORS

- Various common furnishings, specialty equipment
- Small residential appliances

MECHANICAL

- Motors, ductwork and in-duct equipment
- Oil supply systems
- HVAC distribution piping
- Air inlets and outlets

ELECTRICAL

- Disconnects and breakers
- Buried conductors

Discussions of Overall Concepts and Terminology

Evaluation Period

The period of evaluation used for this report is 10 years. Capital repairs and replacement that are reasonably expected to be required within this evaluation period and that cost in excess of the Capital Threshold are included in the Capital Reserve Table.



FLA: OFFICE BUILDING, DIESEL PLANT, AND STAFF HOUSE, FARO, YT

Capital Threshold

The Capital Threshold used for this report is $3,000. This threshold is used to determine whether a capital repair item is to be included in the Capital Reserve Table. Capital repairs identified and estimated to cost less than the threshold, or that will likely to be performed in phases, as a part of routine maintenance as required, at a cost less than the threshold are not included in the Capital Reserve Table.

Costs

Costs presented in this study for future capital repairs and replacement projects are our Opinions of Probable Budgets and are intended to include taxes, permit fees, contingency and where appropriate, Engineering fees for design, specifications, tendering, project management and construction monitoring. We have generally assumed replacement will occur on a like-for-like basis except where obsolescence or technological advancements logically dictates an upgrade. More accurate costing in the future will require a condition assessment, choice and development of an appropriate repair option, designing and tendering the work to qualified contactors.

Immediate Items

Immediate repairs include deficiencies that require action in the next 60 to 90 days as a result of (i) existing or potentially unsafe conditions, (ii) negative conditions significantly impacting marketability or habitability, (iii) material building code violations, (iv) poor or deteriorated condition of a critical element or system, or (v) a condition that if left “as is” with extensive delay in addressing same, would result in or contribute to critical element or system failure within 12 months or a significant escalation in the repair cost.

Capital Reserve Analysis

The Capital Reserve Table includes a section that provides the average annual capital costs per square foot. Replacement Reserves include (i) deficiencies that may not warrant immediate attention, but require repair or replacement that should be undertaken on a priority basis over routine preventive maintenance work and (ii) components or systems that have realized or exceeded their Expected Useful Life (EUL) during the evaluation period (realization of EUL alone does not constitute an immediate repair). Replacement reserve costs are included in Appendix C.

Opinions of probable costs are provided for material physical deficiencies and not for repairs or improvements that could be classified as:

- cosmetic or decorative;
- part or parcel of a building renovation program or tenant improvement/finishes;
- enhancements to reposition the asset in the marketplace;
- for warranty transfer purposes;
- routine or normal preventative maintenance;
- less than the capital threshold for this report; and
- are expected to occur beyond the time frame of this report.



FLA: OFFICE BUILDING, DIESEL PLANT, AND STAFF HOUSE, FARO, YT

Cost Inflation Rate:

We have presented the costs in current year (2016) values. We have used 3% in the capital reserve table attached. Further sensitivity analysis using other inflation assumptions should be tested when projecting future cash-flows.

Life Expectancies:

Our estimates of the life expectancy of common element components, systems and sub-systems are based on our opinion of the observed condition during our Site visit, experience with similar material at other buildings, published industry standards, articles and recommendations made by material suppliers and manufacturers. For some materials or systems, the history of use is not sufficient to predict life expectancy accurately. Monitoring and adjustments to the assumptions are required.

The year in which the capital work is required is estimated on the basis of the current observed conditions, or the construction methods and materials used. This may be shorter or longer than the remaining time in the standard estimated life cycle based on the current age of the item. Our estimates of life cycles reflect our understanding of the standards that the prudent long-term owners would maintain. Deferring and phasing of work is often possible keeping in mind that doing so could reduce building standards, increase disruption to residents, increase costs and risks.



APPENDIX B

Limitations and Use of the Report

LIMITATIONS

This report is intended to provide an assessment of the property conditions at the subject property, at the time of the site visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, Golder may be contacted to extend reliance to such parties. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, which result from reporting the factual information contained herein.

The conclusions as presented represent the judgement of Golder based on the visual observations of the accessible, exposed building elements, supplemented by information and data obtained by Golder and discussions with the Point of Contact and other representatives of the owner identified. Except as otherwise may be requested, Golder disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the FLA. No physical testing or intrusive investigations were conducted, and no samples of building materials were collected to substantiate the observations made.

In evaluating the Site, Golder has relied in good faith on information provided by other individuals noted in this report. Golder in certain instances has been required to assume that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Point of Contact. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, thus any parties making use of this report should review these issues with appropriate legal counsel.

Should additional information become available with respect to the building elements or systems, Golder requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.



APPENDIX C

Capital Reserve Table

Capital Reserve Table (Site A)

ation

				Threshold	$3,000
Gross Sq. m.	376	Year Built	1970	Reserve Term (years)	10
r of Buildings	1	Age	46	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024
L																	
nts																	
	1970	150	45	105	Allowance		Study/Repair		$5,000	$15,000							
ots & Drive Aisles	1970	150	45	105	Allowance		Repair									$4,000	
	-	-	-	-	Allowance		Repair		$8,000								
	-	-	-	-	3 units	$1,320 ea.	Improvement		$4,000								
	1970	40	45	0	344 m²	$630/m²	LCR		$251,100								
	1990	20	25	0	Allowance		Replace		$3,000								
	1970	150	45	105	Allowance		Replace		$5,000								
rs																	
dentified																	
oor/Utility Doors	1970	40	45	0	4 units	$1,200/unit	LCR		$4,800								
ts																	
dentified																	
d Partitions																	
dentified																	
indows																	
dentified																	
dentified																	
	2009	10	6	4	265 m²	$40/m²	LCR					$10,600					
	1970	35	45	0	3.5 m	$1,185/m	LCR		$4,100								
	1970	40	45	0	376 m²	$280/m²	LCR		$105,300								
nspouts	1980	30	35	0	85 m²	$35/m²	LCR		$3,000								
nveyance Devices)																	
dentified																	
	1970	150	45	105	Allowance		Repair		$3,000								
dentified																	
rs and Stairs																	
dentified																	
dentified																	

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024
d Columns																	
dentified																	
nd Columns																	
dentified																	
dentified																	
Sanitary Sewer Study	1970	150	45	105	Allowance		Study/Repair		$5,000	$15,000							
	1992	30	23	7	3 units	$1,250 ea.	LCR									$3,800	
	1970	40	43	0	Allowance		Repair		$15,000								
dentified																	
dentified																	
dentified																	
es																	
dentified																	
ipment																	
	1970	30	45	0	2	$5,280 ea.	LCR		$10,600								
wer																	
	1992	30	23	7	376 m²	$55.92/m² GFA	LCR								$21,000		
ng	2000	20	15	5	Allowance		LCR						$3,000				
	1992	25	23	2	Allowance		LCR			$3,000							
	1992	25	23	2	Allowance		LCR			$3,000							
dentified																	
	1970	25	45	0	1 unit	$9,400 ea.	LCR		$9,400								
	1970	25	45	0	Allowance		LCR		$4,000								
s and Security																	
dentified																	
dentified																	

e Analysis

	Inflated	*Uninflated*
ear	$21,713	$20,748
ear / Sq. Ft.	$57.75	$55.18

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$	$440,300	$36,000	$	$10,600	$3,000	$	$21,000	$7,800	$
$CAD	$	$453,509	$38,192	$	$11,930	$3,478	$	$25,827	$9,881	$

Replacement
acement

Capital Reserve Table

ation

				Threshold	$3,000
Gross Sq. m.	239	Year Built	1992	Reserve Term (years)	10
r of Buildings	1	Age	24	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024
L																	
nts																	
dentified																	
dentified																	
s																	
dentified																	
dentified																	
ts																	
dentified																	
d Partitions																	
dentified																	
indows																	
dentified																	
dentified																	
	2009	10	6	4	265 m²	$40/m²	LCR					$10,600					
	1992	40	23	17	Allowance		Repair		$15,000								
spouts	1992	30	23	7	85 m²	$35/m²	LCR								$3,000		
nveyance Devices)																	
dentified																	
dentified																	
rs and Stairs																	
dentified																	
dentified																	

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
d Columns																	
dentified																	
nd Columns																	
dentified																	
dentified																	
dentified																	
dentified																	
	1992	30	23	7	5 units	$1,250 ea.	LCR									$6,300	
	1992	30	23	7	Allowance		Repair								$10,000		
dentified																	
dentified																	
dentified																	
es																	
dentified																	
ipment																	
	1992	30	23	7	1	$5,280 ea.	LCR								$10,600		
wer																	
	1992	30	23	7	239 m²	$55.92/m² GFA	LCR								$13,400		
ng	2000	20	15	5	Allowance		LCR						$3,000				
dentified																	
	1992	25	23	2	1 unit	$9,400 ea.	LCR				$9,400						
	1992	25	23	2	Allowance		LCR			$4,000							
s and Security																	
dentified																	
dentified																	

e Analysis

	Inflated	*Uninflated*
ear	$3,954	$3,412
ear / Sq. Ft.	$16.55	$14.28

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$	$15,000	$4,000	$9,400	$10,600	$3,000	$	$37,000	$6,300	$
$CAD	$	$15,450	$4,244	$10,272	$11,930	$3,478	$	$45,505	$7,981	$

Replacement
lacement

Capital Reserve Table (Site C)

ation

				Threshold	$3,000
Gross Sq. m.	300	Year Built	1980	Reserve Term (years)	10
r of Buildings	1	Age	36	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024
L																	
nts																	
	1980	150	35	115	Allowance		Study/Repair		$5,000	$10,000							
ots & Drive Aisles	1980	40	35	5	135 m²	$160/m²	Replace						$21,600				
	1980	30	35	0	26 m	$137/m	LCR		$3,600								
	1980	40	35	5	250 m²	$118/m²	LCR		$3,500				$29,500				
rs																	
	2005	40	10	30	Allowance		Repair		$3,000								
oors	1980	35	35	0	2 units	$1,725 ea.	LCR						$3,500				
ts																	
dentified																	
d Partitions																	
	1980	60	35	25	100 m²	$33/m²	Repair		$3,300								
	2008	15	7	8	300 m²	$21/m² GFA	LCR									$6,300	
indows																	
dentified																	
dentified																	
	2001	20	14	6	100 m²	$75/m²	LCR					$5,800		$7,500			
	-	-	-	-	6 m	$75/m	Safety	$1,500									
	2005	20	10	10	Allowance		LCR										
	1980	25	35	0	150 m²	$56/m²	LCR		$8,400								
nveyance Devices)																	
	-	-	-	-	Allowance		Safety	$500									
dentified																	
dentified																	
rs and Stairs																	
dentified																	
dentified																	

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
d Columns																	
dentified																	
nd Columns																	
dentified																	
dentified																	
	1980	150	35	115	Allowance		Study/Repair		$5,000	$10,000							
n	1980	150	35	115	Allowance		Repair		$4,000								
dentified																	
dentified																	
dentified																	
dentified																	
es																	
dentified																	
ipment																	
dentified																	
wer																	
	1980	30	35	0	150m²	$55.92/m² GFA	LCR						$8,400				
dentified																	
dentified																	
s and Security																	
dentified																	
dentified																	

e Analysis

	Inflated	*Uninflated*
ear	$6,587	$5,836
ear / Sq. Ft.	$21.96	$19.45

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$2,000	$35,800	$20,000	$	$5,800	$63,000	$7,500	$	$6,300	$
$CAD	$2,000	$36,874	$21,218	$	$6,528	$73,034	$8,955	$	$7,981	$

Replacement
acement

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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February 2016

REPORT

Facility Lifecycle Assessment
Mayo Facilities
Various Locations,
Mayo, YT

Submitted to:
Yukon Energy Corporation
P.O. Box 5920
Whitehorse, YT Y1A 6S7

REPORT

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Golder Associates



LA: MAYO FACILITIES

EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Mayo Main Office (A), Staff House 1 (B), Staff House 2 (C), Staff House 3 (D) and Staff House 4 (E), located in various locations as it will be described below, in the Town of Mayo, Yukon Territory.

Site A Main Office is comprised of a one storey plus mezzanine office building with approximately 139 m² (1,500 ft²) gross floor area (GFA) on approximately 0.16 hectares (0.40 acres) of land. The building is located on 205 3rd avenue, in the Town of Mayo, Yukon Territory. The site building year of construction is unknown but estimated to be in approximately 1980.

Site B Staff House 1 building consists of a one storey bungalow with basement and approximately 186 m^2 (2,000 ft^2) gross floor area (GFA) on approximately 0.31 hectares (0.76 acres) of land. The site location is identified as Block 8 Airport Drive, in the Town of Mayo, Yukon Territory. According to Point of Contact the estimated year of construction is approximately early 1970's. No additional information was provided regarding the age of the building.

Site C Staff House 2 building is a one storey trailer with approximately 150 m^2 (1,615 ft^2) gross floor area (GFA) on approximately 0.30 hectares (0.75 acres) of land. The site is located at Lot 1095 Airport Drive, in the Town of Mayo, Yukon Territory. According to the Point of Contact the unit might have been constructed in approximately 2005.

Site D Staff House 3 building is a one storey trailer with approximately 150 m^2 (1,615 ft^2) gross floor area (GFA) on approximately 0.30 hectares (0.75 acres) of land. The site is located at Lot 1088 Airport Drive, in the Town of Mayo, Yukon Territory. According to the Point of Contact the unit might have been constructed in approximately 2005.

Site E Staff House 4 building is a two storey detached house with approximately 186 m^2 (2,000 ft^2) gross floor area (GFA) on approximately 0.35 hectares (0.87 acres) of land. No civic address was provided for the site. Reportedly the Site location is Block 8 Airport Drive, Mayo, Yukon Territory. The site building was reportedly constructed in approximately 1993.

The buildings generally do not meet barrier free guidelines. However, Golder assumes is not deemed to be required at this time due to function.

Based on the findings of this FLA, the following conclusions are made for Site A- Main Office:

- The Site was developed in approximately ~1980. The site is provided with a gravelled parking lot and driveway located south of the site. Grassed areas are assumed to be provided throughout and one wood structure sign is located north of the site to identify the building. Grounds were mostly covered with snow which limited visibility and impeded a comprehensive evaluation of the site elements. Based on reports, the site components are in overall acceptable condition.

LA: MAYO FACILITIES

- The exterior of the building is finished with pre-finished corrugated metal cladding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are polyvinyl chloride (PVC) frame type windows with double insulated glazing units provided along the building exterior; one window located in the garage bay is a single pane glazing unit. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed; where concealed it is assumed to consist of batt insulation and poly air/vapour barrier while in the exposed sections of wall in the garage bay area insulation was observed to be provided by reflective insulation panels. A pre-finished metal insulated door in painted wood frames with insulated double glazing units is provided for the main entrance and it is currently not in use. Two pre-finished insulated PVC sectional overhead doors with motorized openers are provided on the north elevation; one of the doors is also fitted with a personal access door which is used as the current access for the building. The roof was mostly covered by snow, limiting visibility but is assumed to be a gable sloped roof covered with a metal sheet roofing system. Pre-finished galvanized metal fascia is provided along the roof perimeter. Roof overhangs are finished with pre-finished vented metal soffits. The exterior components are in overall acceptable condition.
- Interior doors are typically painted wood doors set in painted wood frames. Interior partitions consist of interior wood stud frame partitions with Gypsum Wall Board (GWB) coverings finished with paint. The ceilings for some areas of the building are a combination of texturized hardboard acoustic tiles and GWB painted ceilings. Building floors are finished with resilient sheet flooring, carpet, painted wood boards and painted concrete. One washroom unit is provided by the office area which includes a plastic countertop with a built-in lavatory and a painted wood lower cabinet. The interior components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods it is assumed to be comprised of Caste in Place (CIP) strip and spread foundations. The building floor is a reinforced CIP concrete slab on grade. The superstructure is a steel frame structure comprised of steel columns, rafters and purlins. Interior walls are wood frame and stud walls with GWB coverings throughout. The mezzanine is a wood structure provided with wood beams, floor joists and posts. The floor for the office is a suspended wood floor structure comprised of timber wood beams, floor joists, and plywood decking. The structural components are in overall acceptable condition.
- The building domestic potable water is supplied from the town's local service provider. Domestic water distribution piping is a combination of copper and PVC plastic, while waste water piping is PVC plastic. Storm water drainage is accomplished by overland soil absorption and surface drainage. Domestic hot water is provided by one electric hot water heater located in the garage bay. Heating for the building is accomplished via one oil-fired furnace located on the mezzanine and is distributed throughout the building via galvanized metal ductwork. Cooling for the office area is provided by one through wall air conditioning unit. Ventilation is assumed to be accomplished through the furnace and windows. Localized analog thermostats control the interior temperature for the building. Exhaust ventilation units is provided for the washroom in the office area. The washroom is equipped with plumbing fixtures including vitreous china tank type water closet and a lavatory. Portable ABC fire extinguishers are provided throughout. The mechanical components are in overall acceptable condition.



LA: MAYO FACILITIES

- Electrical service is fed into the building via overhead lines from a pole mounted transformer. Electrical branch wiring circuits is reportedly mostly copper throughout the building, although some aluminum wiring is potentially present. Power from the main exterior transformer is metered and fed into a main distribution panelboard in the storage area. No data was available; equipment is assumed to be rated at 225 Amp 120/240 V and contains 60 circuits, with at least 50% of circuits in use. Lighting is provided primarily by surface mounted tubular fluorescent fixtures fitted with T8 lamps. Some units are reported to have T12 lamps. Exterior lighting is accomplished by high intensity discharge (HID) and light emitting diode (LED) lighting fixtures. One emergency battery pack with integral lighting heads is provided in the garage bay area. One non-powered emergency exit sign is also provided at the garage bay. A fire alarm panel is located in the main entrance by the garage bay and it monitors smoke/heat detectors, strobe/horn lights and pull stations throughout. The building is protected by an Intrusive system connected to door contacts and motion sensors.
- Given the year of the original construction (~1980), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are possible to be present. Suspected ACMs were reported in a piece of partially removed drywall located in the storage area.

Immediate investigation / action items identified pertain to gutters and downspouts, substructure, emergency lighting, exit lighting and emergency exits. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural, mechanical and electrical components and systems.

The following conclusions are made for Site B- Staff House 1:

- The building was constructed in ~1970, according to the Point of Contact. Access to the site is provided from a gravelled driveway. Site components include grassed areas, a detached garage and two ancillary buildings, used for storage and to house the water tank. The building includes additionally two deck areas, one is used as an entrance porch, and both are provided with stained wood stairs from ground level. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- The exterior of the building is primarily finished with stained wood board siding throughout. Joint sealers are provided at material transitions and openings. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Single glazing units are provided at the garage. Wooden frame skylights with acrylic dome panes are included in the building as well over the entrance vestibule and the kitchen area. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and poly air/vapor barrier. The main entrance door is a painted insulated metal door with insulated glazing units completed with a painted insulated metal screen door with glazing units. Access to the detached garage is made through painted wood sliding barn doors with single glazing units. Secondary entrance doors are insulated painted metal doors with and without glazing units. A patio door is also provided to access the back deck from the dining room and is a PVC insulated door unit set in PVC frames with insulated glazing unit, one section operable and the other one fixed. The roof is a low slope roof covered with asphalt shingles throughout. Painted wood fascia is provided along the roof perimeter and pre-finished vented metal soffit is provided at roof overhangs. The exterior components are in overall acceptable condition.

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- The interior doors are typically stained wood doors set in wood frames throughout. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint, wood panels or wall coverings. The ceilings for the building are GWB ceiling panels finished with a stipple texture. Building floor finishes are a combination of resilient floor sheet, carpet, sealed concrete floors in the basement, hardwood floors and laminate floors. Two washrooms are provided one for the master bedroom and one in the basement- both equipped with laminated countertops and stained wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and stained wood upper and lower cabinetry. The kitchen is equipped with standard grade residential appliances. The interior components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and the type of building construction it is assumed that the structure is comprised of CIP foundation wall in the basement, strip and spread foundations. The building basement floor is a reinforced CIP concrete slab on grade. Main floor structure is a wood frame structure comprised of timber wood floor joists and beams, with plywood decking. The superstructure is comprised of load-bearing wood framed stud walls supporting wood beams and roof rafters. The roof structure is presumably covered by plywood panels. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from a water storage tank located on site and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank and field located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via one electric furnace; additionally one vented heater provides backup heating. Ventilation is assumed to be accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and through a range hood in the kitchen. Plumbing fixtures for the washroom are vitreous china tank type water closet, counter mounted enamel lavatories and fiberglass shower inserts. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via overhead conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Power is metered and then fed into the building to a main Square D distribution panelboard located in basement mechanical room. Equipment is rated at rated at 200 amp, 120/240 V and is provided with 24 circuits. Panel was observed to be 90% full. Secondary distribution panels are provided for the detached garage and the water shed. Interior lighting is provided by interior incandescent light fixtures equipped with compact fluorescent lamps (CFL). Exterior lighting is accomplished by a combination of incandescent fluorescent light fixtures and flood lights. No emergency lighting was observed to be provided for the building. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~1970), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are possible to be present. Site Representative reported that they were not aware of any hazardous materials present such as ACMs.

Immediate investigation / action items identified pertain to sanitary sewer, deck, fire extinguisher, emergency lighting and detectors.

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The following conclusions are made for Site C- Staff House 2:

- The unit was manufactured in ~2005 according to Point of Contact. The site access is provided from a gravelled driveway. Site components include stone pavers, grassed areas, and two ancillary buildings, wooden deck entrance porch and patio. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- Exterior finish is primarily with pre-finished vinyl siding and skirting. Joint sealers are provided at material transitions and openings throughout the building exterior. The exterior windows are PVC frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. Main entrance door is comprised of a painted insulated metal unit set in painted wood frames with insulated glazing units. Secondary entrance doors are insulated painted metal doors with and without glazing units. The roof for the building is a sloped gable roof covered with metal sheets according to Point of Contact. Painted wood fascia and pre-finished vinyl soffit are provided along the roof perimeter and at roof overhangs. The exterior components are in overall acceptable condition.
- The interior doors are typically stained wood doors set in wood frames throughout. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheet, carpet, hardwood floors and laminate floors. Two washrooms are provided one for the master bedroom and one in the basement both equipped with laminated countertops and stained wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and stained wood upper and lower cabinetry. The kitchen is equipped with standard grade residential appliances. The interior components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and according to drawings provided it is assumed that the structure is sitting on a compacted granular base and a permanent wood foundation (PWF). The building floor is a suspended wood floor structure comprised of wood beams and floor joists with a plywood deck supported on wood posts and blocks. The superstructure is composed of load-bearing wood frame stud walls supporting wood trusses. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from a water storage tank located on site and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank and field located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. One domestic electric water heater is in the mechanical room with a capacity of 284 litres. Heating for the building is accomplished via one oil-fired furnace also located in the mechanical room. Ventilation is presumably accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized digital analog are used to control room temperatures. Exhaust ventilation in the washrooms is provided by ceiling mounted units and one range hood in the kitchen. Plumbing fixtures are vitreous china tank type water closets, counter mounted enamel lavatories and fiberglass shower inserts. The mechanical components are in overall acceptable condition.



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- Electrical service is provided to the building via overhead line conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished through a main panelboard located in the mechanical room that was not accessible at the time of the assessment. Secondary distribution panels are provided for the sheds. Interior lighting is provided by interior incandescent light fixtures fitted with CFL lamps. Exterior lighting is accomplished by a combination of exterior incandescent light fixtures and flood lights. One battery pack with integral heads was observed in the main hallway for emergency lighting. Smoke/heat detectors are provided throughout. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~2005), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present.

Immediate investigation / action items identified pertain to gutters and downspouts, substructure, fire extinguisher, storage items in front of electrical equipment and receptacles within the building.

The following conclusions are made for Site D- Staff House 3:

- The unit was manufactured in ~2005 according to Point of Contact. The site access is provided from a gravelled driveway. Site components include grassed area, two ancillary buildings, wooden deck entrance porch and patio. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- The building exterior is finished with pre-finished vinyl siding and skirting. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units. Wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided consist of fiberglass batt insulation and poly air/vapor barrier. Main entrance door is comprised of a painted insulated metal unit set in painted wood frames with insulated glazing units. Secondary entrance doors are insulated painted metal doors with and without glazing units. Interior doors are mostly stained wood doors set in stained wood frames. The roof for the building is a sloped gable roof covered with metal sheets according to Point of Contact. Painted wood fascia and pre-finished vinyl soffit are provided along the roof perimeter and at roof overhangs. The exterior components are in overall acceptable condition.
- The interior doors are typically stained wood doors set in wood frames throughout. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and laminate floors. The building includes two washrooms one on the hallway and one in the master bedroom, both including laminated countertops and painted wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and painted wood upper and lower cabinetry. Standard residential grade appliances are provided for the building. The interior components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and according to drawings provided it is assumed that the structure is sitting on a compacted granular base and a permanent wood foundation (PWF). The building floor is a wood floor structure comprised of wood beams and floor joists with a plywood deck supported on wood posts and blocks. The superstructure is composed of load-bearing wood frame stud walls supporting wood trusses. Interior walls are wood framed partitions with wood studs covered with GWB. The roof structure is composed of wood rafters and joists presumably covered by plywood panels. The structural components are in overall acceptable condition.



LA: MAYO FACILITIES

- The building is supplied with domestic water from a water storage tank and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank and field located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided through one electric heater located in one the mechanical room. Heating for the building is accomplished via one oil-fired furnace also located in the mechanical room. Ventilation is presumably accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized analog thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by ceiling mounted units and one range hood in the kitchen. Plumbing fixtures are vitreous china tank type water closets, and counter mounted enamel lavatories. The washroom is additionally provided with fiberglass shower inserts. One portable ABC fire extinguisher was observed in the mechanical room for fire protection. The mechanical components are in overall acceptable condition.

- Electrical service is provided to the building via overhead line conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary distribution is accomplished through a Square D main panelboard located in the mechanical room. No detailed information was observed on equipment, but it is assumed to be rated at 200 amp, 120/240 V and is provided with 40 circuits, with at least 60% in use. Secondary distribution panels are provided for the each of the sheds. Interior and exterior lighting is provided by incandescent light fixtures fitted with CFL lamps. Additional exterior lighting is provided by flood light. No emergency lighting was observed for the building. Smoke/heat detectors are provided throughout. The electrical components are in overall acceptable condition.

- Given the year of the original construction (~2005), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present.

Immediate investigation / action items identified pertain to mould, substructure, receptacles, and emergency lighting within the building.

The following conclusions are made for Site E- Staff House 4:

- The site was developed with the building in ~1993. Access to the site is provided from a gravelled driveway. Site components include grassed areas, fencing, and one ancillary building used for storage. The building includes additionally two deck areas, one is used as an entrance porch, and both are provided with stained wood stairs from ground level. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.

- The exterior of the building is pre-finished vinyl siding throughout. Joint sealers are provided at material transitions and openings. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and poly air/vapor barrier. The main entrance door is a painted insulated metal door set in painted wood frames completed with a painted metal screen door with acrylic panes. Access to the garage is made through two pre-finished insulated PVC sectional overhead doors equipped with motorized openers. Secondary entrance doors are insulated painted metal doors set in painted wood frames. A patio door is also provided to access the back deck from the dining room and is a PVC insulated door unit set in PVC frames with insulated glazing unit, one section operable and the other one fixed. The roof for the building was mostly covered with snow at the time of the assessment but it is assumed to be a sloped gable roof covered with metal sheets. Painted wood fascia is provided along the roof perimeter and pre-finished vented metal soffit is provided at roof overhangs. The exterior components are in overall acceptable condition.



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- Interior doors are typically painted wood doors set in painted wood frames throughout. Interior wall partitions consist of wood stud frame partitions with GWB coverings finished with paint. The ceilings are GWB ceiling panels finished with a stipple texture. Building floor finishes are a combination of resilient floor sheet, carpet, sealed concrete floors, wood board and laminate floors. Two full washrooms are provided one for the master bedroom and one on the second floor hallway both equipped with laminated countertops and stained wood lower cabinets. One half washroom is also provided next to the laundry room and is also equipped with cabinet and countertop. The kitchen furnishings include plastic laminate countertops and stained wood upper and lower cabinetry. The kitchen is also equipped with standard grade residential appliances. The interior components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods the building substructure is comprised of CIP wall, strip and spread foundations. The building floor is a reinforced CIP concrete slab on grade. Main floor and second floor structure is a wood frame structure comprised of timber wood floor joists and beams with wood decking. The superstructure is comprised of load-bearing wood frame stud walls supporting wood beams and roof rafters. The roof is assumed to be covered with plywood panels. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from a well located on site. Water is pumped into interior plumbing fixtures through a pressure tank and water pumps housed in the basement's mechanical room. Domestic potable water is filtered through an osmosis filtration system also observed in the mechanical room. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank and field on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via one electric furnace. Ventilation is accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and through a range hood in the kitchen. Plumbing fixtures for the washroom are vitreous china tank type water closet, counter mounted enamel lavatories and fiberglass shower inserts. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via overhead conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Power is metered and then fed into the building to a main Square D distribution panelboard located in basement mechanical room. Equipment is rated at rated at 225 amp, 120/240 V and is provided with 42 circuits. Panel was observed to be 100% full. Interior lighting is provided by interior incandescent light fixtures equipped with compact fluorescent lamps (CFL). Exterior lighting is accomplished by a combination of incandescent fluorescent light fixtures and flood lights. One emergency light battery pack with integral heads was observed in the garage. Smoke/heat detectors are provided throughout. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~2005), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present. Site Representative reported that they were not aware of any hazardous materials present such as ACMs.

Immediate investigation / action items identified pertain to wall leaks, septic tank and fire extinguisher.

The Immediate Repairs and Capital Reserve Analysis identified for each site are included in Appendix D. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.

LA: MAYO FACILITIES

Table 1: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/ Main Office (Site A)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$8,000	$132,500	$0	$132,500
2	Structural	$5,000	$28,000	$0	$28,000
3	Mechanical	$0	$22,500	$0	$22,500
4	Electrical	$7,000	$30,900	$0	$30,900
TOTALS		**$20,000**	**$213,900**	**$0**	**$213,900**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 2: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ Main Office (Site A)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$20,000	$118,700	$12,500	$0	$0	$82,700

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$0	$0	$0

Table 3: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/ Staff House 1 (Site B)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$0	$48,600	$46,675	$95,275
2	Structural	$5,000	$0	$0	$0
3	Mechanical	$2,500	$8,500	$0	$8,500
4	Electrical	$2,500	$15,600	$0	$15,600
TOTALS		**$10,000**	**$72,700**	**$46,675**	**$119,375**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 4: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ Staff House 1 (Site B)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$10,000	$36,600	$33,100	$0	$0	$3,000

Year 6	Year 7	Year 8	Year 9	Year 10
$15,675	$0	$0	$0	$31,000



LA: MAYO FACILITIES

Table 5: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/ Staff House 2 (Site C)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$1,500	$9,000	$20,150	$29,150
2	Structural	$3,000	$10,000	$0	$10,000
3	Mechanical	$500	$0	$3,500	$3,500
4	Electrical	$1,000	$0	$0	$0
TOTALS		**$6,000**	**$19,000**	**$23,650**	**$42,650**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 6: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ Staff House 2 (Site C)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$6,000	$13,000	$6,000	$0	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$0	$0	$23,650

Table 7: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/ Staff House 3 (Site D)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$5,000	$5,000	$28,150	$33,150
2	Structural	$3,000	$10,000	$0	$10,000
3	Mechanical	$0	$9,000	$3,500	$12,500
4	Electrical	$2,300	$0	$0	$0
TOTALS		**$10,300**	**$24,000**	**$31,650**	**$55,650**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 8: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ Staff House 3 (Site D)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$10,300	$19,000	$5,000	$0	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$0	$8,000	$23,650

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Table 9: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/ Staff House 4 (Site E)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$2,000	$24,725	$52,625	$77,350
2	Structural	$0	$0	$0	$0
3	Mechanical	$2,500	$3,500	$17,600	$21,100
4	Electrical	$0	$0	$4,000	$4,000
TOTALS		**$4,500**	**$28,225**	**$74,225**	**$102,450**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 10: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ Staff House 4 (Site E)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$4,500	$11,900	$5,000	$0	$0	$11,325

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$62,350	$0	$11,875



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1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Mayo Main Office (A), Staff House 1 (B), Staff House 2 (C), Staff House 3 (D) and Staff House 4 (E), located in various locations as it will be described below, in the Town of Mayo, Yukon Territory.

Site A- Main Office is comprised of a one storey plus mezzanine office building with approximately 139 square metres (m²) (1,500 square feet [ft²]) on approximately 0.16 hectares (0.40 acres) of land. The building is located on 205 3rd avenue, in the Town of Mayo, Yukon Territory. The site building year of construction is unknown but estimated to be in approximately 1980.

Site B- Staff House 1 building consists of a one storey bungalow with basement containing approximately 186 m^2 (2,000 ft^2) gross floor area (GFA) on approximately 0.31 hectares (0.76 acres) of land. The site location is identified as Block 8 Airport Drive, in the Town of Mayo, Yukon Territory. According to Point of Contact the estimated year of construction is approximately early 1970's. No additional information was provided regarding the age of the building.

Site C- Staff House 2 building is a one storey trailer with approximately 150 m^2 (1,615 ft^2) gross floor area (GFA) on approximately 0.30 hectares (0.75 acres) of land. The site is located at Lot 1095 Airport Drive, in the Town of Mayo, Yukon Territory. According to the Point of Contact the unit might have been constructed in approximately 2001; although mechanical equipment labels in the building suggest it may have been built in 2005.

Site D- Staff House 3 building is a one storey trailer with approximately 150 m^2 (1,615 ft^2) gross floor area (GFA) on approximately 0.30 hectares (0.75 acres) of land. The site is located at Lot 1088 Airport Drive, in the Town of Mayo, Yukon Territory. According to the Point of Contact the unit might have been constructed in approximately 2000.

Site E- Staff House 4 building is a two storey detached house with approximately 186 m^2 (2,000 ft^2) gross floor area (GFA) on approximately 0.35 hectares (0.87 acres) of land. No civic address was provided for the site. Reportedly the Site location is Block 8 Airport Drive, Mayo, Yukon Territory. The site building was reportedly constructed in approximately 1993.

Written authorization to proceed with the work was provided by Sean Munro, Manager, Property & Risk Management from Yukon Energy Corporation. It is understood that this FLA is required for capital planning.

1.2 Objectives

The objective of the FLA was to document the Site conditions at the time of the Site reconnaissance and, based on available sources of information and observations of surface conditions during the Site reconnaissance, to identify the exterior Site improvements as well as the building structure, envelope, interior finishes, mechanical systems, electrical systems, fire/life safety systems, conveyance devices and visually obvious signs of non-compliance with respect to building code and barrier free accessibility. Due to the age of the buildings, it is possible that hazardous materials are present in the building.



1.3 Methodology

Site Escort and general building information was provided by Rick Brooker (Sites A, C and D), Geoff Siciotte (Site B) and Danny Sutherland (Site E) (hereafter referred to as the "Point of Contact"). Site reconnaissance was conducted by Brian Levy and Adriana Almeida of Golder on December 2nd and December 3rd, 2015. In addition to the Site visit, documents identified in Section 1.6 were reviewed in completing the FLA.

At the time of the Site reconnaissance, the weather was overcast; with most of the grounds and roof covered by snow limiting visibility on the Site.

The scope of work did not include sampling or testing to identify the potential presence of hazardous building construction materials such as ACMs, lead-based paints (LBPs), PCB-containing electrical equipment or other hazardous materials. Due to the age of the buildings, it is possible that hazardous building construction materials are to be present on Site. An asbestos management plan was not reported to be in place and asbestos materials identified and reported are based solely on observations.

1.4 Evaluation Criteria

The FLA was completed in general accordance with accordance with the Yukon Energy Corporation stated scope of work as documented in *Request for Proposals Building Condition Reports* (hereafter referred to as the "RFP"). The scope of the FLA was limited to identifying components, systems and potential concerns by visual examination of surface features and operating practices, and from available documented information sources. Only those items identified as being above the specified Capital Threshold will be addressed in the Capital Reserve Table. The Condition Rating system (CR) used throughout this report is based on the submitted proposal as per Yukon Energy Corporation RFP:

Code	Description
1	**Critical Unsafe**, high risk of injury or critical system failure.
2	**Poor** - does not meet requirements, has significant deficiencies. May have high operating / maintenance costs.
3	**Marginal** - Meets minimum requirements, has significant deficiencies. May have above average operating maintenance costs.
4	**Acceptable** - Meets present requirements, minor deficiencies. Average operating/maintenance costs.
5	**Good** - Meets all present requirements. No deficiencies.
6	**Excellent** - As new/state of the art, meets present and foreseeable requirements.



The capital expenditures identified with respect to deficiencies or deferred maintenance shall be identified by the following Categories ("Cat#"):

Category	Description
1	Code & Safety
2	Repair & Maintenance
3	Capital Expenditure
4	Modernization / Improvements
5	Other

Items identified with a CR rating of 1 and/or Cat1, shall be treated as "Immediate" action items, considered to have conditions that include deficiencies that require action in the next 60 to 90 days. Items identified with a CR of 2 or 3 and/or Cat2 shall be considered to have conditions that include deficiencies that can be addressed within the next five years (2016 to 2020 in the Capital Reserve Table). Preventative Maintenance (PM) items may have been identified. These PM items are items anticipated to be required to maintain specific components/systems through to the end of their Expected Useful Life (EUL) and are considered to have CR of 4 or better that can be addressed at any time within the 10 year time frame of this report (2016 to 2025 in the Capital Reserve Table).

Other non-urgent conditions identified with a CR of 4 to 6, are prioritized by their identification as Cat2 to Cat4 and are included in the Capital Reserve Table in an appropriate year. For items with no observed or reported deficiencies, a lifecycle replacement (LCR) cost estimate has been provided in the Capital Reserve Table spreadsheet in the year equal to the year of original installation plus that component's EUL. If an item with no observed or reported deficiencies is nearing or has surpassed its EUL in the next 5 years (i.e., 2016 to 2020), an LCR cost estimate has been provided in the Lifecycle Plan spreadsheet in year 2020.

For similar components that have been replaced/installed at different times but where the age difference is equal to or less than 20% of the component's EUL, the average install year has been used in calculating the next lifecycle replacement event (i.e., for similar vinyl floor tile installed in 1999 versus 2002, each having a 20 year TDL, an average install year of 2001 has been used to calculate a single lifecycle replacement event in 2021).

No building material sampling or testing was conducted as part of this assessment.

1.5 Recommendations for Additional Investigation or Action

RAI.1E) Study wall leaks.

RAI.2A) Study ice dams on gutters.

RAI.3A) Study building settlement.

RAI.4C) Study building settlement.

RAI.5C) Study building settlement.

RAI. 6A) Study for supplementary heating in the garage bay.

RAI. 7A) Study for supplementary cooling.

RAI. 8B) Study septic tank issues.

RAI. 9D) Study water distribution system and pipes.

RAI. 10E) Study septic tank freezing.

No other additional investigations are recommended at this time.

1.6 Desktop Data Collection

Architectural drawings and any previous condition reports or hazardous materials reports for the Site were requested. The following are a list of drawings provided:

- Electric layout, provided by YEC.
- House floor plan, provided by YEC.
- A pre-Site questionnaire was sent out by Golder and returned by the Site Representative for review.

1.7 Outstanding Information

All information that has been requested has been provided at the time of the completion of this report.

1.8 Building & Fire Code Compliance Overview

The Site Representative advised that they were not aware of any other outstanding work orders, building code violations, building code infractions, building ordinances and municipal health and fire safety by-laws violations.

Additional emergency lighting should be installed in buildings B, C and D. Non-GFCI receptacles were observed within less than a meter from kitchen sink in buildings C and D. Storage items were blocking access to main electrical panel in building C.

1.9 Evidence of Mould Presence

No mould presence was visually identified at the time of the site visit; however, suspected mould is assumed to be present between the wall and floor assemblies in Buildings C and D (Staff House 2 and 3). Details and recommendations are included in the architectural section (Section 3.0) of this report.

1.10 Outline of the Report

The report that follows this section contains a summary description of the Site and building systems/components along with a detailed listing and description of systems/components. Furthermore, current, imminent or anticipated deficiencies above the Capital Threshold (if any) and excluding normal operating maintenance are presented with a CR, including a description of the risk/consequence of deferral, probability of imminent/anticipated failure and/or a further description of any failure if it has already occurred.

A more detailed Capital Reserve Table is presented in Appendix D outlining the specific systems/components, EUL, Install Date, Remaining Useful Life (RUL), replacement event type, basis of estimate and specific years for Capital Reserve planning.

1.11 Mandate and Report Resources

Please refer to Appendix A for the report mandate for this project and for additional resources related to the assumptions used in preparing this report such as:

- Operating and Maintenance Items; and
- Discussions of Overall Concepts and Terminology.

2.0 SITE DESCRIPTION

2.1 Site Location and Setting

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Mayo Main Office (A), Staff House 1 (B), Staff House 2 (C), Staff House 3 (D) and Staff House 4 (E), located in various locations as it will be described below, in the Town of Mayo, Yukon Territory.

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2.2 Site Physical Description(s)

Table 11: Site Physical Description Main Office (Building/Site A)

Topic	Data
Site Area	~0.16 hectares (0.40 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building (s) (m^2)	~139 m² (1,500 ft²)
Levels above grade	One plus Mezzanine
Levels below grade	None
Date of Building (s) Construction	~1980
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~10%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~90% grassed/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~1%



General view of the building on site A- Main Office.

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Table 12: Site Physical Description Staff House 1 (Building/Site B)

Topic	Data
Site Area	~0.31 hectares (0.40 acres)
Number of Buildings on the Site	Three (house, garage and shed)
Approximate Footprint Area of Building (s) (m^2)	~186 m² (2,000 ft²)
Levels above grade	One
Levels below grade	One (partial basement)
Date of Building (s) Construction	~1970
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~6%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~94%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~0%



General view of the building on site B- Staff House 1.

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Table 13: Site Physical Description Staff House 2 (Building/Site C)

Topic	Data
Site Area	~0.30 hectares (0.75 acres)
Number of Buildings on the Site	Two (House plus shed)
Approximate Footprint Area of Building (s) (m^2)	~150 m² (1,615 ft²)
Levels above grade	One
Levels below grade	None
Date of Building (s) Construction	~2005
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~5%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~95%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~0%



General view of the building on Site C- Staff House 2.

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Table 14: Site Physical Description Staff House 3 (Building/Site D)

Topic	Data
Site Area	~0.30 hectares (0.75 acres)
Number of Buildings on the Site	Two (house plus shed)
Approximate Footprint Area of Building (s) (m^2)	~150 m² (1,615 ft²)
Levels above grade	One
Levels below grade	None
Date of Building (s) Construction	~2005
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~5%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~95%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~0%



General view of the building on Site D- Staff House 3.

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Table 15: Site Physical Description Staff House 4 (Building/Site E)

Topic	Data
Site Area	~0.35 hectares (0.87 acres)
Number of Buildings on the Site	Two (house plus shed)
Approximate Footprint Area of Building (s) (m^2)	~186 m² (2,000 ft²)
Levels above grade	Two
Levels below grade	One
Date of Building (s) Construction	~1993
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~6%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~93%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~1%



General view of the building on Site E- Staff House 4.



3.0 ARCHITECTURAL

Site A: Main Office

The Site was developed in approximately ~1980. The site is provided with a gravelled parking lot and driveway located south of the site, mostly covered with snow at the time of the assessment. Grassed areas are assumed to be provided throughout and one wood structure signage is located north of the site to identify the building.

Exterior finish is primarily pre-finished corrugated metal cladding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior; one window located in the garage bay is a single pane glazing unit. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed; where concealed it is assumed to consist of batt insulation and poly air/vapour barrier while in the exposed sections of wall in the garage bay area insulation was observed to be provided by reflective insulation panels. A pre-finished metal insulated door in painted wood frames with insulated double glazing units is provided for the main entrance and it is currently not in use. Two pre-finished insulated PVC sectional overhead doors with motorized openers are provided on the north elevation; one of the doors is also fitted with a personal access door which is used as the current access for the building. Doors for the office spaces are typically painted wood doors set in painted wood frames. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings for some areas of the building are a combination of texturized acoustic hardboard tiles and GWB painted ceilings. Building floors are finished with resilient sheet flooring, carpet, painted wood boards and painted concrete. One washroom unit is provided by the office area which includes a plastic countertop with a built-in lavatory and a painted wood lower cabinet.

The roof was mostly covered by snow, limiting visibility but is assumed to be a gable sloped roof covered with a metal sheet roofing system. Pre-finished galvanized metal fascia is provided along the roof perimeter. Roof overhangs are finished with pre-finished vented metal soffits.

Capital expenditures with respect to the siding, joint sealers, overhead doors, concrete floors and roof, are anticipated within the 10 year time frame of this report.

The architectural components are in overall acceptable condition.

Site B: Staff House 1

The building was constructed in ~1970, according to the Point of Contact. Access to the site is provided from a gravelled driveway. Site components include grassed areas, a detached garage and two ancillary buildings, one used for the water storage tank. The building includes additionally two deck areas, one is used as an entrance porch, and both are provided with stained wood stairs from ground level.

The exterior of the building is primarily finished with stained wood board siding throughout. Joint sealers are provided at material transitions and openings. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Single glazing units are provided at the garage. Wooden frame skylights with acrylic dome panes are included in the building as well over the entrance vestibule and the kitchen area. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and a poly air/vapor barrier. The main entrance door is a painted insulated metal door with insulated glazing units completed with a painted insulated metal screen door with glazing units. Access to the detached garage is made through painted wood sliding barn doors with single glazing units. Secondary entrance doors are insulated painted metal doors with

and without glazing units. A patio door is also provided to access the back deck from the dining room and is a PVC insulated door unit set in PVC frames with insulated glazing unit, one section operable and the other one fixed. Interior doors are typically stained wood doors set in wood frames throughout. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint, wood panels or wall coverings. The ceilings are GWB ceiling panels finished with a stipple texture. Building floor finishes are a combination of resilient floor sheet, carpet, sealed concrete floors, hardwood floors and laminate floors. Two washrooms are provided one for the master bedroom and one in the basement both equipped with laminated countertops and stained wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and stained wood upper and lower cabinetry. The kitchen is equipped with standard grade residential appliances.

The roof for the building was mostly covered with snow at the time of the assessment but it is assumed to be a sloped gable roof covered with asphalt shingles. Painted wood fascia is provided along the roof perimeter and pre-finished vented metal soffit is provided at roof overhangs.

Capital expenditures with respect to the wood siding, joint sealers, skylights, sliding barn doors, wood fascia, wall coverings, interior doors, resilient floor sheet, kitchen cabinets, and roof, are anticipated within the 10 year time frame of this report.

The building generally does not meet barrier free guidelines. However, Golder assumes is not deemed to be required at this time due to function.

The architectural components are in overall acceptable condition.

Site C: Staff House 2

The unit was manufactured in ~2005 according to Point of Contact. The site access is provided from a gravelled driveway. Site components include stone pavers, grassed areas, two ancillary buildings, wooden deck entrance porch and patio.

The exterior of the building is primarily finished with pre-finished vinyl siding and skirting. Joint sealers are provided at material transitions and openings throughout the building exterior. The exterior windows are PVC frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. Main entrance door is comprised of a painted insulated metal unit set in painted wood frames with insulated glazing units. Secondary entrance doors are insulated painted metal doors with and without glazing units. Interior doors are mostly stained wood doors set in stained wood frames. Interior wall partitions are generally wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and laminate floors. The building includes two washrooms one on the hallway and one in the master bedroom, both including laminated countertops and painted wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and painted wood upper and lower cabinetry. Standard residential grade appliances are provided for the building.

The roof for the building is a sloped gable roof covered with metal sheets according to Point of Contact. Painted wood fascia and pre-finished vinyl soffit are provided along the roof perimeter and at roof overhangs.

Capital expenditures with respect to the joint sealers, resilient floor sheets, laminate floor, appliances and mould are anticipated within the 10 year time frame of this report.

The architectural components are in overall acceptable condition.



Site D: Staff House 3

The unit was manufactured in ~2005 according to Point of Contact. The site access is provided from a gravelled driveway. Site components include grassed area, two ancillary buildings, wooden deck entrance porch and patio.

The building exterior is primarily finished with pre-finished vinyl siding and skirting. Joint sealers are provided at material transitions and openings throughout the building exterior. The exterior windows are PVC frame type windows with double insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided it consist of fiberglass batt insulation and a poly air/vapor barrier. Main entrance door is comprised of a painted insulated metal unit set in painted wood frames with insulated glazing units. Secondary entrance doors are insulated painted metal doors with and without glazing units. Interior doors are mostly stained wood doors set in stained wood frames. Interior wall partitions are generally wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and laminate floors. The building includes two washrooms one on the hallway and one in the master bedroom, both including laminated countertops and painted wood lower cabinets. The kitchen furnishing includes plastic laminate countertops and painted wood upper and lower cabinetry. Standard residential grade appliances are provided for the building.

The roof for the building is a sloped gable roof covered with metal sheets according to Point of Contact. Painted wood fascia and pre-finished vinyl soffit are provided along the roof perimeter and at roof overhangs.

Capital expenditures with respect to joint sealers, interior paint, resilient floor sheet, laminate floor and appliances, are anticipated within the 10 year time frame of this report.

The building generally does not meet barrier free guidelines. However, Golder assumes is not deemed to be required at this time due to function.

The architectural components are in overall acceptable condition.

Site E: Staff House 4

The site was developed with the building in ~1993. Access to the site is provided from a gravelled driveway. Site components include grassed areas, fencing, and ancillary building used for storage. The building includes additionally two deck areas, one is used as an entrance porch, and both are provided with stained wood stairs from ground level.

The exterior of the building is primarily finished with pre-finished vinyl siding throughout. Joint sealers are provided at material transitions and openings. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and a poly air/vapor barrier. The main entrance door is a painted insulated metal door set in painted wood frames completed with a painted metal screen door with acrylic panes. Access to the garage is made through two pre-finished insulated PVC sectional overhead doors equipped with motorized openers. Secondary entrance doors are insulated painted metal doors set in painted wood frames. A patio door is also provided to access the back deck from the dining room and is a PVC insulated door unit set in PVC frames with insulated glazing unit, one section operable and the other one fixed. Interior doors are typically painted wood doors set in painted wood frames throughout. Interior wall partitions consist of wood stud frame partitions with GWB coverings finished with



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paint. The ceilings are GWB ceiling panels finished with a stipple texture. Building floor finishes are a combination of resilient floor sheet, carpet, sealed concrete floors, wood board and laminate floors. Two full washrooms are provided one for the master bedroom and one on the second floor hallway both equipped with laminated countertops and stained wood lower cabinets. One half washrooms is also provided by the laundry room also equipped with cabinet and countertop. The kitchen furnishing includes plastic laminate countertops and stained wood upper and lower cabinetry. The kitchen is also equipped with standard grade residential appliances.

The roof for the building was mostly covered with snow at the time of the assessment but it is assumed to be a sloped gable roof covered with metal sheets. Painted wood fascia is provided along the roof perimeter and pre-finished vented metal soffit is provided at roof overhangs.

Capital expenditures with respect to the vinyl siding, joint sealers, overhead doors, interior paint, interior doors, resilient floor sheet, carpet, laminate floor and appliances, are anticipated within the 10 year time frame of this report.

The architectural components are in overall acceptable condition.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.1A	**Site Servicing**	**Water**: Water is supplied from the town municipal service provider. **Sanitary Sewer**: Sanitary sewage is assumed to be disposed to the town sewage system. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building through overhead line conductors on the north elevation. **Oil**: Oil for the furnace is provided from a storage tank located south of the site, recharged when required by a local provider.	**4**	-	No concerns observed or reported.
A01.1B	**Site Servicing**	**Water**: Water is supplied from a water tank. Potable water is delivered by a water truck as needed. **Sanitary Sewer**: Sanitary sewage is disposed to a septic tank and field located on site. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via overhead line conductors. **Oil**: Oil for the backup vented heater is provided from a storage tank located on site, recharged when required by a local provider.	**3**	-	Issues with the septic tank and septic field were reported and are being addressed in the Mechanical Section of this report (See section M01 line item M01.2B) No concerns observed or reported.
A01.1C	**Site Servicing**	**Water**: Domestic water is supplied from a storage tank located on site in a water shed. **Sanitary Sewer**: Sanitary sewage is disposed to a septic tank on site. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via overhead line conductors. **Oil**: Oil for the furnace is provided from a storage tank on site, recharged when required by a local provider.	**4**	-	No concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.1D	**Site Servicing**	**Water**: Domestic water is supplied from a storage tank located on site in a water shed. **Sanitary Sewer**: Sanitary sewage is disposed to a septic tank on site. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via overhead line conductors. **Oil**: Oil for the furnace is provided from a storage tank on site, recharged when required by a local provider.	**4**	-	No concerns observed or reported.
A01.1E	**Site Servicing**	**Water**: Domestic water is supplied from a well located on site. **Sanitary Sewer**: Sanitary sewage is disposed to a septic tank and septic field. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via underground conductors. **Oil**: Oil for the furnaces is provided from a storage tank located on the north elevation.	**3**	-	The septic tank reportedly freezes up when not in use for long periods of time. See line item **M01.2E** for details and recommendations. No other concerns observed or reported.
A01.2A	**Parking Lots & Drive Aisles**	**~1980:** A gravelled parking lot and driveway is provided south of the site.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. No issues or concerns were reported.
A01.3B	**Driveway**	**~1970**: A graveled driveway is provided to access the lot and the garage.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. No concerns observed or reported.

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A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.3C	**Driveway**	**~2005**: A graveled driveway is provided to access the lot.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. No concerns observed or reported.
A01.3D	**Driveway**	**~2005**: A graveled driveway is provided to access the lot.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. No concerns observed or reported.
A01.3E	**Driveway**	**~1993**: A graveled driveway is provided to access the lot. A section of asphalt paved pad is reportedly located at the bottom of the entrance stairs.	**4**	-	Site grounds were mostly covered by snow; therefore, evaluation was limited to issues or concerns reported. The asphalt has reached its EUL and will require replacement within the timeframe of this report. Costs for replacement are below the Capital Threshold; therefore not included in the Capital Reserve Table. No concerns observed or reported.
A01.4C	**Pavers**	According to Point of Contact stone pavers are provided in the patio.	**4**	-	The site was mostly covered with snow which limited visibility on the site components. Pavers were not visible at the time of the assessment. No concerns observed or reported.
A01.5A	**Site Drainage**	Site drainage is accomplished through overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.5B	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.5C	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.5D	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.5E	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.6A	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No irrigation system was observed or reported. No other concerns observed or reported.
A01.6B	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No irrigation system was observed or reported. No concerns observed or reported.
A01.6C	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No irrigation system was observed or reported. No concerns observed or reported.
A01.6D	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No irrigation system was observed or reported. No concerns observed or reported.
A01.6E	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No irrigation system was observed or reported. No concerns observed or reported.
A01.7E	**Fencing**	**~1993**: A combination of chain link and mesh fences are provided.	**4**	-	No concerns observed or reported.
A01.8A	**Amenities – Signage**	**~1980**: One wood structure sign was observed on the south elevation identifying the building.	**4**	-	No concerns observed or reported.
A01.9B	**Amenities – Ancillary buildings**	**~1970:** One wood structure storage shed is provided south of the site. A water shed for the storage tank is also provided attached to the building.	**4**	-	No concerns observed or reported.
A01.9C	**Amenities – Ancillary Buildings**	**~2015:** One wood structure storage shed is provided south of the site. A water shed is also provided for the storage tank attached to the building.	**5**	-	No concerns observed or reported.

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A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.9D	Amenities – Ancillary Buildings	**~2015:** One wood structure storage shed is provided for the site. A water shed is also provided for the storage tank attached to the building.	5	-	No concerns observed or reported.
A01.9E	Amenities – Ancillary Buildings	**~1993:** Two wood structure storage sheds are provided for the site.	4	-	No concerns observed or reported.
A01.10A	Car Plug-ins	**~1980**: One car plug-in outlet was observed on the north elevation wall.	3	-	Outlet was observed to be uncovered, and with ice building up around it. It is recommended to cover the plugs after each use to avoid water coming into the electrical outlet and potential electrical shock. No other concerns observed or reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1C	Exterior Paint	**~2005:** The exterior deck and stairs are finished with paint.	4	-	Paint finish will require replacement within the timeframe of this report. Costs associated are assumed to fall below the Capital Threshold; therefore no costs are included in the Capital Reserve Table. No other concerns observed or reported.
A02.1D	Exterior Paint	**~2005:** The exterior deck and stairs are finished with paint.	4	-	Paint finish will require replacement within the timeframe of this report. Costs associated are assumed to fall below the Capital Threshold; therefore no costs are included in the Capital Reserve Table. No other concerns observed or reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.2A	**Metal Cladding**	**~1980:** The exterior of the building is finished with pre-finished metal cladding throughout.	**3**	3	Metal cladding is near its EUL and will require replacement within the timeframe of this report. Finish is generally faded and evidence of leaks and penetrations were observed from the interior of the building. No other concerns or issues were reported.
A02.3B	**Wood Siding**	**~1970:** Stained wood boards siding is provided throughout.	**4**	-	It was reported that the wood was resealed recently. (See Note **3A**) No concerns or issues were reported.
A02.4C	**Vinyl Siding**	**~2005:** The exterior of the building is finished with pre-finished vinyl siding throughout.	**4**	-	Minor damage to the vinyl siding was reported. Repairs can be completed on a cost below the Capital Threshold. No other concerns or issues were reported.
A02.4D	**Vinyl Siding**	**~2005:** The exterior of the building is finished with pre-finished vinyl siding throughout.	**4**	-	No concerns or issues were reported.
A02.4E	**Vinyl Siding**	**~1993:** The exterior of the building is finished with pre-finished vinyl siding throughout.	**4**	3	Issues with interior wall leaks were observed on the interior west wall elevation. Leaks could be related with the exterior wall envelope. See item **A06.1E** for more details and recommendations. No concerns or issues were reported.
A02.5A	**Joint Sealers**	**~1980**: Sealant at material transitions and openings.	**3**	3	The joint sealers have already surpassed their EUL and should be replaced. Work has been scheduled along with the cladding replacements in the Capital Reserve Table. No other concerns observed or reported.
A02.5B	**Joint Sealers**	**~1970**: Joint sealers are provided at material transitions and openings.	**3**	3	No concerns observed or reported.

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A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.5C	**Joint Sealers**	**~2005**: Joint sealers are provided at material transitions and openings.	**4**	3	No concerns observed or reported.
A02.5D	**Joint Sealers**	**~2005**: Joint sealers are provided at material transitions and openings.	**4**	3	No concerns observed or reported.
A02.5E	**Joint Sealers**	**~1993**: Joint sealers are provided at material transitions and openings.	**4**	3	No concerns observed or reported.
A02.6C	**Skirting**	**~2005:** Pre-finished vinyl siding is provided for the skirting to conceal the crawlspace.	**4**	-	A section with skirting removed or damaged was noted. Section is recommended to be repaired at a cost below the Capital Threshold. No other concerns observed or reported.
A02.6D	**Skirting**	**~2005:** Pre-finished vinyl siding is provided for the skirting to conceal the crawlspace.	**4**	-	No other concerns observed or reported.
A02.7C	**Louvers**	**~2005**: Prefinished metal gable louvers are provided at the exterior walls to vent the attic.	**4**	-	No concerns observed or reported.
A02.7D	**Louvers**	**~2005**: Prefinished metal gable louvers are provided at the exterior walls to vent the attic.	**4**	-	No concerns observed or reported.
A02.8B	**Handrails and Guardrails**	**~1970**: Exterior decks and stairs are provided with stained wood guardrails and handrails.	**4**	-	Mostly snow covered at time of assessment. No concerns observed or reported.
A02.8C	**Handrails and Guardrails**	**~2005**: Exterior decks and stairs are provided with painted wood guardrails and handrails.	**4**	-	Mostly snow covered at time of assessment. No concerns observed or reported.
A02.8D	**Handrails and Guardrails**	**~2005**: Exterior decks and stairs are provided with painted wood guardrails and handrails.	**4**	-	Mostly snow covered at time of assessment . No concerns observed or reported.
A02.8E	**Handrails and Guardrails**	**~1993**: Exterior decks and stairs are provided with stained wood guardrails and handrails.	**4**	-	Mostly snow covered at time of assessment . No concerns observed or reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1A	**Exterior Windows**	**~1980**: The windows are PVC frame type insulated windows.	**4**	3	One single pane window is provided in the garage bay. We recommend replacing this unit with an insulated double glazing unit. According to the Point of Contact the unit where the air conditioner is located leaks air. This unit should be resealed at a cost below the Capital Threshold. No other concerns were observed or reported.
A03.1B	**Exterior Windows**	**~2015**: The building is provided with PVC windows with insulated glazing units. **~1988**: The building is provided with PVC windows with insulated glazing units. Single glazing units are provided in the detached garage.	**3**	3	One window in the dining area was reportedly replaced in 2015 due to issues with leakage. According to the Point of Contact the older window units tend to condensate during winter. No evidence of condensation was detected at the time of the site visit. (See Note **3B**) No other concerns were observed or reported.
A03.1C	**Exterior Windows**	**~2005**: The windows are PVC frame type insulated windows.	**4**	-	No concerns were observed or reported.
A03.1D	**Exterior Windows**	**~2005**: The windows are PVC frame type insulated windows.	**4**	-	No concerns were observed or reported.
A03.1E	**Exterior Windows**	**~1993**: The windows are PVC frame type insulated windows.	**4**	-	No concerns were observed or reported.

A03 EXTERIOR WINDOWS

A03.2B	**Skylights**	**~1970**: Wooden frame skylights with acrylic domed panes are provided in the kitchen and entrance area.	**2**	3	Skylights were covered with snow at the time of the assessment. According to the Point of Contact the skylights have recurrent issues with leaks. Evidence of leaks was observed on the wood panels around the skylights locations. The units have surpassed their expected useful life and will require replacement within the timeframe of this report. With replacement issues with leaks should be fixed if the units are properly sealed. No other concerns were observed or reported.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1A	**Main Entrance Door**	**~1980**: Prefinished insulated metal entrance door with painted wood frame and insulated glazing insert is provided at the main entrance. A PVC screen door is also provided.	**4**	-	The door was locked and reportedly not in use at the time of the site visit. According to the Point of Contact the building was open to the public in the past but currently is only occasionally used by YEC staff members. Access to employees is mostly through the door located on the north elevation. (See Note **3C**) No concerns were observed or reported.
A04.1B	**Main Entrance Door**	**~1970**: Main entrance door is a painted insulated metal entrance door set in painted wood frames with insulated glazing units. The entrance door is completed with a painted insulated metal screen door with glazing units.	**4**	-	The main entrance door has surpassed its EUL and will require replacement within the timeframe of this report. Costs are estimated below the Capital Threshold; therefore not included in the Capital Reserve Table. No concerns were observed or reported.

A04 EXTERIOR DOORS

A04.1C	**Main Entrance Door**	**~2005**: Main entrance door is a painted insulated metal entrance door set in painted wood frames with insulated glazing units. The entrance door is completed with a painted insulated metal screen door with glazing units.	**4**	-	No concerns were observed or reported.
A04.1D	**Main Entrance Door**	**~2005**: Main entrance door is a painted insulated metal entrance door set in painted wood frames with insulated glazing units. The entrance door is completed with a painted insulated metal screen door with glazing units.	**4**	-	No other concerns were observed or reported.
A04.1E	**Main Entrance Door**	**~1993**: Prefinished insulated metal entrance door set in painted wood frames is provided. Main entrance door is completed with painted metal framed screen doors with acrylic panes	**4**	-	Operational issues were reported regarding the screen door. Repairs can be completed at a cost below the Capital Threshold. No other concerns were observed or reported.
A04.2A	**Overhead Doors**	**~1980**: Two prefinished insulated PVC motorized sectional overhead doors in painted wood frames are provided to access the garage bay. One of the units is completed with a personal access door.	**4**	3	No concerns or issues were reported.
A04.2E	**Overhead Doors**	**~1993**: Two prefinished insulated PVC motorized sectional overhead doors set in painted wood frames are provided to access the garage.	**4**	3	No concerns or issues were reported.
A04.3B	**Sliding Barn Doors**	**~1970**: The detached garage is provided with painted wood sliding barn doors with single pane glazing units.	**2**	3	The doors are in poor condition. Units are not insulated and both glazing units were damaged. We recommend replacing this door with a single insulated overhead unit with a motorized opening mechanism. No other concerns or issues were reported.
A04.4B	**Utility Doors**	**~1970:** Insulated painted metal doors with and without glazing units are provided for secondary entrances in the building and sheds.	**4**	3	No concerns or issues were reported.

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A04 EXTERIOR DOORS

A04.4C	**Utility Doors**	**~2005:** Insulated painted metal doors with and without glazing units are provided for secondary entrances in the building and sheds. The door by the dining room to access the deck is additionally provided with a painted insulated metal screen door with glazing units.	**4**	-	No concerns or issues were reported.
A04.4D	**Utility Doors**	**~2005:** Insulated painted metal doors with and without glazing units are provided for secondary entrances in the building and sheds. The door by the dining room to access the deck is additionally provided with a painted insulated metal screen door with glazing units.	**4**	-	The screen door by the deck access was reported to have operational issues and requires replacement within the timeframe of this report. Costs associated with repairs/replacement are below the Capital Threshold. No concerns or issues were reported.
A04.4E	**Utility Doors**	**~1993:** Insulated painted metal doors with and set in painted wood frames are provided for secondary entrances in the building and sheds.	**4**	-	The screen door by the deck access was reported to have operational issues and requires replacement within the timeframe of this report. Costs associated with repairs/replacement are below the Capital Threshold. No concerns or issues were reported.
A04.5B	**Patio Doors**	**2015:** A PVC insulated patio door with insulated glazing units is provided to access the back deck. Right side of the door is a swing operable section and the left side is a fixed glass pane.	**5**	-	No concerns or issues were reported.
A04.5E	**Patio Doors**	**1993:** A painted metal patio door with insulated glazing units is provided to access the back deck. Left side of the door is a swing operable section and the right side is a fixed glass pane.	**4**	-	No concerns or issues were reported.

A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1A	**Metal Fascia**	**~1980:** Pre-finished metal fascia is provided along the perimeter of the roof.	**4**	-	No concerns observed or reported.
A05.2B	**Wood Fascia**	**~1970:** Painted wood fascia boards are installed along the perimeter of the roof.	**3**	3	Fascia finish is generally faded. Replacement is recommended to improve the general aesthetic of the building exterior and to remove any damaged sections. No other concerns observed or reported.
A05.2C	**Wood Fascia**	**~2005:** Painted wood fascia boards are installed along the perimeter of the roof.	**4**	-	Fascia paint finish will require replacement within the timeframe of this report. Costs are assumed to be below the Capital Threshold; therefore no costs are included. No concerns observed or reported.
A05.2D	**Wood Fascia**	**~2005:** Painted wood fascia boards are installed along the perimeter of the roof.	**4**	-	Fascia paint finish will require replacement within the timeframe of this report. Costs are assumed to be below the Capital Threshold; therefore no costs are included. No concerns observed or reported.
A05.2E	**Wood Fascia**	**~1993:** Painted wood fascia boards are installed along the perimeter of the roof.	**4**	-	Fascia paint finish will require replacement within the timeframe of this report. Costs are assumed to be below the Capital Threshold; therefore no costs are included. No concerns observed or reported.
A05.4A	**Metal Soffit**	**~1980:** Pre-finished vented metal soffit is provided for roof overhangs.	**4**	-	No concerns observed or reported.
A05.4B	**Metal Soffit**	**~1970:** Pre-finished vented metal soffit is provided for roof overhangs.	**4**	-	No concerns observed or reported.
A05.4C	**Metal Soffit**	**~2005:** Pre-finished vented metal soffit is provided for roof overhangs.	**4**	-	No concerns observed or reported.
A05.4D	**Metal Soffit**	**~2005:** Pre-finished vented metal soffit is provided for roof overhangs.	**4**	-	No concerns observed or reported.

A05 FASCIA AND SOFFITS

A05.4E	**Metal Soffit**	**~1993:** Pre-finished vented metal soffit is provided for roof overhangs.	**4**	-	One missing section of metal soffit was noted over the garage gable. Section missing should be replaced at a cost below the Capital Threshold. No concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1A	**Fixed Partitions**	**~1980**: Interior partitions are wood stud frame partitions with gypsum wall board (GWB) coverings.	**4**	-	No issues or concerns were reported.
A06.1B	**Fixed Partitions**	**~1970**: Interior partitions are wood stud frame walls with GWB coverings. Walls in the detached garage building are covered with wood boards.	**4**	-	No issues or concerns were reported.
A06.1C	**Fixed Partitions**	**~2005**: Interior partitions are wood stud frame walls with GWB panels.	**4**	-	No issues or concerns were reported.
A06.1D	**Fixed Partitions**	**~2005**: Interior partitions are wood stud frame walls with GWB panels.	**4**	-	No issues or concerns were reported.
Imm.1E **A06.1E**	**Fixed Partitions**	**~1993**: Interior partitions are wood stud frame walls with GWB panels.	**3**	2	Water leaks were observed on the exterior wall assemblies on the west elevation in several sections. This issue was also reported by the Point of Contact. (See Note **3D**) No other issues or concerns were reported.
A06.2A	**Interior Paint**	**~2013**: Most of the interior partition walls throughout the building are provided with interior paint, with the exception of the upper section of the exterior walls in the garage bay.	**5**	-	No issues or concerns were reported.
A06.2B	**Interior Paint**	**~2012**: Some of the interior walls in the house and the detached garage are provided with paint finish.	**4**	-	No issues or concerns were reported.

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A06 INTERIOR WALLS AND PARTITIONS

A06.2C	**Interior Paint**	**~2012**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	-	No issues or concerns were reported.
A06.2D	**Interior Paint**	**~2009**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	3	No issues or concerns were reported.
A06.2E	**Interior Paint**	**~2008**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	3	No issues or concerns were reported.
A06.3B	**Wall Coverings**	**~1970:** Some of the interior walls on the main floor are finished with wallpaper coverings.	**4**	3	Wall paper generally looks outdated but it is in acceptable condition. Wallpaper has surpassed its EUL and requires replacement. It is recommended to replace all wall paper with a painted wall finish. No other concerns observed or reported.
A06.4B	**Wall Panelling**	**~1970:** Interior walls throughout are provided with stained pine wood boards, floor to ceiling height or half wall.	**4**	3	No other concerns observed or reported.
A06.5A	**Interior Partitions**	**~1999**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	Some cracking was observed on the GWB above door frames. Reportedly the cracks are being caused by settlement of the building. This issue will be addressed in the structural section of this report. (See S01.1A for more details). No other concerns observed or reported.
A06.5B	**Interior Partitions**	**~1970**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.
A06.5C	**Interior Partitions**	**~2005**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.
A06.5D	**Interior Partitions**	**~2005**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.
A06.5E	**Interior Partitions**	**~1993**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1A	Interior Doors	**~1980**: Interior doors are typically painted wood doors set in painted wood frames, with or without glazing panes.	4	-	No concerns observed or reported.
A07.1B	Interior Doors	**~1970**: Interior doors are typically stained wood doors set in stained wood frames. Door for the mechanical room is a painted metal insulated unit.	4	3	No concerns observed or reported.
A07.1C	Interior Doors	**~2005**: Interior doors are typically stained wood doors set in stained wood frames.	4	-	No concerns observed or reported.
A07.1D	Interior Doors	**~2005**: Interior doors are typically stained wood doors set in stained wood frames.	4	-	No concerns observed or reported.
A07.1E	Interior Doors	**~1996**: Interior doors are typically painted wood doors set in painted wood frames.	4	3	No concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.1A	Ceiling Tiles	**~1980:** Ceilings for the office spaces are comprised of texturized hardboard acoustic tiles.	4	3	Some tiles presented water damage due to possible leaks. One section in one of the offices was partially collapsing. The ceiling tiles have surpassed their EUL and require replacement within the timeframe of this report. It is recommended to replace the ceiling with a suspended ceiling grid and acoustic lay in tile treatment if feasible in Year 1. No other concerns observed or reported.

A08 CEILINGS

A08.2A	**Gypsum Wall Board (GWB)**	**~1980:** The ceiling in the washroom is finished with painted GWB ceilings throughout. Unfinished GWB ceilings are also provided where the electrical equipment is located.	**4**	-	A small stained section with paint peeling was noted in the washroom around the extraction fan. Repairs can be completed at a cost below the Capital Threshold. No other concerns observed or reported.
A08.3B	**Textured Ceiling**	**~1970:** Ceilings are finished with GWB finished with stipple texture.	**4**	-	No concerns observed or reported.
A08.3C	**Textured Ceiling**	**~2005:** Ceilings are finished with GWB finished with stipple texture.	**4**	-	No concerns observed or reported.
A08.3D	**Textured Ceiling**	**~2005:** Ceilings are finished with GWB finished with stipple texture.	**4**	-	No concerns observed or reported.
A08.3E	**Textured Ceiling**	**~1993:** Ceilings are finished with GWB finished with stipple texture. The basement is not provided with a ceiling finish.	**4**	-	No concerns observed or reported.
A08.4B	**Wood Board Ceiling**	**~1970:** The detached garage ceiling is finished with painted wood boards.	**4**	-	No concerns observed or reported.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1A	**Resilient Floor Sheet**	**~1980:** Floors in the office area and the washroom are generally finished with resilient floor sheets.	**4**	3	No concerns observed or reported.
A09.1B	**Resilient Floor Sheet**	**~1990:** Floors in the living room, kitchen, laundry room, dining room and the master bathroom are finished with resilient floor sheet.	**4**	3	No concerns observed or reported.
A09.1C	**Resilient Floor Sheet**	**~2005:** Floor in the kitchen, washrooms and laundry and entrance vestibule are finished with resilient floor sheet.	**4**	3	No concerns observed or reported.

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A09 FLOORING

A09.1D	**Resilient Floor Sheet**	**~2005:** Floor in the kitchen, washrooms and laundry and entrance vestibule are finished with resilient floor sheet.	**4**	3	No concerns observed or reported.
A09.1E	**Resilient Floor Sheet**	**~1993:** Floor in the second floor washrooms and in one of the basement rooms are finished with resilient floor sheet.	**4**	3	No concerns observed or reported.
A09.3A	**Carpet**	**~1990:** Sections of floors in the office areas are finished with carpet.	**3**	-	Carpets were generally stained and a proper transition strips with the adjacent resilient floor finish was not provided leaving sections of the wood boards for the floor exposed. It is recommended to replace the carpet and provided proper transition strips with other floor finishes by Year 1. Costs for replacing the carpet finish are estimated to be below the Capital Threshold and costs are not included in the Capital Reserve Table. No other concerns observed or reported.
A09.3B	**Carpet**	**~1990:** The floor for the master bedroom walk-in closet is finished with carpet.	**4**	-	The carpet has already surpassed its EUL and will require replacement within the timeframe of this report. However, costs are estimated to fall below the Capital Threshold; therefore, no costs have been included. No other concerns observed or reported.
A09.3E	**Carpet**	**~1993:** Floors for the second floor and one room in the basement are finished with carpet.	**4**	3	No concerns observed or reported.
A09.4A	**Concrete Floors**	**~1980:** Painted concrete floors are found in the garage bay.	**2**	3	Paint finished is mostly faded and concrete is generally spalled and cracked on several sections. Repairs to the concrete slab-on-grade are being addressed in the structural section of this report (See section S02.1A for details). It is recommended to refinish the concrete floor in the garage bay after damages to the concrete have been repaired with epoxy. Costs for refinish are included in the Capital Reserve Table. No concerns observed or reported.

A09 FLOORING

A09.4B	**Concrete Floors**	**~1970:** Unfinished concrete floors are provided for the mechanical room and the detached garage.	**4**	-	No concerns observed or reported.
A09.4E	**Concrete Floors**	**~1993:** Unfinished concrete floors are provided for the mechanical room and the garage.	**4**	-	No concerns observed or reported.
A09.5A	**Wood Floors**	**~1980:** The mezzanine floor is finished with painted wood boards throughout.	**4**	-	Sections of the floors are missing paint and overall finish appears to be worn down. Floors should be refinished within the timeframe of this report at a cost below the Capital Threshold. No concerns observed or reported.
A09.5E	**Wood Floors**	**~1993:** The mechanical room floor is partially finished with unpainted wood boards.	**4**	-	No concerns observed or reported.
A09.6B	**Hardwood Floor**	**~1970:** The master bedroom floor is finished with stained hardwood floors throughout.	**4**	-	Sections of the floors are missing paint and overall finish appears to be worn down. Floors should be refinished within the timeframe of this report at a cost below the Capital Threshold. No concerns observed or reported.
A09.7B	**Laminate Floor**	**2014:** The basement floor is finished with laminate floor.	**5**	-	No concerns observed or reported.
A09.7C	**Laminate Floor**	**~2005:** The corridor, living room, dining room and bedrooms are all finished with laminate flooring.	**4**	3	No concerns observed or reported.
A09.7D	**Laminate Floor**	**~2005:** The corridor, living room, dining room and bedrooms are all finished with laminate flooring.	**4**	3	No concerns observed or reported.
A09.7E	**Laminate Floor**	**~2005:** The living room, dining room and basement family room are all finished with laminate flooring.	**4**	3	No concerns observed or reported.
A09.8B	**Carpet Stair Finish**	**~1990:** Carpet is provided for the stairs treads that lead to the basement.	**4**	-	Carpet has surpassed its EUL and will require replacement within the timeframe of this report. However, costs are estimated below the Capital Threshold and therefore not included. The carpet was observed to be in acceptable condition with visible stains or tenting. No concerns observed or reported.

A09 FLOORING

A09.9E	**Laminate Stair Finish**	**~1993:** Laminate floor finish is provided for the stairs treads that lead to the second floor.	**4**	-	No concerns observed or reported.
A09.10E	**Resilient Stair Finish**	**~1993:** Resilient floor finish is provided for the stairs treads that lead to the basement.	**4**	-	No concerns observed or reported.
A09.11E	**Ceramic Tiles**	**~1993:** Ceramic tiles are provided in the entrance vestibule, laundry room, kitchen and main floor washroom.	**4**	-	No concerns observed or reported.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.1A	**Fixed Casework**	**~1980**: The office spaces are equipped in some areas with fixed casework which generally included upper and lower cabinets, shelves and laminate countertops.	**4**	-	No concerns were observed or reported.
A10.2A	**Counters**	**~1980**: Plastic countertop with a built-in lavatory is provided for the washroom along with a lower base cabinet.	**4**	-	No concerns were observed or reported.
A10.2B	**Counters**	**~1970**: Laminated countertop is provided for the washroom with a lower stained wood base cabinet.	**4**	-	No concerns were observed or reported.
A10.2C	**Counters**	**~2005**: Laminated countertops are provided for the washrooms with painted wood lower base cabinets.	**4**	-	No concerns were observed or reported.
A10.2D	**Counters**	**~2005**: Laminated countertops are provided for the washrooms with painted wood lower base cabinets.	**4**	-	No concerns were observed or reported.
A10.2E	**Counters**	**~1993**: Laminated countertop is provided for the washroom with a stained wood lower base cabinet.	**4**	-	No concerns were observed or reported.

A10 FIXTURES

A10.3B	**Kitchen Cabinets**	**~1970**: The kitchen is equipped with stained wood upper and lower cabinets and laminated countertops. Upper stained cabinets are also provided in the laundry room completed with a wall fixed laminated countertop.	**4**	3	No concerns were observed or reported.
A10.3C	**Kitchen Cabinets**	**~2005**: The kitchen is equipped with kitchen cabinets with painted wood upper and lower cabinets and laminated countertops.	**4**	-	No concerns were observed or reported.
A10.3D	**Kitchen Cabinets**	**~2005**: The kitchen is equipped with kitchen cabinets with painted wood upper and lower cabinets and laminated countertops.	**4**	-	No concerns were observed or reported.
A10.3E	**Kitchen Cabinets**	**~1993**: The kitchen is equipped with stained wood upper and lower cabinets and laminated countertops. Upper wood cabinets are also provided in the laundry room.	**4**	-	No concerns were observed or reported.
A10.5A	**Blinds**	**~1980**: Fabric vertical blinds are installed on the windows throughout the office area completed with matching valances.	**4**	-	No concerns were observed or reported.
A10.5B	**Blinds**	**~1970**: Prefinished metal horizontal blinds are installed on some of the windows throughout the building.	**4**	-	No concerns were observed or reported.
A10.6A	**Washroom Accessories**	**~1980**: The washroom accessories include mirror and paper towel dispenser.	**4**	-	No concerns were observed or reported.
A10.6B	**Washroom Accessories**	**~1990**: Standard residential washroom accessories are provided including mirrors, paper and soap holders.	**4**	-	No concerns were observed or reported.
A10.6C	**Washroom Accessories**	**~2005**: Standard residential washroom accessories are provided including mirrors, paper and soap holders.	**4**	-	No concerns were observed or reported.
A10.6D	**Washroom Accessories**	**~2005**: Standard residential washroom accessories are provided including mirrors, paper and soap holders.	**4**	-	No concerns were observed or reported.
A10.6E	**Washroom Accessories**	**~1993**: Standard residential washroom accessories are provided including mirrors, paper and soap holders.	**4**	-	No concerns were observed or reported.

A10 FIXTURES

A10.7A	**Appliances**	**~2000:** Residential grade appliances are provided. Appliances include: fridge, washer and dryer.	**4**	-	No concerns were observed or reported.
A10.7B	**Appliances**	**~2014:** Residential grade appliances are provided for the building including: refrigerator, freezer, dishwasher, cooking range, washer and dryer.	**5**	-	No concerns were observed or reported.
A10.7C	**Appliances**	**~2005:** Residential grade appliances are provided for the building including: refrigerator, cooking range, dishwasher, washer and dryer.	**4**	3	No concerns were observed or reported.
A10.7D	**Appliances**	**~2005:** Residential grade appliances are provided for the building including: refrigerator, cooking range, dishwasher, washer and dryer.	**4**	3	No concerns were observed or reported.
A10.7E	**Appliances**	**~1993:** Residential grade appliances are provided for the building including: refrigerator, cooking range, dishwasher, washer and dryer.	**4**	3	No concerns were observed or reported.
A10.8C	**Curtains**	**~2005:** Windows for the building are provided with fabric curtains.	**4**	-	No concerns were observed or reported.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.2A R01.1A	**Metal Roofing**	**~1980**: The roof is finished with sheet metal roofing throughout.	**4**	3	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Ice dams on the gutters on the south and north elevations were observed. (See Note **3E**) No concerns or issues were reported regarding leakage.

R01 ROOFING

R01.1C	**Metal Roofing**	**~2005**: According to the Point of Contact the roof is finished with sheet metal roofing throughout.	**4**	-	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Roof finish could not be determined and information provided is based on reports. No concerns or issues were reported regarding active leaks.
R01.1D	**Metal Roofing**	**~2005**: According to the Point of Contact the roof is finished with sheet metal roofing throughout.	**4**	-	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Roof finish could not be determined and information provided is based on reports. No concerns or issues were reported regarding active leaks.
R01.1E	**Metal Roofing**	**~1993**: According to the Point of Contact the roof is finished with sheet metal roofing throughout.	**4**	-	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. Roof finish could not be determined and information provided is based on reports. No concerns or issues were reported regarding active leaks.
R01.2B	**Asphalt Shingles**	**~1970**: The roof for the building and detached garage was mostly covered with snow but it is assumed to be finished with asphalt shingles.	**3**	3	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. According to the Point of Contact the roof is original to the building and is leaking in some sections. No other concerns observed or reported.

R01 ROOFING

Imm.3A R01.3A	**Gutters and Downspouts**	**~1980**: Rainwater is discharged through galvanized steel gutters and downspouts.	**4**	1	Ice dams on the gutters were detected specially above the back entrance door on the north elevation. Since the gutter is completely blocked by ice, water is dripping on the entrance area freezing and forming a layer of ice on the ground in front of the entrance door. This issue is considered a potential hazard and should be attended immediately. (See Note **3E**) No concerns or issues were observed or reported.
R01.3B	**Gutters and Downspouts**	**~1970**: Rainwater drainage for the building is accomplished through pre-finished metal gutters and downspouts.	**4**	-	The gutters and downspouts have reach their EUL require replacement. Replacement is recommended as a preventative maintenance item at a cost below the Capital Threshold. No concerns or issues were observed or reported.
Imm.4C R01.3C	**Gutters and Downspouts**	**~2005**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	2	According to the Point of Contact the eaves trough (gutters) are not working properly and they drain over the entrance porch area. (See Note **3F**) No other concerns or issues were observed or reported.
R01.3D	**Gutters and Downspouts**	**~2005**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	-	Few leaks were reported by the Point of Contact, possibly due to lack of maintenance on gutters. Costs for cleaning gutters are assumed to fall below the Capital Threshold; therefore no costs are included. No other concerns or issues were observed or reported.
R01.3E	**Gutters and Downspouts**	**~1993**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	-	The gutters and downspouts will surpass their EUL by Year 8 and will require replacement. Replacement is recommended as a preventative maintenance item at a cost below the Capital Threshold. No concerns or issues were observed or reported.

R01 ROOFING

R01.4C	**Snow Guards**	**~2005:** Reportedly the roof is provided with snow guards.	**4**	-	No concerns observed or reported.
R01.4D	**Snow Guards**	**~2005:** Reportedly the roof is provided with snow guards.	**4**	-	No concerns observed or reported.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.1A	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	No concerns observed or reported
A99.1B	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	No concerns observed or reported
A99.1C	**Mould**	Presence of mould was not reported. Mould could potentially be present in the washrooms located in the hallway below the water closet.	**4**	2	A section of wall below the water closet in the common washroom was damaged by water. Reportedly a major water leak occurred in the past but has been repaired since. However, the wall was not repaired or inspected for mould growth. It is recommended to test this area and remove mould (if present). Costs are included in the Capital Reserve Table. No concerns observed or reported
Imm.5D A99.1D	**Mould**	Mould was reported to be present within the wall between the master washroom and mechanical room. Potential mould was observed below the water closet.	**3**	1	A previous water pipe burst reportedly caused severe flooding that leaked through the floor and the interior walls. Also, a long term leak through the shower head (which was being replaced at the time of the assessment) caused water to penetrate the wall assembly. (See Note **3G**) No concerns observed or reported

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

A99.1E	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	A leak was observed penetrating the west elevation wall assembly on the second floor. Section should be monitored for potential mould growth. No concerns observed or reported
A99.2B	**Exterior Stairs**	**~1970:** Stained wood stairs are provided for the entrance and back decks.	**4**	-	No concerns or issues were reported.
A99.2C	**Exterior Stairs**	**~2005:** Painted wood structure stairs with wood handrails and guardrails are provided for the main entrance porch and deck.	**4**	-	No concerns or issues were reported.
A99.2D	**Exterior Stairs**	**~2005:** Painted wood structure stairs with wood handrails and guardrails are provided for the main entrance porch and deck.	**4**	-	No concerns or issues were reported.
A99.2E	**Exterior Stairs**	**~1993:** Wood structure stairs with wood handrails and guardrails are provided for the main entrances.	**4**	-	No concerns or issues were reported.

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NOTES:

3A) Golder was unable to determine the age of the wood siding. It was reported by the Point of Contact that the siding is most likely original to the building, but he was unsure about the actual age of the building. Given the current condition of the wood siding and the fact that it was resealed recently, Golder assumes that with ongoing maintenance the wood siding will not require full replacement within the timeframe of this report. An allowance is included in the Capital Reserve Table in Year 10 in the event that refinish or partial replacements are required.

3B) Generally windows have a EUL of approximately 40 years. Date stamped on most of the windows indicates that units were manufactured in 1988 which is also the assumed estimated installation date; according to this the windows have a remaining useful life of 12 years. However, issues with condensation reported (although not evident at the time of the site visit) suggest that the windows may require replacement ahead of time and within the timeframe of this report. Therefore; costs for replacements are included in the Capital Reserve Table for Year 10.

3C) Metal entrance door units generally have a EUL of approximately 40 years. According to reports the door unit is barely used and it is completely locked during the winter season. Since use for this unit is sporadic we assume that the door will not require replacement within the timeframe of this report unless operational issues appear, in which case replacement may be needed but under the Capital Threshold. No costs for replacements are included in the Capital Reserve Table.

3D) Golder was unable to determine on site the source of the leaks. It is possible that the inner wall assembly is failing and it is allowing water to penetrate the wall through the exterior envelope. Issue could also be related to the exterior wall envelope or the roof. Leaks could potentially be from other building systems and due to humidity accumulation, which can lead into mould growth. Golder recommends performing a study on the wall envelope and conduct any necessary repairs required. An allowance is included in the Capital Reserve Table for both the study and the repair. Costs for repairs will rely solely on the results of the study.

3E) Ice dams were especially concerning above entrance areas were they could represent a safety hazard. These ice formations are generally caused by improper insulation or ventilation on higher sections of the roof, causing the roof to warm up enough to melt layers of snow which then go downslope and freeze in colder sections of the roof (typically the eaves). As this freeze-thaw cycle recurs, a ridge of ice develops and traps water on the roof, causing water to leak into the building and over the gutters and affecting several systems and components including the walls, roof, ceilings and insulation, and also causing ice build-up above the ground areas. A common solution for this issue is to install heat traces along the eaves to melt the ice and to allow water to flow along the gutters and downspouts but this will not generally solve the source of the problem which is the roof surface heating up. It is possible as other issues were reported regarding the building insulation that the main issue is caused by improper insulation on the roof. Ultimately, a study is recommended to determine the definite cause and will provide a more permanent solution. An allowance is included in the Capital Reserve for both the study and potential repairs triggered by the study. Costs for repairs will rely solely on the results of the study. An immediate item will also be included to remove the ice dam above the back entrance door and to clean the gutters to avoid water dripping and minimize tripping hazards.

3F) No ice dams or ice accumulation was observed on the porch area at the time of the assessment; however, water staining caused by water overflow was noted on the gutter. It is possible that the gutter is lacking maintenance and is obstructed causing water to overflow instead of draining to adjacent downspouts. It is also possible that the gutter is not properly sealed causing water to leak trough. Even though, no ice was noted on the area, water overflowing or leaking over the entrance area might represent a hazard during freeze-thaw periods. It is recommended to repair this issue immediately. An allowance for repairs is included in the Capital Reserve Table for repairs.

3G) According to the Point of Contact the wall assembly insulation is still potentially moist due to this previous issue as the pipe repairs did not include replacing wall and floor assemblies affected. At the time of the assessment repairs were being completed in the master washroom including replacing the shower head and the water closet. One section of wall below the water closet presented evident signs of potential mould growth. Golder recommends a complete test and repair of the affected areas immediately. Final costs for repairs will rely solely on the extension of the damage within the floor and wall assemblies.

IMMEDIATE ITEMS :

Imm.1E) Study wall leaks.
Imm.2A) Study for ice dams on gutters.
Imm.3A) Remove ice dams over entrance areas and clean gutters.
Imm.4C) Repair gutter over main entrance.
Imm.5D) Test and remove mould on wall and floor assemblies.

No other immediate items were identified.

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RECOMMENDED FURTHER INVESTIGATION :

RAI.1E) Study wall leaks.

RAI.2A) Study ice dams on gutters.

OFFICE BUILDING (SITE A):



Photo #A1A: General overview of the north elevation where the main access to the building is located.



Photo #A2A: Ice dams on gutters above the entrance area.



Photo #A3A: Ceiling tiles collapsing in the office area.



Photo #A4A: Faded concrete paint finish.

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STAFF HOUSE 1 (SITE B):



Photo #A5B: Wood siding detail.



Photo #A6B: Detail of the wood fascia and soffit.



Photo #A7B: Evidence of leaks through the skylights.



Photo #A8B: Typical interior finishes.

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STAFF HOUSE 2 (SITE C):



Photo #A9C: Typical exterior finishes.



Photo #A10C: Damaged/removed skirting.

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Photo #A11C: Water stains on gutters over the entrance porch.



Photo #A12C: Typical interior finishes.

STAFF HOUSE 3 (SITE D):



Photo #A13D: Typical exterior finishes.



Photo #A14D: Metal soffit and louver vent.



Photo #A15D: Typical interior finishes.



Photo #A16D: Suspected mould below the master washroom water closet.

STAFF HOUSE 4 (SITE E):



Photo #A17E: Typical exterior finishes.



Photo #A18E: Missing section of metal soffit.



Photo #A19E: Typical interior finishes on the second floor.



Photo #A20E: Evidence of wall leaks on the west elevation.

4.0 STRUCTURAL

Site A: Main Office

No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods it is assumed to be comprised of CIP strip and spread foundations. The building floor is a reinforced CIP concrete slab on grade. The superstructure is a steel frame structure comprised of steel columns, rafters and purlins. The mezzanine is a wood structure provided with wood beams, floor joists and lumber posts. The floor for the office is a suspended wood floor structure comprised of timber wood beams, sills and floor joists. Interior walls are wood frame stud walls with gypsum wall board (GWB) coverings throughout. One stair to access the mezzanine is provided comprised of wood strings and treads.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site B: Staff House 1

No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods the building substructure is comprised of CIP foundation wall in the basement, strip and spread foundations. The building basement floor is a reinforced CIP concrete slab on grade. Main floor structure is a wood frame structure comprised of timber wood floor joists and beams. The superstructure is comprised of load-bearing wood frame stud walls supporting wood beams and roof rafters. The roof is assumed to be covered with plywood panels.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site C: Staff House 2

Some structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and according to drawings provided it is assumed that the structure is sitting on a compacted granular base and a permanent wood foundation (PWF). The building floor is a suspended wood floor structure comprised of wood beams and floor joists with a plywood deck supported on wood posts and blocks. The superstructure is composed of load-bearing wood frame stud walls supporting wood trusses. Interior walls are wood framed partitions with wood studs covered with GWB.

The roof structure is composed of wood rafters and joists presumably covered by plywood panels.

Capital expenditures items were not identified within the timeframe of this report.



A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site D: Staff House 3

Some structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and according to drawings provided it is assumed that the structure is sitting on a compacted granular base and a permanent wood foundation (PWF). The building floor is a suspended wood floor structure comprised of wood beams and floor joists with a plywood deck supported on wood posts and blocks. The superstructure is composed of load-bearing wood frame stud walls supporting wood trusses. Interior walls are wood framed partitions with wood studs covered with GWB.

The roof structure is composed of wood rafters and joists presumably covered by plywood panels.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site E: Staff House 4

No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods the building substructure is comprised of CIP wall, strip and spread foundations. The building floor is a reinforced CIP concrete slab on grade. Main floor and second floor structure is a wood frame structure comprised of timber wood floor joists and beams with wood decking. The superstructure is comprised of load-bearing wood frame stud walls supporting wood beams and roof rafters. The roof is assumed to be covered with plywood panels.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.6A S01.1A	**Substructure**	**~1980**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made and standard construction methods it is assumed to consist of CIP strip and spread foundations.	**1**	1	No structural drawings were provided. Settlement was evident at the time of the site visit. One significant crack was observed on the northwest concrete wall about 1" wide. A structural study is recommended to determine the settlement causes, and if any structural concerns remain.. Repairs are recommended dependant on the results of the study. Costs are included in the Capital Reserve Table. No other concerns observed or reported.
S01.1B	**Substructure**	**~1970**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made on site and standard construction methods it is assumed to consist of a CIP foundation wall, strip and spread foundations.	**4**	-	No structural drawings were provided. No concerns observed or reported.
Imm.7C S01.1C	**Substructure**	**~2005**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made and according to drawings provided on site the building is sitting on a compacted granular base and the building is sitting on a permanent wood foundation (PWF).	**2**	1	No detailed structural drawings were provided. Settlement was reported by the Point of Contact. Several cracks were observed on the interior walls and above doors thresholds confirming settlement on the building. (See Note **4A**) No other concerns observed or reported.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.8D S01.1D	**Substructure**	**~2005**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made and according to drawings provided on site the building is sitting on a compacted granular base and the building is sitting on a permanent wood foundation (PWF).	**2**	1	No detailed structural drawings were provided. Settlement was reported by the Point of Contact. Several cracks were observed on the interior walls and above doors thresholds confirming settlement on the building. (See Note **4A**). Reportedly the building is built on a swamp and sinks every year. The building was resettled in 2014 and level difference was about 8". No other concerns observed or reported.
S01.1E	**Substructure**	**~1993**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made on site and standard construction methods it is assumed to consist of a CIP wall, strip and spread foundations.	**4**	-	No structural drawings were provided. No concerns observed or reported.

S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1A	**Slab on Grade**	The building is constructed on a CIP slab on grade.	**2**	2	Concrete is severely spalled and cracked in several sections. Cracks are assumed to be potentially caused by settlement. It is recommended to repair all open cracks and spalled sections to avoid water infiltration into the SOG inner structure. Costs for repairs are included in the Capital Reserve Table, and should be executed along the repairs for the substructure (See S01.1A) after the structural study is completed. No other concerns were observed or reported.

S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1B	**Slab on Grade**	The building is constructed on a CIP slab on grade.	**4**	-	No concerns were observed or reported.
S02.1E	**Slab on Grade**	The building is constructed on a CIP slab on grade.	**4**	-	No concerns were observed or reported.

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.1A	**Stairs**	**~1980**: The stairs to access the mezzanine are comprised of wood strings and treads.	**4**	-	No concerns were observed or reported.
S03.1B	**Stairs**	**~1970**: The stairs to access the basement are comprised of wood strings and treads.	**4**	-	No concerns were observed or reported.
S03.1E	**Stairs**	**~1993**: The stairs to access the basemen and the second floor are comprised of wood strings and treads.	**4**	-	No concerns were observed or reported.
S03.2A	**Suspended Floors**	**~1980:** The floor for the office section of the building is a suspended floor structure comprised of timber wood beams, sills and floor joists and decking.	**4**	-	Although it was not evident at the time of the assessment it is possible that the suspended floor structure has been affected by settling as mentioned in section S01.1A. It is assumed that any unevenness in the suspended floor structure will be fixed along with the repairs of the substructure. No other concerns were observed or reported.
S03.2B	**Suspended Floors**	**~1970:** The floor for the main level is a wood frame structure comprised of timber wood beams and floor joists and decking.	**4**	-	No concerns were observed or reported.

S03 SUSPENDED FLOORS AND STAIRS

S03.2C	**Suspended Floors**	**~2005:** The floor for the building is a wood frame structure comprised of wood beams and floor joists with a plywood deck supported on wood posts and blocks.	**4**	-	No concerns were observed or reported.
S03.2D	**Suspended Floors**	**~2005:** The floor for the building is a wood frame structure comprised of wood beams and floor joists with a plywood deck supported on wood posts and blocks.	**4**	-	No concerns were observed or reported.
S03.2E	**Suspended Floors**	**~1993:** The floors for the main and second floors are wood frame structures comprised of timber wood beams and floor joists and decking.	**4**	-	No concerns were observed or reported.
S03.3A	**Mezzanine**	**~1980:** The mezzanine structure located above the office space is a wood structure provided with wood beams, floor joists and lumber posts and decking.	**3**	2	The floor for the mezzanine is uneven and appears to be settling towards the east side of the building. This is evident from the lower level where the offices are located and where cracks on the GWB were observed. It is possible that the overall settling of the building is affecting the mezzanine structure as well. The structural study included in section S01.1A should resolve any structural issues with the mezzanine settling but repairs are required to level the mezzanine floor. Costs are therefore included in the Capital Reserve Table for repairs on the mezzanine. No concerns were observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1A	**Framing**	**~1980**: The frame for the building is a single span steel frame structure comprised of steel columns, rafters and purlins.	**4**	-	No concerns or issues were observed or reported.

S04 ROOF STRUCTURES

S04.1B	**Framing**	**~1970**: The building structure is comprised of load-bearing wood frame stud walls supporting wood beams and roof rafters.	**4**	-	No concerns or issues were observed or reported.
S04.1C	**Framing**	**~2005**: The building structure is comprised of load-bearing wood frame stud walls supporting wood trusses.	**4**	-	No concerns or issues were observed or reported.
S04.1D	**Framing**	**~2005**: The building structure is comprised of load-bearing wood frame stud walls supporting wood trusses.	**4**	-	No concerns or issues were observed or reported.
S04.1E	**Framing**	**~1993**: The building structure is comprised of load-bearing wood frame stud walls supporting wood beams, ceiling joists and roof rafters.	**4**	-	No concerns or issues were observed or reported.

S05 INTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S05.1A	**Interior Walls**	**~1980:** Interior walls are wood frame partitions with wood studs with GWB coverings.	**4**	-	No concerns observed or reported.
S05.1B	**Interior Walls**	**~1970:** Interior walls are wood frame partitions with GWB coverings.	**4**	-	No concerns observed or reported.
S05.1C	**Interior Walls**	**~2005:** Interior walls are wood frame partitions with wood studs and GWB coverings.	**4**	-	No concerns observed or reported.
S05.1D	**Interior Walls**	**~2005:** Interior walls are wood frame partitions with wood studs and GWB coverings.	**4**	-	No concerns observed or reported.
S05.1E	**Interior Walls**	**~1993:** Interior walls are wood frame partitions with wood studs and GWB coverings.	**4**	-	No concerns observed or reported.
S05.2A	**Interior Columns**	**~1980:** Mostly concealed. Based on observations interior wood timber columns are assumed to be provided for the mezzanine structure.	**4**	-	No concerns observed or reported.
S05.2B	**Interior Columns**	**~1991:** Mostly concealed. Based on observations interior wood timber columns are assumed to be provided for vertical support.	**4**	-	No concerns observed or reported.

S05 INTERIOR WALLS AND COLUMNS

S05.2C	**Interior Columns**	**~2005:** Mostly concealed. Based on observations interior wood timber columns are provided.	**4**	-	No concerns observed or reported.
S05.2D	**Interior Columns**	**~2005:** Mostly concealed. Based on observations interior wood timber columns are provided.	**4**	-	No concerns observed or reported.
S05.2E	**Interior Columns**	**~1993:** Mostly concealed. Based on observations interior wood timber columns are assumed to be provided for vertical support.	**4**	-	No concerns observed or reported.

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.1A	**Exterior Load-bearing Walls**	**~1980**: Exterior walls are exterior metal cladding fixed to steel girders around the perimeter of the building. In some areas the exterior walls are covered with GWB while in most of the garage bay exposed reflective insulation is provided.	**4**	-	No concerns observed or reported.
S06.1B	**Exterior Load-bearing Walls**	**~1970**: Exterior load-bearing walls are wood stud framed walls with GWB or wood panels covering the interior and wood siding on the exterior.	**4**	-	No concerns observed or reported.
S06.1C	**Exterior Load-bearing Walls**	**~2005**: Exterior load-bearing walls are wood stud framed walls with GWB covering the interior and plywood vinyl siding on the exterior.	**4**	-	No concerns observed or reported.
S06.1D	**Exterior Load-bearing Walls**	**~2005**: Exterior load-bearing walls are wood stud framed walls with GWB covering the interior and plywood vinyl siding on the exterior.	**4**	-	No concerns observed or reported.
S06.1E	**Exterior Load-bearing Walls**	**~1993**: Exterior load-bearing walls are wood stud framed walls with GWB covering the interior and plywood and vinyl siding on the exterior.	**4**	-	No concerns observed or reported.
S06.2A	**Columns**	**~1980:** The perimeter of the building is provided with load-bearing painted wide flange steel columns.	**4**	-	No concerns observed or reported.

S99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.6B S99.1B	**Deck**	**~1970:** The building is provided with two wood structure decks, one located by the main entrance and one located back of the building.	**3**	1	Decks were mostly covered in snow and a comprehensive evaluation could not be completed. Some rotten wood members that are part of the floor of the deck were reported. Damaged floor section could represent a potential tripping or fall hazard and should be repaired immediately. Costs for repair are included in the Capital Reserve Table.
S99.1C	**Deck**	**~2005:** The building is provided with a wood structure deck accessible through the dining room.	**4**	-	Decks were mostly covered in snow and a comprehensive evaluation could not be completed. No concerns were observed or reported.
S99.1D	**Deck**	**~2005:** The building is provided with a wood structure deck accessible through the dining room.	**4**	-	Decks were mostly covered in snow and a comprehensive evaluation could not be completed. No concerns were observed or reported.
S99.1D	**Deck**	**~1993:** The building is provided with two wood structure decks, one located by the main entrance and one located on the east elevation.	**4**	-	Decks were mostly covered in snow and a comprehensive evaluation could not be completed. No concerns were observed or reported.

NOTES:

4A) It is recommended to conduct a structural study to address this issue and conduct permanent repairs. An allowance is included in the Capital Reserve Table for both the study and the repairs. Costs for repairs will rely solely on the results of the study.

IMMEDIATE ITEMS:

Imm.6A) Study building settlement.
Imm.7C) Study building settlement.
Imm.8D) Study building settlement.
Imm.9B) Repair decks.

No other immediate items identified.

RECOMMENDED FURTHER INVESTIGATION:

RAI.3A) Study building settlement.
RAI.4C) Study building settlement.
RAI.5C) Study building settlement.

No additional recommended investigation is required at this time.

OFFICE BUILDING (SITE A):



Photo #S1A: Crack on foundation wall.



Photo #S2A: Severe cracks on slab on grade.

STAFF HOUSE 1 (SITE B):



Photo #S3B: Entrance deck.



Photo #S4B: Structural elements generally hidden behind interior finishes.

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STAFF HOUSE 2 (SITE C):



Photo #S5C: Entrance porch and building unit overview.



Photo #S6C: Some of the interior cracks observed potentially caused by building settlement.

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STAFF HOUSE 3 (SITE D):



Photo #S7D: Building exterior.



Photo #S8D: One of many interior wall cracks, potentially due to settlement.

STAFF HOUSE 4 (SITE E):



Photo #S9E: Exterior exposed wood structure.



Photo #S10E: Suspended main floor structure.

5.0 MECHANICAL

Site A: Main Office

The building is supplied with domestic water from the town's local service provider. Domestic water distribution piping is a combination of copper and PVC plastic. Sanitary sewer is disposed to the town sewage system. Storm water drainage is accomplished by overland soil absorption and surface drainage. Waste water piping is PVC plastic. Domestic hot water is provided by one electric hot water heater located in the garage bay. Heating for the building is accomplished via one oil-fired furnace located on the mezzanine and is distributed throughout the building via galvanized metal ductwork. Cooling for the office area is provided by one through wall air conditioning unit. Ventilation is assumed to be accomplished through the furnace and via windows. Localized analog thermostats control the interior temperature for the building. Exhaust ventilation units is provided for the washroom in the office area. The washroom is equipped with plumbing fixtures including vitreous china tank type water closet and a lavatory. Portable ABC fire extinguishers are provided throughout.

Capital expenditures with respect to the furnace and air conditioner are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

Site B: Staff House 1

The building is supplied with domestic water from a water storage tank located on site. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank and field. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via one electric furnace; additionally one vented heater provides backup heating. Ventilation is assumed to be accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and through a range hood in the kitchen. Plumbing fixtures for the washroom are vitreous china tank type water closet, counter mounted enamel lavatories and fiberglass shower inserts.

Capital expenditures with respect to sanitary sewer and furnace are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

Site C: Staff House 2

The building is supplied with domestic water from a water storage tank located on site and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank and field located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. One domestic electric water heater is in the mechanical room with a capacity of 284 litres. Heating for the building is accomplished via one oil-fired furnace also located in the mechanical room. Ventilation is presumably accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized digital analog are used to control room temperatures. Exhaust ventilation in the washrooms is provided by ceiling mounted units and one range hood in the kitchen. Plumbing fixtures are vitreous china tank type water closets, counter mounted enamel lavatories and fiberglass shower inserts.

Capital expenditures with respect to the furnace are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

Site D: Staff House 3

The building is supplied with domestic water from a water storage tank and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank and field located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided through one electric heater located in one the mechanical room. Heating for the building is accomplished via one oil-fired furnace also located in the mechanical room. Ventilation is presumably accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized analog thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by ceiling mounted units and one range hood in the kitchen. Plumbing fixtures are vitreous china tank type water closets, and counter mounted enamel lavatories. The washroom is additionally provided with fiberglass shower inserts. One portable ABC fire extinguisher was observed in the mechanical room for fire protection.

Capital expenditures with respect to the water distribution and furnace are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

Site E: Staff House 4

The building is supplied with domestic water from a well located on site. Water is pumped into interior plumbing fixtures through a pressure tank and water pumps housed in the basement's mechanical room. Domestic potable water is filtered through an osmosis filtration system also observed in the mechanical room. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank and field on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided by one electric hot water heater. Heating for the building is accomplished via one electric furnace. Ventilation is accomplished through a heat recovery ventilator (HRV) connected to galvanized metal ductwork. Localized analog thermostats are used to control room temperatures. Exhaust ventilation is through ceiling mounted units in the washrooms and through a range hood in the kitchen. Plumbing fixtures for the washroom are vitreous china tank type water closet, counter mounted enamel lavatories and fiberglass shower inserts.

Capital expenditures with respect to sanitary sewer and washroom fixtures are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M01.1A	**Domestic Water Supply**	Water is supplied from the town service provider	**4**	-	No concerns observed or reported.
M01.1B	**Domestic Water Supply**	**~2015**: The building is supplied with domestic potable water from a water tank located on site. The water tank is refilled as requested by a water truck.	**5**	-	According to the point of contact the water tank was recently installed. (See Note **5E**) No other concerns observed or reported.
M01.1C	**Domestic Water Supply**	**~2015**: The building is supplied with domestic potable water from a water tank located on site. The water tank is refilled as requested by a water truck.	**5**	-	No concerns observed or reported.
M01.1D	**Domestic Water Supply**	**~2015**: The building is supplied with domestic potable water from a water tank located on site. The water tank is refilled as requested by a water truck.	**5**	-	It was reported that the water was previously provided from a well that dried out and water was no longer potable. Issues with water were addressed by installing the water storage tank. No concerns observed or reported.
M01.1E	**Domestic Water Supply**	Domestic potable water is provided from a well located on site.	**4**	-	No concerns observed or reported.
M01.2A	**Sanitary Sewer**	Sanitary sewage is assumed to be disposed to the town sewage system.	**4**	-	No concerns observed or reported.
Imm.10B M01.2B	**Sanitary Sewer**	Sanitary sewage is disposed to a septic tank and field located on site.	**2**	2	It was reported that the septic tank fills quickly and that the connection to the septic field may be blocked causing septic gases to leak into the air. (See Note **5A**) No other concerns observed or reported.
M01.2C	**Sanitary Sewer**	Sanitary sewage is disposed to a septic tank and field located on site.	**4**	-	No concerns observed or reported.
M01.2D	**Sanitary Sewer**	Sanitary sewage is disposed to a septic tank and field located on site.	**4**	-	No concerns observed or reported.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.11E M01.2E	**Sanitary Sewer**	Sanitary sewage is disposed to a septic tank and septic field located on site.	**4**	-	The septic tank reportedly freezes up when not in use for long periods of time. (See Note **5B**) No other concerns observed or reported.
M01.3A	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3B	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3C	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3D	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3E	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.4A	**Gas Servicing**	No domestic gas connections are provided.	**-**	-	No concerns observed or reported.
M01.4B	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.
M01.4C	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.
M01.4D	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.
M01.4E	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.1A	**Water Distribution**	**~1980:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	It was reported by the Point of Contact that the main water line inside the building freezes during winter. (See Note **5C**). No other concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.1B	**Water Distribution**	**~1970:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No other concerns observed or reported.
M02.1C	**Water Distribution**	**~2005:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No other concerns observed or reported.
M02.1D	**Water Distribution**	**~2005:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**2**	4	Previous issue was reported regarding a pipe burst and a leak on the master washroom. Repairs have been completed to address these issues. However; pipes bursting were reported to be a concurrent issue. (See Note **5D**) No other concerns observed or reported.
M02.1E	**Water Distribution**	**~1993:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No other concerns observed or reported.
M02.2A	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2B	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2C	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2D	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2E	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.3A	**Domestic Hot Water Heaters**	**2013:** One electric water heater is provided for the building. Unit is located in the garage bay. Data label information is as follow: Make: GSW Series 6 Model: G650SDE1-30210. Serial Number: 1332A004088. Capacity: 182 L	**5**	-	No other concerns or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.3B	**Domestic Hot Water Heaters**	A GSW Series 5 domestic water heater is provided in the basement mechanical room. Data label was not accessible as equipment is insulated.	**4**	-	Domestic hot water heaters generally have a EUL of 20 years, at which time they should be replaced as a preventative maintenance item and to guarantee domestic hot water supply. (See Note **5E**) No concerns observed or reported.
M02.3C	**Domestic Hot Water Heaters**	**2010:** One electric domestic hot water heater is provided for the building. Unit is located in the mechanical room. Data label information is as follow: Make: GSW Model: 6G80SDE1 Serial Number: S1037 F707439 Capacity: 284 Litres.	**4**	-	No concerns observed or reported.
M02.3D	**Domestic Hot Water Heaters**	**2005:** One electric domestic hot water heater is provided for the building. Unit is located in the mechanical room. Data label information is as follow: Make: GSW Model: 6G80SDE1 Serial Number: S0511 539423 Capacity: 284 Litres.	**4**	-	The equipment will reach its EUL by 2025, at which time it is recommended to replace it. (See Note **5E**). No other concerns or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.3E	**Domestic Hot Water Heaters**	**2010:** One electric domestic hot water heater is provided for the building. Unit is located in the mechanical room. Data label information is as follow: Make: GSW Model: 9G50SDE Serial Number: V1006 F702051 Capacity: 184 Litres.	**4**	-	No other concerns or reported.
M02.4A	**Waste Water Piping**	**~1980**: PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4B	**Waste Water Piping**	**~1970**: PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4C	**Waste Water Piping**	**~2005:** PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4D	**Waste Water Piping**	**~2005:** PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4E	**Waste Water Piping**	**~1993:** PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.5E	**Pressure Tank**	**~2008**: One Pro-source steel pressure tank is in place for the water well system. The tank provides a maximum working pressure of 100 psi.	**4**	-	No concerns were observed or reported.
M02.6B	**Water Pumps**	**~1990:** Two water pumps were observed provided for the septic tank. The pump are generally ½ HP.	**4**	-	The pumps have surpassed their EUL and are recommended to be replaced in Year 1. (See Note **5E**) No other concerns were observed or reported.
M02.6C	**Water Pumps**	**~2015:** Two water pumps are provided one located next to the storage water tank and one in the mechanical room. The pump are ½ HP.	**4**	-	No concerns were observed or reported.
M02.6D	**Water Pumps**	**~2015:** One water pump is provided located in the water shed. The pump is ½ HP.	**4**	-	No concerns were observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.6E	**Water Pumps**	**~2000:** One AO Smith water pump is provided for the well system located in the mechanical room. The pump is ½ HP.	**4**	-	. Replacement is recommended as a preventative maintenance item to ensure water pressure and supply in the building. (See Note **5E**) No concerns were observed or reported.
M02.8A	**Washroom Fixtures**	**~1980**: The washroom is provided with one vitreous china flush tank water closet and plastic laminate counter with a built-in lavatory.	**4**	-	No concerns observed or reported.
M02.8B	**Washroom Fixtures**	**~1970**: The washrooms are provided with vitreous china flush tank water closets, enamel steel counter mounted lavatories and fiberglass shower inserts.	**3**	-	Washroom fixtures like water closet tanks and shower insert in the master washroom were observed to be severely stained by running water. (See Note **5F, 5E**) No concerns observed or reported.
M02.8C	**Washroom Fixtures**	**~2005**: The washrooms are provided with vitreous china flush tank water closets, enamel steel counter mounted lavatories and fiberglass shower inserts.	**4**	-	No concerns observed or reported.
M02.8D	**Washroom Fixtures**	**~2005**: The washrooms are provided with vitreous china flush tank water closets, enamel steel counter mounted lavatories and fiberglass shower inserts.	**4**	-	The water closets were reportedly replaced in 2015. No concerns observed or reported.
M02.8E	**Washroom Fixtures**	**~1993**: The washrooms are provided with vitreous china flush tank water closets, counter mounted lavatories and fiberglass shower and bathtub inserts.	**4**	3	No concerns observed or reported.
M02.9A	**Sinks**	**~1980**: A stand-alone double basin fiberglass sink is provided in the garage bay area.	**4**	-	No concerns observed or reported.
M02.9B	**Sinks**	**~1970**: Stainless steel single basin sink is provided for the kitchen.	**4**	-	No concerns observed or reported. (See Note **5E**)
M02.9C	**Sinks**	**~2005**: One stainless steel double basin sink is provided for the kitchen.	**4**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.9D	**Sinks**	**~2005**: One stainless steel double basin sink is provided for the kitchen.	**4**	-	No concerns observed or reported.
M02.9E	**Sinks**	**~1993**: Stainless steel double basin sink is provided for the kitchen.	**4**	-	No concerns observed or reported.
M02.10A	**Floor Drains**	The garage bay and washroom include floor drains.	**4**	-	No concerns observed or reported.
M02.11A	**Shower**	**~1980**: A shower compartment is provided on the mezzanine area with doors.	**4**	-	No concerns observed or reported.
M02.12C	**Water Filtration System**	**~2010:** A central water filtration system is installed within the building, including chemical and mechanical filtration.	**4**	-	The equipment was scheduled to be removed after the site assessment according to the Point of Contact as it is no longer required after the installation of the new water storage tank located in the water shed. No concerns observed or reported.
M02.12D	**Water Filtration System**	**~2010:** A central water filtration system is installed within the building, including chemical and mechanical filtration.	**4**	-	The equipment was scheduled to be removed after the site assessment according to the Point of Contact as it is no longer required after the installation of the new water storage tank located in the water shed. No concerns observed or reported.
M02.12E	**Water Filtration System**	**~1996: T**he building is provided with a water filtration system including a reverse osmosis tank and a chemical filter with storage tanks.	**4**	-	No concerns observed or reported. (See Note **5E**)

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.1A	**Furnace**	~**1997**: The building is heated through an oil fired furnace, manufactured by Olsen Manufacturing. Data labels is as follows: Make: Olsen Manufacturing Model: BFL-145 Serial: 37664BFSL Capacity: 143000 BTUH	**3**	4/3	Heating appears to be inadequate in the garage bay area allowing water lines to freeze during winter time. (See Note **5G**). No other concerns observed or reported.
M03.1B	**Furnace**	~**1990**: The building is mainly heated through an electric furnace, manufactured by Nortron. Data label is as follows: Make: Nortron Model: 21 B 25 Serial: Unknown Capacity: 85,235 BTUH.	**4**	3	Heating was reported and observed to be adequate for the building. Age for the unit could not be determined, but it is assumed to have been installed in ~1990. No other concerns observed or reported.
M03.1C	**Furnace**	~**2005**: The building is heated through an oil fired furnace, manufactured by Olsen. Data label was not accessible and detailed information for the furnace could not be determined.	**4**	3	No concerns observed or reported.
M03.1D	**Furnace**	~**2005**: The building is heated through an oil fired furnace, manufactured by Olsen. Data label was not accessible and detailed information for the furnace could not be determined.	**4**	3	No concerns observed or reported.
M03.1E	**Furnace**	~**2010**: The building is heated through an oil fired furnace, manufactured by Kerr. Data label information is as follows: Model: Compact Multi Classic A Serial: 1017992	**4**	-	No concerns observed or reported.

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.4A	**Baseboard Heaters**	**~1980**: Heating is also provided by electric baseboard heaters in the office spaces.	**4**	-	No concerns observed or reported. (See Note **5E**)
M03.4B	**Baseboard Heaters**	**~2015**: Heating is provided in the water shed by electric baseboard heaters.	**5**	-	No concerns observed or reported.
M03.4C	**Baseboard Heaters**	**~2015**: Heating is provided in the water shed by electric baseboard heaters.	**5**	-	No concerns observed or reported.
M03.4D	**Baseboard Heaters**	**~2015**: Heating is provided in the water shed by electric baseboard heaters.	**5**	-	No concerns observed or reported.
M03.5B	**Vented Heater**	**~2000:** A Toyostove Laser 73 vented heater is provided in the basement. Reportedly this unit serves as a backup heating supply system. The unit is oil –fired and has an approximate capacity of 40,000 BTUH.	**4**	-	The oil monitor was reportedly not working at the time of the assessment. It is recommended to replace it at a cost below the Capital Threshold to guarantee back up heating in case the electric furnace fails. No other concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1A	**Air Distribution**	**~1980**: Air distribution is provided by galvanized metal ductwork throughout the building.	**4**	-	No concerns observed or reported.
M04.1B	**Air Distribution**	**~1970**: Air distribution is provided by galvanized metal ductwork distributed within the floor space.	**4**	-	Ducts require cleaning according to the Point of Contact, which can be done at a cost below the Capital Threshold. No concerns observed or reported.
M04.1C	**Air Distribution**	**~2005**: Air distribution is provided by galvanized metal ductwork distributed within the crawlspace.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1D	**Air Distribution**	**~2005**: Air distribution is provided by galvanized metal ductwork distributed within the crawlspace.	**4**	-	No concerns observed or reported.
M04.1E	**Air Distribution**	**~1993**: Air distribution is provided by galvanized metal ductwork.	**4**	-	No concerns observed or reported.
M.04.2A	**Ventilation**	**~1980:** Ventilation for the building is assumed to be accomplished through the furnace equipment.	**4**	-	No concerns observed or reported.
M.04.2B	**Ventilation**	**~1988:** Ventilation is accomplished through a heat recovery ventilator connected to the ductwork. Unit is located in the mechanical room.	**4**	-	No concerns observed or reported.
M.04.2C	**Ventilation**	**~2005:** Ventilation is assumed to be accomplished through a heat recovery ventilator connected to the ductwork and concealed within the ceiling space.	**4**	-	No concerns observed or reported.
M.04.2D	**Ventilation**	**~2005:** Ventilation is assumed to be accomplished through a heat recovery ventilator connected to the ductwork and concealed within the ceiling space.	**4**	-	No concerns observed or reported.
M.04.2E	**Ventilation**	**~1993:** Ventilation is assumed to be accomplished through heat recovery ventilators connected to the ductwork. No units were observed on site.	**4**	-	No concerns observed or reported.
M04.3A	**Air Outlets & Inlets**	**~1980**: The air outlets and inlets are comprised of supply and return air diffusers.	**4**	-	No concerns observed or reported.
M04.3B	**Air Outlets & Inlets**	**~1991**: The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.3C	**Air Outlets & Inlets**	**~2005**: The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.
M04.3D	**Air Outlets & Inlets**	**~2005**: The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.
M04.3E	**Air Outlets & Inlets**	**~1993**: The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.
M04.4A	**Exhaust Fans**	**~1980**: One ceiling mounted exhaust fan is located in the washroom.	**4**	-	No concerns observed or reported.
M04.4B	**Exhaust Fans**	**~1970**: Ceiling mounted exhaust fans are provided in the washrooms. Exhaust ventilation in the kitchen is accomplished by a range hood.	**4**	-	No concerns observed or reported.
M04.4C	**Exhaust Fans**	**~2005**: Ceiling mounted exhaust fans are provided in the washrooms. Exhaust ventilation in the kitchen is accomplished by a range hood.	**4**	-	No concerns observed or reported.
M04.4D	**Exhaust Fans**	**~2005**: Ceiling mounted exhaust fans are provided in the washrooms. Exhaust ventilation in the kitchen is accomplished by a range hood.	**4**	-	No concerns observed or reported.
M04.4E	**Exhaust Fans**	**~1993**: Ceiling mounted exhaust fans are provided in the washrooms. Exhaust ventilation in the kitchen is accomplished by a range hood.	**4**	-	No concerns observed or reported.

M05 COOLING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M05.1A	**Air Conditioner**	**~1980**: One through wall air conditioner unit is provided in one of the offices.	**4**	**4**	It was reported by the Point of Contact that the office area gets too hot during the summer months. (See Note **5H**) No other concerns observed or reported.

M06 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M06.1A	**Fire Extinguishers**	Portable ABC fire extinguishers are provided throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
Imm.12B M06.1B	**Fire Extinguishers**	No fire extinguishers were observed or reported to be present in the building.	**1**	1	It is recommended to provide a fire extinguisher for the building immediately. No concerns observed or reported.
Imm.13C M06.1C	**Fire Extinguishers**	Reportedly one fire extinguisher is provided for the building. However, none was observed at the time of the assessment.	**4**	1	It is recommended to provide a fire extinguisher for the building immediately. No concerns observed or reported.
M06.1D	**Fire Extinguishers**	One portable ABC fire extinguisher is provided for the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.

M06 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.14E M06.1E	**Fire Extinguishers**	Reportedly one fire extinguisher is provided for the building. However, none was observed at the time of the assessment.	**4**	1	It is recommended to provide a fire extinguisher for the building immediately. No concerns observed or reported.

M07 CONTROLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M07.1A	**Electric and Electronic Controls**	**~1999**: Local analog manual thermostats were observed throughout the building to control temperature.	**4**	-	No concerns observed or reported.
M07.1B	**Electric and Electronic Controls**	**~1970**: Local analog thermostats were observed throughout the building.	**4**	-	No concerns observed or reported.
M07.1C	**Electric and Electronic Controls**	**~2005**: Local analog thermostats were observed throughout the building.	**4**	-	No concerns observed or reported.
M07.1D	**Electric and Electronic Controls**	**~2005**: Local analog thermostats were observed throughout the building.	**4**	-	No concerns observed or reported.
M07.1E	**Electric and Electronic Controls**	**~1993**: Local analog thermostats were observed throughout the building.	**4**	-	No concerns observed or reported.

NOTES:

5A) Issues with the septic tank could be related with a damaged connection or the size of the tank being too small to meet de demand. A study is recommended to determine the cause for this issue. An allowance is included in the Capital Reserve Table for both the study and the repairs. Costs of repairs will rely solely on the findings resultant from the study.

5B) A heat tape appears to be provided to avoid issues with freezing in the septic tank. It is possible that the heat trace is not working properly causing the septic tank to freeze when not in use for several days. A study is recommended to evaluate the septic tank and investigate other potential causes of freezing. Repairs are recommended to be completed pendant on the results of the study. Allowances for the study and related repairs are included in the Capital Reserve Table. Final costs will rely on the results on the study.

5C) Pipes are generally in good condition. Golder assumes that pipes freezing are the result of inadequate heating in the garage bay area. As this issue is potentially not related with the pipes itself it will be addressed in the heating section (M03) of this report.

5D) The most common causes of a burst pipe will come from frozen temperatures or pipe pin holes forming, pipes surpassing their EUL and unprotected piping. Golder was unable to determine the cause of this issue since assessment is based on visual observations and pipes are mostly concealed. It is unlikely that the pipes have already surpassed their EUL based on the age of the building. Golder assumes that the main cause for pipes burst is due to unprotected or pinholed pipes. An extensive study is recommended to determine the causes for this issue and the best way to address it. Costs are included in the Capital Reserve Table for the study and repairs resultant from the study.

5E) This component requires repair or replacement; however, the cost associated with repairing or replacing it is anticipated to fall below the Capital Threshold, therefore it has not been included in the Capital Reserve Table.

5F) Some of the washroom fixtures including the master washroom shower and water closet tanks were severely stained by running water which indicates a poor quality of the domestic water supply. This issue was reportedly addressed by the installation of a new potable water storage tank which is expected to be filled with better quality domestic potable water. Washroom fixtures like the water closet in the master bedroom was scheduled to be replaced after the site visit, no information was provided if the shower insert was to be replaced as well, but it is recommended at a cost below the Capital Threshold. No issues were observed on the washroom fixtures located in the basement.

5G) Additional heating support is possibly required in this area to supplement the existing heating system; one possible solution is to install additional oil fired radiant tube heaters. Golder recommends conducting a study to determine the most adequate solution to this issue. An allowance is included in the Capital Reserve Table for the study and for repairs resultant of the study. Heating in the office area appears to be adequate according to reports and based on observations made on site.

5H) The existing unit might not have enough capacity to cool down the entire space during the hottest months of the year. Inadequate cooling may also be the result of the unit surpassing its EUL and not working properly. A study is recommended to improve climate comfort in the building during summer; this may include installing additional air conditioning units. An allowance is included in the Capital Reserve Table for both the study and potential repairs resultant from the study. Replacement for the existing unit is expected to fall below the Capital Threshold and therefore no costs are included.

IMMEDIATE ITEMS:

Imm.10B) Study septic tank issues.
Imm.11E) Study septic tank freezing.
Imm.12B) Supply fire extinguisher.
Imm.13C) Supply fire extinguisher.
Imm.14E) Supply fire extinguisher.

No other immediate items were identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

RAI. 6A) Study for supplementary heating in the garage bay.
RAI. 7A) Study for supplementary cooling.
RAI. 8B) Study septic tank issues.
RAI. 9D) Study water distribution system and pipes.
RAI. 10E) Study septic tank freezing.

No additional further investigation recommended at this time.

OFFICE BUILDING (SITE A):



Photo #M1A: Area where pipes freeze, heated by a portable electric heater and domestic water heater.



Photo #M2A: Oil Fired Furnace.



Photo #M3A: Air distribution ducts in the garage bay area. Is the only existing source of heating for this area.



Photo #M4A: Air conditioner unit in one of the offices.

STAFF HOUSE 1 (SITE B):



Photo #M5B: Recently installed water storage tank.



Photo #M6B: Stained shower insert by running water.



Photo #M7B: Pumps for the septic tank.



Photo #M8B: Backup vented heater.

STAFF HOUSE 2 (SITE C):



Photo #M9C: Water storage tank in the water shed.



Photo #M10C: Water heater and filtration system (this last one to be removed).



Photo #M11C: Furnace.



Photo #M12C: Typical controls.

STAFF HOUSE 3 (SITE D):



Photo #M13D: Water storage tank.



Photo #M14D: Pipe replacements at the time of the assessment.



Photo #M15D: Typical shower insert and shower head recently installed.



Photo #M16D: Furnace.

STAFF HOUSE 4 (SITE E):



Photo #M17E: Water well system.



Photo #M18E: Domestic water heater.

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Photo #M19E: Part of the water filtration system.



Photo #M20E: Furnace.

6.0 ELECTRICAL

Site A: Main Office

Electrical service is fed into the building via overhead lines from a pole mounted transformer. Electrical branch wiring circuits is reportedly mostly copper throughout the building, although some aluminum wiring is potentially present. Power from the main exterior transformer is metered and fed into a main distribution panelboard in the storage area. No data was available; equipment is assumed to be rated at 225 Amp 120/240 V and contains 60 circuits, with at least 50% of circuits in use. Lighting is provided primarily by surface mounted tubular fluorescent fixtures fitted with T8 lamps. Some units are reported to have T12 lamps. Exterior lighting is accomplished by high intensity discharge (HID) and light emitting diode (LED) lighting fixtures. One emergency battery pack with integral lighting heads is provided in the garage bay area. One non-powered emergency exit sign is also provided at the garage bay. A fire alarm panel is located in the main entrance by the garage bay and it monitors smoke/heat detectors, strobe/horn lights and pull stations throughout. The building is protected by an Intrusive system connected to door contacts and motion sensors.

Capital expenditures with respect to the interior lighting, exterior lighting, intrusion detection, fire alarm panel and detectors are anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

Site B: Staff House 1

Electrical service is provided to the building via overhead conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Power is metered and then fed into the building to a main Square D distribution panelboard located in basement mechanical room. Equipment is rated at rated at 200 amp, 120/240 V and is provided with 24 circuits. Panel was observed to be 90% full. Secondary distribution panels are provided for the detached garage and the water shed. Interior lighting is provided by interior incandescent light fixtures equipped with compact fluorescent lamps (CFL). Exterior lighting is accomplished by a combination of incandescent fluorescent light fixtures and flood lights. No emergency lighting was observed to be provided for the building.

Capital expenditures with respect to the primary distribution is anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

Site C: Staff House 2

Electrical service is provided to the building via overhead line conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished through a main panelboard located in the mechanical room that was not accessible at the time of the assessment. Secondary distribution panels are provided for the water shed and shed. Interior lighting is provided by interior incandescent light fixtures fitted with CFL lamps. Exterior lighting is accomplished by a combination of exterior incandescent light fixtures and flood lights. One battery pack with integral heads was observed in the main hallway for emergency lighting. Smoke/heat detectors are provided throughout.

Capital expenditures items were not identified within the timeframe of this report.

The electrical components are in acceptable overall condition.



Site D: Staff House 3

Electrical service is provided to the building via overhead line conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary distribution is accomplished through a Square D main panelboard located in the mechanical room. No detailed information was observed on equipment, but it is assumed to be rated at 200 amp, 120/240 V and is provided with 40 circuits, with at least 60% in use. Secondary distribution panels are provided for the ancillary buildings. Interior and exterior lighting is provided by incandescent light fixtures fitted with CFL lamps. Additional exterior lighting is provided by flood light. No emergency lighting was observed for the building. Smoke/heat detectors are provided throughout.

Capital expenditures items were not identified within the timeframe of this report.

The electrical components are in acceptable overall condition.

Site E: Staff House 4

Electrical service is provided to the building via overhead conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Power is metered and then fed into the building to a main Square D distribution panelboard located in basement mechanical room. Equipment is rated at rated at 225 amp, 120/240 V and is provided with 42 circuits. Panel was observed to be 100% full. Interior lighting is provided by interior incandescent light fixtures equipped with compact fluorescent lamps (CFL). Exterior lighting is accomplished by a combination of incandescent fluorescent light fixtures and flood lights. One emergency light battery pack with integral heads was observed in the garage. Smoke/heat detectors are provided throughout.

Capital expenditures with respect to the primary distribution is anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

E01 INCOMING SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E01.1A	**Exterior Transformer**	A pole mounted transformer is located south of the site, and provides power for the building.	**4**	-	No concerns observed or reported.
E01.1B	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.1C	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.1D	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.1E	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.2A	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's main panelboard.	**4**	-	No concerns observed or reported.
E01.2B	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's main panelboard through a service meter located on the north elevation.	**4**	-	No concerns observed or reported.
E01.2C	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's main panelboard through a service meter located on the north elevation.	**4**	-	No concerns observed or reported.
E01.2D	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's main panelboard through a service meter located on the north elevation.	**4**	-	No concerns observed or reported.
E01.2E	**Conductors**	Underground line conductors are provided from the exterior transformer and into the building's main panelboard through a service meter located on the west elevation.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.1A	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~2012**: Primary distribution is accomplished through a main panelboard located in the storage area. No data was available on equipment, but it is assumed to be rated at 225 amp, 120/240 V and is provided with 60 circuits.	**4**	-	No concerns observed or reported.
E02.1B	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1990**: Primary distribution is accomplished through a main Square D panelboard located in the mechanical room. Equipment is rated at 200 amp, 120/240 V and is provided with 24 circuits. Panel was observed to be 90% full.	**4**	3	No concerns observed or reported.
Imm.15 C E02.1C	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~2005**: Primary distribution is accomplished through a main panelboard located in the mechanical room. Panel was not accessible at the time of the assessment but it is assumed to be rated at 200 amp, 120/240 V.	**4**	1	The panelboard is obstructed by a refrigerator and was completely inaccessible. Any storage items or equipment should be removed a relocated within 1 m of main electrical equipment. No other concerns observed or reported.
E02.1D	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~2005**: Primary distribution is accomplished through a Square D main panelboard located in the mechanical room. No detailed information was found on equipment, but it is assumed to be rated at 200 amp, 120/240 V. The panel is provided with 40 circuits. Panel was observed to be 60% full.	**4**	-	No concerns observed or reported.
E02.1E	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1993**: Primary distribution is accomplished through a Square D main panelboard located in the mechanical room. Equipment is rated at 225 amp, 120/240 V and is provided with 42 circuits. Panel was observed to be 100% full.	**4**	4/3	Additional space may be required for new circuit additions. It is recommended to install a secondary panel or replace the existing panel with one with more capacity. An allowance is included in the Capital Reserve Table. No other concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.2B	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~2015**: One secondary panelboard was being installed at the time of the assessment in the water shed. Another secondary panel was observed in the garage. No data was available on this equipment.	**4**	-	Panelboard in the garage area appears to be outdated and requires replacement within the timeframe of this report. Costs are estimated below the Capital Threshold; therefore no costs are included. No other concerns observed or reported.
E02.2C	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~2015**: One secondary panelboard is provided for the water shed. Equipment was manufactured by Square D and is provided with 20 circuits. Panel is 5% full. No other data was available.	**4**	-	No concerns observed or reported.
E02.2D	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~2015**: Two secondary panelboards are provided for the water shed and the storage shed. Equipment was manufactured by Square D and is provided with 20 circuits. Panels are 5% full. No other data was available.	**4**	-	No concerns observed or reported.
E02.3A	**Branch Wiring**	**~1980**: Electrical branch circuit wiring is reportedly mostly copper throughout the building. Some suspected aluminum wiring is potentially present according to the Point of Contact.	**4**	-	No concerns observed or reported.
E02.3B	**Branch Wiring**	**~1970**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.3C	**Branch Wiring**	**~2005**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.3D	**Branch Wiring**	**~2005**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.3E	**Branch Wiring**	**~1993**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.5A	**Receptacles**	**~1980**: Electrical receptacles are provided throughout the building.	**4**	-	No other concerns observed or reported.
E02.5B	**Receptacles**	**~1970**: Electrical receptacles are provided throughout the building.	**4**	-	No other concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.16 C E02.5C	**Receptacles**	**~2005**: Electrical receptacles are provided throughout the building.	**4**	1	One non ground fault circuit interrupter (GFCI) was observed located less than 1 meter from the kitchen sink. Receptacle should be replaced immediately with a GFCI outlet as per code and to prevent shocking hazards. No other concerns observed or reported.
Imm.17 D E02.5D	**Receptacles**	**~2005**: Electrical receptacles are provided throughout the building.	**4**	1	One non ground fault circuit interrupter (GFCI) was observed located less than 1 meter from the kitchen sink. Receptacle should be replaced immediately with a GFCI outlet as per code and to prevent shocking hazards. No other concerns observed or reported.
E02.5E	**Receptacles**	**~1993**: Electrical receptacles are provided throughout the building.	**4**	-	No other concerns observed or reported.
E02.6A	**Surge Protection**	**~2012:** A Square D surge protector breaker is provided for the main panelboard.	**4**	-	No concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1A	**Interior Lighting**	**~2000**: Surface mounted tubular fluorescent lamps are provided in the building equipped with T8 lamps. Some units are reported to have T12 lamps.	**4**	3	Lighting fixtures will surpass their EUL within the timeframe of this report and will require replacement. It is recommended to retrofit the older lighting fixtures for more energy efficient fixtures as T12 lamps are being phased out and replacements may no longer be available in the future. No other concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1B	**Interior Lighting**	**~1970**: Interior lighting is provided by incandescent fixtures fitted with compact fluorescent lamps (CFL).	**4**	3	No concerns observed or reported.
E03.1C	**Interior Lighting**	**~2005**: Interior lighting is provided by incandescent fixtures fitted with CFL lamps.	**4**	-	No concerns observed or reported.
E03.1D	**Interior Lighting**	**~2005**: Interior lighting is provided by incandescent fixtures fitted with CFL lamps.	**4**	-	No concerns observed or reported.
E03.1E	**Interior Lighting**	**~1993**: Interior lighting is provided by a combination of incandescent fixtures fitted with CFL lamps and surface mounted fluorescent fixtures with T8 lamps.	**4**	-	No other concerns observed or reported.
E03.2A	**Lighting Controls**	**~1980**: Interior lighting is operated by in-line voltage switches throughout the building. Exterior lighting is operated by photocells.	**4**	-	No concerns observed or reported.
E03.2B	**Lighting Controls**	**~1970**: Interior and exterior lighting is operated by in-line voltage switches located throughout the building.	**4**	-	Lighting controls will reach the end of their EUL and will require replacement during the timeframe of this report. . Costs for replacement are considered to be below the capital threshold. No other concerns observed or reported.
E03.2C	**Lighting Controls**	**~2005**: Interior lighting is operated by in-line voltage switches located throughout the building. Exterior lighting is operated by a combination of sensors and in-line voltage switches.	**4**	-	No concerns observed or reported.
E03.2D	**Lighting Controls**	**~2005**: Exterior and Interior lighting is operated by in-line voltage switches located throughout the building.	**4**	-	No concerns observed or reported.
E03.2E	**Lighting Controls**	**~1993**: Interior and exterior lighting is operated by in-line voltage switches located throughout the building. Exterior lighting at back door is operated by motion sensors.	**4**	-	Lighting controls will reach the end of their EUL and will require replacement during the timeframe of this report. . Costs for replacement are considered to be below the capital threshold. No other concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.18 A E03.3A	**Emergency Lighting**	**~2000:** One Lumacell battery pack was observed in the garage bay area. Strobe lights are also provided throughout.	**3**	1	Based on observations made on site the emergency lighting seems to be inadequate and might not be sufficient in case of a power shut down. It is recommended to install additional emergency lighting devices immediately, especially in the office area and in the stairs leading to the mezzanine. No concerns observed or reported.
Imm.19 B E03.3B	**Emergency Lighting**	No emergency lights were observed.	**1**	1	Emergency lighting is recommended to be supplied immediately. No concerns observed or reported.
E03.3C	**Emergency Lighting**	**~2005**: Emergency lighting is provided by one battery pack located on the main corridor.	**4**	-	No concerns observed or reported.
Imm.20 D E03.3D	**Emergency Lighting**	No emergency lights were observed.	**1**	1	Emergency lighting is recommended to be supplied immediately. No other concerns observed or reported.
E03.3E	**Emergency Lighting**	**~1993**: Emergency lighting is provided by battery packs, one located in the garage and one in the basement.	**4**	-	Emergency lights have surpassed their EUL and require replacement. Costs for replacement are estimated below the Capital Threshold; therefore no costs are included. No other concerns observed or reported.
Imm.19 A E03.4A	**Exit Lighting**	Powered LED exit signs are not provided at the emergency exit. However, a non-powered exit sign was observed.	**4**	1	Based on observations made on site and the size of the building Golder concluded that the one designated exit door may not be adequate to clear the building in the case of a fire event. (See Note **6A**). No concerns observed or reported.

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E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.5A	Exterior Lighting	**~1980**: Exterior lighting is comprised of wall mounted HID fixtures throughout.	4	3	No concerns observed or reported.
E03.5B	Exterior Lighting	**~1970**: Exterior lighting is a combination of incandescent light fixtures and flood lights.	4	-	No concerns observed or reported.
E03.5C	Exterior Lighting	**~2005**: Exterior lighting is a combination of incandescent light fixtures and flood lights.	4	-	No concerns observed or reported.
E03.5D	Exterior Lighting	**~2005**: Exterior lighting is a combination of incandescent light fixtures and flood lights.	4	-	No concerns observed or reported.
E03.5E	Exterior Lighting	**~1993**: Exterior lighting is a combination of incandescent light fixtures and flood lights.	4	-	Exterior lights have surpassed their EUL and require replacement. Costs for replacement are estimated below the Capital Threshold; therefore no costs are included. No concerns observed or reported.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1A	Grounding	**~1980**: The grounding components are concealed.	4	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1B	Grounding	**~1970**: The grounding components are concealed.	4	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1C	Grounding	**~2005**: The grounding components are concealed.	4	-	Concealed and not directly reviewed. No issues or concerns were reported.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1D	**Grounding**	**~2005**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1E	**Grounding**	**~1993**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E05.1A	**Fire Alarm Panel**	**~2000**: The building is controlled by a Notifier fire alarm panel located in the garage bay. The panel monitors detection devices throughout the building including: smoke/heat detectors and pull stations.	**4**	3	No concerns observed or reported.
E05.2A	**CO2 Alarm System**	**~2000**: One CO2 detector was observed in the office area.	**4**	-	No concerns observed or reported.
E05.2B	**CO2 Alarm System**	No CO2 detector was observed on site.	**4**	-	Golder recommends installing a plug-in CO2 alarm device at a cost below the Capital Threshold. No concerns observed or reported.
E05.2C	**CO2 Alarm System**	No CO2 detector was observed on site.	**4**	-	Golder recommends installing a plug-in CO2 alarm device at a cost below the Capital Threshold. No concerns observed or reported.
E05.2D	**CO2 Alarm System**	No CO2 detector was observed on site.	**4**	-	Golder recommends installing a plug-in CO2 alarm device at a cost below the Capital Threshold. No concerns observed or reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E05.2E	**CO2 Alarm System**	No CO2 detector was observed on site.	**4**	-	Golder recommends installing a plug-in CO2 alarm device at a cost below the Capital Threshold. No concerns observed or reported.
E05.3A	**Detectors**	**~2000**: Detection and alarm equipment for the fire alarm system include smoke/heat detectors, fire bells, pull stations and strobe lights.	**4**	3	No concerns observed or reported.
Imm.21 B E05.3B	**Detectors**	No smoke detectors were observed at the time of the Site visit.	**1**	1	Smoke detectors should be provided immediately. Costs of installation are included in the Capital Reserve Table as an immediate item. No concerns observed or reported.
E05.3C	**Detectors**	**~2005**: Detection and fire alarm devices include smoke/heat detectors.	**4**	-	Smoke detectors will surpass their EUL by Year 5 and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.
E05.3D	**Detectors**	**~2005**: Detection and fire alarm devices include smoke/heat detectors.	**4**	-	Smoke detectors will surpass their EUL by Year 5 and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.
E05.3E	**Detectors**	**~1993**: Detection and fire alarm devices include smoke/heat detectors.	**4**	-	Smoke detectors have surpassed their EUL and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.1A	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.1B	**Telephone**	No telephone service appears to be provided for the building.	**-**	-	None.
E06.1C	**Telephone**	The building is provided with a phone system.	**4**	-	Although no phone devices were observed, wall outlet connections are provided. No concerns observed or reported.
E06.1D	**Telephone**	The building is provided with a phone system.	**4**	-	Although no phone devices were observed, wall outlet connections are provided. No concerns observed or reported.
E06.1E	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.2A	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.2B	**LAN Systems**	No LAN or internet service appears to be provided for the building.	**-**	-	No concerns observed or reported.
E06.2C	**LAN Systems**	No LAN or internet service appears to be provided for the building.	**-**	-	No concerns observed or reported.
E06.2D	**LAN Systems**	No LAN or internet service appears to be provided for the building.	**-**	-	No concerns observed or reported.
E06.2E	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.3A	**Intrusive Systems**	**~2000**: The building is protected by a security system with intrusion detection. The system is being monitored and detection devices include door contacts and motion sensors. Access to the building is controlled by a FOB system.	**4**	3	No concerns observed or reported.
E06.3B	**Intrusive Systems**	No intrusive system is provided for the building.	**-**	-	None appears to be required for this building. No concerns observed or reported.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.3C	**Intrusive Systems**	No intrusive system is provided for the building.	**4**	-	None appears to be required for this building. No other concerns observed or reported.
E06.3D	**Intrusive Systems**	No intrusive system is provided for the building.	**4**	-	None appears to be required for this building. No other concerns observed or reported.
E06.3E	**Intrusive Systems**	No intrusive system is provided for the building.	**4**	-	None appears to be required for this building. No other concerns observed or reported.

NOTES:

6A) According to the Point of Contact the entry access located by the office area is not currently in use and remains locked. Only one emergency exit was identified located in the garage bay provided with a non-powered exit sign. Based on the size and use of the building and as stated in the National Building Code more than one exit is required (See Division B Article 3.4.2.1). Golder recommends reinstating immediately the use of the entry access located by the office area as means of egress, and include additional exit sign devices, preferably powered. An immediate item is included in the Capital Reserve Table.

IMMEDIATE ITEMS:

Imm.15C) Remove storage and appliances within less than 1 m from electrical panel.
Imm.16C) Install GFCI receptacle by the kitchen sink.
Imm.17D) Install GFCI receptacle by the kitchen sink.
Imm.18A) Install emergency lighting.
Imm.19B) Install emergency lighting.
Imm.20D) Install emergency lighting.
Imm.21B) Install smoke detectors.

No other immediate items were identified.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.

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OFFICE BUILDING (SITE A):



Photo #E1A: Main Electrical Service.



Photo #E2A: Main electrical panelboard.



Photo #E3A: Battery pack observed in the garage bay.



Photo #E4A: Identified emergency exit.

STAFF HOUSE 1 (SITE B):



Photo #E5B: Service meter.



Photo #E6B: Main electrical panel.



Photo #E7B: Secondary panel in the garage.



Photo #E8B: Typical interior lighting.

STAFF HOUSE 2 (SITE C):



Photo #E9C: Service meter.



Photo #E10C: Location of the main electrical panel.

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Photo #E11C: Non GFCI receptacle.



Photo #E12C: Emergency lighting.

STAFF HOUSE 3 (SITE D):



Photo #E13D: Service meter.



Photo #E14D: Main electrical panel.



Photo #E15D: Secondary panel in the water shed.



Photo #E16D: Non GFCI receptacle.

STAFF HOUSE 4 (SITE E):



Photo #E17E: Service meter.



Photo #E18E: Main electrical panel.

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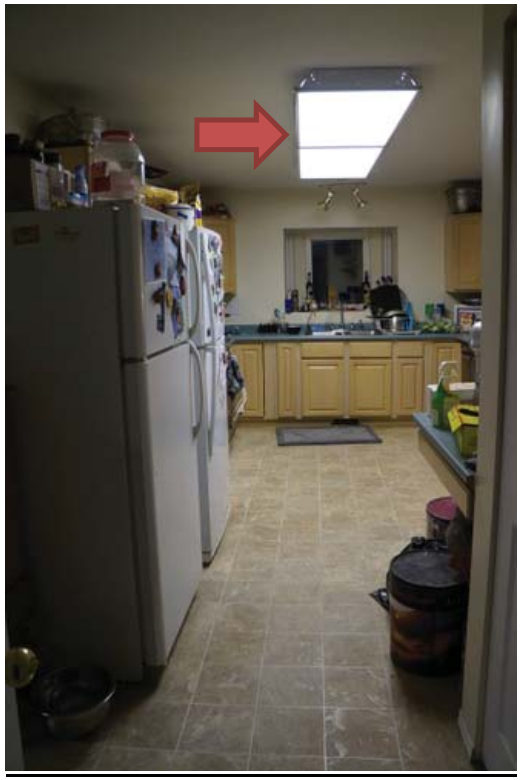


Photo #E19E: Fluorescent light fixtures in the kitchen.



Photo #E20E: Emergency battery pack in the garage.



7.0 HAZARDOUS MATERIAL REPORTS

Based on the year of the original development for all sites, A (~1980), B (~1970), C (~2005), D (~2005) and E (~1993), hazardous building construction materials such as ACMs (asbestos containing materials), and/or PCBs (polychlorinated biphenyls) are possible to be present in buildings A and B only. Suspected containing asbestos materials were observed in the main office (A) in a damaged drywall section near the main electrical panel. No other hazardous materials were observed to be present or stored. If additional items are found through other investigations, and/or suspect or identified materials become damaged, or renovations/demolition activities are planned that may disturb these materials, they should be tested and handled in accordance with applicable regulations.

Report Signature Page

GOLDER ASSOCIATES LTD.



Dave Ayriss, B.Sc., CIH, CRSP
on behalf of
Lawrence P. McSorley, M.Arch., M.C.P., RA
Senior Building Condition Specialist

LPM/rp

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APPENDIX A

Mandate & Report Resources

MANDATE AND REPORT RESOURCES

Authorization

Written Notice of Award of Building Assessment Reports for Yukon Energy Corporation (YEC) was provided on November 1st, 2015. A Facility Lifecycle Report (FLA) of the Sites identified in the Introduction section of the report was subsequently conducted. The Sites are currently owned and managed by YEC.

Purpose

The primary objective of the FLA was to visually examine and evaluate the present condition of the property elements, buildings and related structures. The FLA process is being undertaken to assist YEC in capital planning and evaluating the potential financial liabilities associated with the condition of the Site elements, building and related structures on the Sites. Golder understands that YEC will rely on this report for capital planning.

Scope

The FLA was conducted in general accordance with the American Society for Testing and Materials (ASTM) “Standard Guide for Property Condition Assessments: Baseline Property Condition Process E 2018-08”, as locally applicable. The Golder Assessors (identified on the first page of the report) conducted the Sites reconnaissance on the date shown. The Sites reconnaissance was limited to a walk around the Sites, a walk-through of the buildings and interview with personnel listed in the Introduction section of the report (referred to as the “Point of Contact” in this report). Copies of selected photographs documenting conditions at the time of the visit are provided throughout the report.

The purpose of the report is to communicate identified physical deficiencies, future capital projects, and the associated opinions of estimated costs where the cost is greater than the Capital Threshold and expected to occur within the time frame used for the report. In accordance with this agreed mandate, assumptions were required to delineate between capital items and routine maintenance. Please refer to the “Operating and Maintenance Item” list below. Also please refer to the attached “Discussions of Overall Concepts and Terminology” for additional explanation of assumptions used.

The review of the structural elements was limited to a visual review of the accessible, exposed portions of the buildings and related structures during our visit to the building. The roofs, walls, floors and ceilings were visually reviewed to collect information in this regard.

The review of the mechanical, electrical and fire safety systems was performed by non-specialists in conjunction with discussions with the Point of Contact. A detailed assessment by a mechanical or electrical professional consultant should be conducted if further information regarding the condition, durability and/or expected future capital expenditures related to these systems is required.

Compliance with national and provincial building codes and/or fire codes is not part of the scope of this assessment.



FLA: MAYO FACILITIES

The estimated costs outlined in this report are based on the conditions encountered and observations made during the reconnaissance. Estimates of quantities and areas are based on information supplied, field observations and/or interviews. Item repair/replacement costs are approximate only. Restoration costs are sensitive to local and overall economic factors and therefore, specific quotations from qualified contractors should be obtained when a specific deficiency is addressed or a capital project is to be implemented.

Operating and Maintenance Items

Golder assumes the following items will be maintained under normal operating budgets and are therefore not included in the Capital Reserve Table.

SITE

- Buried services
- Landscaping
- Fences

STRUCTURE

- Foundations and footings

ROOF

- Periodic maintenance

WALLS AND WINDOWS

- Local periodic repairs and needle glazing
- Weather-stripping

INTERIORS

- Various common furnishings, specialty equipment
- Small residential appliances

MECHANICAL

- Sump Pits
- Irrigation System
- Motors, ductwork and in-duct equipment
- Gas supply systems
- Roof drains
- HVAC distribution piping
- Air inlets and outlets

ELECTRICAL

- Disconnects and breakers
- Buried conductors



Discussions of Overall Concepts and Terminology

Evaluation Period

The period of evaluation used for this report is 10 years. Capital repairs and replacement that are reasonably expected to be required within this evaluation period and that cost in excess of the Capital Threshold are included in the Capital Reserve Table.

Capital Threshold

The Capital Threshold used for this report is $3,000. This threshold is used to determine whether a capital repair item is to be included in the Capital Reserve Table. Capital repairs identified and estimated to cost less than the threshold, or that will likely to be performed in phases, as a part of routine maintenance as required, at a cost less than the threshold are not included in the Capital Reserve Table.

Costs

Costs presented in this study for future capital repairs and replacement projects are our Opinions of Probable Budgets and are intended to include taxes, permit fees, contingency and where appropriate, Engineering fees for design, specifications, tendering, project management and construction monitoring. We have generally assumed replacement will occur on a like-for-like basis except where obsolescence or technological advancements logically dictates an upgrade. More accurate costing in the future will require a condition assessment, choice and development of an appropriate repair option, designing and tendering the work to qualified contactors.

Immediate Items

Immediate repairs include deficiencies that require action in the next 60 to 90 days as a result of (i) existing or potentially unsafe conditions, (ii) negative conditions significantly impacting marketability or habitability, (iii) material building code violations, (iv) poor or deteriorated condition of a critical element or system, or (v) a condition that if left “as is” with extensive delay in addressing same, would result in or contribute to critical element or system failure within 12 months or a significant escalation in the repair cost.

Capital Reserve Analysis

The Capital Reserve Table includes a section that provides the average annual capital costs per square foot. Replacement Reserves include (i) deficiencies that may not warrant immediate attention, but require repair or replacement that should be undertaken on a priority basis over routine preventive maintenance work and (ii) components or systems that have realized or exceeded their Expected Useful Life (EUL) during the evaluation period (realization of EUL alone does not constitute an immediate repair). Replacement reserve costs are included in Appendix C.

Opinions of probable costs are provided for material physical deficiencies and not for repairs or improvements that could be classified as:

- cosmetic or decorative;
- part or parcel of a building renovation program or tenant improvement/finishes;
- enhancements to reposition the asset in the marketplace;
- for warranty transfer purposes;



- routine or normal preventative maintenance;
- less than the capital threshold for this report; and
- are expected to occur beyond the time frame of this report.

Cost Inflation Rate:

We have presented the costs in current year (2016) values. We have used 3% in the capital reserve table attached. Further sensitivity analysis using other inflation assumptions should be tested when projecting future cash-flows.

Life Expectancies:

Our estimates of the life expectancy of common element components, systems and sub-systems are based on our opinion of the observed condition during our Site visit, experience with similar material at other buildings, published industry standards, articles and recommendations made by material suppliers and manufacturers. For some materials or systems, the history of use is not sufficient to predict life expectancy accurately. Monitoring and adjustments to the assumptions are required.

The year in which the capital work is required is estimated on the basis of the current observed conditions, or the construction methods and materials used. This may be shorter or longer than the remaining time in the standard estimated life cycle based on the current age of the item. Our estimates of life cycles reflect our understanding of the standards that the prudent long-term owners would maintain. Deferring and phasing of work is often possible keeping in mind that doing so could reduce building standards, increase disruption to residents, increase costs and risks.



APPENDIX B

Limitations and Use of the Report



LIMITATIONS

This report is intended to provide an assessment of the property conditions at the subject properties, at the time of the Sites visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, Golder may be contacted to extend reliance to such parties. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, which result from reporting the factual information contained herein.

The conclusions as presented represent the judgement of Golder based on the visual observations of the accessible, exposed building elements, supplemented by information and data obtained by Golder and discussions with the Point of Contact and other representatives of the owner identified. Except as otherwise may be requested, Golder disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the FLA. No physical testing or intrusive investigations were conducted, and no samples of building materials were collected to substantiate the observations made.

In evaluating the Sites, Golder has relied in good faith on information provided by other individuals noted in this report. Golder in certain instances has been required to assume that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Point of Contact. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, thus any parties making use of this report should review these issues with appropriate legal counsel.

Should additional information become available with respect to the building elements or systems, Golder requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.



APPENDIX C

Capital Reserve Tables

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				Threshold	$3,000
Gross Sq. m.	139	Year Built	1980	Reserve Term (years)	10
r of Buildings	1	Age	36	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024
ntified																	
	1980	40	36	4	300 m²	$50/m²	LCR		$15,000								
	1980	20	36	0	150 m	$40/m	LCR		$6,000								
	1980	40	36	4	14 m²	$1,300/m²	LCR						$18,200				
	1980	30	36	0	2	$5,500/each,	LCR		$11,000								
ntified																	
artitions																	
ntified																	
ntified																	
	1980	25	36	0	60 m²	$65/m²	LCR		$3,900								
	1980	25	36	0	40 m²	$235/m²	LCR		$9,400								
ntified																	
	-	-	-	-	Allowance		Study	$5,000									
	-	-	-	-	Allowance		Repair		$15,000								
	1980	40	36	4	150 m²	$360/m²	LCR						$54,000				
uts	-	-	-	-	Allowance		Safety	$3,000									
yance Devices)																	
ntified																	
	-	-	-	-	Allowance		Study	$5,000									
	-	-	-	-	Allowance		Repair		$10,000								
	-	-	-	-	Allowance		Repair		$10,000								
nd Stairs																	
nezzanine	-	-	-	-	Allowance		Repair		$8,000								

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
tified																	
olumns																	
tified																	
Columns																	
tified																	
tified																	
tified																	
tified																	
ng	-	-	-	-	Allowance		Improvements			$8,000							
	-	-	-	-	Allowance		Study		$4,000								
	1997	20	18	2	1	$4,500/ea.	LCR			$4,500							
tified																	
ng	-	-	-	-	Allowance		Study		$3,000								
	-	-	-	-	Allowance		Improvements		$3,000								
tified																	
tified																	
tified																	
ent																	
tified																	
	2000	20	16	4	150 m² GFA	$70/m² GFA	LCR						$10,500				
	-	-	-	-	Allowance		Safety	$3,500									
ergency Exits	-	-	-	-	Allowance		Safety	$3,500									
	1980	20	36	0	5	$600/each	LCR		$3,000								
tified																	
	2000	15	16	0	Allowance		LCR		$3,000								
	2000	15	16	0	180 m² GFA	$40/m² GFA	LCR		$7,200								
d Security																	
	2000	15	16	0	180m²	$40/m² GFA			$7,200								

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Inflated	*Uninflated*
$9,256	$8,556
$66.59	$61.55

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$20,000	$118,700	$12,500	$	$	$82,700	$	$	$	$
$CAD	$20,000	$122,261	$13,261	$	$	$95,872	$	$	$	$

n

				Threshold	$3,000
Gross Sq. m.	186	Year Built	1970	Reserve Term (years)	10
r of Buildings	1	Age	46	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024
ntified																	
	1970	40	46	0	Allowance		Repair										
	1970	20	46	0	100 m	$40/m	LCR		$4,000								
	1988	40	28	10	20 m²	$1,300/m²	LCR										
	1970	40	46	0	2	$1,500/each	LCR		$3,000								
	1970	30	46	0	1	$4,600/each	LCR			$4,600							
	1970	40	46	0	3	$1,000/each.	LCR			$3,000							
	1970	40	46	0	100 m	$30/m				$3,000							
artitions																	
	1970	15	46	0	150 m²	$40/m²	LCR			$6,000							
	1970	30	46	0	100 m²	$65/m²	LCR							$6,500			
	1970	30	46	0	12	$250/each	LCR							$3,000			
ntified																	
	1990	20	26	0	65 m²	$95/m²	LCR							$6,175			
	1970	35	46	0	10 m	$1,300/m	LCR			$13,000							
	1970	25	46	0	200 m²	$60/m²	LCR		$12,000								
yance Devices)																	
ntified																	
ntified																	
ntified																	
nd Stairs																	
ntified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
tified																	
olumns																	
tified																	
Columns																	
tified																	
	-	-	-	-	Allowance		Repair	$5,000									
	-	-	-	-	Allowance		Study	$2,000									
	1970	40	46	0	Allowance		Repair		$5,000								
tified																	
	1990	20	26	0	1	$3,500/ea.	LCR			$3,500							
tified																	
tified																	
	-	-	-	-	Allowance		Safety	$500									
tified																	
tified																	
ent																	
	1990	30	26	4	1	$3,000 ea.	LCR						$3,000				
	1970	20	46	0	180 m² GFA	$70/m² GFA	LCR		$12,600								
	-	-	-	-	Allowance		Safety	$1,500									
tified																	
	-	-	-	-	Allowance		Safety	$1,000									
d Security																	
tified																	

nalysis

	Inflated	*Uninflated*
	$5,467	$4,775
/ Sq. Ft.	$29.39	$25.67

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$10,000	$36,600	$33,100	$	$	$3,000	$15,675	$	$	$
$CAD	$10,000	$37,698	$35,116	$	$	$3,478	$18,717	$	$	$

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ment

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				Threshold	$3,000
Gross Sq. m.	150	Year Built	2005	Reserve Term (years)	10
r of Buildings	1	Age	11	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
ntified																	
	2005	20	11	9	80 m	$40/m	LCR										
ntified																	
ntified																	
ntified																	
artitions																	
ntified																	
ntified																	
ntified																	
	2005	20	11	9	60 m²	$95/m²	LCR										
	2005	20	11	9	90 m²	$125/m²	LCR										
	2005	10	10	0	6	$1,000/each	LCR			$6,000							
uts	-	-	-	-	Allowance		Safety	$1,500									
yance Devices)																	
	-	-	-	-	Allowance		Repair		$3,000								
	-	-	-	-	Allowance		Study	$3,000									
	-	-	-	-	Allowance		Repair		$10,000								
ntified																	
nd Stairs																	
ntified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year								
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
tified																	
olumns																	
tified																	
Columns																	
tified																	
tified																	
tified																	
tified																	
	2005	20	10	10	1	$3,500/ea.	LCR										
tified																	
tified																	
	-	-	-	-		Allowance	Safety	$500									
tified																	
tified																	
ent																	
ns	-	-	-	-		Allowance	Code	$200									
	-	-	-	-		Allowance	Code	$800									
tified																	
tified																	
tified																	
d Security																	
tified																	

nalysis

	Inflated	*Uninflated*
	$2,062	$1,706
' Sq. Ft.	$13.74	$11.37

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$6,000	$13,000	$6,000	$	$	$	$	$	$	$
$CAD	$6,000	$13,390	$6,365	$	$	$	$	$	$	$

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ement

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				Threshold	$3,000
Gross Sq. m.	811	Year Built	2000	Reserve Term (years)	10
r of Buildings	5	Age	16	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
ntified																	
	2005	20	11	9	80 m	$40/m	LCR										
ntified																	
ntified																	
ntified																	
artitions																	
	2009	15	7	8	200 m²	$40/m²	LCR										$8,000
ntified																	
ntified																	
	2005	20	11	9	60 m²	$95/m²	LCR										
	2005	20	11	9	90 m²	$125/m²	LCR										
	2005	10	10	0	5	$1,000/each	LCR			$5,000							
ntified																	
yance Devices)																	
	-	-	-	-	Allowance		Repair	$5,000									
	-	-	-	-	Allowance		Study	$3,000									
	-	-	-	-	Allowance		Repair		$10,000								
ntified																	
nd Stairs																	
ntified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
tified																	
olumns																	
tified																	
Columns																	
tified																	
tified																	
tified																	
	-	-	-	-		Allowance	Study		$3,000								
	2005	40	10	30		Allowance	Improvements		$6,000								
	2005	20	10	10	1	$3,500/ea.	LCR										
tified																	
tified																	
tified																	
tified																	
tified																	
tified																	
ent																	
	-	-	-	-		Allowance	Code	$800									
	-	-	-	-		Allowance	Safety	$1,500									
tified																	
tified																	
d Security																	
tified																	

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	Inflated	*Uninflated*
	$2,684	$2,226
/ Sq. Ft.	$3.31	$2.74

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$10,300	$19,000	$5,000	$	$	$	$	$	$	$15,000
$CAD	$10,300	$19,570	$5,305	$	$	$	$	$	$	$19,438

n

				Threshold	$3,000
Gross Sq. m.	811	Year Built	1993	Reserve Term (years)	10
r of Buildings	5	Age	23	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024
ntified																	
	1993	30	23	7	200 m²	$95/m²	LCR									$19,000	
	1993	20	23	0	85 m	$40/m	LCR		$3,400								
ntified																	
	1993	30	23	7	2	$2,000/each,	LCR									$4,000	
ntified																	
artitions																	
	-	-	-	-	Allowance		Study	$2,000									
	-	-	-	-	Allowance		Repair		$5,000								
	2008	15	8	7	350 m²	$40/m²	LCR									$14,000	
	1993	30	23	7	~15	$250/each	LCR									$3,750	
ntified																	
	1993	20	23	0	35 m²	$95/m²	LCR						$3,325				
	1993	15	23	0	100 m²	$80/m²	LCR						$8,000				
	2005	20	11	9	95 m²	$125/m²	LCR										
	1993	10	23	0	5	$1,000/each	LCR			$5,000							
ntified																	
yance Devices)																	
ntified																	
ntified																	
ntified																	
nd Stairs																	
ntified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
tified																	
olumns																	
tified																	
Columns																	
tified																	
tified																	
	-	-	-	-		Allowance	Study	$2,000									
	-	-	-	-		Allowance	Repair		$3,500								
	1993	30	23	7	8	$2,200/each	LCR									$17,600	
tified																	
tified																	
tified																	
	-	-	-	-		Allowance	Safety	$500									
tified																	
tified																	
ent																	
	1993	30	23	7		Allowance	LCR/Improv.									$4,000	
tified																	
tified																	
tified																	
d Security																	
tified																	

nalysis

	Inflated	Uninflated
	$5,025	$4,098
/ Sq. Ft.	$6.20	$5.05

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$4,500	$11,900	$5,000	$	$	$11,325	$	$	$62,350	$
$CAD	$4,500	$12,257	$5,305	$	$	$13,129	$	$	$78,983	$

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At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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February 2016

REPORT

Facility Lifecycle Assessment Whitehorse Fish Facilities Various Locations, Whitehorse, YT

Submitted to:
Yukon Energy Corporation
P.O. Box 5920
Whitehorse, YT Y1A 6S7

REPORT

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Golder Associates



FLA: WHITEHORSE FISH FACILITIES

EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Fish Hatchery (henceforth known as Site A) and Fish Ladder (henceforth known as Site B), located at #21 Selkirk Road and Nisutlin Drive, respectively, in the City of Whitehorse, Yukon Territory (the "Sites").

Site A Fish Hatchery (A) is comprised of a one storey fish hatchery facility with approximately 158 m² (1,701 ft²) on approximately 0.11 hectares (0.27 acres) of land, the building includes a mechanical penthouse on the roof. Access to the site is provided from Selkirk Street. The site building was approximately constructed in 1984.

Site B Fish Ladder (B) building consists of a one storey fish ladder viewing facility with approximately 67 m^2 (722 ft^2) gross floor area (GFA) on approximately 0.01 hectares (0.02 acres) of land; however, the ladder structure itself occupies a long stretch of area along the Yukon River and it was not part of this evaluation. No civic address was provided for this site, but the building is located along Nisutlin Drive, located east of the Yukon River and beside the Yukon Energy dam. The Site building was constructed with the ladder in approximately 1958 with one major addition completed in approximately 1996.

Based on the findings of this FLA, the following conclusions are made for the Fish Hatchery (A):

- The Site was developed in approximately ~1984. One major addition was done in approximately 2000 when the maintenance shop and the fresh water room were constructed. The site is not provided with parking except for a small driveway located near the main entrance. Site components include, but are not limited to, chain link fencing, gravelled driveway, picnic table, cast-in-place (CIP) concrete pads at main and service entrances, vinyl signage, a wooden shed and grassed areas. Exterior wood structured stairs are provided for access to the mechanical penthouse and roof top. The site components are in overall acceptable condition.
- Exterior finish is primarily painted concrete masonry unit (CMU) walls; newer sections of the building are finished with corrugated metal cladding with and without paint finish. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are prefinished aluminum-framed standard type insulated windows provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but are likely to consist of batt insulation and/or foam board insulation throughout the building; blown-in cell insulation is most likely provided for CMU walls. A pre-finished metal door in pre-finished metal frame is provided for the main entrance. Exterior utility doors are pre-finished metal units set in pre-finished metal frames with and without insulated glass inserts. The roof for the building is a low slope roof with a modified bitumen roofing system (SBS). Newer building additions are provided with a gable roof or sloped roof covered with metal sheet roofing. Pre-finished aluminum metal fascia is provided along the roof perimeter. The exterior components are in overall acceptable condition.



LA: WHITEHORSE FISH FACILITIES

- Interior doors are typically painted metal doors or stained wood doors set in painted metal frames. Interior walls are painted CMU walls or gypsum wall boards (GWB); some partitions are finished with corrugated metal sheets. Ceiling finish is generally exposed metal decking. Building floor finishes are sealed or painted concrete throughout with some metal grating grills sections. One washroom is provided for the building equipped with a lavatory vanity with cabinets and countertop. The kitchen furnishing includes plastic laminate countertops and laminate upper and lower cabinetry. Small residential grade appliances are provided for the kitchen and include a microwave and a small fridge. The interior components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. According to drawings provided by the Client the foundations are cast-in-place (CIP) concrete strip and spread footings. The building floor is a reinforced CIP slab on grade. The superstructure is composed of load bearing CMU walls and metal stud frames with metal sheet coverings for the newer sections. Interior walls are a combination of CMU walls and wood or metal frames and studs with drywall or metal sheet coverings throughout. The roof structure is composed of open web steel joists with a metal deck and metal or wood frame and joists covered by metal panels. The structural components are in overall acceptable condition.
- The building is supplied with domestic water through a well located on site. Domestic water distribution piping is a combination of copper and PVC plastic. Sanitary sewer is discharged into a septic tank located north of the site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Waste water piping is PVC plastic. Domestic hot water is provided by one electric hot water heater located in the office area. Heating for the building is accomplished via gas-fired radiant tube heaters, electric suspended unit heaters, duct heaters, electric baseboard heaters and a wall mounted force flow electric unit heater. Heating equipment is distributed throughout the building. Ventilation and assisted heating is provided by heat recovery ventilators (HRV) located in the chinook and fresh water rooms. Galvanized metal ductwork is provided throughout except for the office area. The HVAC systems are controlled by zoned manual thermostats throughout the building. One exhaust ventilation unit was observed in the washroom. Plumbing fixtures for the washroom are vitreous china tank type water closet and counter mounted enamel lavatory. The kitchen is provided with a double basin stainless steel sink. The mechanical components are in overall acceptable condition.
- Electrical service is fed into the building via overhead lines from a pole mounted utility-owned transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution to the building is by a 225 Amp, 120/208 V Square D panel board containing 42 circuits. A main Square D 225 Amp shut off switch is provided for the building. A secondary distribution panel was also observed on site, this equipment is rated at 225 Amp 120/208 V with 30 circuits. Lighting is provided primarily by tubular fluorescent lamps and Light-emitting diode (LED) throughout. Exterior lighting is accomplished by HID lighting fixtures. Emergency battery packs with integral lighting heads are provided throughout the building. An emergency generator is on site reportedly connected to mechanical equipment and to all light fixtures in the building according to the Point of Contact. No exits signs were observed at emergency exits. The electrical components are in overall acceptable condition.



LA: WHITEHORSE FISH FACILITIES

- Given the year of the original construction (~1984), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are possible to be present. Site Representative reported that they were not aware of any hazardous materials present such as ACMs but if present they might be contained. No testing was reported to be completed and no asbestos management plan was reported to be in place.

Immediate investigation / action items identified pertain to roof drainage, storage items in front of electrical equipment and identifying devices for emergency exits. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural, mechanical and electrical components and systems. The Immediate Repairs and Capital Reserve Analysis are included in Appendix C. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.

The following conclusions are made for the Fish Ladder (B):

- The Site was developed in approximately ~1958 with the construction of the fish ladder. According to drawings provided by the client, one major building addition was developed in ~1996 and currently includes the display and office areas. No parking is provided within the site. Site components generally include: chain link fencing, vinyl signage, and grassed areas. Access to the viewing roof deck and to the main entrance is accomplished through wooden ramps with wooden handrails. The sites components are in overall acceptable condition.
- The building exterior finish is pre-finished metal clad throughout. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are a combination of prefinished aluminum-framed double glazed insulated windows provided along the building exterior and pre-finished steel frame windows with insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided by the Client they are comprised of batt insulation and vapour-barrier throughout the building. Access to the building is provided through pre-finished insulated metal doors with insulated and fire rated glazing units. Exterior utility doors are pre-finished metal units set in pre-finished metal frames. The roof for the building is a low slope roof with a single ply (EPDM) roofing system. A wood viewing deck is provided on the roof top. The exterior components are in overall acceptable condition.
- Interior doors are typically hollow core wood doors set in wood frames. One metal screen door was observed on one of the emergency exit doors. Interior walls and ceilings are pine boards throughout the building. Floors are finished with resilient sheet flooring. The interior components are in overall acceptable condition.



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- The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. According to drawings provided by the Client for the 1996 addition the foundations are shallow CIP spread footings for the mid-section of the building. It is assumed that the older section of the building is provided with the same foundation system. The perimeter of the building according to the drawings is sitting on a compacted granular base. The building floor is a suspended wood floor structure supported on wood posts, wood beams and joists. The superstructure is composed of wood framed studs. Interior walls are wood framed studs with plywood coverings throughout. The roof structure is composed of wood rafters and joists covered by plywood panels. The structural components are in overall acceptable condition.
- No domestic potable water or a sanitary sewage disposal service is provided for the site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Heating for the building is accomplished through electric baseboard and force flow electric unit heaters. No mechanical components were identified for ventilation. The heating units are controlled by localized manual thermostats throughout the building. The building is not provided with washrooms facilities or plumbing fixtures of any kind. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via underground conductors. Solar panels are also provided fixed to the main tower structure. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished by a Square D main panelboard rated at 125 Amp, 120/240 V with 24 circuits. Lighting is provided by tubular fluorescent T12 lamps throughout. Exterior lighting is accomplished by HID lighting fixtures. No emergency lighting was observed with the exception of some LED emergency exit signs. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~1958), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are possible to be present. Site Representative reported that they were not aware of any hazardous materials present such as ACMs but if present they might be contained.

Immediate investigation / action items identified pertain to interior screen door, roof drainage, mould, roof deck structure, installation of emergency lighting and detectors. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural, structural, and electrical components and systems. The Immediate Repairs and Capital Reserve Analysis are included in Appendix D. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.

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Table 1: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/Site A Fish Hatchery

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$3,500	$19,350	$0	$19,350
2	Structural	$0	$0	$0	$0
3	Mechanical	$0	$0	$5,000	$5,000
4	Electrical	$1,800	$5,000	$41,100	$46,100
TOTALS		**$5,300**	**$24,350**	**$46,100**	**$70,450**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 2: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)/Site A Fish Hatchery

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$5,300	$19,350	$0	$0	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$5,000	$41,100	$0	$5,000	$0

Table 3: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/Site B Fish Ladder

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$12,500	$67,850	$13,925	$81,775
2	Structural	$3,000	$75,000	$0	$75,000
3	Mechanical	$0	$0	$0	$0
4	Electrical	$3,100	$10,550	$0	$10,550
TOTALS		**$18,600**	**$153,400**	**$13,925**	**$167,325**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 4: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)/Site B Fish Ladder

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$18,600	$70,400	$4,550	$61,950	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$16,500	$0	$0	$13,925	$0

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1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Whitehorse Fish Hatchery (Site A) and Fish Ladder (Site B), located at #21 Selkirk Road and Nisutlin Drive respectively, in the City of Whitehorse, Yukon Territory.

The Fish Hatchery (A) is comprised of a one storey fish hatchery facility with approximately 158 m² (1,701 ft²) on approximately 0.11 hectares (0.27 acres) of land. The building includes a mechanical penthouse on the roof. Access to the site is provided from Selkirk Street. The site building was approximately constructed in 1984.

The Fish Ladder (B) building consists of a one storey fish ladder viewing facility with approximately 67 m^2 (722 ft^2) gross floor area (GFA) on approximately 0.01 hectares (0.02 acres) of land; however the ladder structure occupies a long stretch area along the Yukon River and is not being accounted for the size of the site. No civic address was provided for this site, although building location was reported to be along Nisutlin Drive, located east of the Yukon River and beside the Yukon Energy dam. The Site building was constructed in approximately 1958 when the ladder was developed and one major addition was completed in approximately 1996.

Written authorization to proceed with the work was provided by Sean Munro, Manager, Property & Risk Management from Yukon Energy Corporation. It is understood that this FLA is required for capital planning.

1.2 Objectives

The objective of the FLA was to document the Site conditions at the time of the Site reconnaissance and, based on available sources of information and observations of surface conditions during the Site reconnaissance, to identify the exterior Site improvements as well as the building structure, envelope, interior finishes, mechanical systems, electrical systems, fire/life safety systems, conveyance devices and visually obvious signs of non-compliance with respect to building code and barrier free accessibility. Due to the age of the buildings, it is possible that hazardous materials are present in the building.

1.3 Methodology

Site Escort and general building information was provided by Lawrence Vano, an employee of Access Consulting, who currently operates the Fish Hatchery (A) site and provided access to the Fish Ladder (B) site (hereafter referred to as the “Point of Contact”). Both sites are owned and managed by YEC but operated by third party companies. Site reconnaissance was conducted by Brian Levy and Adriana Almeida of Golder on November 19, 2015. In addition to the Site visit, documents identified in Section 1.6 were reviewed in completing the FLA.

At the time of the Site reconnaissance, the weather was clear; however, most of the grounds and roof were covered by snow limiting visibility on the Site.

The scope of work did not include sampling or testing to identify the potential presence of hazardous building construction materials such as ACMs, lead-based paints (LBPs), PCB-containing electrical equipment or other hazardous materials. Due to the age of the buildings, it is unlikely that hazardous building construction materials are to be present on Site.

1.4 Evaluation Criteria

The FLA was completed in general accordance with accordance with the Yukon Energy Corporation stated scope of work as documented in *Request for Proposals Building Condition Reports* (hereafter referred to as the "RFP"). The scope of the FLA was limited to identifying components, systems and potential concerns by visual examination of surface features and operating practices, and from available documented information sources. Only those items identified as being above the specified Capital Threshold will be addressed in the Capital Reserve Table. The Condition Rating system (CR) used throughout this report is based on the submitted proposal as per Yukon Energy Corporation RFP:

Code	Description
1	**Critical Unsafe**, high risk of injury or critical system failure.
2	**Poor** - does not meet requirements, has significant deficiencies. May have high operating / maintenance costs.
3	**Marginal** - Meets minimum requirements, has significant deficiencies. May have above average operating maintenance costs.
4	**Acceptable** - Meets present requirements, minor deficiencies. Average operating/maintenance costs.
5	**Good** - Meets all present requirements. No deficiencies.
6	**Excellent** - As new/state of the art, meets present and foreseeable requirements.

The capital expenditures identified with respect to deficiencies or deferred maintenance shall be identified by the following Categories ("Cat#"):

Category	Description
1	Code & Safety
2	Repair & Maintenance
3	Capital Expenditure
4	Modernization / Improvements
5	Other

Items identified with a CR rating of 1 and/or Cat1, shall be treated as “Immediate” action items, considered to have conditions that include deficiencies that require action in the next 60 to 90 days. Items identified with a CR of 2 or 3 and/or Cat2 shall be considered to have conditions that include deficiencies that can be addressed within the next five years (2016 to 2020 in the Capital Reserve Table). Preventative Maintenance (PM) items may have been identified. These PM items are items anticipated to be required to maintain specific components/systems through to the end of their Expected Useful Life (EUL) and are considered to have CR of 4 or better that can be addressed at any time within the 10 year time frame of this report (2016 to 2025 in the Capital Reserve Table).

Other non-urgent conditions identified with a CR of 4 to 6, are prioritized by their identification as Cat2 to Cat4 and are included in the Capital Reserve Table in an appropriate year. For items with no observed or reported deficiencies, a lifecycle replacement (LCR) cost estimate has been provided in the Capital Reserve Table spreadsheet in the year equal to the year of original installation plus that component’s EUL. If an item with no observed or reported deficiencies is nearing or has surpassed its EUL in the next 5 years (i.e., 2016 to 2020), an LCR cost estimate has been provided in the Lifecycle Plan spreadsheet in year 2020.

For similar components that have been replaced/installed at different times but where the age difference is equal to or less than 20% of the component’s EUL, the average install year has been used in calculating the next lifecycle replacement event (i.e., for similar vinyl floor tile installed in 1999 versus 2002, each having a 20 year TDL, an average install year of 2001 has been used to calculate a single lifecycle replacement event in 2021).

No building material sampling or testing was conducted as part of this assessment.

1.5 Recommendations for Additional Investigation or Action

RAI 1A) Roof drainage.

RAI 2B) Roof drainage.

RAI 3B) Mould wall study and sampling.

RAI 4B) Structural study for the roof viewing deck.

1.6 Desktop Data Collection

Architectural drawings and any previous condition reports or hazardous materials reports for the Site were requested. The following are a list of drawings provided:

- Whitehorse Hatchery, Hatchery Foundation Plan, drawing number 1498-011-S1, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Hatchery Building General Arrangement, drawing number 1498-011-S2, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Roof Plan Details, drawing number 1498-011-S3, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Elevations, drawing number 1498-011-S4, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.

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- Whitehorse Hatchery, Adult Holding Layout, drawing number 1498-011-S5, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Adult Holding Details, drawing number 1498-011-S5A, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Plumbing and HVAC Details, drawing number 1498-011-M1, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Building Pumping Details, drawing number 1498-011-M2, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Aeration Tower and Pumping Details, drawing number 1498-011-M3, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Rearing Trough General Arrangement, drawing number 1498-011-M4, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Incubation and Rearing Details, drawing number 1498-011-M5, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Rearing Trough Details, drawing number 1498-011-M6, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Electrical, drawing number 1498-011-E1, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Electrical, drawing number 1498-011-E2, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery, Electrical, drawing number 1498-011-E3, provided by YEC and prepared by Northern Canada Power Commission dated September 25, 1981.
- Whitehorse Hatchery Contract No. 1 Well No.1 Pumping Station and Pipeline Location Plan, Key Map and Drawing Index, Electrical, drawing number 25-16-23, provided by YEC and prepared by Department of Fisheries and Oceans dated June, 1981.
- Whitehorse Hatchery Contract No. 1 Pumping Station Architectural Details, drawing number 25-16-24, provided by YEC and prepared by Department of Fisheries and Oceans dated June, 1981.
- Whitehorse Hatchery Contract No. 1 Pipelines and Conduits Plan and Profile, drawing number 25-16-25, provided by YEC and prepared by Department of Fisheries and Oceans dated June, 1981.
- Whitehorse Hatchery Contract No. 1 Pipelines and Conduits Plan and Profile, drawing number 25-16-26, provided by YEC and prepared by Department of Fisheries and Oceans dated June, 1981.
- Whitehorse Hatchery Contract No. 1 Pump Installation and Mechanical Details, drawing number 25-16-27, provided by YEC and prepared by Department of Fisheries and Oceans dated June, 1981.
- Whitehorse Hatchery Contract No. 1 Electrical Plan and Details, drawing number 25-16-28, provided by YEC and prepared by Department of Fisheries and Oceans dated June, 1981.
- Whitehorse Hatchery Contract No. 1 Pipelines and Conduits Plan and Profile, drawing number 25-16-25, provided by YEC and prepared by Department of Fisheries and Oceans dated June, 1981.
- A pre-Site questionnaire was sent out by Golder and returned by the Site Representative for review.

1.7 Outstanding Information

All information that has been requested has been provided at the time of the completion of this report.

1.8 Building & Fire Code Compliance Overview

The Site Representative advised that she was not aware of any other outstanding work orders, building code violations, building code infractions, building ordinances and municipal health and fire safety by-laws violations.

Building code violations were detected regarding storage items located less than 1m from electrical equipment in the Fish Hatchery building (A).

Fire alarm and detection system was considered to be inadequate on both buildings. Additional alarm, lighting and detection devices should be installed.

1.9 Evidence of Mould Presence

No mould presence was visually identified at the time of the site visit; however, suspected mould is assumed to be present between the wall assemblies in Building B (Fish Ladder). Details and recommendations are included in the architectural section (Section 3.0) of this report.

1.10 Outline of the Report

The report that follows this section contains a summary description of the Site and building systems/components along with a detailed listing and description of systems/components. Furthermore, current, imminent or anticipated deficiencies above the Capital Threshold (if any) and excluding normal operating maintenance are presented with a CR, including a description of the risk/consequence of deferral, probability of imminent/anticipated failure and/or a further description of any failure if it has already occurred.

A more detailed Capital Reserve Table is presented in Appendix C outlining the specific systems/components, EUL, Install Date, Remaining Useful Life (RUL), replacement event type, basis of estimate and specific years for Capital Reserve planning.

1.11 Mandate and Report Resources

Please refer to Appendix A for the report mandate for this project and for additional resources related to the assumptions used in preparing this report such as:

- Operating and Maintenance Items; and
- Discussions of Overall Concepts and Terminology.

2.0 SITE DESCRIPTION

2.1 Site Location and Setting

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Whitehorse Fish Hatchery (hence forth known as Site A) and Fish Ladder (henceforth known as Site B), located at #21 Selkirk Road and Nisutlin Drive respectively, in the City of Whitehorse, Yukon Territory.

Site A Fish Hatchery is comprised of a one storey fish hatchery facility with approximately 158 m² (1,701 ft²) on approximately 0.11 hectares (0.27 acres) of land, the building includes a mechanical penthouse on the roof. Access to the Site is provided from Selkirk Street. The Site building was approximately constructed in 1984.

Site B Fish Ladder building consists of a one storey fish ladder viewing facility with approximately 67 m^2 (722 ft^2) gross floor area (GFA) on approximately 0.01 hectares (0.02 acres) of land; however the ladder structure occupies a long stretch of area along the Yukon River and it was not part of this evaluation. No civic address was provided for this site, building is located along Nisutlin Drive, located east of the Yukon River and beside the Yukon Energy dam. The Site building was constructed with the ladder in approximately 1958 with one major addition completed in approximately 1996.

2.2 Site Physical Description(s)

Table 5: Site Physical Description Fish Hatchery (Building/Site A)

Topic	Data
Site Area	~0.11 hectares (0.27 acres)
Number of Buildings on the Site	Two (main building and shed)
Approximate Footprint Area of Building (s) (m^2)	~158 m² (1,701 ft²)
Levels above grade	Two
Levels below grade	None
Date of Building (s) Construction	1984
Date of Major Renovation/Addition (s)	~2000
Percentage Site Coverage by Building (s)	~35%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~55% grassed/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~10% wood deck surface



General view of the building on site A Fish Hatchery.

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Table 6: Site Physical Description Fish Ladder (Building/Site B)

Topic	Data
Site Area	~0.01 hectares (0.02 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building (s) (m^2)	~67 m² (722 ft²)
Levels above grade	One
Levels below grade	None
Date of Building (s) Construction	~1958
Date of Major Renovation/Addition (s)	~1996
Percentage Site Coverage by Building (s)	~95%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	N/A
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~5% fish ladder



General view of the building on site B Fish Ladder.

3.0 ARCHITECTURAL

Site A: Fish Hatchery

The Site was developed in approximately ~1984. One major addition was done in approximately 2000 when the maintenance shop and the fresh water room were constructed. The site is not provided with parking except for a small driveway located near the main entrance. Site components include, but are not limited to, chain link fencing, gravelled driveway, picnic table, cast-in-place (CIP) concrete pads at main and service entrances, vinyl signage, a wooden shed and grassed areas. Exterior wood structure stairs are provided for the mechanical penthouse and roof top.

Exterior finish is primarily painted concrete masonry unit (CMU) walls; newer sections of the building are finished with corrugated metal clad with and without paint finish. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are prefinished aluminum-framed standard type insulated windows provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but are likely to consist of batt insulation and/or foam board insulation throughout the building; blown-in cell insulation is most likely provided for CMU walls. A pre-finished metal door in pre-finished metal frame is provided for the main entrance. Exterior utility doors are pre-finished metal units set in pre-finished metal frames with and without insulated glass inserts. Interior doors are typically painted metal doors or stained wood doors set in painted metal frames. Interior walls are painted CMU walls or gypsum wall boards (GWB); some partitions are finished with corrugated metal sheets. Ceiling finish is generally exposed metal decking. Building floor finish is sealed or painted concrete throughout with some metal grating grills sections. One washroom is provided for the building and equipped with a lavatory vanity with cabinets and countertop. The kitchen furnishing includes plastic laminate countertops and laminate upper and lower cabinetry. Small residential grade appliances are provided for the kitchen and include a microwave and a small fridge.

The roof for the building is a low slope roof with a modified bitumen roofing system (SBS). Newer building additions are provided with a gable roof covered with metal sheet roofing. Pre-finished aluminum metal fascia is provided along the roof perimeter.

Capital expenditures with respect to the exterior paint, joint sealers, interior wall finishes and roof drainage, is anticipated within the 10 year time frame of this report.

The building does not meet barrier free guidelines; however, barrier-free compliance is not deemed to be required due to the use of the building.

The architectural components are in overall acceptable condition.

Site B: Fish Ladder

The Site was developed in approximately ~1958 with the construction of the fish ladder. According to drawings provided by the client, one major building addition was developed in ~1996 and currently includes the display and office areas. No parking is provided within the site. Site components generally include: chain link fencing, vinyl signage, and grassed areas. Access to the viewing roof deck and to the main entrance is accomplished through wooden ramps with wooden handrails.



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The building exterior finish is pre-finished metal clad throughout. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are a combination of prefinished aluminum-framed double glazed insulated windows provided along the building exterior and pre-finished steel frame windows with insulated glazing units. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided by the Client they are comprised of batt insulation and vapour-barrier throughout the building. Access to the building is provided through pre-finished insulated metal doors with insulated and fire rated glazing units. Exterior utility doors are pre-finished metal units set in pre-finished metal frames. Interior doors are typically hollow core wood doors set in wood frames. One metal screen door was observed on one of the emergency exit doors. Interior walls and ceilings are pine boards throughout the building. Floors are finished with resilient sheet flooring.

The roof for the building is a low slope roof with a modified bitumen roofing system (SBS). A wood viewing deck is provided on the roof top.

Capital expenditures with respect to the exterior windows, utility doors, pine board wall panels and ceilings, floor finish, roof, roof drainage, mould and exterior ramps, is anticipated within the 10 year time frame of this report.

The building does not meet barrier free guidelines; since the building is for public access barrier-free compliance is required and improvements are recommended for lever handles for doors, review ramp slopes and provide additional handrails for ramps. Since visits are seasonal, Golder recommends the concept of providing a barrier free portable washroom on site rather than the creation of a barrier free washroom within the building.

The architectural components are in overall acceptable condition.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.1A	**Site Servicing**	**Water**: Water is supplied from an underground well located north of the site. **Sanitary Sewer**: A septic tank is provided for the site and it is located north of the site. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building through overhead lines on the south elevation.	**5**	-	No concerns observed or reported.
A01.1B	**Site Servicing**	**Water**: Potable water is not provided. **Sanitary Sewer**: Building is not connected to any sanitary sewer system. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via underground conductors. Solar panels are also provided mounted on the tower	**4**	-	No concerns observed or reported.
A01.2A	**Parking Lots & Drive Aisles**	**~1984:** A gravelled parking driveway is provided east of the site.	**4**	-	Site grounds were mostly covered by snow including the driveway; therefore evaluation was limited to Site Representative reports. No issues or concerns were reported.
A01.2B	**Parking Lots & Drive Aisles**	The building is not provided with a parking lot. However, public parking spaces are available outside the building on the main street.	**-**	-	N/A
A01.3A	**Concrete Curbs / Pads**	**~1984**: One concrete pad provided at the main entrance and one for the back entrance.	**4**	-	Reportedly a small section of concrete was replaced at the back door. No details were provided regarding the year of replacement. No other concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.3B	**Concrete Curbs / Pads**	No concrete elements were observed to be provided surrounding the building.	**4**	-	The site was mostly covered with snow which limited visibility on the site components. No other concerns observed or reported.
A01.4A	**Site Drainage**	Overland soil absorption and drainage.	**5**	-	Ice thaw/freezing reported to be an issue at the gravel city road next to the site. No issues or concerns were reported regarding the site drainage.
A01.4B	**Site Drainage**	Overland soil absorption and drainage.	**5**	-	No issues or concerns were reported regarding the site drainage.
A01.5A	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No irrigation system was observed or reported. No other concerns observed or reported.
A01.5B	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No other concerns observed or reported.
A01.6A	**Fencing**	**~1984**: The site is delimited by a chain link fence with barb wire and chain link gates throughout the perimeter.	**4**	-	No concerns observed or reported.
A01.6B	**Fencing**	**~1996**: The site is delimited by a chain link fence with barb wire and chain link gates throughout the perimeter. In some sections the fence is reinforced with a welded wire mesh.	**4**	-	No concerns observed or reported.
A01.7A	**Amenities – Signage**	**~1984**: Wall mounted and ceiling hung signs were observed on the south elevation. They are generally a metal framed structure covered with printed vinyl fabric.	**4**		No concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.7B	**Amenities – Signage**	**~1996**: Structure mounted and wall mounted signs were observed on the south and east elevations. They are generally a metal framed structure covered with printed vinyl fabric.	**5**		No concerns observed or reported.
A01.8A	**Amenities – Site Furnishings**	**~2000**: One wood picnic table was observed on site located on the driveway.	**5**	-	No concerns observed or reported.
A01.9B	**Amenities - Flagpoles**	**~1996:** Two flagpoles are provided on top of the tower above the main entrance.	**4**	-	No concerns observed or reported.
A01.10A	**Ancillary Buildings**	**~1984:** A wood structure shed is located west of the site.	**4**	-	Not included for capital costing as it is considered out of the scope of work for this report.
Imm.1A A01.11A	**Handrails**	**~1984**: Unfinished wood guardrails and handrails are installed along the exterior stairs that lead to the roof top and the mechanical penthouse.	**4**	1	Spacing in the railing was observed to be greater than 4" which is considered a hazard. Additional cross rails are required to reduce the railing spaces. An immediate item is included in the Capital Reserve Table for repairs. No other concerns observed or reported.
Imm.2B A01.11B	**Handrails**	**~1996**: Painted wood guardrails and handrails are installed along the exterior stairs and ramps that lead to the roof top deck and to the main entrance.	**1**	1	Issues were identified regarding the access ramps for the main entrance and the roof deck. (See Note **3H**). No other concerns observed or reported.

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A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1A	**Exterior Paint**	**~1995:** The exterior walls are mostly CMU walls finished with paint.	**4**	3	Exterior paint was observed to be fading in some sections. Painted wall sections on the north elevations were peeling and sections of CMU were observed to be exposed. Cost for repainting exterior walls has been included in the Capital Reserve Table. Repairs to damaged CMU should be executed along with repainting work. No concerns or issues were reported.
A02.2A	**Metal Cladding**	**~2000:** Newer building additions like the fresh water facility and the shop exterior walls are finished with corrugated metal cladding.	**5**	-	No concerns or issues were reported.
A02.2B	**Metal Cladding**	**~1996:** Pre-finished corrugated metal panels are provided for the exterior walls of the building.	**4**	-	No concerns or issues were reported.
A02.3A	**Joint Sealers**	**~2000**: Sealant at material transitions and openings.	**4**	2	A leak was reported on the roof above the fresh water room where the transition from the old to the new building is located. Leak should be repair in order to avoid further issues with corroded structural elements among others. An allowance is included in the Capital Reserve Table for repairs. See also roofing section. No concerns observed or reported.

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A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.3B	**Joint Sealers**	**~1996**: Joint sealers are provided at material transitions and openings.	**3**	2	Leaks were reported to be a major issue through the walls towards the fish ladder in the viewing room. According to the Site Representative this issue is addressed every 2 years. One major leak was reported to have been fixed in 2015. No newer leaks were reported. Ongoing repairs are assumed to be completed every two years to keep the building operable; however, costs for repairs are assumed to fall below the Capital Threshold, therefore no costs are being included in the Capital Reserve Table. No other concerns observed or reported.
A02.4A	**Louvers**	**~1984**: Anodized aluminum fixed louvers are provided at the exterior walls where the mechanical room is located.	**4**	-	No concerns observed or reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1A	**Exterior Windows**	**~2014**: Prefinished aluminum-framed insulated windows are provided along the building exterior.	**5**	-	Two windows were reportedly replaced in 2014 in the office and the chinook room. No issues or concerns were reported. However, some condensation was noted on some units in the fresh water room. However, replacements for these units are assumed to fall under the Capital Threshold; therefore, no costs have been included in the Capital Reserve Table. No other concerns were observed or reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1B	Exterior Windows	**~1958**: Prefinished steel-framed insulated windows are provided along the building exterior. **~1996**: Prefinished aluminum frame double glazed insulated windows are provided along the building exterior.	3	4	Windows located in the viewing room were showing signs of corrosion on the frames. Leaks were not observed but it was reported to be a concurrent issue addressed every 2 years. (See Note **3B**). No other concerns were observed or reported.
A03.2A	Skylights	**~1984**: Prefinished metal frame skylight provided above the fresh water room.	3	-	Skylight was covered with snow at the time of the assessment. Issues with leakage were reported by the Site Representative. We recommend resealing all skylights at a cost below the Capital Threshold.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1A	Main Entrance Door	**~1984**: Prefinished metal entrance door with prefinished metal frame is provided at the main entrance.	4	-	According to the site Representative all doors were resealed in ~2013. No other concerns were observed or reported.
Imm.3B A04.1B	Main Entrance Door	**~1996**: Prefinished metal entrance doors with prefinished metal frames and insulated glass inserts are provided at the main entrance. One screen type door is provided for one of the emergency exits on the west elevation of the building.	4	1	The screen door was observed to be opening inwards which could potentially interfere with the means of egress in an emergency event. It is recommended to remove the screen door immediately. No other concerns were observed or reported.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.2A	**Utility Doors**	**2011**: Prefinished metal doors in prefinished metal frames are provided along the building exterior with and without insulated glass inserts.	**3**	-	Some ice accumulation towards the inside of the doors was noted on the maintenance shop doors. It is possible that the room is not being heated properly and it is not an issue related with the door itself. See M03.2A in the Mechanical Section of this report. No other concerns or issues were reported.
A04.2B	**Utility Doors**	**~1958**: Prefinished metal doors in prefinished metal frames are provided along the original building exterior.	**3**	3	Some operational issues were observed with some of the older exterior utility doors, which are recommended to be addressed at a cost below the Capital Threshold. Most of the exterior doors identified as emergency exit doors are provided with locks. No information was provided regarding these doors and if they remain unlocked while the building is open to the public. However, it is Golder's recommendation to maintain these doors unlocked during business hours for the user's safety. Doors can remain locked when the building is empty. Panic hardware along with closers should be installed when the doors are replaced. No other concerns or issues were reported.

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A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1A	Metal Fascia	**~1984**: Pre-finished aluminum fascia is provided along the roof perimeter. **~2000**: Pre-finished aluminum fascia is provided along the roof perimeter.	4	-	No other concerns observed or reported.
A05.1B	Metal Fascia	**~1996**: Pre-finished aluminum fascia is provided along the roof perimeter.	3	-	No other concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1A	Fixed Partitions	**~1981/1990**: Interior partitions are a combination of load bearing concrete masonry unit walls (CMU), wood stud frames with drywall and metal sheet coverings.	3	-	Interior walls were observed to be damaged by a previous humidity issue within the building. This issue was reportedly addressed in 2010, but the walls were not repaired. We recommend repairing these walls to improve the overall aesthetics of the building. As damage was only superficial repairs can be completed along with the repainting project indicated in item A06.2 (below). No issues or concerns were reported.
A06.1B	Fixed Partitions	**~1996**: Interior partitions are wood stud frame walls with pine board coverings.	4	-	No issues or concerns were reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.2A	**Interior Paint**	**~2000**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	3	Interior paint was generally in acceptable condition with the exception of the water damaged walls (see A06.1A above). Interior paint will reach the end of its EUL during the timeframe of this report. A cost will be included in the capital reserve table. No issues or concerns were reported.
A06.3A	**Interior Partitions**	**~1984/2000**: Interior stud-framed partitions are provided with gypsum board wall and metal sheet coverings throughout some sections of the building.	**4**	-	No concerns observed or reported.
A06.4B	**Pine Board**	**~1996**: The interior walls are finished with pine boards throughout.	**4**	2	Some water damage was noted on the wall facing the fish ladder (viewing area). Golder was unable to determine if the damage is due to an ongoing wall leakage or if this issue has been addressed but the panels were not replaced. No other concerns observed or reported.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1A	**Interior Doors**	**~2000**: Interior doors are typically painted metal doors set in painted metal frames or stained wood doors set in painted metal frames.	**4**	-	No concerns observed or reported.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1B	**Interior Doors**	**~1996**: Interior doors are typically hollow core wood doors set in wood frames.	**4**	-	Interior doors are not equipped with lever handles which are required by code due to the use of the building. (See Note **3D**). No concerns observed or reported.
A07.2A	**Interior Doors (Utility)**	**~2000**: Painted metal doors set in painted metal frames are provided for the electrical/mechanical room.	**5**	-	No concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.1A	**Metal Deck**	**~1984:** Ceilings for the building are exposed prefinished metal decking and roof metal sheets throughout provided for the roof structure. **~2000:** Ceilings for the building are exposed prefinished metal decking and roof metal sheets throughout provided for the roof structure.	**5**	-	No concerns observed or reported.
A08.2B	**Pine Boards**	**~1996:** The ceiling is finished with cedar wood panels throughout.	**5**	3	No concerns observed or reported.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1A	Concrete Floors	**~1984/2000:** Sealed or painted concrete floors are provided for all areas within the building.	4	-	Minor cracking was observed on the concrete floors in the fresh water room. Cracks are recommended to be sealed at a cost below the Capital Threshold. No concerns observed or reported.
A09.2A	Metal Grating	**~1984:** Prefinished metal grating planks were observed in the incubation and chinook rooms.	4	-	No concerns observed or reported.
A09.3B	Vinyl Sheet	**~1996**: The floor is covered with a vinyl sheet finish throughout the building.	4	3	No concerns observed or reported. However, the vinyl sheet flooring will reach its EUL within the timeframe of this report and will require replacement. A cost has been included in the Capital Reserve Table.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.1A	Casework/Vanities	**~2000**: The kitchen, washroom and office space are provided with laminate countertops and upper and/or lower stained wood cabinets.	5	-	The kitchen, office and washroom were reported to have been renovated in 2000, including new cabinets and countertops. No concerns were observed or reported.
A10.2B	Counters	**~1996**: The office facing the main entrance is provided with wall openings with laminate countertops to serve as a reception area.	4	-	No concerns were observed or reported.
A10.3A	Lockers	**2011**: Full size prefinished metal lockers is provided in the shop area.	4	-	Locker will reach EUL during the period of this report. The cost for locker replacement is below threshold of this report.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.4A	**Blinds**	**~2000**: Plastic horizontal blinds are installed on the fresh water room windows.	**3**	-	Blinds are generally worn down and damaged in some sections. Cost of replacement is below the threshold of this report.
A10.4B	**Blinds**	**~1996**: Plastic horizontal blinds are installed on the windows facing the public street.	**4**	-	No concerns were observed or reported.
A10.5A	**Washroom Accessories**	**~2000**: The washroom is equipped with a mirror. Soap, hand sanitizer and paper towel dispensers are provided for the transition and fresh water room.	**5**	-	Washroom accessories will reach EUL during the period of this report. The cost to replace them falls under the capital reserve limit.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1A	**Modified Bitumen Roofing System (SBS)**	**~2011**: The roof is provided with a modified bitumen roofing system (SBS) for the original building construction.	**5**	-	Roof was covered by snow and a complete evaluation could not be completed at the time of the site visit. It was reported that the roof was replaced in ~2011. As a general recommendation roof should be cleared of any debris or storage items to preserve the roof membrane integrity. No concerns or issues were reported regarding leakage.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1B	**Modified Bitumen Roofing System (SBS)**	**~1996**: The roof is provided with a modified bitumen roofing system (SBS).	**4**	3/2	It was observed that the fascia along the perimeter of the building is not placed properly as it is leaving the edge of the roof membrane exposed. (See Note **3C**) Roof membrane was covered by a wood deck mostly covered with snow and a complete evaluation could not be completed at the time of the site visit. It was reported that the roof had some issues in the past regarding leaks but has been repaired. It was also reported that these leaks were mostly located were the new and older building sections meet. (See Note **3E**) No concerns or issues were reported regarding leakage.
R01.2A	**Metal Roofing**	**~2000**: Metal sheet roofing is installed on the shop and fresh water room building sections.	**5**	-	Roof was mostly covered with snow, limiting visibility. No concerns or issues were reported regarding leakage.
RAI/Imm.4A R01.3A	**Gutters and Downspouts**	The roof drainage system could not be determined. No gutters or downspouts are provided and no evidence of an alternate drainage system was possible to confirm.	**2**	2	Based on observations made on site the roof is not provided with a drainage system. It was reported by the site Representative that this issue causes ice doming at the main entrance canopy creating a potential injury and tripping hazard (See Note **3A**). No other concerns or issues were observed or reported.

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R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
RAI/Imm. 5B R01.3B	**Gutters and Downspouts**	The roof drainage system could not be determined. No gutters or downspouts are provided and no evidence of an alternate drainage system was possible to confirm.	**2**	2	The roof was mostly hidden by a wood deck constructed above it. No gutters or downspouts were observed along the perimeter of the building and no other internal drainage system or related components was possible to determine to be provided for the building. It is possible that the lack of a proper drainage system for the roof is causing it to leak in some sections. (See Note **3F**). No other concerns or issues were observed or reported.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.1A	**Mould**	No evidence of mould was observed on the CMU walls affected by previous humidity issue within the building, neither was reported.	**5**	-	No concerns observed or reported
Imm. 6B A99.1B	**Mould**	Based on visual observations presence of mould was not evident.	**3**	2	Previous issue with leaks through windows facing the fish ladder were reported. These issues according to the site Representative are recurrent and they are usually addressed and repaired at least every 2 years. (See Note **3G**)
A99.2A	**Exterior Stairs**	**~1984:** The building is provided with a wood structure stair located south of the site to access the lower level roof and mechanical penthouse.	**4**	-	Stairs were mostly covered with snow. No concerns or issues were reported.

A99.2B	**Exterior Stairs**	**~1996:** The building is provided with a wood structure stair located on the east elevation that leads to a secondary exterior viewing deck above the fish ladder.	**4**	-	Stairs were mostly covered with snow. No concerns or issues were reported.
A99.3A	**Exterior Ramps**	**~1996:** Two wood structure ramps were observed on site, one leading to the main roof deck and one for the main entrance.	**3**	-	Ramps were mostly covered with snow. However, based on observations made on site it was determined that the ramps do not comply with barrier free standards. Observations and recommendations regarding code compliance are included in section A01.11B Handrails of this report.

NOTES:

3A) Water accumulation on the roof that is not properly drained could potentially affect several building systems, including but not limited to the roofing system, exterior wall assemblies, building perimeter grading and drainage, among others. It can also become a hazard during freeze/thaw periods due to ice built-up on areas above main entrances and on the ground as well. It is recommended for a study to be performed by a specialist to determine appropriate roof drainage solutions. An allowance for repairs will be provided in the Capital Reserve Table; final costs will rely solely on the results of the study.

3B) Window units original to the building (1958) are constantly under water as they are below the water level when the fish ladder is in use. It is likely that the type of windows installed as well as the caulking used is not designed for this purpose; therefore they constantly fail when the fish ladder fills with water. It is recommended to replace these window units with more suitable ones capable of resisting long periods of time under water without allowing any water into the building, generally for this purpose fiberglass framed windows with acrylic panes are recommended. A contractor specialized in this type of requirements should be able to determine the most appropriate solution for this issue. An allowance is included in the Capital Reserve Table for window replacements.

3C) The primary role of the fascia is to act as a layer between the edge of the roof and the outdoor elements protecting the inner wooden structure of the building and the roof against water damage during certain weather conditions by not allowing water into the building. As the fascia in this case is not properly covered by an overlap of the roof membrane, and appears not to have any flashing. It is possible to assume that both the roof as the inner wooden structure are not properly protected against the weather elements possibly allowing water into the building when conditions are not favorable. We recommend repairing or replacing the existing fascia, so it is covered by the edge of the roof membrane and is provided with flashing that extends from under the roof membrane and down the top portion of the fascia and has a drip edge. An allowance is included in the Capital Reserve Table.

3D) Please refer to Division B Article 3.8.3.3 and related Appendix A of the National Building Code for further information. It is recommended to replace all interior knob handles with lever handles at a cost below the Capital Threshold.

3E) SBS roofing systems generally have an estimated useful life of 25 years. The life of the roof is generally subject to original application of the membrane, positive drainage and exposure to outdoor elements. Since most of the roof was hidden below the wood deck constructed above it, Golder was unable to determine any issues with the roof or evidence of those reported. However, it is possible that positive drainage and original application of the roof are the primary causes of leaks as most of the membrane is covered and damage to the roof membrane is highly unlikely. Since repairs were already executed Golder assumes that the roof will reach the end of its useful life without any major issues by 2022 at which time it should be replaced. Additional costs may be incurred at the time of replacement since the wood deck platform would have to be removed to replace the entire roof membrane and install a new one. Costs are included in the Capital Reserve Table for roof replacement, final costs will rely solely on the complexity of the work required to remove the wood deck viewing platform.

3F) Roof drainage study and repair is recommended to be executed along with the roof replacement. An allowance is included in the Capital Reserve Table for repairs contingent on the results of the study.

3G) Golder is under the understanding that the wall facing the fish ladder and where the viewing room is located is mostly below the water level during the several months of the year. It is also assumed that most of the structure of the building and exterior walls, even the ones located on this side of the building are wood framed structure covered with a metal cladding, which we consider not suitable for being constantly submerged in water as it can penetrate the building structure and wall assembly and rot the wood, compromising the structural integrity of the building and also leading to mould growth due to the high level of moisture enclosed in between the building walls. Some damage to some of the wood panels inside the building leads to assume that water is penetrating the wall assembly and that mould is potentially present. Golder recommends performing a sample testing and study to this section of the building to confirm or deny the presence of mould. If mould is confirmed to be present a remediation work is recommended to remove it. Costs for the study and sampling testing as well as an allowance for any remediation work required are included in the Capital Reserve Table. Golder concludes that the building was not designed for being constantly exposed to water, please refer to Structural section of this report, section 4.0, S06.1B for more details and recommendations.

3H) It was observed that the ramps are not provided with lowered handrails. Also, the slope for the main entrance should be revised as it appears to be too steep and the spacing between the guardrails too great. Barrier free improvements are recommended to the exterior ramps to comply with barrier free standards, improvements include: installing additional lowered handrails, reviewing ramp slopes and correcting slopes if necessary. Since the deck is for public access, it is required for the access to be code compliant with gripable handrails and with cross rails that do not allow a 4" sphere to pass through for both the stairs and guardrails. Additional members are required to be added to minimize the spacing on the rails. Also, the ramp to roof does not complete the final turn down to grade with a handrail/guardrail. Ramp at grade main entrance requires handrails and spacing between rails also needs to be reduced. Costs for repairs are included in the Capital Reserve Table.

IMMEDIATE ITEMS:

Imm.1A) Repair handrails.
Imm.2B) Repair handrails and ramps.
Imm.3B) Remove screen door.
Imm.4A) Roof drainage study.
Imm.5A) Roof drainage study.
Imm.6B) Mould study.

RECOMMENDED FURTHER INVESTIGATION:

RAI 1A) Roof drainage Study.
RAI 1B) Roof drainage Study.
RAI 2B) Mould wall study and sampling.

FISH HATCHERY (SITE A):



Photo #A1: General view of the Fish Hatchery building.



Photo #A2: Exterior septic tank.

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Photo #A3: Exterior water well.



Photo #A4: View of the entrance driveway.



Photo #A5: General site overview mostly covered with snow.



Photo #A6: Damaged Exterior CMU walls.

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Photo #A7: Roof covered with snow.



Photo #A8: Exterior stairs towards the roof top and mechanical penthouse- in need of additional cross rails.

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Photo #A9: Damaged interior CMU walls.



Photo #A10: Minor cracks on the concrete floor.

FISH LADDER (SITE B):



Photo #B1: Building main entrance.



Photo #B2: General overview of the fish ladder.



Photo #B3: Non-Compliant ramp leading to the viewing deck.



Photo #B4: Non-compliant ramp at main entrance.



Photo #B5: Improper roof membrane flashing edge.



Photo #B6: Viewing deck over roof membrane.

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Photo #B7: Corrosion on the interior window frame and damages wood by water leaks in the viewing room facing the fish ladder.



Photo #B8: Exterior emergency exit door with lock and no panic hardware.



Photo #B9: Interior general overview.



Photo #B10: Damaged pine wall panels caused by water.



4.0 STRUCTURAL

Site A: Fish Hatchery

The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. According to drawings provided by the Client the foundations are cast-in-place (CIP) concrete strip and spread footings. The building floor is a reinforced CIP slab on grade. The superstructure is composed of load bearing CMU walls and metal stud frames with metal sheet coverings for the newer sections. Interior walls are a combination of CMU walls and wood or metal frames and studs with drywall or metal sheet coverings throughout.

The roof structure is composed of open web steel joists with a metal deck and metal or wood frame and joists covered by metal panels. Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site B: Fish Ladder

The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. According to drawings provided by the Client for the 1996 addition the foundations are shallow CIP spread footings for the mid-section of the building. It is assumed that the older section of the building is provided with the same foundation system. The perimeter of the building according to the drawings is sitting on a compacted granular base. The building floor is a suspended wood floor structure supported on wood posts, wood girders and joists. The superstructure is composed of wood frames and studs. Interior walls are wood framed studs with plywood coverings throughout.

The roof structure is composed of wood rafters and joists covered by plywood panels. Capital expenditures items were identified regarding the exterior walls and the roof deck.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S01.1A	**Substructure**	**~1984/2000**: The substructure is mostly concealed; therefore, was not directly reviewed. According to drawings provided by the client the substructure consists of CIP strip and spread footings.	**4**	-	No concerns observed or reported.
S01.1B	**Substructure**	**~1958/1996**: The substructure is mostly concealed; therefore, was not directly reviewed. According to drawings provided by the Client, the building is sitting on a shallow foundation consisting of CIP spread footings towards the interior of the building. The perimeter of the building according to the drawings is sitting on a compacted granular base. The tower structure is supported by CIP concrete spread footings.	**4**	-	It is assumed that the substructures on both sections of the building are similar. No concerns observed or reported.

S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1A	**Slab on Grade**	The building is constructed on a CIP slab on grade.	**3**	-	A damaged section was observed between the older and newer sections of the building. Concrete was observed to be cracked and spalled on this section leaving some rebar exposed. Repair is recommended to avoid water infiltration and corrosion that could potentially spread and affect the inner structure of the SOG. Repairs are assumed to fall below the Capital Threshold; therefore no costs have been included in the Capital Reserve Table.

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.1B	**Suspended Floor**	**~1958/1996**: The floor for the building is a suspended floor structure comprised of timber wood beams, sills and floor joists.	**5**	-	No concerns were observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1A	**Framing**	**~1984/2000**: The building structure is comprised of load-bearing CMU walls supporting open web steel joists topped with a metal roof deck. Newer sections are assumed to be mostly metal or wood framed with metal sheet covering.	**5**	-	No concerns or issues were observed or reported.
S04.1B	**Framing**	**~1958/1996**: The main building is a wood framed structure with wood beams and posts. The exterior tower is a free standing structure comprised of hollow steel section (HSS) bracing and members.	**5**	-	No concerns or issues were observed or reported.

S05 INTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S05.1A	**Interior Walls**	**~1984/2000:** Interior walls are a combination of wood framed partitions with wood studs and drywall coverings, load bearing CMU walls and metal sheet panelling.	**3**	-	A previous issue with humidity was reported which considerably affected the CMU interior wall assemblies. This issue was reportedly addressed in ~2010. (See Note **4A**) No concerns observed or reported.
S05.1B	**Interior Walls**	**~1996:** Interior walls are wood framed partitions with wood studs and wood panel coverings.	**5**	-	No concerns observed or reported.
S05.2B	**Interior Columns**	**~1996:** Interior wood timber columns are provided where the new and old sections of the building connect. Columns are covered with cedar wall panels.	**5**	-	No concerns observed or reported.

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.1A	**Exterior Load-bearing Walls**	**~1984/2000**: Exterior load-bearing walls are mostly CMU walls for the older sections of the building and metal frame walls with metal sheet coverings for the newer sections.	**4**	-	No concerns observed or reported. (See Note **4A**).
S06.2B	**Exterior Load-bearing Walls**	**~1958/1996**: Exterior load-bearing walls are wood stud farmed walls with pine wall panels covering the interior and metal cladding on the exterior.	**2**	4	Water penetration issues were observed on the north wall elevation facing the fish ladder. It was reported that this wall is constantly under water during the summer months when the fish ladder is in use. (See Note **4B**)

S99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.7B S99.1B	**Roof Deck**	**~1958/1996**: The building is provided with a wood structure viewing deck located on the roof top. The deck is sitting on sleepers on the roof structure.	**1**	1	The deck structure was mostly concealed by large amounts of snow limiting visibility at the time of the site visit and access was not provided due to operational issues with the access door. (See Note **4C**).

NOTES:

4A) Previous humidity issue caused freeze/thaw spalling on some of the CMU wall assemblies. This issue is especially evident on the fresh water and incubation room CMU walls. A structural study was reportedly performed on the affected walls in ~2010, which determined the structural integrity of the walls was not compromised. A copy of the report was not provided at the time of the site visit and not reviewed directly by Golder. Humidity issue was reportedly addressed by installing a dehumidifier unit in the building and there are currently no issues with humidity affecting wall assemblies. However, no repairs have been completed up to the current date on these walls and evidence of degradation and water staining are still present.

4B) Based on observations and given the current use of the building, Golder concludes that this building was not originally designed for its current use and purpose. Walls facing or submerged in water should be designed and assembled to serve this purpose with construction materials that are more water resistant like waterproofed concrete and not wood. Continued exposure to water will potentially compromise the building structural integrity leading to a permanent closure. In this matter Golder ultimately recommends a redesign of the entire building wall facing the fish ladder with materials more adequate for its current use, especially the older section of the building. An estimated cost for a major rebuilt is included in the Capital Reserve Table to serve as a reference. Potential mould is most likely present on the exterior walls, especially those exposed to water; please refer to the architectural section of this report, section 3.0, A99.1B for more details and recommendations.

4C) According to drawings provided by the Client, the roof deck was built in two phases. No age was provided for the original section which is located towards the fish ladder, it is assumed that this section was built along with the fish ladder in ~1958; a newer section was added later on facing the main street and assumed to have been constructed in ~1996. Based on observations made on site it is possible that the building was not engineered to support the deck load, some concerns regarding the deck structure were also reported by the Client. This issue should be addressed immediately before opening to the public next season as it poses a safety risk on users visiting the building. Since Golder evaluation is based only on observations it is recommended to conduct a structural study on the deck and the building to determine if the deck is safe for use or if some structural reinforcement is required. Costs for the study and potential repairs are included in the Capital Reserve Table; final costs of repairs will rely solely on the results of the study.

IMMEDIATE ITEMS:

Imm.7B) Wood roof deck study.

RECOMMENDED FURTHER INVESTIGATION:

RAI 3B) Structural study for the roof viewing deck.

FISH HATCHERY (SITE A):



Photo #SA1: Damaged section on SOG.



Photo #SA2: Building framing, with open web steel joists and metal deck.



Photo #SA3: Maintenance shop addition enclosures.



Photo #SA4: Fresh water room addition.

FISH LADDER (SITE B):



Photo #SB1: Interior view, building structure is mostly hidden behind finishes.



Photo #SB2: Tower, partial view of the structure.

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Photo #SB3: Typical exterior wall.



Photo #SB4: Deck structure on the roof top.

5.0 MECHANICAL

Site A: Fish Hatchery

The building is supplied with domestic water through a well located on site. Domestic water distribution piping is a combination of copper and PVC plastic. Sanitary sewer is discharged into a septic tank located north of the site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Waste water piping is PVC plastic. Domestic hot water is provided by one electric hot water heater located in the office area. Heating for the building is accomplished via gas-fired radiant tube heaters, electric suspended unit heaters, duct heaters, electric baseboard heaters and a wall mounted force flow electric unit heater. Heating equipment is distributed throughout the building. Ventilation and assisted heating is provided by heat recovery ventilators (HRV) located in the chinook and fresh water rooms. Galvanized metal ductwork is provided throughout except for the office area. The HVAC systems are controlled by zoned manual thermostats throughout the building. One exhaust ventilation unit was observed in the washroom. Plumbing fixtures for the washroom are vitreous china tank type water closet and counter mounted enamel lavatory. The kitchen is provided with a double basin stainless steel sink.

Capital expenditures with respect to the radiant tube heaters are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

Site B: Fish Ladder

No domestic potable water or a sanitary sewage disposal service is provided for the site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Heating for the building is accomplished through electric baseboard and force flow electric unit heaters. No mechanical components were identified for ventilation. The heating units are controlled by localized manual thermostats throughout the building. The building is not provided with washrooms facilities or plumbing fixtures of any kind.

Capital expenditures items were not identified within the timeframe of this report.

The mechanical components are in acceptable overall condition.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M01.1A	**Domestic Water Supply**	The building is supplied with domestic potable water through a well located north of the site.	**4**	-	No concerns observed or reported.
M01.1B	**Domestic Water Supply**	No potable water is provided for the building.	**-**	-	N/A
M01.2A	**Sanitary Sewer**	The sanitary sewer is discharged into a septic tank located north of the site.	**4**	-	No concerns observed or reported.
M01.2B	**Sanitary Sewer**	No sewage discard system is provided.	**-**	-	N/A
M01.3A	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3B	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.4A	**Gas Servicing**	Propane gas is provided by a propane gas tank located outside the building and north of the site.	**4**	-	No concerns observed or reported.
M01.4A	**Gas Servicing**	No gas service available.	**-**	-	N/A

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.1A	**Water Distribution**	**~1984/2000:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No concerns observed or reported.
M02.1B	**Water Distribution**	The building is not provided with potable water service or plumbing fixtures.	**-**	-	N/A.
M02.2A	**Backflow Prevention**	According to drawings provided by the client a backflow preventer is provided for the main water line. However, no backflow prevention was observed or reported to be on site.	**-**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.3A	**Domestic Hot Water Heaters**	**2011:** One electric water heater is provided for the building. Data label information is as follow: Make: GSW. Model: 3G30LSEB. Serial Number: 9603839501. Capacity: 102 L	**4**	-	The equipment will reach its EUL by 2016, at which time it is recommended to replace it. (See Note **5A**). No other concerns or reported.
M02.4A	**Waste Water Piping**	**~1984/2000**: PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4B	**Waste Water Piping**	The building is not provided with potable water service or plumbing fixtures.	**-**	-	N/A.
M02.5A	**Washroom Fixtures**	**2014**: The washroom is provided with a counter mounted vitreous china lavatory and tank type water closet.	**5**	-	No concerns observed or reported.
M02.5B	**Washroom Fixtures**	No washrooms are provided within the facilities.	**-**	-	Site Representative reported that a washroom addition is necessary as the building receives numerous amounts of visitors during the summer months. (See Note **5B**)
M02.6A	**Sinks**	**~2000**: One stainless steel double basin sink is provided for the kitchen space. One stainless steel sanitizing hand wash station sink located in the transition room.	**4**	-	No concerns observed or reported.

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.1A	**Radiant Heaters**	The building is heated by gas propane fired radiant tube heaters. Data label information is as follows: Make: Roberts-Gordon Canada Inc. Model: H-35 Serial: 925369 Input: 35,000 BTUH Date of installation: ~1992 Make: Roberts-Gordon Canada Inc. Model: CTH2-100 Serial: 924836 Input: 100,000 BTUH Date of installation: ~1992 Make: Calcana Industries Ltd. Model: CAL-40A Serial: 7HXXXXX (illegible) Input: 40,000 BTUH Date of installation: ~2000	**4**	3	Heating was reported to be adequate for the use and size of the building. No concerns observed or reported.
M03.2A	**Unit Heaters**	**~1984**: Electric suspended unit heaters are provided throughout the building.	**4**	-	The unit will reach the end of their EUL within the timeframe of this report and should be replaced at a cost below the Capital Threshold. Major ice build-up and condensation was noted from the interior on the door units in the shop which may lead to operational issues during the winter time. It is possible that this issue is due to inadequate heating in this room. We recommend installing a unit heater in this room to assist heating and to avoid ice building up around the exterior doors at a cost below the Capital threshold.

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M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.3A	**Baseboard Heaters**	**~1984/2000**: Heating is also provided by electric baseboard heaters and a force flow heater in the office area.	**4**	-	The units will reach the end of their EUL within the timeframe of this report and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.
M03.3B	**Baseboard Heaters**	**~1996**: Heating is provided by electric baseboard heaters and force flow heaters throughput the building. The viewing windows are also provided with heaters.	**4**	-	No concerns observed or reported.
M03.4A	**Duct Heating**	**~2000:** Electric duct heater equipment was observed connected to the ductwork throughout the building.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1A	**Air Distribution**	**~2000**: Air distribution is provided by galvanized metal ductwork throughout the building.	**4**	-	No concerns observed or reported.
M.04.2A	**Ventilation**	**~2010:** The building is ventilated via several Fantech heat recovery ventilators (HRV). The units are equipped with heat pumps, assisting with the overall heating system in the building.	**5**	-	No concerns observed or reported.
M04.3A	**Air Outlets & Inlets**	**~2000**: The air outlets and inlets are comprised of supply and return air grilles that are fixed to the exposed ductwork.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.4A	**Exhaust Fans**	**~1984**: One ceiling mounted exhaust fans is provided for the washroom.	**4**	-	The unit will reach the end of their EUL within the timeframe of this report and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.

M05 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M05.1A	**Fire Extinguishers**	Portable ABC fire extinguishers are provided throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M05.1B	**Fire Extinguishers**	Portable ABC fire extinguishers are provided throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.

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M06 CONTROLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M06.1A	Electric and Electronic Controls	**~2000**: Local manual thermostats were observed throughout the building to control HVAC equipment.	4	-	No concerns observed or reported.
M06.1B	Electric and Electronic Controls	**~1996**: Local manual thermostats were observed throughout the building to control baseboard heaters.	4	-	No concerns observed or reported.

M99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M99.1A	De-humidifiers	**2013**: Two portable Fantech steel dehumidifiers were observed in the Chinook and Fresh Water rooms.	5	-	Units appear to be functioning properly, no humidity issues have been reported since equipment was installed. No concerns observed or reported.
M99.2A	Heat Trace	**2015:** A heat trace is installed for the toilet pipes.	5	-	Previous issues with pipes freezing were reported which has been resolved since the heat trace was installed. No concerns observed or reported.
M99.3A	Toilet Grinder	**2015:** A Saniplus toilet grinder is installed below the water closet tank.	5	-	No concerns observed or reported.

FLA: WHITEHORSE FISH FACILITIES

NOTES:

5A) This component requires repair or replacement; however, the cost associated with repairing or replacing it is anticipated to fall below the Capital Threshold, therefore it has not been included in the Capital Reserve Table.

5B) Addition for a washroom would be a convenient amenity for visitors; however, Golder understands that potable water supplies and sanitary water disposal would be problematic since the building is located outside the city serviced areas, and the investment cost of a washroom add-on might not be worth it given the size of the building. Golder assumes that this issue can be addressed by leasing portable barrier-free washroom units that can be located outside close to the building for the visitor's convenience.

IMMEDIATE ITEMS:

No immediate items were identified.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.

FISH HATCHERY (SITE A):



Photo #MA1: View of the location of the water heater above the kitchen area.



Photo #MA2: Typical Water Closet.

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Photo #MA3: Sanitation station sink in the transition room.



Photo #MA4: Radiant tube heater located in the office.



Photo #MA5: Typical suspended unit heater.



Photo #MA6: Typical duct heater equipment.

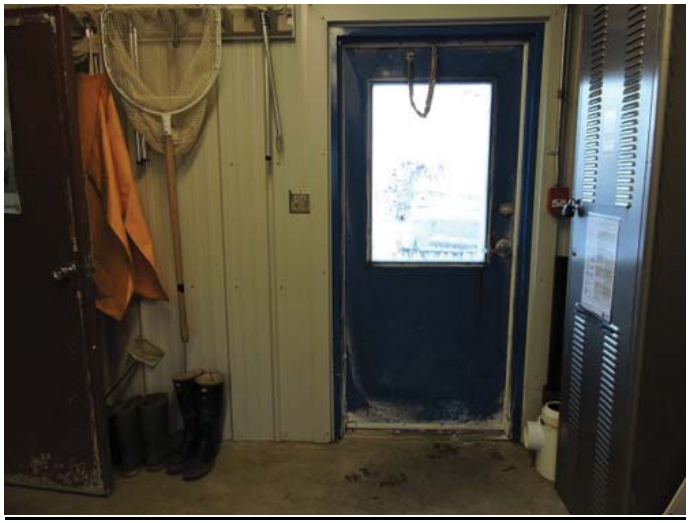


Photo #MA7: Ice around doors in the maintenance shop.



Photo #MA8: Typical ductwork.

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Photo #MA9: Heat Recovery Ventilator (HRV).



Photo #MA10: Portable de-humidifier unit.



Photo #MA11: Heat trace controls.



Photo #MA12: Toilet grinder.

FISH LADDER (SITE B):



Photo #MB1: Force flow heaters in the viewing room.



Photo #MB2: Windows heaters for the units facing the fish ladder.

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6.0 ELECTRICAL

Site A: Fish Hatchery

Electrical service is fed into the building via overhead lines from a pole mounted utility-owned transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution to the building is by a 225 Amp, 120/208 V Square D panel board containing 42 circuits. A main Square D 225 Amp shut off switch is provided for the building. A secondary distribution panel was also observed on site, this equipment is rated at 225 Amp 120/208 V with 30 circuits. Lighting is provided primarily by tubular fluorescent T5 and T8 lamps and Light-emitting diode (LED) throughout. Exterior lighting is accomplished by HID lighting fixtures. Emergency battery packs with integral lighting heads are provided throughout the building. An emergency generator is on site reportedly connected to all light fixtures in the building. No exits signs were observed at emergency exits.

Capital expenditures with respect to the interior transformer, secondary distribution and exterior lighting are anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

Site B: Fish Ladder

Electrical service is provided to the building via underground conductors. Solar panels are also provided fixed to the main tower structure. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished by a Square D main panelboard rated at 125 Amp, 120/240 V with 24 circuits. Lighting is provided by tubular fluorescent T12 lamps throughout. Exterior lighting is accomplished by HID lighting fixtures. No emergency lighting was observed with the exception of some emergency exit signs.

Capital expenditures with respect to the primary distribution and exterior lighting are anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

E01 INCOMING SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E01.1A	**Exterior Transformer**	A pole mounted transformer is located east of the site, and provides power for the building.	**4**	-	No concerns observed or reported.
E01.1B	**Exterior Transformer**	No exterior transformer was observed on site.	**-**	-	N/A.
E01.2A	**Conductors**	Overhead line conductors are provided from the exterior transformer and into the building's south elevation where the meters are located and then into the interior services.	**4**	-	No concerns observed or reported.
E01.2B	**Conductors**	Underground line conductors provide power for the building. A service meter was observed located next to the main entrance.	**4**	-	No concerns observed or reported.
E01.3B	**Solar Panels**	Solar panels are fixed to the tower structure.	**4**	-	No details were provided as to what components are fed from the solar panels. No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.8A E02.1A	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1984**: One Square D 225 Amp disconnect main switchgear unit is provided in the electrical room. A main distribution panel was observed labeled as Panel A and rated at 225 Amp 120/208 V and it contains 42 circuits.	**4**	1	No concerns observed or reported. (See Note **6A**).
E02.1B	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1996**: Primary distribution is accomplished through a Square D main panelboard located in the office. Equipment is rated at 125 amp, 120/240 V and is provided with 24 circuits. Panel was observed to be 90-100% full.	**3**	3/4	It was reported that the additional space is required in the main panelboard. No other concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.2A	**Interior Transformers**	**~1984**: One Marcus transformer rated at 30 kVA steps down power from 480V to 120/208V and is located in the electrical room.	**4**	3	No concerns observed or reported.
E02.3A	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1984:** One Square D sub-panel is provided labeled as Panel B and rated at 225 Amp 120/208 V and contains 30 circuits. Panel was observed to be 80-90% full.	**4**	3	No concerns observed or reported.
E02.4A	**Branch Wiring**	**~1984/2000**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.4B	**Branch Wiring**	**~1958/1996**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
E02.5A	**Receptacles**	**~1984/2000**: Electrical receptacles are provided throughout the building.	**4**	-	No other concerns observed or reported.
E02.5B	**Receptacles**	**~1958/1996**: Electrical receptacles are provided throughout the building.	**4**	-	No other concerns observed or reported.
E02.6A	**Surge Protection**	**1982:** Surge protection is provided located beside the main disconnect switch. Equipment was manufactured by Westinghouse and is rated at 240 V.	**4**	-	No concerns observed or reported.
E02.7A	**Emergency Generator**	**1982:** A Hewage Stamford fuel fired emergency generator is provided on site rated at 62.5 kVA, 208/120 V and 174 amps.	**4**	3	No concerns observed or reported.

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E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1A	**Interior Lighting**	**2014**: Suspended tubular fluorescent lamps with T8 and T5 bulbs are provided in the building. Some LED lighting fixtures are also provided.	**4**	-	No concerns observed or reported.
E03.1B	**Interior Lighting**	**~1958/1996**: Surface mounted tubular fluorescent lamps are provided in the building. Reportedly the fixtures are original to the building and are equipped with T12 lamps.	**4**	3	Lighting fixtures have surpassed their EUL and require replacement. It is recommended to replace the older lighting fixtures for more energy efficient fixtures as T12 lamps are being phased out and replacements may no longer be available in the future. No concerns observed or reported.
E03.2A	**Lighting Controls**	**~1984/2000**: Interior lighting is operated by switches located throughout the building. Exterior lighting is operated by motion sensors.	**4**	-	Lighting controls will reach the end of their EUL and will require replacement during the timeframe of this report. Costs for replacement are considered to be below the capital threshold. No other concerns observed or reported.
E03.2B	**Lighting Controls**	**~1958/1996**: Interior lighting is operated by switches located throughout the building. Exterior lighting is operated by motion sensors.	**4**	-	Lighting controls will reach the end of their EUL and will require replacement during the timeframe of this report. Costs for replacement are considered to be below the capital threshold. No other concerns observed or reported.
E03.3A	**Emergency Lighting**	**~1984:** Some battery packs were observed throughout the building. It was reported that all interior lighting is connected to the emergency generator.	**4**	-	No concerns observed or reported (See Note **6B** and **6C**).
Imm. 9B E03.3B	**Emergency Lighting**	No emergency light components were observed.	**1**	1	Emergency is recommended to be installed immediately as it a safety concern in an emergency event. No other concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm. 10A E03.4A	**Exit Lighting**	No signs indicating emergency exits were observed.	**1**	1	Exit signs are recommended to be installed indicating emergency exits. An allowance is included in the Capital Reserve Table for new LED exit signs.
E03.4B	**Exit Lighting**	~**1958/1996**: Powered emergency exit signs are provided at emergency exits.	**3**	-	Two exit signs were observed to be aged and past their EUL. (See Note **6D**).
E03.5A	**Exterior Lighting**	**~1984/2000**: Exterior wall-mounted HID lights are provided along the building elevations.	**4**	3	Exterior Lighting will reach the end of its EUL and will require replacement within the timeframe of this report.
E03.5B	**Exterior Lighting**	**~1996**: Exterior wall-mounted HID lights are provided along the building elevations.	**4**	3	Exterior Lighting will reach the end of its EUL and will require replacement within the timeframe of this report.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1A	**Grounding**	**~1984**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1B	**Grounding**	**~1958**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E05.1A	**Fire Alarm System**	**~2007**: The building is equipped with a Mircom fire alarm panel.	**4**	-	Fire alarm certificate and inspections were observed to be up to date. No concerns observed or reported.
E05.2A	**CO2 Alarm System**	**~2000**: One CO2 detector was observed for the building located in the office area.	**4**	-	No concerns observed or reported.
E05.3A	**Detectors**	**~2000**: Detection and alarm equipment for the fire alarm system include smoke/heat detectors, fire bells, pull stations	**4**	-	No concerns observed or reported.
Imm.11B E05.3B	**Detectors**	No detection devices were observed on site.	**-**	1	It is recommended to install fire detection devices immediately.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.1A	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.2A	**LAN Systems**	None observed.	**-**	-	N/A
E06.3A	**Intrusive Systems**	**~2000**: The building is protected by a security system with intrusion detection. The system is being monitored and detection devices include door contacts, cold sensor, low water level sensor (for fish tanks) and motion sensors.	**4**	-	No concerns observed or reported.
E06.3B	**Intrusive Systems**	**~1996**: The building is protected by a security system with intrusion detection. The system is being monitored and detection devices include door contacts, glass break-ins, alarms and motion sensors.	**4**	-	No concerns observed or reported.
E06.4A	**Surveillance System**	None provided.	**-**	-	N/A

E06 COMMUNICATIONS, DATA, & SECURITY

E06.4B	**Surveillance System**	One security camera was observed at the main entrance.	**4**	-	It was reported that no surveillance system was installed in the building, but one security camera was found. Security camera is assumed to be monitored by YEC Security Control Center (SCC). No concerns observed or reported.

NOTES:

6A) It was noted that some storage items were located within less than 1 m from electrical panels. This is a code violation. Storage items should be removed immediately and be relocated at a distance of at least 1 m from all electrical panels and switches.

6B) This component requires repair or replacement; however, the cost associated with repairing or replacing it is anticipated to fall below the Capital Threshold, therefore it has not been included in the Capital Reserve Table.

6C) According to Point of Contact the interior light fixtures are tied in to the emergency generator on site; however, battery packs were observed as emergency lighting within the building. It is recommended to verify if the emergency lighting is tied in to the generator as well.

6D) Exit signs were not located properly, in one case the exit sign is located in between two exit doors making it confusing to identify the exit door. It is recommended to replace older units with newer and more reliable units properly placed above all exit door frames. Costs for replacement are assumed to fall below the Capital Threshold; therefore no costs are included in the Capital Reserve Table.

IMMEDIATE ITEMS:

Imm.8A) Remove storage items and relocate at a distance of at least 1 m from panelboards and switchgears.

Imm.9B) Install emergency lights.

Imm.10A) Install emergency LED exit signs.

Imm.11B) Install fire detection devices.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.

FISH HATCHERY (SITE A):



Photo #EA1: View of the pole mounted transformer.



Photo #EA2: View of the exterior meters.



Photo #EA3: Typical panelboard distribution.



Photo #EA4: Main transformer.



Photo #EA5: Surge protection device.



Photo #EA6: On-site emergency generator.



Photo #EA7: Some of the fluorescent fixtures provided.



Photo #EA8: Emergency lighting in the electrical room.

FISH LADDER (SITE B):



Photo #EB1: Solar panels fixed to the tower.



Photo #EB2: View of the exterior meter.



Photo #EB3: Main panelboard.



Photo #EB4: Interior fluorescent light fixtures in the viewing room.



Photo #EB5: Older emergency exit light.



Photo #EB6: Intrusive security system panel.



7.0 HAZARDOUS MATERIAL REPORTS

Based on the year of the original development for both sites, Building A (~1984) and Building B (~1958), hazardous building construction materials such as ACMs (asbestos containing materials), and/or PCBs (polychlorinated biphenyls) are possible to be present in the building. Site Representative reported that they were not aware of any hazardous materials present such as ACMs but if present they might be contained. Some other hazardous materials were reported to be stored within the fish hatchery facility such as chlorine, pool pucks, cleaning products, anesthetic, among others; these materials were reported to be properly stored and MSDS sheets are provided. No other hazardous materials were observed to be present or stored within the fish ladder building.

Report Signature Page

GOLDER ASSOCIATES LTD.



Dave Ayriss, B.Sc., CIH, CRSP
on behalf of
Lawrence P. McSorley, M.Arch., M.C.P., RA
Senior Building Condition Specialist

LPM/rp

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APPENDIX A

Mandate & Report Resources

MANDATE AND REPORT RESOURCES

Authorization

Written Notice of Award of Building Assessment Reports for Yukon Energy Corporation (YEC) was provided on November 1st, 2015. A Facility Lifecycle Assessment (FLA) of the Sites identified in the Introduction section of the report was subsequently conducted. The Sites are currently owned and managed by YEC.

Purpose

The primary objective of the FLA was to visually examine and evaluate the present condition of the property elements, buildings and related structures. The FLA process is being undertaken to assist YEC in capital planning and evaluating the potential financial liabilities associated with the condition of the Site elements, building and related structures on the Sites. Golder understands that YEC will rely on this report for capital planning.

Scope

The FLA was conducted in general accordance with the American Society for Testing and Materials (ASTM) “Standard Guide for Property Condition Assessments: Baseline Property Condition Process E 2018-08”, as locally applicable. The Golder Assessors (identified on the first page of the report) conducted the Sites reconnaissance on the date shown. The Sites reconnaissance was limited to a walk around the Sites, a walk-through of the buildings and interview with personnel listed in the Introduction section of the report (referred to as the “Point of Contact” in this report). Copies of selected photographs documenting conditions at the time of the visit are provided throughout the report.

The purpose of the report is to communicate identified physical deficiencies, future capital projects, and the associated opinions of estimated costs where the cost is greater than the Capital Threshold and expected to occur within the time frame used for the report. In accordance with this agreed mandate, assumptions were required to delineate between capital items and routine maintenance. Please refer to the “Operating and Maintenance Item” list below. Also please refer to the attached “Discussions of Overall Concepts and Terminology” for additional explanation of assumptions used.

The review of the structural elements was limited to a visual review of the accessible, exposed portions of the buildings and related structures during our visit to the building. The roofs, walls, floors and ceilings were visually reviewed to collect information in this regard.

The review of the mechanical, electrical and fire safety systems was performed by non-specialists in conjunction with discussions with the Point of Contact. A detailed assessment by a mechanical or electrical professional consultant should be conducted if further information regarding the condition, durability and/or expected future capital expenditures related to these systems is required.

Compliance with national and provincial building codes and/or fire codes is not part of the scope of this assessment.



FLA: WHITEHORSE FISH FACILITIES

The estimated costs outlined in this report are based on the conditions encountered and observations made during the reconnaissance. Estimates of quantities and areas are based on information supplied, field observations and/or interviews. Item repair/replacement costs are approximate only. Restoration costs are sensitive to local and overall economic factors and therefore, specific quotations from qualified contractors should be obtained when a specific deficiency is addressed or a capital project is to be implemented.

Operating and Maintenance Items

Golder assumes the following items will be maintained under normal operating budgets and are therefore not included in the Capital Reserve Table.

SITE

- Buried services
- Landscaping
- Fences

STRUCTURE

- Foundations and footings

ROOF

- Periodic maintenance

WALLS AND WINDOWS

- Local periodic repairs and needle glazing
- Weather-stripping

INTERIORS

- Various common furnishings, specialty equipment
- Small residential appliances

MECHANICAL

- Sump Pits
- Irrigation System
- Motors, ductwork and in-duct equipment
- Gas supply systems
- Roof drains
- HVAC distribution piping
- Air inlets and outlets



ELECTRICAL

- Disconnects and breakers
- Buried conductors

Discussions of Overall Concepts and Terminology

Evaluation Period

The period of evaluation used for this report is 10 years. Capital repairs and replacement that are reasonably expected to be required within this evaluation period and that cost in excess of the Capital Threshold are included in the Capital Reserve Table.

Capital Threshold

The Capital Threshold used for this report is $3,000. This threshold is used to determine whether a capital repair item is to be included in the Capital Reserve Table. Capital repairs identified and estimated to cost less than the threshold, or that will likely to be performed in phases, as a part of routine maintenance as required, at a cost less than the threshold are not included in the Capital Reserve Table.

Costs

Costs presented in this study for future capital repairs and replacement projects are our Opinions of Probable Budgets and are intended to include taxes, permit fees, contingency and where appropriate, Engineering fees for design, specifications, tendering, project management and construction monitoring. We have generally assumed replacement will occur on a like-for-like basis except where obsolescence or technological advancements logically dictates an upgrade. More accurate costing in the future will require a condition assessment, choice and development of an appropriate repair option, designing and tendering the work to qualified contactors.

Immediate Items

Immediate repairs include deficiencies that require action in the next 60 to 90 days as a result of (i) existing or potentially unsafe conditions, (ii) negative conditions significantly impacting marketability or habitability, (iii) material building code violations, (iv) poor or deteriorated condition of a critical element or system, or (v) a condition that if left “as is” with extensive delay in addressing same, would result in or contribute to critical element or system failure within 12 months or a significant escalation in the repair cost.

Capital Reserve Analysis

The Capital Reserve Table includes a section that provides the average annual capital costs per square foot. Replacement Reserves include (i) deficiencies that may not warrant immediate attention, but require repair or replacement that should be undertaken on a priority basis over routine preventive maintenance work and (ii) components or systems that have realized or exceeded their Expected Useful Life (EUL) during the evaluation period (realization of EUL alone does not constitute an immediate repair). Replacement reserve costs are included in Appendix C.



Opinions of probable costs are provided for material physical deficiencies and not for repairs or improvements that could be classified as:

- cosmetic or decorative;
- part or parcel of a building renovation program or tenant improvement/finishes;
- enhancements to reposition the asset in the marketplace;
- for warranty transfer purposes;
- routine or normal preventative maintenance;
- less than the capital threshold for this report; and
- are expected to occur beyond the time frame of this report.

Cost Inflation Rate:

We have presented the costs in current year (2015) values. We have used 3% in the capital reserve table attached. Further sensitivity analysis using other inflation assumptions should be tested when projecting future cash-flows.

Life Expectancies:

Our estimates of the life expectancy of common element components, systems and sub-systems are based on our opinion of the observed condition during our Site visit, experience with similar material at other buildings, published industry standards, articles and recommendations made by material suppliers and manufacturers. For some materials or systems, the history of use is not sufficient to predict life expectancy accurately. Monitoring and adjustments to the assumptions are required.

The year in which the capital work is required is estimated on the basis of the current observed conditions, or the construction methods and materials used. This may be shorter or longer than the remaining time in the standard estimated life cycle based on the current age of the item. Our estimates of life cycles reflect our understanding of the standards that the prudent long-term owners would maintain. Deferring and phasing of work is often possible keeping in mind that doing so could reduce building standards, increase disruption to residents, increase costs and risks.



APPENDIX B

Limitations and Use of the Report



LIMITATIONS

This report is intended to provide an assessment of the property conditions at the subject properties, at the time of the Sites visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, Golder may be contacted to extend reliance to such parties. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, which result from reporting the factual information contained herein.

The conclusions as presented represent the judgement of Golder based on the visual observations of the accessible, exposed building elements, supplemented by information and data obtained by Golder and discussions with the Point of Contact and other representatives of the owner identified. Except as otherwise may be requested, Golder disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the FLA. No physical testing or intrusive investigations were conducted, and no samples of building materials were collected to substantiate the observations made.

In evaluating the Sites, Golder has relied in good faith on information provided by other individuals noted in this report. Golder in certain instances has been required to assume that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Point of Contact. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, thus any parties making use of this report should review these issues with appropriate legal counsel.

Should additional information become available with respect to the building elements or systems, Golder requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.



APPENDIX C

Capital Reserve Tables

Appendix D - Capital Reserve Table (Site A)

Project Information

				Threshold	$3,000
Total Gross Sq. m.	158	Year Built	1984	Reserve Term (years)	10
Number of Buildings	1	Age	31	Assumed Inflation	3%

Identified Costs

Report Section	Building Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year											RESERVE TOTAL
									Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)					
										2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
3	**ARCHITECTURAL**																			
A01	**Site Improvements**																			
Imm.1A	Handrails	-	-	-	-	Allowance		Safety	$1,000											
A02	**Exterior Walls**																			
A02.1A	Exterior Paint	1995	15	20	0	180 m²	$20/m²	LCR		$3,600										**$3,600**
A02.3A	Joint Sealers	2000	20	15	5	Allowance		Repair		$3,000										**$3,000**
A03	**Exterior Windows**																			
	No Capital Items Identified																			
A04	**Exterior Doors**																			
	No Capital Items Identified																			
A05	**Fascia and Soffits**																			
	No Capital Items Identified																			
A06	**Interior Walls and Partitions**																			
A06.2A	Interior Paint	2000	15	15	0	250 m²	$35/m²	LCR		$8,750										**$8,750**
A07	**Interior Doors**																			
	No Capital Items Identified																			
A08	**Ceilings**																			
	No Capital Items Identified																			
A09	**Flooring**																			
	No Capital Items Identified																			
A10	**Fixtures**																			
	No Capital Items Identified																			
R01	**Roofing**																			
RAI/Imm. 4A	Drainage Study	-	-	-	-	Allowance		Study	$2,500											
R01.3A	Gutters and Downspouts	-	-	-	-	Allowance		Repair		$4,000										**$4,000**
A99	**Other (Stairs Conveyance Devices)**																			
	No Capital Items Identified																			
4	**STRUCTURAL**																			
S01	**Foundations**																			
	No Capital items identified																			
S02	**Floors on Grade**																			
	No Capital items identified																			
S03	**Suspended Floors and Stairs**																			
	No Capital items identified																			
S04	**Roof Structures**																			
	No Capital items identified																			

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Identified Costs

Report Section	Building Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year										RESERVE TOTAL
									Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)				
										2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
S05	**Interior Walls and Columns**																			
	No Capital items identified																			
S06	**Exterior Walls and Columns**																			
	No Capital items identified																			
S99	**Other**																			
	No Capital items identified																			
5	**MECHANICAL**																			
M01	**Site Services**																			
	No Capital Items identified																			
M02	**Plumbing**																			
	No Capital Items Identified																			
M03	**Heating**																			
M03.1A	Radiant Tube Heaters	1992	30	23	7	2	$2,500/ea.	LCR									$5,000			**$5,000**
M04	**Ventilation**																			
	No Capital Items Identified																			
M05	**Fire Protection**																			
	No Capital Items Identified																			
M06	**Controls**																			
	No Capital Items identified																			
M99	**Other**																			
	No Capital Items identified																			
4	**ELECTRICAL**																			
E01	**Incoming Services**																			
	No Capital Items identified																			
E02	**Distribution Equipment**																			
Imm.8A	Remove Storage	-	-	-	-	Allowance		Code	$200											
E02.2A	Interior Transformer	1984	30	19	6	1	$3,100 ea.	LCR							$3,100					**$3,100**
E02.3A	Secondary Distribution	1984	30	19	6	1	$3,000 ea.	LCR							$3,000					**$3,000**
E02.7A	Emergency Generator	1984	30	19	6	1	$35,000	LCR							$35,000					**$35,000**
E03	**Lighting and Power**																			
Imm.10A	Install Exit Signs	-	-	-	-	Allowance		Safety	$1,600											
E03.5A	Exterior Lighting	2000	20	15	5	Allowance		LCR						$5,000						**$5,000**
E04	**Grounding**																			
	No Capital Items Identified																			
E05	**Fire Alarm**																			
	No Capital Items Identified																			
E06	**Communications and Security**																			
	No Capital Items Identified																			

Capital Reserve Analysis

	Inflated	*Uninflated*
Average Cost / Year	$3,245	$2,818
Average Cost / Year / Sq. Ft.	$20.54	$17.84

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Reserve Totals
$CAD	$5,300	$19,350	$	$	$	$5,000	$41,100	$	$5,000	$	$	$70,450
$CAD	$5,300	$19,931	$	$	$	$5,796	$49,076	$	$6,334	$	$	$81,136

Notes
LCR = Lifecycle Replacement
FR = Failure Replacement

Completed by: **AA**
Reviewed by: **LPM**

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Appendix D - Capital Reserve Table (Site B)

Project Information

				Threshold	$3,000
Total Gross Sq. m.	67	Year Built	1958	Reserve Term (years)	10
Number of Buildings	1	Age	57	Assumed Inflation	3%

Identified Costs

Report Section	Building Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024	2025	RESERVE TOTAL
3	**ARCHITECTURAL**																			
A01	**Site Improvements**																			
Imm.2B/A01.11B	Handrails	-	-	-	-	Allowance		Safety	$5,500	$3,000										**$3,000**
A02	**Exterior Walls**																			
	No Capital Items Identified																			
A03	**Exterior Windows**																			
Imm. 3B	Remove Screen Door	-	-	-	-	Allowance		Safety	$500											
A03.1B	Exterior Windows	1958	40	57	0	Allowance		Replace/Improv.		$8,000										**$8,000**
A04	**Exterior Doors**																			
A04.2B	Utility Doors	1958	40	57	0	3	$1,800/unit	LCR		$5,400										**$5,400**
A05	**Fascia and Soffits**																			
	No Capital Items Identified																			
A06	**Interior Walls and Partitions**																			
A06.4B	Pine Boards	1996	25	19	6	125 m²	$85/m²	LCR/Replace		$3,000								$7,625		**$10,625**
A07	**Interior Doors**																			
	No Capital Items Identified																			
A08	**Ceilings**																			
A08.2B	Pine Board Ceiling	1996	25	19	6	70 m²	$90/m²	LCR										$6,300		**$6,300**
A09	**Flooring**																			
A09.3B	Resilient Floor Sheet	1996	20	19	1	70 m²	$85/m²	LCR				$5,950								**$5,950**
A10	**Fixtures**																			
	No Capital Items Identified																			
R01	**Roofing**																			
R01.1B	SBS Roofing System	1996	25	19	6	75 m²	$220/m²	LCR						$16,500						**$16,500**
RAI/Imm. 5B	Drainage Study	-	-	-	-	Allowance		Study	$2,500											**$3,000**
R01.3B	Gutters and Downspouts	-	-	-	-	Allowance		Repair		$3,000										
A99	**Other (Stairs Conveyance Devices)**																			
RAI/Imm. 6B	Mould	-	-	-	-	Allowance		Study	$4,000											**$20,000**
A99.1B	Mould	-	-	-	-	Allowance		Repair		$20,000										**$3,000**
A99.3B	Exterior Wood Ramps	1996	25	19	6	Allowance		LCR/Code				$3,000								
4	**STRUCTURAL**																			
S01	**Foundations**																			
	No Capital items identified																			
S02	**Floors on Grade**																			
	No Capital items identified																			
S03	**Suspended Floors and Stairs**																			
	No Capital items identified																			
S04	**Roof Structures**																			
	No Capital items identified																			

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Identified Costs

Report Section	Building Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024	2025	RESERVE TOTAL
S05	**Interior Walls and Columns**																			
	No Capital Items identified																			
S06	**Exterior Walls and Columns**																			
S06.2B	Exterior Load-bearing Walls	-	-	-	-	Allowance		Improvement				$50,000								**$50,000**
S99	**Other**																			
RAI/Imm.7B	Roof Wood Deck	-	-	-	-	Allowance		Study/Safety	$3,000											
S99.1B	Roof Wood Deck	-	-	-	-	Allowance		Repair		$25,000										**$25,000**
5	**MECHANICAL**																			
M01	**Site Services**																			
	No Capital Items identified																			
M02	**Plumbing**																			
	No Capital Items Identified																			
M03	**Heating**																			
	No Capital Items Identified																			
M04	**Ventilation**																			
	No Capital Items Identified																			
M05	**Fire Protection**																			
	No Capital Items Identified																			
M06	**Controls**																			
	No Capital Items identified																			
M99	**Other**																			
	No Capital Items identified																			
4	**ELECTRICAL**																			
E01	**Incoming Services**																			
	No Capital Items identified																			
E02	**Distribution Equipment**																			
E02.1B	Main Switchgear Unit	1996	30	19	6	1	$3,000 ea.	LCR/Improv.				$3,000								**$3,000**
E03	**Lighting and Power**																			
E03.1B	Interior Lighting	1996	20	19	1	70 m² GFA	$65/m² GFA	LCR			$4,550									**$4,550**
Imm.9B	Install Emergency Lighting	-	-	-	-	Allowance		Safety	$1,600											
E03.5B	Exterior Lighting	1996	20	19	1	Allowance		LCR		$3,000										**$3,000**
E04	**Grounding**																			
	No Capital Items Identified																			
E05	**Fire Alarm**																			
Imm.11B	Detectors	-	-	-	-	Allowance		Safety	$1,500											
E06	**Communications and Security**																			
	No Capital Items Identified																			

Capital Reserve Analysis

	Inflated	*Uninflated*
Average Cost / Year	$7,272	$6,693
Average Cost / Year / Sq. Ft.	$108.54	$99.90

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Reserve Totals
$CAD	$18,600	$70,400	$4,550	$61,950	$	$16,500	$	$	$13,925	$	$	$167,325
$CAD	$18,600	$72,512	$4,827	$67,694	$	$19,128	$	$	$17,640	$	$	$181,801

Notes
LCR = Lifecycle Replacement
FR = Failure Replacement

Completed by: **AA**
Reviewed by: **LPM**

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At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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February 2016

REPORT

Facility Lifecycle Assessment
Kulan Warehouse
5 Lindeman Road, Whitehorse, YT
Kulan Powerline Shop
7 Bennett Road, Whitehorse, YT

REPORT

A world of capabilities delivered locally

Submitted to:
Yukon Energy Corporation
P.O Box 5920
Whitehorse, YT Y1A 6S7

Report Number: 1541813

Distribution:

2 Copies - Yukon Energy Corporation

1 Copy - Golder Associates Ltd.

Golder Associates

FLA: KULAN WAREHOUSE AND KULAN POWERLINE SHOP, WHITEHORSE YT

EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as the Kulan Warehouse (Building A) located at #5 Lindeman Road, Whitehorse, YT, and the Kulan Powerline Shop (Building B) located at #7 Bennet Road, Whitehorse, YT.

Building A is a single-storey building originally constructed circa 1984 and has the primary function of a warehouse. Building A has a gross floor area (GFA) of approximately 167 m² (1,800 ft²) and is situated on a site covering approximately 1.97 hectares (1.16 acres). Building B is a single-storey building constructed circa 1981 and provides maintenance bays and office space for YEC's Whitehorse Transmission and Distribution department. Building B has a GFA of approximately 446 m² (4,800 ft²) and is situated on a site covering approximately 1.16 hectares (2.86 acres).

Based on the findings of this FLA, the following conclusions are made:

Building A – Kulan Warehouse:

- The site and building were developed circa 1984. Graded gravel is provided throughout the parking areas and drive aisles. The site is enclosed by a chain-link fence with barbed wire and two entrance gates along Lindeman Road. Concrete site elements include a Cast-In-Place (CIP) concrete apron at the west elevation, and a CIP concrete sidewalk along the north elevation. Building A is located approximately 200 m to the southwest of Building B.
- The building is clad with prefinished standing seam metal panels. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows are insulated glazed units set in vinyl frames, and have metal security bars on their interior. Pedestrian entrance doors are painted metal-faced residential units set in painted wood frames. The doors are equipped with proximity card access readers and magnetic locks. An insulated, painted metal, sectional overhead door with motorized opener is provided along the west elevation of the building. Interior wall finishes include painted gypsum wallboard and painted Oriented Strand Board (OSB). Interior doors are wood units with wood veneer finishes and set in painted wood frames. The interior window at the office is a single pane unit set in a painted wood frame. The ceilings are painted gypsum board throughout the building. Flooring finishes throughout the main floor consist of painted concrete slab, with unfinished plywood flooring at the mezzanine. The washroom is provided with a vanity consisting of plastic laminate countertop and cabinets. The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs. The architectural components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip footings around the building perimeter. The main floor is a slab on grade throughout. The mezzanine is wood-framed with plywood flooring. The interior and exterior walls consist of wood stud framing with gypsum wallboard or OBS coverings. The roof construction consists of wood framing with plywood decking. The structural components are in overall acceptable condition.

- Domestic water is trucked on-site and stored in a plastic above ground storage tank and is distributed by a domestic water pump via plastic piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface runoff. Domestic hot water is provided by a single electric domestic hot water heater. Plumbing fixtures include a vitreous china flush tank water closet, and a counter-mounted enameled iron lavatory. Fuel oil is provided by an exterior steel above ground storage tank located to the east of the building. The building is heated by a forced-air, oil-fired furnace located on the mezzanine. Warmed air is distrusted throughout the building by a galvanized steel ductwork system. Building ventilation is provided by the furnace and exterior doors, with air circulation aided by ceiling-mounted rotary fans. The mechanical components are in acceptable overall condition.
- Electrical service is provided from an off-site electrical transformer via overhead cables to the north elevation of the building. Power is distributed by a 42-circuit electrical sub panel rated at 120/240 V, and 200 A. Interior lighting is provided by T8 tubular fluorescent lamps controlled by line voltage switches and dimmers. Exterior lighting is provided by building-mounted and pole-mounted Light Emitting Diode (LED) light fixtures controlled by line voltage switches and photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel auto-dial, pull stations, strobes, and smoke/heat detectors. The building is equipped with a security system and is monitored by YEC's System Control Centre. Features of the security system include motion sensors, key pad, exterior surveillance cameras, and proximity card sensors and magnetic locks on the pedestrian entrance doors. The electrical components are in acceptable overall condition.

Building B – Kulan Powerline Shop:

- The site and building were developed circa 1981. It is estimated the office area at the west side of the building was an addition to the original building. This has not been verified and as such, a construction date of 1981 has been used for all sections of the building for costing purposes. The site is enclosed by a chain-link fence with barbed wire and one entrance gates along Bennett Road. Building B is located approximately 200 m to the northeast of Building B.
- The building is clad with prefinished corrugated metal panels along the north, east, and south, elevations, and is finished with painted fibre cement siding along the west elevation. Exterior walls are provided with batt and expanding spray foam insulation and polyethylene vapour barrier within the wall cavities. Exterior windows are insulated glazed units set in vinyl frames. Exterior doors are a combination of painted and prefinished metal units set in painted or prefinished metal frames. Insulated, prefinished metal, sectional overhead doors with glass inserts and motorized openers are provided at the east elevation of the building. Interior walls are finished with a combination of prefinished metal wall panels, painted and unfinished gypsum board, and painted wood panelling. Interior doors are typically painted or stained wood units set in painted or stained wood frames. One prefinished metal unit set in a prefinished metal frame provided at the utility room. The ceiling finishes consist of exposed structure in the bays, and acoustic ceiling tiles on a suspended T-bar ceiling in the office areas. The floor finishes consist of concrete slab in the bay, and vinyl floor tiles in the office areas. The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs. The architectural components are in overall acceptable condition.

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- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and pad type footings, as well as CIP concrete foundation walls. The main floor is a slab on grade throughout. The interior and exterior walls are a combination of structural steel and wood stud framing, with gypsum wallboard or metal panel coverings. The roof construction is a combination of metal decking supported by structural steel I-sections, and plywood sheeting supported by wood framing. The structural components are in overall acceptable condition.
- Domestic water is trucked on-site and stored in a concrete underground storage tank and is distributed via type M copper piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface runoff. Domestic hot water is provided by a single electric domestic hot water heater. Plumbing fixtures include vitreous china flush tank water closets, and wall-mounted vitreous china lavatories. The office areas are heated by a forced-air heating system, with galvanized ductwork and an oil-fire furnace located within the ceiling space. The bays are heated by suspended oil-fired unit heaters. Building ventilation is provided by the furnace and washroom exhaust fans, with rotary ceiling fans provided further air circulation. The mechanical components are in acceptable overall condition.
- Electrical service is provided from a pole-mounted electrical transformer via overhead cables to the northwest corner of the building. Power is distributed by two electrical distribution panels, each rated at 120/240 V and 200 A. Interior lighting is primarily provided by T8 tubular fluorescent lamps, with incandescent wall sconces provided in the washrooms. Exterior lighting is provided by a combination of LED and High Pressure Sodium (HPS) building-mounted fixtures. All lighting is controlled by line voltage switches. Emergency lighting is provided by battery packs with integral and remote heads, with LED exit signs above exit ways. No fire alarm panel or fire alarm/detection devices are provided within the building. The building is monitored by YEC's System Control Centre, and access control is provided a proximity card sensors and magnetic lock on the main entrance door. The electrical components are in acceptable overall condition.

Given the year of original construction of each building (~1984 and ~1981), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) may be present.

Immediate investigation / action items identified pertain to the branch wiring, receptacles, fire alarm panel and devices at Building B. Deficiencies and Capital Reserve Items have been identified within the 10-year time frame of this report with respect to architectural, mechanical, structural, and electrical components and systems. The Immediate Repairs and Capital Reserve Analysis are included in Appendix C. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.

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Table 1: Summary of Immediate and 10-Year Capital Reserve Expenditures (uninflated)/ Kulan Warehouse (Site A)

Section	Description	Immediate (2016)	Reserve Years 1 to 5 (2016 to 2020)	Reserve Years 6 to 10 (2021 to 2025)	10-Year Reserve Total
3.0	Architectural	$0	$26,300	$220,300	$246,600
4.0	Structural	$0	$0	$0	$0
5.0	Mechanical	$0	$7,800	$0	$7,800
6.0	Electrical	$0	$3,000	$0	$3,000
TOTALS		**$0**	**$37,100**	**$220,300**	**$257,400**

Note: Immediate (2015) expenditures are not included in the Capital Reserve Totals.

Table 2: Summary of Immediate 10-Year Capital Reserve Expenditures (uninflated)/ Kulan Warehouse (Site A)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$6,000	$20,000	$0	$3,000	$7,100	$7,000

Year 6	Year 7	Year 8	Year 9	Year 10
$20,200	$0	$0	$200,100	$0

Table 3: Summary of Immediate and 10-Year Capital Reserve Expenditures (uninflated)/ Kulan Powerline Shop (Site B)

Section	Description	Immediate (2016)	Reserve Years 1 to 5 (2016 to 2020)	Reserve Years 6 to 10 (2021 to 2025)	10-Year Reserve Total
3.0	Architectural	$0	$46,700	$159,100	$205,800
4.0	Structural	$0	$8,000	$0	$8,000
5.0	Mechanical	$0	$24,100	$0	$24,100
6.0	Electrical	$6,000	$31,000	$0	$31,000
TOTALS		**$6,000**	**$109,800**	**$159,100**	**$268,900**

Note: Immediate (2015) expenditures are not included in the Capital Reserve Totals.

Table 4: Summary of Immediate 10-Year Capital Reserve Expenditures (uninflated)/ Kulan Powerline Shop (Site B)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$6,000	$85,800	$17,400	$6,600	$0	$0

Year 6	Year 7	Year 8	Year 9	Year 10
$153,100	$0	$0	$3,000	$3,000

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1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as the Kulan Warehouse (Building A) located at #5 Lindeman Road, Whitehorse, YT, and the Kulan Powerline Shop (Building B) located at #7 Bennet Road, Whitehorse, YT.

Building A is a single-storey building originally constructed circa 1984 and has the primary function of a warehouse. Building A has a gross floor area (GFA) of approximately 167 m² (1,800 ft²) and is situated on a site covering approximately 1.97 hectares (1.16 acres). Building B is a single-storey building constructed circa 1981 and provides maintenance bays and office space for YEC's Whitehorse Transmission and Distribution department. Building B has a GFA of approximately 446 m² (4,800 ft²) and is situated on a site covering approximately 1.16 hectares (2.86 acres).

Written authorization to proceed with the work was provided by Sean Munro, Manager, Property & Risk Management from Yukon Energy Corporation. It is understood that this FLA is required for capital planning.

1.2 Objectives

The objective of the FLA was to document the Site conditions at the time of the Site reconnaissance and, based on available sources of information and observations of surface conditions during the Site reconnaissance, to identify the exterior Site improvements as well as the building structure, envelope, interior finishes, mechanical systems, electrical systems, fire/life safety systems, conveyance devices and visually obvious signs of non-compliance with respect to building code and barrier free accessibility. Due to the age of the buildings, it is possible that hazardous building materials are present.

1.3 Methodology

Site Escort and general building information for Building A was provided by Darryel Collins, Kulan Warehouse Administrator (hereafter referred to as the "Site Representative"). Site Escort and general building information for Building B was provided by Jordan Corbeil, Apprentice Powerline Technician (hereafter referred to as the "Site Representative"). Site reconnaissance was conducted by Brian Levy and Adriana Almeida of Golder on November 30, 2015. The weather at the time of assessment was 3 °C and clear, with no conditions limiting access to or around each Site. Snow coverage prevented observational assessment of the roof or and Site components.

The scope of work did not include sampling or testing to identify the potential presence of hazardous building construction materials such as asbestos-containing materials (ACMs), lead-based paints (LBPs), PCB-containing electrical equipment or other hazardous materials. Due to the age of the buildings (~1984 and ~1981), it is possible that hazardous building construction materials are suspected to be present on Site.

1.4 Evaluation Criteria

The FLA was completed in general accordance with accordance with the YEC stated scope of work as documented in *Request for Proposals Yukon Energy Corporation Building Condition Reports # 2015-036* (hereafter referred to as the "RFP"). The scope of the FLA was limited to identifying components, systems and potential concerns by visual examination of surface features and operating practices, and from available documented information sources. Only those items identified as being above the specified Capital Threshold will be addressed in the Capital Reserve Table. The Condition Rating system (CR) used throughout this report is based on the YEC RFP:

Code	Description
1	**Critical Unsafe**, high risk of injury or critical system failure.
2	**Poor** - does not meet requirements, has significant deficiencies. May have high operating / maintenance costs.
3	**Marginal** - Meets minimum requirements, has significant deficiencies. May have above average operating maintenance costs.
4	**Acceptable** - Meets present requirements, minor deficiencies. Average operating/maintenance costs.
5	**Good** - Meets all present requirements. No deficiencies.
6	**Excellent** - As new/state of the art, meets present and foreseeable requirements.

The capital expenditures identified with respect to deficiencies or deferred maintenance shall be identified by the following Categories ("Cat#"):

Category	Description
1	Code & Safety
2	Repair & Maintenance
3	Capital Expenditure
4	Modernization / Improvements
5	Other

Items identified with a CR rating of 1 and/or Cat1, shall be treated as “Immediate” action items, considered to have conditions that include deficiencies that require action in the next 60 to 90 days. Items identified with a CR of 2 or 3 and/or Cat2 shall be considered to have conditions that include deficiencies that can be addressed within the next five years (2016 to 2020 in the Capital Reserve Table). Preventative Maintenance (PM) items may have been identified. These PM items are items anticipated to be required to maintain specific components/systems through to the end of their Expected Useful Life (EUL) and are considered to have CR of 4 or better that can be addressed at any time within the 10 year time frame of this report (2016 to 2025 in the Capital Reserve Table).

Other non-urgent conditions identified with a CR of 4 to 6, are prioritized by their identification as Cat2 to Cat4 and are included in the Capital Reserve Table in an appropriate year. For items with no observed or reported deficiencies, a lifecycle replacement (LCR) cost estimate has been provided in the Capital Reserve Table spreadsheet in the year equal to the year of original installation plus that component’s EUL. If an item with no observed or reported deficiencies is nearing or has surpassed its EUL in the next 5 years (i.e., 2016 to 2020), an LCR cost estimate has been provided in the Lifecycle Plan spreadsheet in year 2020.

For similar components that have been replaced/installed at different times but where the age difference is equal to or less than 20% of the component’s EUL, the average install year has been used in calculating the next lifecycle replacement event (i.e., for similar vinyl floor tile installed in 1999 versus 2002, each having a 20 year TDL, an average install year of 2001 has been used to calculate a single lifecycle replacement event in 2021).

No building material sampling or testing was conducted as part of this assessment.

1.5 Recommendations for Additional Investigation or Action

- Determine if mould growth is present in the utility room of Building B.
- Conduct a domestic water quality assessment in Building B.

1.6 Desktop Data Collection

The following documents were provided by YEC:

- Various architectural drawings related to the Kulan Warehouse.
- Electrical drawings titled Kulan Warehouse Lighting Layout prepared by Yukon Energy Corporation dated June 2014.

1.7 Outstanding Information

All information that has been requested has been provided at the time of the completion of this report.

1.8 Building & Fire Code Compliance Overview

An electrical junction box in the south bay was observed to be missing a cover. Code violations were also noted with the electrical receptacles throughout the building, including exposed live wires, and receptacles near the lavatories in the washrooms being not GFCI protected. No other outstanding work orders, building code violations, building code infractions, building ordinances or municipal health or fire safety by-laws violations were reported.

1.9 Evidence of Mould Presence

Suspect mould was observed in the utility room of Building B. The room provides access to the domestic water storage tank which may produce an environment conducive to mould growth. Black discolouration was observed throughout the walls which should be tested and managed accordingly.

1.10 Outline of the Report

The report that follows this section contains a summary description of the Site and building systems/components along with a detailed listing and description of systems/components. Furthermore, current, imminent or anticipated deficiencies above the Capital Threshold (if any) and excluding normal operating maintenance are presented with a CR, including a description of the risk/consequence of deferral, probability of imminent/anticipated failure and/or a further description of any failure if it has already occurred.

A more detailed Capital Reserve Table is presented in Appendix C outlining the specific systems/components, EUL, Install Date, Remaining Useful Life (RUL), replacement event type, basis of estimate and specific years for Capital Reserve planning.

1.11 Mandate and Report Resources

Please refer to Appendix A for the report mandate for this project and for additional resources related to the assumptions used in preparing this report such as:

- Operating and Maintenance Items; and,
- Discussions of Overall Concepts and Terminology.

2.0 SITE DESCRIPTION

2.1 Site Location and Setting

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as the Kulan Warehouse (Building A) located at #5 Lindeman Road, Whitehorse, YT, and the Kulan Powerline Shop (Building B) located at #7 Bennet Road, Whitehorse, YT.

Building A is a single-storey building originally constructed circa 1984 and has the primary function of a warehouse. Building A has a gross floor area (GFA) of approximately 167 m² (1,800 ft²) and is situated on a site covering approximately 1.97 hectares (1.16 acres). Building B is a single-storey building constructed circa 1981 and provides maintenance bays and office space for YEC's Whitehorse Transmission and Distribution department. Building B has a GFA of approximately 446 m² (4,800 ft²) and is situated on a site covering approximately 1.16 hectares (2.86 acres).

2.2 Site Physical Description

Table 5: Site Physical Description of the Kulan Warehouse (Building A)

Topic	Data
Site Area	~1.97 hectares (~4.88 acres)
Number of Buildings on the Site	Three (Kulan Warehouse, Garage, and Shed)
Approximate Footprint Area of Building	~149 m² (~1,600 ft²)
Levels above grade	One plus mezzanine
Levels below grade	None
Date of Building Construction	~1984
Date of Major Renovations/Additions	None
Percentage Site Coverage by Building	~5%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~95% bare/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	N/A



Whitehorse Kulan Warehouse – Building A.

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Table 6: Site Physical Description of the Powerline Shop (Building B)

Topic	Data
Site Area	~1.16 hectares (~2.86 acres)
Number of Buildings on the Site	Two (Kulan Powerline Shop and Staff House)
Approximate Footprint Area of Building	~446 m² (~4,800 ft²)
Levels above grade	One
Levels below grade	None
Date of Building Construction	~1981
Date of Major Renovation/Addition	None
Percentage Site Coverage by Building	~5%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~95%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	N/A



Whitehorse Kulan Powerline Shop – Building B.

3.0 ARCHITECTURAL

Building A – Kulan Warehouse:

The site and building were developed circa 1984. Graded gravel is provided throughout the parking areas and drive aisles. The site is enclosed by a chain-link fence with barbed wire and two entrance gates along Lindeman Road. Concrete site elements include a CIP concrete apron at the west elevation, and a CIP concrete sidewalk along the north elevation. A garage is located at the northwest corner of the site, and a storage shed is located at the northeast corner of the site. These buildings were not reviewed and are outside the scope of this report. Building A is located approximately 200 m to the southwest of Building B.

The building is clad with prefinished standing seam metal panels. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows are insulated glazed units set in vinyl frames, and have metal security bars on their interior. Pedestrian entrance doors are painted metal-faced residential units set in painted wood frames. The doors are equipped with proximity card access readers and magnetic locks. An insulated, painted metal, sectional overhead door with motorized opener is provided along the west elevation of the building. Interior wall finishes include painted gypsum wallboard and painted OSB. Interior doors are wood units with wood veneer finishes and set in painted wood frames. The interior window at the office is a single pane unit set in a painted wood frame. The ceilings are painted gypsum board throughout the building. Flooring finishes throughout the main floor consist of painted concrete slab, with unfinished plywood flooring at the mezzanine. The washroom is provided with a vanity consisting of plastic laminate countertop and cabinets.

The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.

Capital expenditures with respect to the gravel parking lot and drive aisles, concrete sidewalk and apron, chain-link fencing, metal cladding, overhead door, soffits, interior wall paint, metal roofing, and the roof gutters and downspouts are anticipated within the 10-year time frame of this report.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall acceptable condition.

Building B – Kulan Powerline Shop:

The site and building were developed circa 1981. It is estimated the office area at the west side of the building was an addition to the original building. This has not been verified and as such, a construction date of 1981 has been used for all sections of the building for costing purposes. The site is enclosed by a chain-link fence with barbed wire and one entrance gates along Bennett Road. A staff house is located to the south of Building B. The staff house was not reviewed and is outside the scope of this report. Building B is located approximately 200 m to the northeast of Building A.

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The building is clad with prefinished corrugated metal panels along the north, east, and south, elevations, and is finished with painted fibre cement siding along the west elevation. Exterior walls are provided with batt and expanding spray foam insulation and polyethylene vapour barrier within the wall cavities. Exterior windows are insulated glazed units set in vinyl frames. Exterior doors are a combination of painted and prefinished metal units set in painted or prefinished metal frames. Insulated, prefinished metal, sectional overhead doors with glass inserts and motorized openers are provided at the east elevation of the building. Interior walls are finished with a combination of prefinished metal wall panels, painted and unfinished gypsum board, and painted wood panelling Interior doors are typically painted or stained wood units set in painted or stained wood frames. One prefinished metal unit set in a prefinished metal frame provided at the utility room. The ceiling finishes consist of exposed structure in the bays, and acoustic ceiling tiles on a suspended T-bar ceiling in the office areas. The floor finishes consist of concrete slab in the bay, and vinyl floor tiles in the office areas.

The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal fascia is provided along the roof perimeter, and prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.

Capital expenditures with respect to the gravel parking lot and drive aisles, metal cladding, exterior paint, main entrance and utility doors, interior wall paint, acoustic ceiling tiles, vinyl floor tiles, metal roof, and gutters and downspouts are anticipated within the 10-year time frame of this report. Further investigation is recommended regarding suspect mould growth in the utility room.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall acceptable condition.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.01a	**Site Servicing**	**Water**: Domestic water is trucked on-site and is stored in a plastic aboveground storage tank within the building. **Sanitary Sewer**: Sanitary waste is fed to an on-site septic field. **Oil**: Fuel oil is provided by an exterior steel aboveground storage tank located to the east of the building. **Electrical**: Power is fed to the building via overhead cables at the north elevation.	**4**	-	No concerns observed or reported.
A01.01b	**Site Servicing**	**Water**: Domestic water is trucked on-site and is stored in a concrete underground storage tank within the building. **Sanitary Sewer**: Sanitary waste is fed to an on-site septic field. **Oil**: Fuel oil is provided by an exterior steel aboveground storage tank located at the northwest corner of the building. **Electrical**: Power is fed to the building via overhead cables at the northwest corner of the building.	**3/4**	-	Issues were reported regarding the domestic water storage tank and the oil storage tank. See Items M01.1b and M01.4b below for further information. No other concerns observed or reported.
A01.02a	**Parking Lots & Drive Aisles**	**~1984:** The site is provided with gravel parking lots and drive aisles.	**4**	3	The site was snow-covered at the time of assessment so the condition of the gravel surfaces was not observed. No concerns were reported. Costing has been included for the re-grading and gravel refresh of the site.
A01.02b	**Parking Lots & Drive Aisles**	**~1981:** The site is provided with gravel parking lots and drive aisles.	**3**	3	The site was snow-covered at the time of assessment so the condition of the gravel surfaces was not observed. It was reported that potholes were present and the site required regarding. Additionally, ponding occurs in some areas suggesting an insufficient slope for drainage. Costing has been included for the re-grading and gravel refresh of the site.
A01.03a	**Parking Lot Markings**	N/A	**-**	-	N/A
A01.03b	**Parking Lot Markings**	N/A	**-**	-	N/A

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.04a	**Concrete Sidewalk**	**~1984:** A CIP concrete walkway is provided along the north elevation of the building.	**4**	-	The concrete sidewalks are currently in acceptable condition. Costing for the replacement of the sidewalk has been included with Item A01.05a below.
A01.04b	**Concrete Sidewalk**	N/A	**-**	-	N/A
A01.05a	**Concrete Curbs / Pads**	**~1984:** A CIP concrete apron is located at the loading dock at the west elevation.	**3**	3	The concrete apron has settled and slopes towards the building which reportedly contributes to water ingress. The concrete surface appeared to be in an acceptable condition. An allowance has been made to mud jack the pad in Year 1, and to replace the pad in year 6. Costing has been included to replace the concrete sidewalk concurrently.
A01.05b	**Concrete Curbs / Pads**	N/A	**-**	-	N/A
A01.06a	**Parking Islands**	N/A	**-**	-	N/A
A01.06b	**Parking Islands**	N/A	**-**	-	N/A
A01.07a	**Parking bumpers**	N/A	**-**	-	N/A
A01.07b	**Parking bumpers**	N/A	**-**	-	N/A
A01.08a	**Site Drainage**	Overland soil absorption and runoff.	**4**	-	No concerns observed or reported.
A01.08b	**Site Drainage**	Overland soil absorption and runoff.	**3**	-	Ponding was reported at some areas of the site. An allowance for regarding has been included with Item A01.2b above.
A01.09a	**Grassed Areas**	N/A	**-**	-	N/A
A01.09b	**Grassed Areas**	N/A	**-**	-	N/A
A01.10a	**Fencing**	**~1984**: Chain-link fencing with barbed wire is provided along the property line of the site. Two chain-link gates are provided along Lindeman Road.	**4**	-	The site fencing is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced.
A01.10b	**Fencing**	**~1981**: Chain-link fencing with barbed wire is provided along the property line of the site. One chain-link gate is provided along Bennett Road.	**4**	-	The site fencing is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced.
A1.11a	**Retaining Walls**	N/A	**-**	-	N/A
A1.11b	**Retaining Walls**	N/A	**-**	-	N/A

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A1.12a	**Signage**	**~1984**: Sheet metal warning signs are provided throughout the site.	**4**	-	No concerns observed or reported.
A1.12b	**Signage**	**~1981**: Plastic signage is provided adjacent to the overhead doors.	**4**	-	No concerns observed or reported.
A1.13a	**Amenities**	**~1984**: A cigarette receptacle is located adjacent to the main entrance.	**-**	-	N/A
A1.13b	**Amenities**	N/A	**-**	-	N/A
A01.14a	**Ancillary Buildings**	**~2007**: A garage is located at the northwest corner of the site. **~2012**: A storage shed is located at the northwest east corner of the site.	**4**	-	These buildings are outside the scope of this report and were not directly reviewed. No concerns reported.
A01.14b	**Ancillary Buildings**	**~2012**: A staff housing building is located to the south of Building B.	**4**	-	These buildings are outside the scope of this report and were not directly reviewed. No concerns reported.
A01.15a	**Decks and Terraces**	N/A	**-**	-	N/A
A01.15b	**Decks and Terraces**	N/A	**-**	-	N/A
A01.16a	**Canopies**	N/A	**-**	-	N/A
A01.16a	**Canopies**	N/A	**-**	-	N/A
A01.17a	**Railings**	**~1984:** A galvanized steel guardrail with treated wood posts is located at the northwest corner of the site.	**4**	-	No concerns observed or reported.
A01.17b	**Railings**	N/A	**-**	-	N/A
A01.18a	**Bollards**	**~1984:** Painted steel concrete-filled bollards are provided adjacent to the overhead door.	**4**	-	No concerns observed or reported.
A01.18b	**Bollards**	**~1981:** Painted steel concrete-filled bollards are provided adjacent to the overhead doors.	**4**	-	No concerns observed or reported.
A01.19a	**Fire Hydrants**	None observed on site.	**-**	-	N/A
A01.19b	**Fire Hydrants**	None observed on site.	**-**	-	N/A

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1a	**Metal Cladding**	**~1984**: Prefinished standing seam metal panels are provided around the exterior of Building A.	**4**	3	The cladding is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced.
A02.1b	**Metal Cladding**	**~1981**: Prefinished corrugated metal panels are provided around the north, east, and south elevations of Building B.	**4**	3	The cladding is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced.
A02.2a	**Concrete**	N/A	**-**	-	N/A
A02.2b	**Concrete**	**~2015**: Fibre cement siding is provided around the west section of the building.	**5**	-	The fibre cement siding was reportedly installed in 2015. No concerns observed or reported.
A02.3a	**Exterior Paint**	N/A	**-**	-	N/A
A02.3b	**Exterior Paint**	**~2015**: The fibre cement siding is finished with exterior paint.	**5**	-	The exterior paint is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced.
A02.4a	**Joint Sealers**	N/A	**-**	-	N/A
A02.4b	**Joint Sealers**	N/A	**-**	-	N/A
A02.5a	**Louvers**	N/A	**-**	-	N/A
A02.5b	**Louvers**	N/A	**-**	-	N/A
A02.6a	**Insulation**	**~1984:** Insulation was concealed and not directly reviewed, but likely consists of batt insulation.	**4**	-	No concerns reported.
A02.6b	**Insulation**	**~1981:** Insulation was mostly concealed and not directly reviewed, but likely consists of batt insulation. Expanding spray foam insulation was observed at the upper section of the north wall of the north bay.	**4**	-	No concerns reported.
A02.7a	**Vapour Barrier**	**~1984:** The vapour barrier was concealed and not directly reviewed, but likely consists of polyethylene sheets.	**4**	-	No concerns reported.
A02.7b	**Vapour Barrier**	**~1981:** The vapour barrier was concealed and not directly reviewed, but likely consists of polyethylene sheets.	**4**	-	No concerns reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1a	**Exterior Windows**	**~2000**: The exterior windows are insulated glazed units set in vinyl frames. Metal security bars are installed on the interior side of the windows.	**4**	-	No concerns observed or reported.
A03.1b	**Exterior Windows**	**~2014**: The exterior windows are insulated glazed units set in vinyl frames.	**4**	-	No concerns observed or reported.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1a	**Main Entrance Door**	**~1984**: Painted metal-faced residential doors set in painted wood frames provide pedestrian access to the building. One door is located at the north elevation and one doors located and the west elevation.	**3/4**	3	One of the doors was reported to have operational issues and should be replaced. The other door is currently in acceptable condition, but it has surpassed it EUL.
A04.1b	**Main Entrance Door**	**~1981**: The main entrance door is a painted metal unit with glass insert set in painted a metal frame. **~2000**: Two prefinished metal storefront units set in prefinished metal frames are provided at the vestibule at the main entrance.	**3/4**	3	The main entrance doors are not barrier free in their current condition. Due to the function of the building, no costing has been included for barrier free upgrades. The painted metal entrance door has surpassed its EUL and should be replaced. Costing for the replacement of this door has been combined with Item A04.2b below.
A04.2a	**Utility Doors**	N/A	**-**	-	N/A
A04.2b	**Utility Doors**	**~1981**: Exterior utility doors are prefinished metal units set in prefinished metal frames.	**3/4**	3	Two of the four utility doors have reported operational issues and should be replaced. The remaining two utility doors will surpass their EUL within the timeframe of this report at which time they should be replaced. Costing has been combined with Item A04.1b above.

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A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.3a	**Overhead Doors**	**~1992**: An insulated, painted metal, sectional overhead door with motorized opener is provided along the west elevation of the building.	**4**	3	The door is currently in acceptable condition, but has surpassed its EUL and should be replaced.
A04.3b	**Overhead Doors**	**~2014**: Four insulated, prefinished metal, sectional overhead doors with glass inserts and motorized openers are provided at the east elevation of the building.	5	-	The doors were reportedly replaced in 2014. No concerns observed or reported.

A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1a	**Fascia**	**~1984**: Prefinished metal fascia is provided along the roof perimeter.	**4**	-	The fascia is currently in acceptable condition but has surpassed its EUL and should be replaced. See Note **3A**.
A05.1b	**Fascia**	**~2015**: Prefinished metal fascia is provided along the roof perimeter.	**5**	-	No concerns observed or reported.
A05.2a	**Soffit**	**~1984**: Prefinished metal soffits with ventilation perforations are provided along the underside of the roof overhangs.	**4**	-	The soffits are currently in acceptable condition but have surpassed their EUL and should be replaced.
A05.2b	**Soffit**	**~2015**: Prefinished metal soffits are provided along the roof perimeter.	**5**	-	No concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1a	**Fixed Partitions**	**~1984**: Interior partitions are framed with wood studs and covered with gypsum wallboard.	**4**	-	No concerns observed or reported.
A06.1b	**Fixed Partitions**	**~1981**: Interior partitions are a combination of steel and wood framing, covered with gypsum wallboard or prefinished metal panels.	**4**	-	No concerns observed or reported.
A06.2a	**Metal**	N/A	**-**	-	N/A
A06.2b	**Metal**	**~1981**: Prefinished metal wall panel finishes are provided at some of the walls in the bays.	**4**	-	No concerns observed or reported.
A06.3a	**Gypsum Board**	**~1984**: Gypsum board walls are provided at the office and washroom, as well as along the upper sections of the exterior walls.	**4**	-	No concerns observed or reported.
A06.3b	**Gypsum Board**	**~1984:** Gypsum board walls are provided throughout the building.	**4**	-	The gypsum board walls are generally in acceptable condition. A damaged section was observed at the base of the north wall of the south bay and should be repaired. See Note **3A**.
A06.4a	**Wood**	**~1984**: OSB walls are provided along the lower sections of the exterior walls.	**4**	-	No concerns observed or reported.
A06.4b	**Wood**	**~1981**: Painted wood panelling is provided at some of the interior walls throughout the office area.	**4**	-	No concerns observed or reported.
A06.5a	**Interior Paint**	**~2004**: The gypsum board and OSB walls are finished with paint.	**4**	3	The interior wall paint is generally in acceptable condition, but will require repainting within the timeframe of this report.
A06.5b	**Interior Paint**	**~2001**: The gypsum board walls are typically finished with paint.	**3**	3	The interior paint finishes are approaching their EUL and should be repainted.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1a	**Interior Doors**	**~1984**: The interior doors at the washroom and office are wood units with wood veneer finishes.	**4**	-	The interior doors have surpassed their EUL and should be replaced. See Note **3A**.
A07.1b	**Interior Doors**	**~1981**: Interior doors are typically painted or stained wood units set in painted or stained wood frames. One prefinished metal door set in prefinished metal frame is provided at the utility room.	**3**	-	The interior doors have surpassed their EUL and should be replaced. See Note **3A**.
A07.3a	**Interior Windows**	**~1984**: A single pane window set in a painted wood frame is located at the office.	**4**	-	No concerns observed or reported.
A07.3b	**Interior Windows**	N/A	**-**	-	N/A

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.1a	**Exposed Structure**	N/A	**-**	-	N/A
A08.1b	**Exposed Structure**	**~1981**: The ceilings throughout the bays are exposed to the structure, consisting of metal decking supported by structural steel I-section beams.	**4**	-	No concerns observed or reported.
A08.2a	**Gypsum Board**	**~1984**: Gypsum board ceilings are provided throughout the building.	**4**	-	No concerns observed or reported.
A08.2b	**Gypsum Board**	N/A	**-**	-	N/A
A08.3a	**Interior Paint**	**~2004**: The gypsum board ceilings are finished with paint.	**4**	-	No concerns observed or reported. It is recommended to repaint the ceiling finishes concurrently with the wall painting, or as required. No costing has been included for repainting of the ceiling.
A08.3b	**Interior Paint**	N/A	**-**	-	N/A
A08.4a	**Acoustic Ceiling Tile**	N/A	**-**	-	N/A

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A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.4b	**Acoustic Ceiling Tile**	**~1981**: The office area is provided with acoustic ceiling tiles supported by a suspended T-bar system.	**3**	3	Many of the ceiling tiles are missing, damaged, or stained. The ceiling tiles have surpassed their EUL and should be replaced throughout the office area.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1a	**Concrete**	**~1984**: Painted concrete slab flooring is provided throughout the main floor of the building.	**4**	-	No concerns observed or reported.
A09.1b	**Concrete**	**~1981**: Unfinished concrete slab flooring is provided throughout the bays.	**4**	-	No concerns observed or reported.
A09.2a	**Wood**	**~1984:** Unfinished plywood flooring is provided at the mezzanine.	**4**	-	No concerns observed or reported.
A09.2b	**Wood**	N/A	**-**	-	N/A
A09.3a	**Interior Paint**	**~2000:** Interior paint is provided on the concrete flooring throughout the building.	**3**	-	The painted interior flooring finishes require repainting. See Note **3A**.
A09.3b	**Interior Paint**	N/A	**-**	-	N/A
A09.4a	**Vinyl**	N/A	**-**	-	N/A
A09.4b	**Vinyl**	**~1981**: Vinyl tile flooring is provided throughout the office area.	**2**	3	The vinyl floor tiles are severely worn and damaged. The floor tiles have surpassed their EUL and should be replaced throughout the office area. See Note **3B**.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.1a	**Counters/Cabinets**	**~1984:** The washroom is provided with a vanity with plastic laminate countertop and cabinets.	**4**	3	The washroom vanity will surpass its EUL within the timeframe of this report and should be replaced. See Note **3A**.
A10.1b	**Counters/Cabinets**	N/A	**-**	-	N/A
A10.2a	**Railing**	**~1984:** Painted wood railing is provided around the perimeter of the mezzanine.	**4**	-	The railing should be repainted within the timeframe of this report. Costing has been included with repainting of the interior walls (see Item A06.6a above). No concerns observed or reported.
A10.2b	**Railing**	N/A	**-**	-	N/A
A10.3a	**Interior Signs**	**~1984**: Interior signs are typically self-adhesive vinyl labels.	**4**	-	No concerns observed or reported.
A10.3b	**Interior Signs**	N/A	**-**	-	N/A
A10.4a	**Washroom Accessories**	**~1984**: The washroom is provided with a mirror, trash receptacle, soap dispenser, towel bar, and paper towel dispenser.	**4**	-	Some of the washroom accessories may require replacing within the timeframe of this report. See Note **3A**.
A10.4b	**Washroom Accessories**	**~2005**: The washrooms are provided with soap dispensers, toilet paper dispenser, paper towel dispenser, and magazine holders. The women's washroom is also provided with a wall-hung mirror.	**4**	-	Some of the washroom accessories may require replacing within the timeframe of this report. See Note **3A**.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1a	**Metal Roofing**	**~1984**: Building A is provided with a pitched roof covered with prefinished corrugated metal panels.	**4**	3/2	The metal roofing is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced. Costing has been included for ongoing roof repairs.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1b	**Metal Roofing**	**~2015**: Building B is provided with a pitched roof covered with prefinished corrugated metal panels.	**5**	2	A new metal roof, along with new roof insulation, was reportedly installed in 2015. Reports of previous leaks were made, though no new leaks have been observed since the new installation. Costing has been included for ongoing roof repairs.
R01.2a	**Gutters and Downspouts**	**~1984**: Prefinished metal gutters and downspouts provide roof drainage directly to the ground.	**3**	3/4	The gutters and downspouts have surpassed their EUL and should be replaced. Issues were reported regarding icing up of the roof gutters. An allowance has been made to replace the gutters and downspouts, as well as to install a heat trace system.
R01.2b	**Gutters and Downspouts**	N/A	**2**	4	No gutters or downspouts are provided. It was reported that snow and ice fall onto pedestrian areas blocking doors, and has also caused damage to the exterior electrical receptacles. An allowance has been made to install appropriate roof drainage and/or snow dams as required.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.1a	**Mould**	N/A	**-**	-	N/A
RAI.1b A99.1b	**Mould**	Suspect mould was observed on the gypsum board walls in the utility room.	**3**	1	Black discolouration was observed throughout the walls in the utility room. An allowance has been made to determine of mould growth exists, and to remediate affected areas as required. Cost of remediation will depend on the results of the study.
A99.2a	**Elevators**	N/A	**-**	-	N/A
A99.2b	**Elevators**	N/A	**-**	-	N/A
A99.3a	**Exterior Stairs and Ramps**	N/A	**-**	-	N/A

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.3b	**Exterior Stairs and Ramps**	N/A	**-**	-	N/A
A99.4a	**Interior Stairs**	**~1984**: Access to the mezzanine is provided by a wood-framed stair with painted wood treads and railing.	**4**	-	The interior stairs should be repainted within the timeframe of this report. Costing has been included with repainting of the interior walls (see Item A06.6a above). No concerns observed or reported.
A99.4b	**Interior Stairs**	N/A	**-**	-	N/A
A99.5a	**Ladders**	N/A	**-**	-	N/A
A99.5b	**Ladders**	N/A	**-**	-	N/A
A99.6a	**Crane**	N/A	**-**	-	N/A
A99.6b	**Crane**	**~1981**: A mobile hoist with one-tonne capacity is located in the north bay.	**4**	-	No concerns observed or reported.

NOTES:

3A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

3B) Due to the age of the building, the vinyl flooring tiles have the potential to contain asbestos. Before removing the floor tiles for replacement, it is recommended have the materials tested for asbestos. Appropriate abatement procedures should be followed if the tile is found to be an asbestos-containing material.

IMMEDIATE ITEMS:

No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

RAI.1b) Determine if mould growth is present in the utility room.
No further investigation recommended at this time.



Photo #A1a: General view of the Kulan Warehouse (Building A).



Photo #A2a: Overhead door and concrete apron.

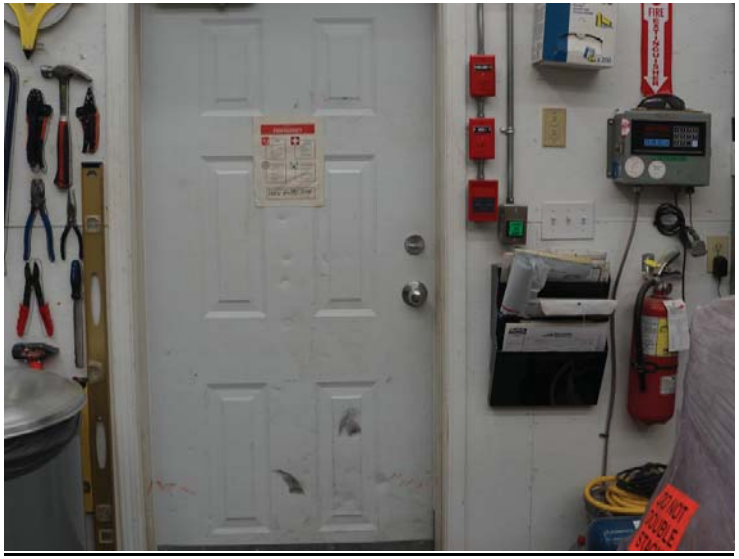


Photo #A3a: Worn exterior door requiring replacing.



Photo #A4a: Interior finishes of the warehouse area.

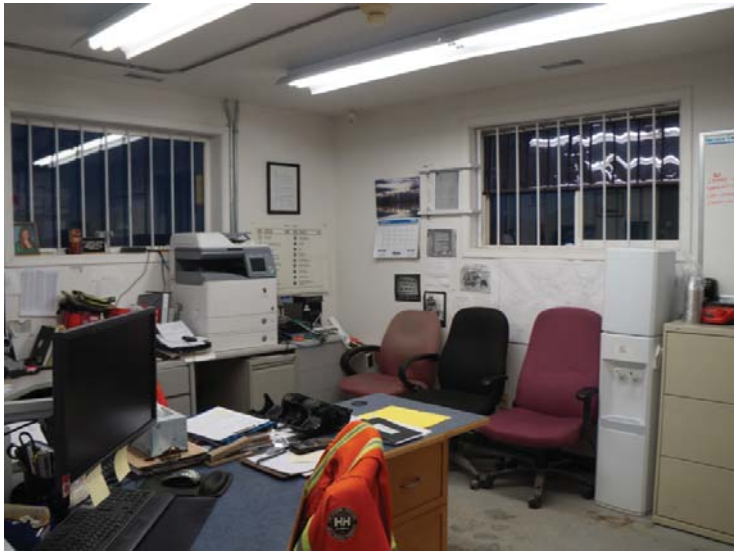


Photo #A5a: Interior finishes of the office.



Photo #A6a: General view of the mezzanine.



Photo #A7b: General view of the Kulan Powerline Shop (Building B)



Photo #A8b: Overhead doors at the rear of the building.

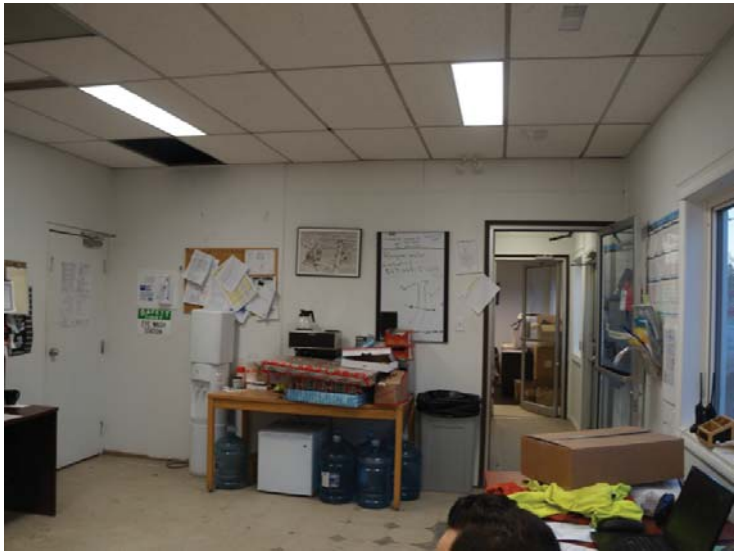


Photo #A9b: Interior finishes of the office area.



Photo #A10b: Damaged vinyl floor tiles.



Photo #A11b: Damaged acoustic ceiling tile in the office area.



Photo #A12b: Interior finishes of the south bay.



Photo #A13b: Damaged gypsum board wall in the south bay.



Photo #A14b: Suspect mould in the utility room.

4.0 STRUCTURAL

Building A – Kulan Warehouse:

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip footings around the building perimeter. The main floor is a slab on grade throughout. The mezzanine is wood-framed with plywood flooring. The interior and exterior walls consist of wood stud framing with gypsum wallboard or OBS coverings. The roof construction consists of wood framing with plywood decking.

No capital expenditures with respect to the structural elements of the building are anticipated within the 10-year timeframe of this report.

A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Building B – Kulan Powerline Shop:

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and pad type footings, as well as CIP concrete foundation walls. The main floor is a slab on grade throughout. The interior and exterior walls are a combination of structural steel and wood stud framing, with gypsum wallboard or metal panel coverings. The roof construction is a combination of metal decking supported by structural steel I-sections, and plywood sheeting supported by wood framing.

Capital expenditure with respect to the concrete slab on grade is anticipated within the 10-year timeframe of this report.

A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S01.1a	**Footings**	**~1984**: The substructure is mostly concealed and was not directly reviewed. Based upon standard construction methods and observations made on site, it is estimated the substructure consists of strip footings around the building perimeter.	**4**	-	No concerns reported.
S01.1b	**Footings**	**~1981**: The substructure is mostly concealed and was not directly reviewed. Based upon standard construction methods and observations made on site, it is estimated the substructure consists of strip and spread type footings.	**4**	-	No concerns observed or reported.
S01.2a	**Foundation Walls**	N/A	**-**	-	N/A
S01.2b	**Foundation Walls**	**~1984**: CIP concrete foundation walls are provided around the perimeter of the building.	**4**	-	No concerns observed or reported.

S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1a	**Slab on Grade**	**~1984**: A CIP slab on grade is provided throughout the building.	**4**	-	No concerns observed or reported.
S02.1b	**Slab on Grade**	**~1981**: A CIP slab on grade is provided throughout the building.	**3**	2	Some heaving and cracking was observed at the northeast corner of the north bay. Drainage issues were also reported in the bays with water pooling near the overhead doors along the east wall instead of collecting at the central catch basins. Costing to have the concrete repaired and regarded if necessary has been included in the Capital Reserve Table.

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S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.1a	**Suspended Floor**	**~1984**: The mezzanine is wood-framed with plywood sheet flooring.	**4**	-	No concerns observed or reported.
S03.1b	**Suspended Floor**	N/A	**-**	-	N/A
S.03.2a	**Crawlspace**	N/A	**-**	-	N/A
S.03.2b	**Crawlspace**	N/A	**-**	-	N/A
S03.3a	**Stairs**	**~1984/1992**: The interior stairs to the mezzanine are wood-framed with painted wood treads and railing.	**-**	-	N/A
S03.3b	**Stairs**	N/A	**-**	-	N/A

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1a	**Framing**	**~1984**: The roof structure was mostly concealed and was not directly reviewed. Based upon standard construction methods and observations made on site, it is estimated the roof is wood-framed.	**4**	-	No concerns reported.
S04.1b	**Framing**	**~1981**: The roof structure of the bays is framed with structural steel I-section beams and girders. The roof structure over the office space was mostly concealed and was not directly reviewed. Based upon standard construction methods and observations made on site, it is estimated the roof is wood-framed over the office areas.	**4**	-	No concerns observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.2a	**Decking**	**~1984**: Concealed and not directly review, but estimated to consist of plywood decking.	**4**	-	No concerns reported.
S04.2b	**Decking**	**~1981**: Metal roof decking is provided at the bays. Plywood roof decking is estimated to be provided at the office section.	**4**	-	No concerns observed or reported.
S04.3a	**Lateral Resistance**	**~1984**: Lateral resistance achieved by shear resistance from the plywood decking.	**4**	-	No concerns observed or reported.
S04.3b	**Lateral Resistance**	**~1981**: Lateral resistance achieved by a tension-only cross braces in the bays, and shear resistance from the plywood decking in the office area.	**4**	-	No concerns observed or reported.

S05 INTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S05.1a	**Interior Walls**	**~1984:** Interior partitions around the office and washroom are framed with wood studs and covered with gypsum wallboard.	**4**	-	No concerns observed or reported.
S05.1b	**Interior Walls**	**~1981**: Interior partitions are a combination of steel and wood framing, covered with gypsum wallboard or prefinished metal panels.	**4**	-	No concerns observed or reported.
S05.2a	**Interior Columns**	**~1984:** Interior wood columns were observed under the mezzanine.	**-**	-	N/A
S05.2b	**Interior Columns**	**~1981:** Interior columns are constructed of structural steel.	**-**	-	N/A

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.1a	**Exterior Load-bearing Walls**	**~1984**: Exterior walls are framed with wood studs and covered with gypsum wallboard or OBS sheets on the inside face. It is estimated plywood sheets are provided on the outside face.	**4**	-	No concerns observed or reported.
S06.1b	**Exterior Load-bearing Walls**	**~1981**: Exterior load-bearing walls are a combination of steel I-section columns with prefinished metal coverings, and wood stud framing with gypsum board coverings.	**4**	-	No concerns observed or reported.
S06.2a	**Exterior Columns**	**~1984:** Exterior columns are constructed of wood.	**4**	-	No concerns observed or reported.
S06.2b	**Exterior Columns**	**~1984:** Interior columns are constructed of structural steel.	**4**	-	No concerns observed or reported.
S06.3a	**Lateral Resistance**	**~1984:** Lateral resistance is achieved by the shear walls created by the plywood sheets.	**4**	-	No concerns observed or reported.
S06.3b	**Lateral Resistance**	**~1981**: Lateral resistance is achieved by shear walls.	**4**	-	No concerns observed or reported.

S99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S99.1a	**Specially Engineered Construction**	N/A	**-**	-	N/A
S99.1b	**Specially Engineered Construction**	N/A	**-**	-	N/A

FLA: KULAN WAREHOUSE AND KULAN POWERLINE SHOP, WHITEHORSE YT

NOTES:

None.

IMMEDIATE ITEMS:

No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.



Photo #S1a: Concrete slab at the main floor.

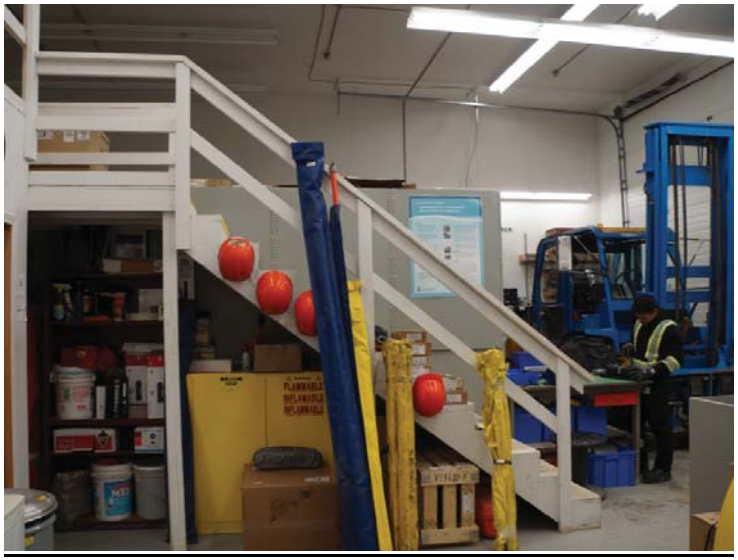


Photo #S2a: Wood construction of the mezzanine, stair, and interior partitions.

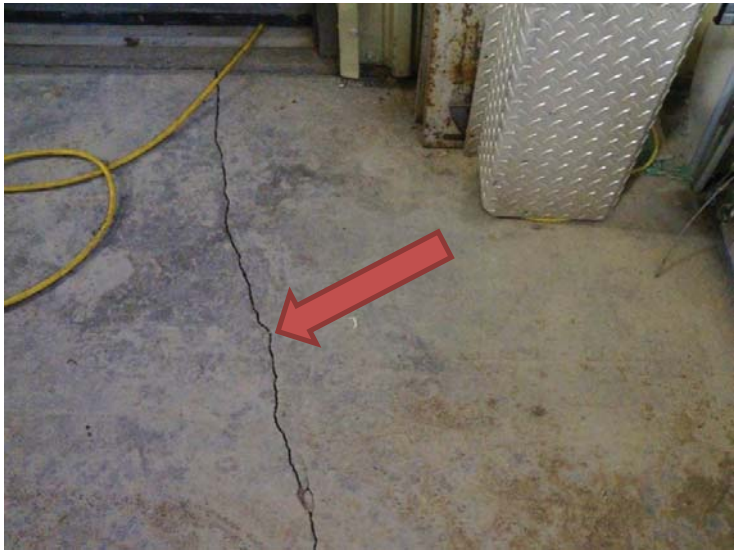


Photo #S3b: Crack in the concrete slab at the northeast corner of the north bay.



Photo #S4b: Roof construction at the south bay.



Photo #S5b: Roof construction at the north bay.



Photo #S6b: Structural steel interior column (shown).

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5.0 MECHANICAL

Building A – Kulan Warehouse:

Domestic water is trucked on-site and stored in a plastic above ground storage tank and is distributed by a domestic water pump via plastic piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface runoff. Domestic hot water is provided by a single electric domestic hot water heater. Plumbing fixtures include a vitreous china flush tank water closet, and a counter-mounted enameled iron lavatory.

Fuel oil is provided by an exterior steel above ground storage tank located to the east of the building. The building is heated by a forced-air, oil-fired furnace located on the mezzanine. Warmed air is distrusted throughout the building by a galvanized steel ductwork system. Building ventilation is provided by the furnace and exterior doors, with air circulation aided by ceiling-mounted rotary fans.

Capital expenditures with respect to the washroom fixtures and the furnace are anticipated to be required within the 10-year time frame of this report.

The mechanical components are in acceptable overall condition.

Building B – Kulan Powerline Shop:

Domestic water is trucked on-site and stored in a concrete underground storage tank and is distributed via type M copper piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface runoff. Domestic hot water is provided by a single electric domestic hot water heater. Plumbing fixtures include vitreous china flush tank water closets, and wall-mounted vitreous china lavatories.

The office areas are heated by a forced-air heating system, with galvanized ductwork and an oil-fire furnace located within the ceiling space. The bays are heated by suspended oil-fired unit heaters. Building ventilation is provided by the furnace and washroom exhaust fans, with rotary ceiling fans provided further air circulation.

Capital expenditures with respect to the domestic water supply, oil storage tank, washroom fixtures, and a gas monitoring system are anticipated to be required within the 10-year time frame of this report. Further investigation is recommended regarding a water quality assessment of the domestic water supply.

The mechanical components are in acceptable overall condition.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M01.1a	**Domestic Water Supply**	Domestic water is trucked on-site and is stored in a plastic above ground storage tank within the building.	**4**	-	No concerns observed or reported.
RAI.2b M01.1b	**Domestic Water Supply**	Domestic water is trucked on-site and is stored in a concrete underground storage tank within the building.	**3**	5/3	Concerns were reported regarding the quality of the domestic water. The concrete tank is original to the building and has evidence of mineral build up and possible organic growth. It is recommended to conduct a water quality assessment and to replace the water tank with a plastic above ground storage tank.
M01.2a	**Sanitary Sewer**	Sanitary waste is fed to an on-site septic field.	**4**	-	No concerns observed or reported.
M01.2b	**Sanitary Sewer**	Sanitary waste is fed to an on-site septic field.	**4**	-	No concerns observed or reported.
M01.3a	**Storm Sewer**	Storm water is drained through overland soil absorption and surface runoff.	**4**	-	No concerns observed or reported.
M01.3b	**Storm Sewer**	Storm water is drained through overland soil absorption and surface runoff.	**4**	-	No concerns observed or reported.
M01.4a	**Oil**	Fuel oil is provided by an exterior steel aboveground storage tank located to the east of the building.	**4**	-	No concerns observed or reported.
M01.4b	**Oil**	Fuel oil is provided by an exterior steel aboveground storage tank located at the northwest corner of the building.	**3**	3	The storage tank is old and corroded, and has no form of spill containment. It is recommended to replace the tank with a new tank with appropriate spill containment.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.1a	**Water Distribution**	**~1984:** Plastic and water distribution piping is provided throughout Building A.	**4**	-	No concerns observed or reported.
M02.1b	**Water Distribution**	**~1981:** Type M copper domestic water distribution piping is provided in Building B.	**3**	-	The domestic water distribution pipes may be contaminated from the water tank. See Item M01.1b above for further information.
M02.2a	**Backflow Prevention**	None observed.	**-**	-	N/A
M02.2b	**Backflow Prevention**	None observed.	**-**	-	N/A
M02.3a	**Domestic Hot Water Heaters**	**~2000:** An electric domestic hot water heater is located on the main floor. Technical specifications for the unit are given below: Manufacturer: Bradford White Corporation Model Number: MI50S6DS13 Serial Number: WB8553106 Capacity: 189.3 L (50 USG) Input: 2 elements x 3 kW each	**4**	-	The domestic hot water heater will surpass its EUL within the timeframe of this report and should be replaced. See Note **5A**.
M02.3b	**Domestic Hot Water Heaters**	**~1981:** An electric domestic hot water heater is located on the main floor. Technical specifications for the unit are given below: Manufacturer: John Wood Ltd. Model Number: JW A 525DE Serial Number: 754096-8112 Capacity: 181.8 L (40 imp. gal) Input: 2 elements x 3 kW each	**4**	-	The domestic hot water heater has its EUL and should be replaced. See Note **5A**.
M02.4a	**Water Tank**	**~1984:** A 2614 L (575 imperial gallon) plastic above ground storage tank is provided within the building for domestic water. A 0.5 HP pump manufactured by A.O. Smith was observed to provide plumbing fixtures with adequate water pressure.	**4**	-	No concerns observed ore reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.4b	**Water Tank**	**~2012:** An underground concrete domestic water storage tank is located in the utility room.	**3**	3	Concerns were reported regarding build-up in the concrete water tank. See Item M01.1b above for further details.
M02.5a	**Waste Water Piping**	**~1984**: ABS plastic waste water piping is provided in the building.	**4**	-	No concerns observed or reported.
M02.5b	**Waste Water Piping**	**~1984**: ABS plastic waste water piping is provided in the building.	**4**	-	No concerns observed or reported.
M02.6a	**Irrigation System**	N/A	**-**	-	N/A
M02.6b	**Irrigation System**	N/A	**-**	-	N/A
M02.7a	**Washroom Fixtures**	**~1984:** The washroom is provided with a floor-mounted vitreous china flush tank water closet, and a counter-mounted enameled iron lavatory.	**4**	3	The washroom fixtures are currently in acceptable condition, but will surpass their EUL within the timeframe of this report and should be replaced.
M02.7b	**Washroom Fixtures**	**~1981**: Each washroom is provided with a floor-mounted vitreous china flush tank water closet, and a wall-mounted vitreous china lavatory.	**3/4**	3	The plumbing fixtures are reportedly original and are approaching their EUL and should be replaced. Concerns were also reported with one of the toilets leaking internally.
M02.8a	**Sinks**	N/A	**-**	-	N/A
M02.8b	**Sinks**	N/A	**-**	-	N/A
M02.9a	**Oil Interceptor**	N/A	**-**	-	N/A
M02.9b	**Oil Interceptor**	N/A	**-**	-	N/A
M02.10a	**Sumps**	N/A	**-**	-	N/A
M02.10b	**Sumps**	N/A	**-**	-	N/A

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M03 HEATING AND COOLING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.1a	**Boilers**	N/A	**-**	-	N/A
M03.1b	**Boilers**	N/A	**-**	-	N/A
M03.2a	**Unit Heaters**	N/A	**-**	-	N/A
M03.2b	**Unit Heaters**	**~2015**: Suspended oil-fire unit heaters are provided in the bays.	**6**	-	The unit heaters were reportedly replaced in 2015. No concerns observed or reported.
M03.3a	**Burners**	N/A	**-**	-	N/A
M03.3b	**Burners**	N/A	**-**	-	N/A
M03.4a	**Heat Exchanger**	N/A	**-**	-	N/A
M03.4b	**Heat Exchanger**	N/A	**-**	-	N/A
M03.5a	**Baseboard Heaters**	N/A	**-**	-	N/A
M03.5b	**Baseboard Heaters**	N/A	**-**	-	N/A
M03.6a	**Furnace**	**~1984**: The building is heated by an oil-fired forced-air furnace located on the mezzanine. Technical specification for the unit are given below: Manufacturer: Olsen Technology Inc. Model Number: MPL-120 Serial Number: MPSL44555 Capacity: ~100,000 BTU/hr	**4**	3	The furnace has surpassed it EUL and should be replaced. No concerns observed or reported.
M03.6b	**Furnace**	**~2015**: The office space is heated by an oil-fired forced-air furnace located in the ceiling space above the north office. Technical specification for the unit are given below: Manufacturer: Granby Industries LP Model Number: Conforto Serial Number: 6071496	**6**	-	No concerns observed or reported.
M03.7a	**Air Conditioning**	N/A	**-**	-	N/A
M03.7b	**Air Conditioning**	N/A	**-**	-	N/A

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1a	**Air Distribution**	**~1984**: Forced air from the furnace is distributed throughout the building via a galvanized steel ductwork system.	**4**	-	No concerns observed or reported.
M04.1b	**Air Distribution**	**~1984**: Forced air from the furnace is distributed throughout the office space via a galvanized steel ductwork system.	**4**	-	No concerns observed or reported.
M.04.2a	**Ventilation**	**~1984**: Building ventilation is provided by the furnace and passively by the exterior doors. Further air circulation is provided by ceiling-mounted rotary fans in the bay.	**4**	-	No concerns observed or reported.
M.04.2b	**Ventilation**	**~1981**: General building ventilation is provided by the forced air furnace, exhaust fans in the washrooms, and passively by the exterior doors and operable windows. Further air circulation is provided by ceiling-mounted rotary fans in the bays	**4**	-	No concerns observed or reported.
M04.3a	**Air Outlets & Inlets**	**~1984**: Prefinished metal registers are provided for the forced air furnace system.	**4**	-	No concerns observed or reported.
M04.3b	**Air Outlets & Inlets**	**~1984**: Prefinished metal registers are provided for the forced air furnace system.	**4**	-	One register was falling out of the acoustic ceiling tile in the men's washroom. The register should be repaired when the ceiling tiles are replaced (See Note **5A**). No other concerns observed or reported.
M04.4a	**Exhaust Fans**	N/A	**-**	-	N/A
M04.4b	**Exhaust Fans**	**~2011**: The washrooms are provided with ceiling-mounted exhaust fans.	**4**	-	No concerns observed or reported.
M04.5a	**Gas Monitoring**	N/A	**-**	-	N/A
M04.5b	**Gas Monitoring**	None provided.	**2**	4	The Site Representative requested costing be included for the installation of a gas monitoring system in the bays.

M05 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M05.1a	**Suppression**	N/A	**-**	-	N/A
M05.1b	**Suppression**	N/A	**-**	-	N/A
M05.2a	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building A.	**4**	-	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.
M05.2b	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building A.	**4**	-	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.

M06 CONTROLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M06.1a	**Electric and Electronic Controls**	**~1984**: The furnace is controlled by a programmable digital thermostat located in the office.	**4**	-	No concerns observed or reported.
M06.1b	**Electric and Electronic Controls**	**~1981**: Manual analog thermostats were observed throughout the building.	**4**	-	The thermostats have surpassed their EUL and should be replaced. See Note **5A**.

M99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M99.1a	**Humidifiers**	N/A	**-**	-	N/A
M99.1b	**Humidifiers**	N/A	**-**	-	N/A

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NOTES:
5A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

IMMEDIATE ITEMS:
No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:
RAI.2b) Conduct a domestic water quality assessment.
No other further investigations recommended at this time.



Photo #M1a: Above ground steel storage tank for the fuel oil.

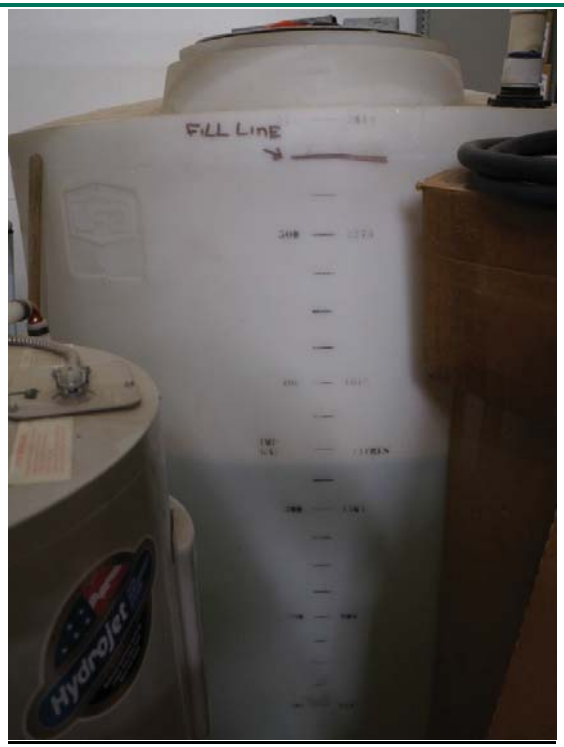


Photo #M2a: Above ground steel storage tank for domestic water.

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Photo #M3a: Domestic hot water heater.



Photo #M4a: Vitreous china flush tank water closet.



Photo #M5a: Enameled iron lavatory.



Photo #M6a: Forced-air, oil-fired furnace.

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Photo #M7b: Above ground steel storage tank for the fuel oil.



Photo #M8b: Underground concrete storage tank for domestic water.



Photo #M9b: Domestic hot water heater.



Photo #M10b: Plumbing fixtures in the women's washroom.



Photo #M11b: Suspended oil-fired unit heater.



Photo #M12b: Forced-air, oil-fired furnace.

6.0 ELECTRICAL

Building A – Kulan Warehouse:

Electrical service is provided from an off-site electrical transformer via overhead cables to the north elevation of the building. Power is distributed by a 42-circuit electrical sub panel rated at 120/240 V, and 200 A. Interior lighting is provided by T8 tubular fluorescent lamps controlled by line voltage switches and dimmers. Exterior lighting is provided by building-mounted and pole-mounted LED light fixtures controlled by line voltage switches and photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel auto-dial, pull stations, strobes, and smoke/heat detectors. The building is equipped with a security system and is monitored by YEC's System Control Centre. Features of the security system include motion sensors, key pad, exterior surveillance cameras, and proximity card sensors and magnetic locks on the pedestrian entrance doors.

Capital expenditure with respect to the fire alarm panel is anticipated within the 10-year time frame of this report.

The electrical components are in acceptable overall condition.

Building B – Kulan Powerline Shop:

Electrical service is provided from a pole-mounted electrical transformer via overhead cables to the northwest corner of the building. Power is distributed by two electrical distribution panels, each rated at 120/240 V and 200 A. Interior lighting is primarily provided by T8 tubular fluorescent lamps, with incandescent wall sconces provided in the washrooms. Exterior lighting is provided by a combination of LED and HPS building-mounted fixtures. All lighting is controlled by line voltage switches. Emergency lighting is provided by battery packs with integral and remote heads, with LED exit signs above exit ways. No fire alarm panel or fire alarm/detection devices are provided within the building. The building is monitored by YEC's System Control Centre, and access control is provided a proximity card sensors and magnetic lock on the main entrance door.

Capital expenditures with respect to the secondary distribution, interior lighting, and are anticipated within the 10-year time frame of this report. Immediate action is required with respect to the branch wiring, receptacles, fire alarm panel and devices.

The electrical components are in acceptable overall condition.

E01 INCOMING SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E01.1a	**Exterior Transformer**	An exterior pole-mounted transformer is located on the north side of Lindeman Road and steps down the distribution voltage to 120/240 V.	**4**	-	No concerns observed or reported.
E01.1b	**Exterior Transformer**	An exterior pole-mounted transformer is located to the northwest of the building and steps down the distribution voltage to 120/240 V.	**4**	-	No concerns observed or reported.
E01.2a	**Cables**	Power is fed to the building by overhead cables at the north elevation.	**4**	-	No concerns observed or reported.
E01.2b	**Cables**	Power is fed to the building by overhead cables at the northwest corner.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.1a	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	N/A	**-**	-	N/A
E02.1b	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	N/A	**-**	-	N/A
E02.2a	**Interior Transformers**	N/A	**-**	-	N/A
E02.2b	**Interior Transformers**	N/A	**-**	-	N/A
E02.3a	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~2000**: Electrical distribution is handled by a Square D sub panel located adjacent to the main entrance. The panel is rated at 120/240 V, 200 A, and has a total of 42 circuits.	**4**	-	N

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.3b	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1981**: A 20-circuit Westinghouse sub panel rated at 120/240 V and 200 A is located in the north bay. **~2014**: A 42-circuit Square-D sub panel rated at 120/240 V and 200 A is located in the south bay. A Square D general duty safety switch rated at 120/240 V and 200 A is located in the north bay.	**3/4**	3	The Westinghouse electrical sub panel has surpassed its EUL and should be replaced. It is recommended to replace the unit with a larger panel as it was observed to be at maximum capacity at the time of assessment.
E02.4a	**Branch Wiring**	**~1984**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns observed or reported.
Imm.1b E02.4b	**Branch Wiring**	**~1981**: Electrical branch circuit wiring is reportedly copper throughout the building.	**2/4**	1	An electrical junction box in the south bay was observed to be missing a cover which should be replaced. No other concerns observed or reported.
E02.5a	**Receptacles**	**~1984**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.
Imm.2b E02.5b	**Receptacles**	**~1981**: Electrical receptacles are provided throughout the interior and exterior of the building.	**1**	1	Several issues were observed regarding the electrical receptacles. See Note **6A**.
E02.6a	**Surge Protection**	None observed.	**-**	-	N/A
E02.6b	**Surge Protection**	**~2000**: Surge protected power bars are provided for the computers.	**4**	-	No concerns observed or reported.
E02.7a	**Uninterruptable Power Supply**	**~2000**: An uninterruptable power supply manufactured by APC is located in the office.	**-**	-	N/A

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1a	**Interior Lighting**	**~2014**: T8 tubular fluorescent lamps provide interior lighting throughout the building.	**5**	-	No concerns observed or reported.
E03.1b	**Interior Lighting**	**~1981/2014**: Interior lighting primarily consists of T8 tubular fluorescent lamps throughout the building. Incandescent wall sconces are provided in the washroom.	**3/5**	3	The tubular fluorescent light fixtures in the north bay and the incandescent light fixtures in the washrooms have surpassed their EUL and should be replaced.
E03.2a	**Lighting Controls**	**~1984**: Interior lighting is controlled by line voltage switches and dimmers. Exterior lighting is controlled by a combination of line voltage switches and photocells.	**4**	-	No concerns observed or reported.
E03.2b	**Lighting Controls**	**~1981**: All interior and exterior lighting is reportedly controlled by line voltage switches.	**4**	-	No concerns observed or reported.
E03.3a	**Emergency Lighting**	**~2000:** Battery packs with integral lighting heads are provided within the building.	**4**	-	No concerns observed or reported.
E03.3b	**Emergency Lighting**	**~1997:** Battery packs with integral and remote lighting heads are provided throughout the building.	**4**	3	The emergency lighting is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced.
E03.4a	**Exit Lighting**	**~2000**: LED exit signs are provided at the exits.	**4**	-	The exit signs are currently in acceptable condition, but will surpass their EUL within the timeframe of this report and should be replaced. See Note **6B**.
E03.4b	**Exit Lighting**	**~2000**: LED exit signs are provided at the exits.	**4**	-	The exit signs are currently in acceptable condition, but will surpass their EUL within the timeframe of this report and should be replaced. See Note **6B**.
E03.5a	**Exterior Lighting**	**~2010**: Wall-mounted LED light fixtures are provided around the building exterior. Site lighting is provided by pole-mounted LED light fixtures.	**5**	-	No concerns observed or reported.
E03.5b	**Exterior Lighting**	**~1981/2010**: A wall-mounted LED light fixtures is provided at the front elevation. Two wall-mounted HPS light fixtures are provided at the rear elevation.	**3/5**	-	The older HPS light fixtures have surpassed their EUL and should be replaced. See Note **6B**.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1a	**Grounding**	**~1984**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.
E04.1b	**Grounding**	**~1981**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E05.1a	**Fire Alarm Panel**	**~2010**: A Notifier CFP-2410B panel with audible alarm is located adjacent to the main entrance. The fire alarm panel is equipped with an AD-2000 automatic voice/pager dialer manufactured by United Security Products, Inc.	**3**	1/2	Issues were reported with the auto-dial features of the fire alarm panel. Costing to repair the dialer has been included in Year 1 as the inspections for the panel were up to date.
E05.1b	**Fire Alarm Panel**	None.	**1**	1/4	The building is not provided with a fire alarm panel. Costing has been included for the installation of a fire alarm panel.
E05.2a	**Devices**	**~1984**: Fire alarm and detection devices include pull stations, strobes, and smoke/heat detectors.	**3/4**	-	Some of the fire alarm and detections appeared to be original to the building and have surpassed their EUL. Replacement of the older devices is recommended. See Note **6B**.
E05.2b	**Devices**	None.	**1**	1/4	The building is not provided with fire detection or alarm devices. Costing has been included for the installation of these devices throughout the building.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.1a	**Telephone**	**~2000**: Telephone services are provided to the building.	**4**	-	No concerns observed or reported.
E06.1b	**Telephone**	**~2000**: Telephone services are provided to the building.	**4**	-	No concerns observed or reported.
E06.2a	**LAN Systems**	**~2000**: LAN internet services are provided to the building.	**4**	-	No concerns observed or reported.
E06.2b	**LAN Systems**	**~2000**: LAN internet services are provided to the building.	**4**	-	No concerns observed or reported.
E06.3a	**Intrusive Systems**	**~2000**: A Maxsys security system key pad is located adjacent to the main entrance, and motion sensors are located within the building. The building is monitored by YEC's System Control Centre.	**4**	-	No concerns observed or reported.
E06.3b	**Intrusive Systems**	**~2000**: The building is monitored by YEC's System Control Centre.	**4**	-	No concerns observed or reported.
E06.4a	**Surveillance System**	**~2000**: Wall-mounted surveillance cameras are provided around the building exterior.	**4**	-	No concerns observed or reported.
E06.4b	**Surveillance System**	N/A	**-**	-	N/A
E06.5a	**Access Control**	**~2015**: The main entrance door of the building equipped with a proximity card sensor and magnetic lock.	**6**	-	No concerns observed or reported.
E06.5b	**Access Control**	**~2015**: The building's main entrance door is equipped with proximity card access and magnetic lock.	**6**	-	No concerns observed or reported.

Yukon Energy Corporation
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John Maissan-YEC-1-37 Attachment 1

E99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E99.1a	**Emergency Generator**	N/A	**-**	-	N/A
E99.1b	**Emergency Generator**	N/A	**-**	-	N/A

NOTES:

6A) Receptacles along the north exterior of the building have been reportedly broken off due to falling ice. Exposed live wires were observed at these areas. Covers are also missing from the exterior receptacles along the west elevation. The electrical receptacles in the washrooms are not GFCI-rated. The receptacles are within 1 m of a water source and should be replaced with GFCI units. Immediate repair of the receptacles is recommended.

6B) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

IMMEDIATE ITEMS:

Imm.1b) Replace the cover on the junction box.

Imm.2b) Repair electrical receptacles.

No other immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

No further investigation recommended at this time.

Yukon Energy Corporation
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John Maissan-YEC-1-37 Attachment 1



Photo #E1a: Electrical sub panel.



Photo #E2a: Uninterruptable power supply.



Photo #E3a: Interior fluorescent light fixtures.



Photo #E4a: Emergency lighting and exit sign.



Photo #E5a: Exterior LED light fixture.



Photo #E6a: Fire alarm panel, security key pad, light controls, pull station, and magnetic door lock release.

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2017 – 2018 General Rate Application
John Maissan-YEC-1-37 Attachment 1



Photo #E7b: Electrical distribution equipment in the north bay.



Photo #E8b: Junction box with missing cover in the south bay.

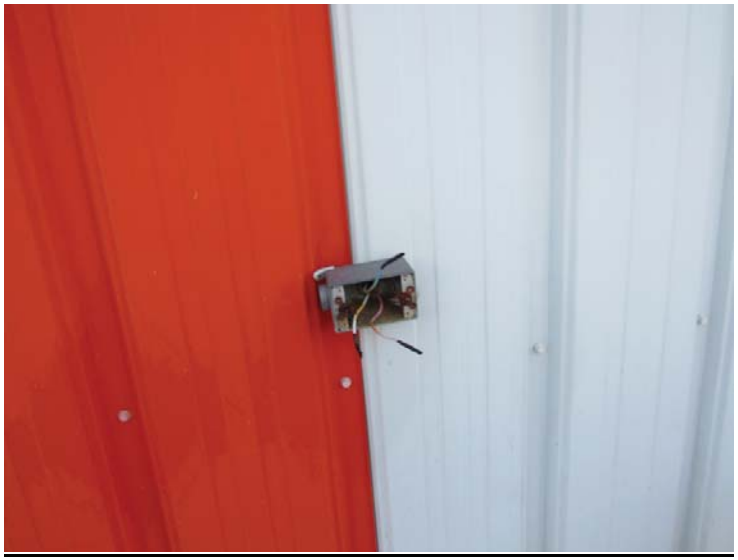


Photo #E9b: Damaged exterior receptacle at the north elevation.



Photo #E10b: Receptacle requiring replacement with a GFCI unit.



Photo #E9b: Interior tubular fluorescent lighting fixtures.



Photo #E10b: Emergency lighting and exit sign.

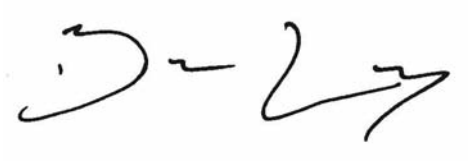


7.0 HAZARDOUS MATERIAL REPORTS

No previous hazardous materials reports were made available by the YEC. Based on the year of the construction of the buildings outlined in this report (~1984 and ~1981), hazardous building construction materials such as ACMs (asbestos containing materials) and PCBs (polychlorinated biphenyls) are possible to be present in the building. It was reported that PCBs from an old transformer were located at the back of Building A's site. The PCBs were effectively being contained within a berm at the time of assessment. The vinyl floor tiles in Building B are potentially made of ACMs. Before the flooring is replaced, it is recommended to test the tiles for asbestos and properly abate the material if required.

Report Signature Page

GOLDER ASSOCIATES LTD.



Brian Levy, E.I.T.
Building Conditions Assessor



Dave Ayriss, B.Sc, CIH, CRSP
on behalf of
Lawrence P. McSorley, M.Arch., M.C.P., RA
Senior Building Condition Specialist

BL/LPM/rp

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APPENDIX A

Mandate & Report Resources

MANDATE AND REPORT RESOURCES

Authorization

Written Notice of Award of Building Assessment Reports for Yukon Energy Corporation (YEC) was provided on November 1st, 2015. A Facility Lifecycle Assessment (FLA) of the Sites identified in the Introduction section of the report was subsequently conducted. The Sites are currently owned and managed by YEC.

Purpose

The primary objective of the FLA was to visually examine and evaluate the present condition of the property elements, buildings and related structures. The FLA process is being undertaken to assist YEC in capital planning and evaluating the potential financial liabilities associated with the condition of the Site elements, building and related structures on the Sites. Golder understands that YEC will rely on this report for capital planning.

Scope

The FLA was conducted in general accordance with the American Society for Testing and Materials (ASTM) “Standard Guide for Property Condition Assessments: Baseline Property Condition Process E 2018-08”, as locally applicable. The Golder Assessors (identified on the first page of the report) conducted the Sites reconnaissance on the date shown. The Sites reconnaissance was limited to a walk around the Sites, a walk-through of the buildings and interview with personnel listed in the Introduction section of the report (referred to as the “Point of Contact” in this report). Copies of selected photographs documenting conditions at the time of the visit are provided throughout the report.

The purpose of the report is to communicate identified physical deficiencies, future capital projects, and the associated opinions of estimated costs where the cost is greater than the Capital Threshold and expected to occur within the time frame used for the report. In accordance with this agreed mandate, assumptions were required to delineate between capital items and routine maintenance. Please refer to the “Operating and Maintenance Item” list below. Also please refer to the attached “Discussions of Overall Concepts and Terminology” for additional explanation of assumptions used.

The review of the structural elements was limited to a visual review of the accessible, exposed portions of the buildings and related structures during our visit to the building. The roofs, walls, floors and ceilings were visually reviewed to collect information in this regard.

The review of the mechanical, electrical and fire safety systems was performed by non-specialists in conjunction with discussions with the Point of Contact. A detailed assessment by a mechanical or electrical professional consultant should be conducted if further information regarding the condition, durability and/or expected future capital expenditures related to these systems is required.

Compliance with national and provincial building codes and/or fire codes is not part of the scope of this assessment.



FLA: KULAN WAREHOUSE AND KULAN POWERLINE SHOP, WHITEHORSE YT

The estimated costs outlined in this report are based on the conditions encountered and observations made during the reconnaissance. Estimates of quantities and areas are based on information supplied, field observations and/or interviews. Item repair/replacement costs are approximate only. Restoration costs are sensitive to local and overall economic factors and therefore, specific quotations from qualified contractors should be obtained when a specific deficiency is addressed or a capital project is to be implemented.

Operating and Maintenance Items

Golder assumes the following items will be maintained under normal operating budgets and are therefore not included in the Capital Reserve Table.

SITE

- Buried services
- Landscaping
- Fences

STRUCTURE

- Foundations and footings

ROOF

- Roof drains
- Periodic maintenance

WALLS AND WINDOWS

- Local periodic repairs and needle glazing
- Weather-stripping

INTERIORS

- Various common furnishings, specialty equipment
- Small residential appliances

MECHANICAL

- Sump pits
- Motors, ductwork and in-duct equipment
- Gas and diesel supply systems
- HVAC distribution piping
- Air inlets and outlets

ELECTRICAL

- Disconnects and breakers
- Buried conductors

CONVEYANCE SYSTEMS

- Cranes and hoists



FLA: KULAN WAREHOUSE AND KULAN POWERLINE SHOP, WHITEHORSE YT

Discussions of Overall Concepts and Terminology

Evaluation Period

The period of evaluation used for this report is 10 years. Capital repairs and replacement that are reasonably expected to be required within this evaluation period and that cost in excess of the Capital Threshold are included in the Capital Reserve Table.

Capital Threshold

The Capital Threshold used for this report is $3,000. This threshold is used to determine whether a capital repair item is to be included in the Capital Reserve Table. Capital repairs identified and estimated to cost less than the threshold, or that will likely to be performed in phases, as a part of routine maintenance as required, at a cost less than the threshold are not included in the Capital Reserve Table.

Costs

Costs presented in this study for future capital repairs and replacement projects are our Opinions of Probable Budgets and are intended to include taxes, permit fees, contingency and where appropriate, Engineering fees for design, specifications, tendering, project management and construction monitoring. We have generally assumed replacement will occur on a like-for-like basis except where obsolescence or technological advancements logically dictates an upgrade. More accurate costing in the future will require a condition assessment, choice and development of an appropriate repair option, designing and tendering the work to qualified contactors.

Immediate Items

Immediate repairs include deficiencies that require action in the next 60 to 90 days as a result of (i) existing or potentially unsafe conditions, (ii) negative conditions significantly impacting marketability or habitability, (iii) material building code violations, (iv) poor or deteriorated condition of a critical element or system, or (v) a condition that if left “as is” with extensive delay in addressing same, would result in or contribute to critical element or system failure within 12 months or a significant escalation in the repair cost.

Capital Reserve Analysis

The Capital Reserve Table includes a section that provides the average annual capital costs per square foot. Replacement Reserves include (i) deficiencies that may not warrant immediate attention, but require repair or replacement that should be undertaken on a priority basis over routine preventive maintenance work and (ii) components or systems that have realized or exceeded their Expected Useful Life (EUL) during the evaluation period (realization of EUL alone does not constitute an immediate repair). Replacement reserve costs are included in Appendix C.

Opinions of probable costs are provided for material physical deficiencies and not for repairs or improvements that could be classified as:

- cosmetic or decorative;
- part or parcel of a building renovation program or tenant improvement/finishes;
- enhancements to reposition the asset in the marketplace;
- for warranty transfer purposes;
- routine or normal preventative maintenance;
- less than the capital threshold for this report; and
- are expected to occur beyond the time frame of this report.



FLA: KULAN WAREHOUSE AND KULAN POWERLINE SHOP, WHITEHORSE YT

Cost Inflation Rate:

We have presented the costs in current year (2016) values. We have used 3% in the capital reserve table attached. Further sensitivity analysis using other inflation assumptions should be tested when projecting future cash-flows.

Life Expectancies:

Our estimates of the life expectancy of common element components, systems and sub-systems are based on our opinion of the observed condition during our Site visit, experience with similar material at other buildings, published industry standards, articles and recommendations made by material suppliers and manufacturers. For some materials or systems, the history of use is not sufficient to predict life expectancy accurately. Monitoring and adjustments to the assumptions are required.

The year in which the capital work is required is estimated on the basis of the current observed conditions, or the construction methods and materials used. This may be shorter or longer than the remaining time in the standard estimated life cycle based on the current age of the item. Our estimates of life cycles reflect our understanding of the standards that the prudent long-term owners would maintain. Deferring and phasing of work is often possible keeping in mind that doing so could reduce building standards, increase disruption to residents, increase costs and risks.

APPENDIX B

Limitations and Use of the Report

LIMITATIONS

This report is intended to provide an assessment of the property conditions at the subject properties, at the time of the Sites visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, Golder may be contacted to extend reliance to such parties. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, which result from reporting the factual information contained herein.

The conclusions as presented represent the judgement of Golder based on the visual observations of the accessible, exposed building elements, supplemented by information and data obtained by Golder and discussions with the Point of Contact and other representatives of the owner identified. Except as otherwise may be requested, Golder disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the FLA. No physical testing or intrusive investigations were conducted, and no samples of building materials were collected to substantiate the observations made.

In evaluating the Sites, Golder has relied in good faith on information provided by other individuals noted in this report. Golder in certain instances has been required to assume that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Point of Contact. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, thus any parties making use of this report should review these issues with appropriate legal counsel.

Should additional information become available with respect to the building elements or systems, Golder requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

APPENDIX C

Capital Reserve Table

Capital Reserve Table (Site A)

ation

				Threshold	$3,000
Gross Sq. m.	167	Year Built	1984	Reserve Term (years)	10
er of Buildings	1	Age	32	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024
L																	
nts																	
ots & Drive Aisles	1984	150	31	119	Allowance		Repair							$7,000			
k/Pad	1984	25	19	6	85 m²	$120/m²	Repair/LCR		$2,500					$10,200			
	1984	40	31	9	575 m	$101/m	Repair/LCR										$58,100
	1984	40	31	9	250 m²	$344/m²	LCR										$86,000
rs																	
dentified																	
oor	1984	30	31	30	2 units	$1,500/unit	LCR		$3,000								
	1984	25	20	0	1 unit	$7,041/unit	LCR						$7,000				
ts																	
	1984	30	31	0	50 m²	$60/m²	LCR		$3,000								
d Partitions																	
	2004	15	11	4	167 m²	$21/m² GFA	LCR					$3,500					
indows																	
dentified																	
dentified																	
dentified																	
dentified																	
	1984	40	31	9	200 m²	$280/m²	LCR/Repair				$3,000			$3,000			$6,000
nspouts/Heat Trace	1984	30	31	0	Allowance		LCR/Improvement		$4,300								
nveyance Devices)																	
dentified																	
dentified																	
rs and Repairs																	
dentified																	
dentified																	

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
d Columns																	
dentified																	
nd Columns																	
dentified																	
dentified																	
dentified																	
es	1984	35	31	4	Allowance		LCR						$3,600				
	1984	20	31	0	1 unit	$4,200 ea.	LCR		$4,200								
dentified																	
dentified																	
dentified																	
dentified																	
es																	
dentified																	
ipment																	
dentified																	
dentified																	
Identified																	
	2010	25	5	20	Allowance		Safety/Repair		$3,000								
s and Security																	
Identified																	
Identified																	

e Analysis

	Inflated	*Uninflated*
ear	$13,008	$10,296
ear / Sq. Ft.	#REF!	#REF!

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$	$20,000	$	$3,000	$7,100	$7,000	$20,200	$	$	$200,100
$CAD	$	$20,600	$	$3,278	$7,991	$8,115	$24,120	$	$	$261,385

Replacement
lacement

Capital Reserve Table

ation

				Threshold	$3,000
Gross Sq. m.	446	Year Built	1981	Reserve Term (years)	10
er of Buildings	1	Age	35	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024
L																	
nts																	
ts & Drive Aisles	1981	150	34	116	Allowance		Repair		$7,000								
	1981	40	34	6	435 m	$101/m	Repair/LCR							$43,900			
	1981	40	34	6	300 m²	$344/m²	LCR							$103,200			
	2015	10	0	10	125 m²	$24/m²	LCR										
rs																	
dentified																	
oor/Utility Doors	1981	40	40/34	0/6	5 units	$1,500/unit	LCR		$4,500					$3,000			
ts																	
dentified																	
d Partitions																	
	2001	15	14	1	446 m²	$21/m² GFA	LCR			$9,400							
indows																	
dentified																	
Tile	1981	25	34	0	85 m²	$51/m²			$4,300								
	1981	20	34	0	85 m²	$88/m²	LCR		$7,500								
dentified																	
	2015	40	0	40	Allowance		LCR/Repair				$3,000			$3,000			$3,000
nspouts/Snow Dams	-	-	-	0	Allowance		Safety		$3,000								
nveyance Devices)																	
	-	-	-	-	Allowance		Study/Repair		$3,000	$5,000							
dentified																	
	1981	150	34	116	Allowance		Repair		$8,000								
rs and Stairs																	
dentified																	
dentified																	

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024
d Columns																	
dentified																	
nd Columns																	
dentified																	
dentified																	
Supply	1981	150	34	116	Allowance		Study/Replace		$3,000	$3,000							
ainment	1981	30	34	0	1 unit	$5,800 ea.	LCR		$5,800								
es	1981	35	34	1	Allowance		LCR		$7,300								
dentified																	
	-	-	-	-	Allowance		Improvement		$5,000								
identified																	
identified																	
identified																	
es																	
identified																	
ipment																	
ution	1981	30	34	0	1 unit	$3,400 ea.	LCR		$3,400								
	1981	80	34	46	Allowance		Code/Safety	$500									
	1981	80	34	46	Allowance		Code/Safety	$5,500									
	1981	30	34	0	200 m²	$55.92/m² GFA	LCR		$11,200								
ng	1998	20	17	3	Allowance		Safety				$3,600						
dentified																	
	-	-	-	-	1 unit	$9,400 ea.	Safety		$9,400								
	-	-	-	-	446 m²	$7.55/m² GFA	Safety		$3,400								
s and Security																	
dentified																	
dentified																	

e Analysis

	Inflated	*Uninflated*
ear	$12,192	$10,756
ear / Sq. ft.	$27.34	$24.12

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$6,000	$85,800	$17,400	$6,600	$	$	$153,100	$	$	$3,000
$CAD	$6,000	$88,374	$18,460	$7,212	$	$	$182,809	$	$	$3,094

Replacement
acement

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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February 2016

REPORT

Facility Lifecycle Assessment Whitehorse Offices #2 Miles Canyon Road, Whitehorse, YT

Submitted to:
Yukon Energy Corporation
P.O. Box 5920
Whitehorse, YT Y1A 6S7

REPORT

A world of capabilities delivered locally

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Golder Associates



EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the group of properties described as Whitehorse Main Office (henceforth known as Site A), IT Trailer (henceforth known as Site B), Electricians Trailer (henceforth known as Site C) and Drafting Trailer (henceforth known as Site D), located at #2 Miles Canyon Road, in the city of Whitehorse, Yukon Territory.

Site A Main Office is comprised of a three storey office building with approximately 1,289 m² (13,874 ft²) on approximately 0.40 hectares (1.00 acres) of land. The site building was approximately constructed in 1999.

Site B IT Trailer building consists of a one storey trailer with approximately 92 m^2 (990 ft^2) gross floor area (GFA) on approximately 0.05 hectares (0.12 acres) of land, according to ATCO tag on the building the unit was factory constructed in 1991.

Site C Electricians Trailer building is a one storey trailer with approximately 120 m^2 (1,288 ft^2) gross floor area (GFA) on approximately 0.06 hectares (0.15 acres) of land, according to a label found on site the building was factory manufactured in 2001.

Site D Drafting Trailer building is a one storey trailer with approximately 187 m^2 (938 ft^2) gross floor area (GFA) on approximately 0.06 hectares (0.15 acres) of land, no factory label was found but it was reportedly built approximately in 1996.

Site size for all locations refers only to the immediate surroundings of the buildings and not the actual size of the entire site. All buildings are located within the Whitehorse office compound and access is provided from Miles Canyon Road.

Based on the findings of this FLA, the following conclusions are made for Site A:

- The Site was developed in approximately ~1999. One paved parking lot is provided south of the Site. Site components include, but are not limited to, chain link fencing, CIP concrete aprons and stairs, wood parking bumpers and railings, CIP retaining walls, picnic tables and grassed areas. Grounds were mostly covered with snow which limited visibility and impeded a comprehensive evaluation of the site components. Based on reports, the site components are in overall acceptable condition.
- The exterior of the building is finished with pre-finished corrugated metal clad. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Most of the window units include galvanized metal sunshades above. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided consist of batt insulation and an olefin air/vapour barrier. A pre-finished metal door in pre-finished metal frame with insulated double glazing units is provided for the main entrance. Exterior utility doors are pre-finished metal units set in pre-finished metal frames with and without insulated glass inserts. The roof for the building is comprised of different sections of sloped shed type roof covered with asphalt shingles throughout according to the drawings. A pre-finished galvanized metal fascia is provided along the roof perimeter. Roof overhangs are finished with stained wood soffits. The exterior components are in overall acceptable condition.



FLA: WHITEHORSE OFFICES

- Interior doors are typically stained wood doors set in painted metal frames, utility rooms are fitted with painted metal doors set in painted metal frames. Interior partitions consist of interior wood stud frame partitions with GWB coverings and finished with paint. The ceilings for the building are acoustic ceiling tiles on a suspended metallic T-bar grid for most areas and GWB painted ceilings for the utility rooms. Building floor finishes are a combination of resilient sheet flooring, carpet, and sealed or painted concrete for the mechanical and electrical rooms. Washrooms for women and men are provided on the main and second floor, one unisex washroom is located on the third floor. Washrooms on the main and second floor generally include pre-finished metal toilet partitions, laminated countertops, toilet accessories and lockers, and are mostly barrier free compliant. The washroom on the third floor is mostly barrier free compliant unit provided with toilet accessories and grab bars. Shower rooms (non-barrier free compliant) are also provided on the main and second floors including shower inserts and wood benches. Two kitchens are provided for the staff one on the second floor and one on the third floor. The kitchens furnishing includes plastic laminate countertops and laminate upper and lower cabinetry. One kitchenette area was also observed in the boardroom also equipped with kitchen cabinets and countertops. Small residential grade appliances are provided for the kitchens and include fridges, microwaves and a stove (only for the third floor kitchen). The interior components are in overall acceptable condition.

- No Structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods it is assumed to be comprised of CIP concrete piers. The building floor is a reinforced CIP concrete slab on grade. The superstructure is a wood frame structure comprised of load-bearing stud walls supporting wood trusses. Exterior roof overhangs are supported by stained wood posts and glulam beams. Interior walls are wood frame and stud walls with gypsum wall board (GWB) coverings throughout. Three staircases are provided for the building, structure was mostly concealed but based on observations it is presumably comprised of wood strings, risers and treads. A galvanized steel structure is provided for the third floor balcony which is attached to the exterior load-bearing walls. The structural components are in overall acceptable condition.

- The building potable water and sanitary sewage disposal servicing is supplied from a well and a septic tank located on site. Domestic water distribution piping is a combination of copper and PVC plastic, while waste water piping is PVC plastic. Storm water drainage is accomplished by overland soil absorption and surface drainage. Domestic hot water is provided by one electric hot water heater located in the battery backup room and it is completed with a recirculation system. Heating for the building is accomplished via two oil-fired boilers and one primary electric boiler located in the mechanical room. Hot water from the boiler is distributed throughout the building via fan coil units located within the ceiling space, with some cabinet units also included. Additional heating is provided by radiant ceiling panels, unit heaters and baseboard heaters. A cooling system is also incorporated in the building through a chilled well water system, assumed to be also connected to fan coils. In the case of the server rooms, Engineered Air units are provided with cooling coils. Ventilation is accomplished via air handling units. Galvanized metal ductwork is provided throughout the building. The building HVAC equipment is controlled through a building management control system (BMCS) from the IT Trailer. Localized thermostats and controls were also observed throughout the building. Exhaust ventilation units are provided for the washrooms and shower rooms. Plumbing fixtures for the washrooms are vitreous china tank type water closets, vitreous china flush valve urinals and counter mounted enamel lavatories. Pre-cast terrazzo mop sink is installed in the janitor's room. The kitchens and kitchenette are provided with single and double basin stainless steel sinks. The building is sprinklered and portable fire extinguishers in recessed cabinets are also provided throughout. The mechanical components are in overall acceptable condition.



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- Electrical service is fed into the building via underground lines from a pad mounted transformer. Solar PV panels are provided on fixed to the exterior walls on the south elevation. Copper wiring is reported to be present throughout the building. Power is stepped down from 600 V to 120/208V by one Federal Pioneer interior transformer rated at 150kVA. Main distribution is by one Federal Pioneer central distribution panel (CDP) located in the main electrical room. Equipment is rated at 400 Amp 120/208 V and it contains 12 circuits. One Federal Pioneer 400 Amp disconnect main disconnect switchgear unit is provided in the mechanical room. Secondary distribution is accomplished through seven secondary panelboards manufactured by Federal Pioneer and rated at 225 A 120/208V with 84 circuits each. Panels were observed to be 70% full. Several disconnect units are provided throughout the building for mechanical equipment generally rated at 60-200A and manufactured by Federal Pioneer or Square D. Lighting is provided primarily by suspended tubular fluorescent fixtures and pot lights fitted with T8 lamps and compact fluorescent (CFL) lamps. Exterior lighting is accomplished by high intensity discharge (HID) and light emitting diode (LED) lighting fixtures. Emergency battery packs with integral lighting heads are provided throughout the building. Powered LED exit signs are provided at emergency exits and egress path of ways. One fire alarm panel is located in the main entrance vestibule, monitored by a secondary panel located on the third floor in the SCC room. Battery backups are provided for the main servers located in the building and also for individual computers. Intrusive and surveillance systems are also included for the building controlled from the SCC room. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~1999), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present.

Immediate investigation / action items identified pertain to water distribution pipes. Deficiencies and Capital Reserve Items have been identified within the 10 year time frame of this report with respect to architectural, mechanical and electrical components and systems.

The following conclusions are made for Site B:

- The trailer unit was manufactured in ~1991, according to an ATCO tag found on site. The site location is provided with a paved parking lot east of the site. Site components include grassed and fenced areas that are part of the Whitehorse Office compound, additionally the building is provided with an attached painted metal stair. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- The exterior finish is primarily painted wood board siding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and air/vapor barrier. The entrance door is an aluminum frame entrance door with insulated double glazing units. The roof is a low slope roof covered with asphalt shingles throughout. Painted wood fascia is provided along the roof perimeter. The exterior components are in overall marginal condition.



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- The interior doors are typically stained wood doors set in wood frames throughout. Interior partitions consist of interior wood stud frame partitions with wall panel coverings finished with paint. The ceilings for the building are texturized ceiling panels. Building floor finishes are a mostly carpet with some sections of resilient floor sheet in the washroom and the kitchen area. One unisex washroom is provided for the building equipped with a laminated countertop with lower cabinets. The kitchen staff furnishing includes plastic laminate countertops and laminate upper and lower cabinetry. The interior components are in overall acceptable condition.
- No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and the type of building construction it is assumed that the structure is sitting on a compacted granular base. The building floor is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads. The superstructure is composed of wood frames and studs supporting wood beams and ceiling joists. Interior walls are wood frames partitions with wood studs covered with wall panels. The roof structure is composed of wood rafters and joists presumably covered by plywood roof panels. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from the Diesel Plant and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. No domestic hot water heater was observed on site but it is presumably present, most likely concealed within the ceiling space. Heating for the building is accomplished via one oil-fired furnace located in the washroom and distributed through galvanized steel ducts running within the crawlspace. An outdoor condenser cooling unit was observed located on the roof assumed to be connected to the furnace and providing air conditioning for the building. Ventilation is probably accomplished through heat recovery ventilators (HRV) connected to the ductwork. Localized digital thermostats are used to control room temperatures. One exhaust ventilation unit is provided for the washroom. Plumbing fixtures for the washroom are vitreous china tank type water closet, and counter mounted enamel lavatory. The building is provided with portable ABC fire extinguishers throughout. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via underground conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished through a main panelboard located in the kitchen area, no data was available on equipment, but it is assumed to be rated at 100 amp, 120/240 V and is provided with 24 circuits. The panel was observed to be 100% full. Interior lighting is a combination of surface mounted tubular fluorescent lamps equipped with T8 lamps and incandescent fixtures. Some units are reported to have T12 lamps. Exterior lighting is accomplished by HID lighting fixtures. Emergency lighting was not observed at the time of assessment, but was reportedly installed during reporting. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~1991), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) may be present. Site Representative reported that they were not aware of any hazardous materials present such as ACMs.

Immediate investigation / action items identified pertain to emergency lighting within the building.



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The following conclusions are made for Site C:

- The unit was manufactured in ~2001 according to information found on site. The site location is provided with a paved parking lot west of the site. Site components include grassed and fenced areas that are part of the Whitehorse Office compound, additionally the building is provided with wood stairs. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- Exterior finish is primarily pre-finished vinyl siding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and air/vapor barrier. The building includes two main entrances comprised of pre-finishes insulated doors set in stained wood frames and insulated glass inserts. The roof for the building is a gable roof covered with asphalt shingles throughout. Pre-finished metal fascia and soffit provided along the roof perimeter and at roof overhangs. The exterior components are in overall acceptable condition.
- The interior doors are typically stained wood doors set in wood frames throughout. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and tiles. One unisex washroom is provided for the building equipped with a laminated countertop with lower cabinets. The kitchen staff furnishing includes plastic laminate countertops and laminate upper and lower cabinetry. The interior components are in overall acceptable condition.
- No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and the type of building construction it is assumed that the structure is sitting on a compacted granular base. The building floor is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads. The superstructure is composed of wood frames and studs supporting wood beams and ceiling joists. Interior walls are wood frames partitions with wood studs covered with wall panels. The roof structure is composed of wood rafters and joists presumably covered by plywood roof panels. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from a well located on site and is distributed through a combination of copper and PVC plastic pipes. The domestic water distribution lines include a water filtration system. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. One domestic electric water heater is in the mechanical room with 38.5 Gallon capacity. Heating for the building is accomplished via one oil-fired furnace located in the mechanical room. One outdoor condenser unit was observed east of the site connected to the building. Data label was not accessible and detailed information for this equipment was not available. It is assumed that this equipment is part of an air conditioning system, although no air conditioning system for this building was reported. Ventilation is probably accomplished through heat recovery ventilators (HRV) connected to galvanized metal ductwork. Localized digital thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by one wall mounted unit. Plumbing fixtures are vitreous china tank type water closet, and counter mounted enamel lavatory. The building is provided with portable ABC fire extinguishers throughout. The mechanical components are in overall acceptable condition.



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- Electrical service is provided to the building via underground conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished through a main Siemens panelboard located in the mechanical room, rated at 100 amp, 120/240 V with 24 circuits. The panel was observed to be 100% full. Interior lighting is a combination of surface mounted tubular fluorescent lamps equipped with T8 lamps and incandescent light fixtures. Some units are reported to have T12 lamps. Exterior lighting is accomplished by LED lighting fixtures. No emergency lighting was observed for the building, neither were exit signs. One Notifier fire alarm panel is provided at the main entrance vestibule. The panel monitors detection devices throughout the building including: smoke/heat detectors and pull stations. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~2001), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present.

Immediate investigation / action items identified pertain to exterior stairs and emergency lighting within the building.

The following conclusions are made for Site D:

- The unit was manufactured in ~1996. The site is provided with a paved parking lot shared with the electricians' trailer located west of the site. Site components include grassed and fenced areas that are part of the Whitehorse Office compound, additionally the building is provided with wood stairs. Grounds were mostly covered in snow which limited visibility and impeded a comprehensive evaluation of the site, but according to reports the site components are in overall acceptable condition.
- The building exterior is finished with pre-finished vinyl siding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and air/vapor barrier. Pre-finished insulated metal doors set in stained wood frames are provided for main entrances; doors are completed with PVC framed screen doors with acrylic panels. The roof for the building is a gable roof covered with asphalt shingles throughout. Pre-finished metal fascia and soffit provided along the roof perimeter and at roof overhangs. The exterior components are in overall acceptable condition.
- The interior doors are typically stained wood doors set in wood frames throughout. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and carpet. One unisex washroom is provided for the building equipped with a laminated countertop with lower cabinets. The kitchen staff furnishing includes plastic laminate countertops and laminate upper and lower cabinetry. The interior components are in overall acceptable condition.



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- No structural drawings were provided. The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and the type of building construction it is assumed that the structure is sitting on a compacted granular base. The building floor is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads. The superstructure is composed of wood frames and studs supporting wood beams and ceiling joists. Interior walls are wood frames partitions with wood studs covered with wall panels. The roof structure is composed of wood rafters and joists presumably covered by plywood roof panels. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from a well shared with the electricians' trailer and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank located on electricians' trailer site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided through one electric heater located in one of the offices. Heating for the building is accomplished via one oil-fired furnace located in one of the entrance vestibules. One outdoor compressor unit provides cooling for the building and it is connected to the interior furnace equipment. Ventilation is probably accomplished through heat recovery ventilators (HRV) connected to galvanized metal ductwork. Localized digital thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by one wall mounted unit. Plumbing fixtures are vitreous china tank type water closet, and counter mounted enamel lavatory. The washroom is additionally provided with a modular fiberglass shower unit. The building is provided with portable ABC fire extinguishers throughout. The mechanical components are in overall acceptable condition.
- Electrical service is provided to the building via underground conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary distribution is accomplished through a Federal Pioneer main panelboard located in the entrance vestibules. Equipment is rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 100% full. Interior lighting is a combination of surface mounted tubular fluorescent lamps equipped with T8 lamps and incandescent light fixtures. Some units are reported to have T12 lamps. Exterior lighting is accomplished by LED lighting fixtures. No emergency lighting was observed for the building, neither were exit signs. One empty Notifier fire alarm cabinet is provided at the main entrance vestibule. The building is tied-in to the panel located in the Electricians Trailer (C). Devices throughout the building including: smoke/heat detectors and pull stations are being monitored. The electrical components are in overall acceptable condition.
- Given the year of the original construction (~2001), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) are unlikely to be present.

Immediate investigation / action items identified pertain to exterior stairs, water distribution, and emergency lighting within the building.

The Immediate Repairs and Capital Reserve Analysis identified for each site are included in Appendix D. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.



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Table 1: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/ Main Office (Site A)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$0	$473,625	$105,500	$579,125
2	Structural	$0	$0	$0	$0
3	Mechanical	$3,000	$102,300	$0	$102,300
4	Electrical	$0	$146,000	$0	$146,000
TOTALS		**$3,000**	**$721,925**	**$105,500**	**$827,425**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 2: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ Main Office (Site A)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$3,000	$92,500	$43,000	$40,000	$145,300	$401,125

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$0	$105,500	$0

Table 3: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/ IT Trailer (Site B)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$0	$284,650	$0	$284,650
2	Structural	$0	$0	$0	$0
3	Mechanical	$0	$6,500	$5,000	$11,500
4	Electrical	$4,000	$20,000	$0	$20,000
TOTALS		**$4,000**	**$311,150**	**$5,000**	**$316,150**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 4: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ IT Trailer (Site B)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$4,000	$49,700	$28,950	$0	$0	$232,500

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$0	$5,000	$0	$0



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Table 5: Summary of Immediate and 10 Year Capital Reserve Expenditures (uninflated)/ Electricians Trailer (Site C)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$1,000	$179,100	$3,500	$182,600
2	Structural	$0	$0	$0	$0
3	Mechanical	$0	$72,500	$3,500	$76,000
4	Electrical	$4,000	$12,700	$7,800	$20,500
TOTALS		**$5,000**	**$264,300**	**$14,800**	**$279,100**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 6: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (uninflated)/ Electricians Trailer (Site C)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$5,000	$27,500	$28,300	$0	$25,000	$183,500

Year 6	Year 7	Year 8	Year 9	Year 10
$14,800	$0	$0	$0	$0

Table 7: Summary of Immediate and 10 Year Capital Reserve Expenditures by Section (Uninflated)/ Drafting Trailer (Site D)

Section	Description	Immediate	Reserve Years 0 to 5 (2016 to 2020)	Reserve Years 5 to 10 (2021 to 2025)	10 Year Reserve Total
1	Architectural	$200	$163,500	$5,225	$168,725
2	Structural	$0	$0	$0	$0
3	Mechanical	$2,500	$8,500	$0	$8,500
4	Electrical	$2,000	$15,500	$0	$15,500
TOTALS		**$4,700**	**$187,500**	**$5,225**	**$192,725**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Table 8: Summary of Immediate and 10 Year Capital Reserve Expenditures by Year (Uninflated)/ Drafting Trailer (Site D)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$4,700	$25,500	$3,500	$0	$3,500	$155,000

Year 6	Year 7	Year 8	Year 9	Year 10
$5,225	$0	$0	$0	$0



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1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Whitehorse Main Office (Site A), IT Trailer (Site B), Electricians Trailer (Site C) and Drafting Trailer (Site D), located at #2 Miles Canyon Road, in the city of Whitehorse, Yukon Territory.

Site A is comprised of a three storey office building with approximately 1,289 m² (13,874 ft²) on approximately 0.40 hectares (1.00 acres) of land. The site building was approximately constructed in 1999. Site B building consists of a one storey trailer with approximately 92 m^2 (990 ft^2) gross floor area (GFA) on approximately 0.05 hectares (0.12 acres) of land, according to ATCO tag on the building the unit was constructed in 1991. Site C building is a one storey trailer with approximately 120 m^2 (1,288 ft^2) gross floor area (GFA) on approximately 0.06 hectares (0.15 acres) of land, according to a label found on site the building was manufactured in 2001. Site D building is a one storey trailer with approximately 187 m^2 (938 ft^2) gross floor area (GFA) on approximately 0.06 hectares (0.15 acres) of land, built approximately in 1996. Site size for all locations refers only to the immediate surroundings of the buildings and not the actual size of the entire site. Access to the site where all buildings are located is provided from Miles Canyon Road.

Written authorization to proceed with the work was provided by Sean Munro, Manager, Property & Risk Management from Yukon Energy Corporation. It is understood that this FLA is required for capital planning.

1.2 Objectives

The objective of the FLA was to document the Site conditions at the time of the Site reconnaissance and, based on available sources of information and observations of surface conditions during the Site reconnaissance, to identify the exterior Site improvements as well as the building structure, envelope, interior finishes, mechanical systems, electrical systems, fire/life safety systems, conveyance devices and visually obvious signs of non-compliance with respect to building code and barrier free accessibility. Due to the age of the buildings, it is possible that hazardous materials are present in some of the buildings.

1.3 Methodology

Site Escort and general building information was provided by Sean Munro (hereafter referred to as the “Point of Contact”). Site reconnaissance was conducted by Brian Levy and Adriana Almeida of Golder on November 17, 2015. In addition to the Site visit, documents identified in Section 1.6 were reviewed in completing the FLA.

At the time of the Site reconnaissance, the weather was overcast; however, most of the grounds and roof were covered by snow limiting visibility on the Site.

The scope of work did not include sampling or testing to identify the potential presence of hazardous building construction materials such as ACMs, lead-based paints (LBPs), PCB-containing electrical equipment or other hazardous materials. Due to the age of the buildings, it is possible that hazardous building construction materials are to be present on Site.



1.4 Evaluation Criteria

The FLA was completed in general accordance with accordance with the Yukon Energy Corporation stated scope of work as documented in *Request for Proposals Building Condition Reports* (hereafter referred to as the "RFP"). The scope of the FLA was limited to identifying components, systems and potential concerns by visual examination of surface features and operating practices, and from available documented information sources. Only those items identified as being above the specified Capital Threshold will be addressed in the Capital Reserve Table. The Condition Rating system (CR) used throughout this report is based on the submitted proposal as per Yukon Energy Corporation RFP:

Code	Description
1	**Critical Unsafe**, high risk of injury or critical system failure.
2	**Poor** - does not meet requirements, has significant deficiencies. May have high operating / maintenance costs.
3	**Marginal** - Meets minimum requirements, has significant deficiencies. May have above average operating maintenance costs.
4	**Acceptable** - Meets present requirements, minor deficiencies. Average operating/maintenance costs.
5	**Good** - Meets all present requirements. No deficiencies.
6	**Excellent** - As new/state of the art, meets present and foreseeable requirements.

The capital expenditures identified with respect to deficiencies or deferred maintenance shall be identified by the following Categories ("Cat#"):

Category	Description
1	Code & Safety
2	Repair & Maintenance
3	Capital Expenditure
4	Modernization / Improvements
5	Other

Items identified with a CR rating of 1 and/or Cat1, shall be treated as “Immediate” action items, considered to have conditions that include deficiencies that require action in the next 60 to 90 days. Items identified with a CR of 2 or 3 and/or Cat2 shall be considered to have conditions that include deficiencies that can be addressed within the next five years (2016 to 2020 in the Capital Reserve Table). Preventative Maintenance (PM) items may have been identified. These PM items are items anticipated to be required to maintain specific components/systems through to the end of their Expected Useful Life (EUL) and are considered to have CR of 4 or better that can be addressed at any time within the 10 year time frame of this report (2016 to 2025 in the Capital Reserve Table).

Other non-urgent conditions identified with a CR of 4 to 6, are prioritized by their identification as Cat2 to Cat4 and are included in the Capital Reserve Table in an appropriate year. For items with no observed or reported deficiencies, a lifecycle replacement (LCR) cost estimate has been provided in the Capital Reserve Table spreadsheet in the year equal to the year of original installation plus that component’s EUL. If an item with no observed or reported deficiencies is nearing or has surpassed its EUL in the next 5 years (i.e., 2016 to 2020), an LCR cost estimate has been provided in the Lifecycle Plan spreadsheet in year 2020.

For similar components that have been replaced/installed at different times but where the age difference is equal to or less than 20% of the component’s EUL, the average install year has been used in calculating the next lifecycle replacement event (i.e., for similar vinyl floor tile installed in 1999 versus 2002, each having a 20 year TDL, an average install year of 2001 has been used to calculate a single lifecycle replacement event in 2021).

No building material sampling or testing was conducted as part of this assessment.

1.5 Recommendations for Additional Investigation or Action

RAI 1A) Domestic water distribution pipes.

RAI 2D) Domestic water distribution pipes.

No other additional investigations are recommended at this time.

1.6 Desktop Data Collection

Architectural drawings and any previous condition reports or hazardous materials reports for the Site were requested. The following are a list of drawings provided:

- Double Wide Trailer, drawing number WHQ-D-A402-1, prepared and provided by YEC, dated October 23, 2008.
- Double Wide Trailer, Electricians Trailer, drawing number WHQ-D-A403-1, prepared and provided by YEC, dated October 24, 2008.
- Single Wide Trailer, File Storage Trailer, drawing number WHQ-D-A401-1, prepared and provided by YEC, dated October 24, 2008.
- YEC Corporate Offices, Main Floor Plan, drawing number A02, provided by YEC and prepared by Maurer Kobayashi Architects Ltd., dated June 1998.
- YEC Corporate Offices, Second Floor Plan, drawing number A03, provided by YEC and prepared by Maurer Kobayashi Architects Ltd., dated June 1998.
- YEC Corporate Offices, Third Floor Plan, drawing number A04, provided by YEC and prepared by Maurer Kobayashi Architects Ltd., dated June 1998.



- YEC Corporate Offices, Building Elevations, drawing number A05, provided by YEC and prepared by Maurer Kobayashi Architects Ltd., dated June 1998.
- YEC Corporate Offices, Building Elevations, drawing number A06, provided by YEC and prepared by Maurer Kobayashi Architects Ltd., dated June 1998.
- YEC Corporate Offices, Building Sections, drawing number A07, provided by YEC and prepared by Maurer Kobayashi Architects Ltd., dated June 1998.
- A pre-Site questionnaire was sent out by Golder and returned by the Site Representative for review.

1.7 Outstanding Information

All information that has been requested has been provided at the time of the completion of this report.

1.8 Building & Fire Code Compliance Overview

The Site Representative advised that they were not aware of any other outstanding work orders, building code violations, building code infractions, building ordinances and municipal health and fire safety by-laws violations.

Additional emergency lighting should be installed in buildings B, C and D.

1.9 Evidence of Mould Presence

No mould presence was visually identified at the time of the site visit; however, suspected mould is assumed to be present between the wall assemblies in Building B (IT Trailer). Details and recommendations are included in the architectural section (Section 3.0) of this report.

1.10 Outline of the Report

The report that follows this section contains a summary description of the Site and building systems/components along with a detailed listing and description of systems/components. Furthermore, current, imminent or anticipated deficiencies above the Capital Threshold (if any) and excluding normal operating maintenance are presented with a CR, including a description of the risk/consequence of deferral, probability of imminent/anticipated failure and/or a further description of any failure if it has already occurred.

A more detailed Capital Reserve Table is presented in Appendix C outlining the specific systems/components, EUL, Install Date, Remaining Useful Life (RUL), replacement event type, basis of estimate and specific years for Capital Reserve planning.

1.11 Mandate and Report Resources

Please refer to Appendix A for the report mandate for this project and for additional resources related to the assumptions used in preparing this report such as:

- Operating and Maintenance Items; and
- Discussions of Overall Concepts and Terminology.



2.0 SITE DESCRIPTION

2.1 Site Location and Setting

Golder Associates Ltd. (Golder) was retained by the Yukon Energy Corporation to conduct a Facility Lifecycle Assessment (FLA) of the properties described as Whitehorse Main Office (A), IT Trailer (B), Electricians Trailer (C) and Drafting Trailer (D), located at #2 Miles Canyon Road, in the city of Whitehorse, Yukon Territory.

Whitehorse Main Office (Site A) is comprised of a three storey office building with approximately 1,289 m² (13,874 ft²) on approximately 0.40 hectares (1.00 acres) of land. The site building was approximately constructed in 1999. The IT Trailer (Site B) building consists of a one storey trailer with approximately 92 m^2 (990 ft^2) gross floor area (GFA) on approximately 0.05 hectares (0.12 acres) of land, according to ATCO tag on the building the unit was factory constructed in 1991. The Electricians Trailer (Site C) building is a one storey trailer with approximately 120 m^2 (1,288 ft^2) gross floor area (GFA) on approximately 0.06 hectares (0.15 acres) of land, according to a label found on site the building was manufactured in 2001. The Drafting Trailer (Site D) building is a one storey trailer with approximately 187 m^2 (938 ft^2) gross floor area (GFA) on approximately 0.06 hectares (0.15 acres) of land, factory built approximately in 1996. Site size for all locations refers only to the immediate surroundings of the buildings and not the actual size of the entire site. Access to the site where all buildings are located is provided from Miles Canyon Road.

2.2 Site Physical Description(s)

Table 9: Site Physical Description Whitehorse Main Office (Building/Site A)

Topic	Data
Site Area	~0.40 hectares (1.00 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building (s) (m^2)	~495 m² (5,328 ft²)
Levels above grade	Three
Levels below grade	None
Date of Building (s) Construction	1999
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~15%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~30% grassed/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~55%



General view of the building on site A Main Office.

FLA: WHITEHORSE OFFICES

Table 10: Site Physical Description IT Trailer (Building/Site B)

Topic	Data
Site Area	~0.05 hectares (0.12 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building (s) (m^2)	~92 m² (990 ft²)
Levels above grade	One
Levels below grade	None
Date of Building (s) Construction	~1991
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~20%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~20%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~60%



General view of the building on site B IT Trailer.

FLA: WHITEHORSE OFFICES

Table 11: Site Physical Description Electricians Trailer (Building/Site C)

Topic	Data
Site Area	~0.06 hectares (0.15 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building (s) (m^2)	~120 m² (1,288 ft²)
Levels above grade	One
Levels below grade	None
Date of Building (s) Construction	~2001
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~20%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~20%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~60%



General view of the building on Site C Electricians Trailer.

FLA: WHITEHORSE OFFICES

Table 12: Site Physical Description Drafting Trailer (Building/Site D)

Topic	Data
Site Area	~0.06 hectares (0.15 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building (s) (m^2)	~187 m^2 (938 ft^2)
Levels above grade	One
Levels below grade	None
Date of Building (s) Construction	~1996
Date of Major Renovation/Addition (s)	N/A
Percentage Site Coverage by Building (s)	~20%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~20%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~60%



General view of the building on Site D Drafting Trailer.

3.0 ARCHITECTURAL

Site A: Main Office

The Site was developed in approximately ~1999. One paved parking lot is provided south of the site. Site components include, but are not limited to, chain link fencing, CIP concrete aprons and stairs, wood parking bumpers and railings, CIP retaining walls, picnic tables and grassed areas.

Exterior finish is primarily pre-finished corrugated metal clad. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Most of the window units include galvanized metal sunshades above. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but according to drawings provided consist of batt insulation and olefin air/vapour barrier. A painted metal pair of doors in painted metal frame with insulated double glazing vision units, and transom and sidelites is provided for the main entrance. Exterior utility doors are painted metal units set in painted metal frames with and without insulated glass inserts. Doors for the office spaces are typically stained wood doors set in painted metal frames, utility rooms are fitted with painted metal doors set in painted metal frames. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are acoustic ceiling tiles on a suspended metallic T-bar grid for most areas and GWB painted ceilings for the utility rooms. Building floor finishes are a combination of resilient sheet flooring, carpet, and sealed or painted concrete for the mechanical and electrical rooms. Washrooms for women and men are provided on the main and second floor, one unisex washroom is located on the third floor. Washrooms on the main and second floor generally include pre-finished metal toilet partitions, laminated countertops, toilet accessories and lockers, and with the exception of a non-compliant mirror, are barrier free. Washroom on the third floor is a barrier free unisex unit provided with toilet accessories and grab bars, the washroom is generally barrier free compliant with the exception of the mirror. Shower rooms are also provided on the main and second floors including shower inserts and wood benches and are not barrier free. Two kitchens are provided for the staff one on the second floor and one on the third floor. The kitchens furnishing includes plastic laminate countertops and laminate upper and lower cabinetry. One kitchenette area was also observed in the boardroom also equipped with kitchen cabinets and countertops. Small residential grade appliances are provided for the kitchens and include a, fridges, microwaves and a stove (only for the third floor kitchen).

The roof for the building is comprised of different sections of sloped shed type roof covered with asphalt shingles throughout according to the drawings. Pre-finished galvanized metal fascia is provided along the roof perimeter. Roof overhangs are finished with stained wood soffits.

Capital expenditures with respect to the asphalt, joint sealers, ceiling tiles, floor finishes, and roof, are anticipated within the 10 year time frame of this report.

The building generally meets barrier free guidelines. A barrier path of way is provided from the parking lot to the main entrance, main entrance doors includes automated door openers, washrooms are provided with barrier-free stalls and an elevator is included to move between the main and second floors. Mirrors in the washrooms and shower units are non-compliant.

The architectural components are in overall acceptable condition.

Site B: IT Trailer

The trailer unit was factory constructed in ~1991, according to an ATCO tag found on site. The site location is provided with a paved parking lot east of the site. Site components include grassed and fenced areas that are part of the Whitehorse Office compound, additionally the building is provided with an attached painted metal stair.

Exterior finish is primarily painted wood board siding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and air/vapor barrier. The entrance door is an aluminum frame storefront entrance door with insulated double glazing units. Interior doors are typically stained wood doors set in wood frames throughout. Interior partitions consist of interior wood stud frame partitions with wall panel coverings finished with paint. The ceilings for the building are texturized ceiling panels. Building floor finishes are a mostly carpet with some sections of resilient floor sheet in the washroom and the kitchen area. One unisex washroom is provided for the building equipped with a laminated countertop with lower cabinets. The kitchen staff furnishing includes plastic laminate countertops and laminate upper and lower cabinetry.

The roof for the building is a low slope roof covered with asphalt shingles throughout. Painted wood fascia is provided along the roof perimeter.

Capital expenditures with respect to the asphalt, exterior paint, wood siding, joint sealers, interior paint, ceiling tiles, carpet, roof and mould, are anticipated within the 10 year time frame of this report.

The building generally does not meet barrier free guidelines. However, Golder assumes is not deemed to be required at this time due to function.

The architectural components are in overall acceptable condition.

Site C: Electricians Trailer

The unit was manufactured in ~2001 according to information found on site. The site location is provided with a paved parking lot west of the site. Site components include grassed and fenced areas that are part of the Whitehorse Office compound, additionally the building is provided with wood stairs.

Exterior finish is primarily pre-finished vinyl siding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Exterior wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and air/vapor barrier. The building includes two main entrances comprised of pre-finished insulated doors set in stained wood frames and insulated glass inserts. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and tiles. One unisex washroom is provided for the building equipped with a laminated countertop with lower cabinets. The kitchen staff furnishing includes plastic laminate countertops and laminate upper and lower cabinetry.

The roof for the building is a gable roof covered with asphalt shingles throughout. Pre-finished metal fascia and soffit provided along the roof perimeter and at roof overhangs.

Capital expenditures with respect to the asphalt, joint sealers, interior paint and resilient floor tiles are anticipated within the 10 year time frame of this report.

The building generally does not meet barrier free guidelines. However, Golder assumes is not deemed to be required at this time due to function.

The architectural components are in overall acceptable condition.

Site D: Drafting Trailer

The unit was manufactured in ~1996. The site is provided with a paved parking lot shared with the electricians' trailer located west of the site. Site components include grassed and fenced areas that are part of the Whitehorse Office compound, additionally the building is provided with wood stairs.

The building exterior is finished with pre-finished vinyl siding. Joint sealers are provided at material transitions and openings throughout the building exterior. Exterior windows are PVC frame type windows with double insulated glazing units provided along the building exterior. Wall insulation and air/vapour barrier systems were mostly concealed and therefore not completely reviewed, but presumably consist of batt insulation and air/vapor barrier. Pre-finished insulated metal doors set in stained wood frames are provided for main entrances; doors are completed with PVC framed screen doors with acrylic panels. Interior partitions consist of interior wood stud frame partitions with GWB coverings finished with paint. The ceilings for the building are texturized stipple GWB. Building floor finishes are a combination of resilient floor sheets and carpet. One unisex washroom is provided for the building equipped with a laminated countertop with lower cabinets. The kitchen staff furnishing includes plastic laminate countertops and laminate upper and lower cabinetry.

The roof for the building is a gable roof covered with asphalt shingles throughout. Pre-finished metal fascia and soffit provided along the roof perimeter and at roof overhangs.

Capital expenditures with respect to the asphalt, joint sealers, wall coverings and roof are anticipated within the 10 year time frame of this report.

The building generally does not meet barrier free guidelines. However, Golder assumes is not deemed to be required at this time due to function.

The architectural components are in overall acceptable condition.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.1A	**Site Servicing**	**Water**: Water is supplied from a water well located on site. **Sanitary Sewer**: Sanitary sewage is assumed to be disposed to a septic tank on site. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building through underground line conductors. Solar panels are also provided.	**4**	-	No concerns observed or reported.
A01.1B	**Site Servicing**	**Water**: Water is supplied from the Diesel Plant. **Sanitary Sewer**: Sanitary sewage is disposed to a septic tank on site. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via underground conductors. **Oil**: Oil for the furnaces is provided from a storage tank located south of the site, recharged when required by a local provider.	**4**	-	No concerns observed or reported.
A01.1C	**Site Servicing**	**Water**: Domestic water is supplied from a water well located on site. **Sanitary Sewer**: Sanitary sewage is disposed to a septic tank on site. **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via underground conductors. **Oil**: Oil for the furnaces is provided from a storage tank located east of the site, recharged when required by a local provider.	**4**	-	No concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.1D	**Site Servicing**	**Water**: Domestic water is supplied from the water well located in the Electricians Trailer (C). **Sanitary Sewer**: Sanitary sewage is disposed to a septic tank located in the Electricians Trailer (C). **Gas**: No domestic gas connections are provided. **Electrical**: Power is fed to the building via underground conductors. **Oil**: Oil for the furnaces is provided from a storage tank located by the Electricians Trailer (C).	**4**	-	No concerns observed or reported.
A01.2A	**Parking Lots & Drive Aisles**	**~1995:** A paved parking lot is provided south of the site.	**4**	3	Site grounds were mostly covered by snow including the parking lot; therefore, evaluation was limited to issues or concerns reported. According the Point of Contact approximately 60% of the paved surface is ~20 years old and is showing signs of cracking in some areas. No other issues or concerns were reported. (See Note **2A**)
A01.2B	**Parking Lots & Drive Aisles**	**~1995:** A paved parking lot is provided east of the site.	**4**	3	Site grounds were mostly covered by snow including the parking lot; therefore, evaluation was limited to issues or concerns reported. According the Point of Contact approximately 60% of the paved surface is ~20 years old and is showing signs of cracking in some areas. No other issues or concerns were reported. (See Note **2A**)

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A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.2C	**Parking Lots & Drive Aisles**	**~1995:** A paved parking lot is provided east of the site.	**4**	3	Site grounds were mostly covered by snow including the parking lot; therefore, evaluation was limited to issues or concerns reported. According the Point of Contact approximately 60% of the paved surface is ~20 years old and is showing signs of cracking in some areas. Typical freeze/thaw cracking was reported. (See Note **2A**)
A01.2D	**Parking Lots & Drive Aisles**	**~1995:** A paved parking lot is provided east of the site.	**4**	3	Site grounds were mostly covered by snow including the parking lot; therefore, evaluation was limited to issues or concerns reported. Typical freeze/thaw cracking was reported. (See Note **3B**)
A01.3A	**Concrete Sidewalks**	**~1999**: CIP concrete sidewalks provided at main and secondary entrances.	**4**	3	The site was mostly covered with snow which limited visibility on the site components. No concerns observed or reported.
A01.3B	**Concrete Sidewalks**	No concrete elements were observed to be provided surrounding the building.	**4**	-	The site was mostly covered with snow which limited visibility on the site components. No other concerns observed or reported.
A01.3C	**Concrete Sidewalks**	No concrete elements were observed to be provided surrounding the building.	**4**	-	The site was mostly covered with snow which limited visibility on the site components. No other concerns observed or reported.
A01.3D	**Concrete Sidewalks**	No concrete elements were observed to be provided surrounding the building.	**4**	-	The site was mostly covered with snow which limited visibility on the site components. No other concerns observed or reported.
A01.4A	**Wood Bumpers / Railings**	**~1999**: Wood parking bumpers and railings are provided at the building's parking lot.	**4**	-	No concerns observed or reported.
A01.5A	**Site Drainage**	Overland soil absorption and drainage.	**5**	-	No issues or concerns were reported regarding the site drainage.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.5B	**Site Drainage**	Overland soil absorption and drainage.	**3**	2	It was reported that water is draining towards the building and into the building crawlspace. This represents a major concern as it could potentially affect the building foundation system. Site should be re-graded to allow positive drainage away from the building walls. An allowance is included in the Capital Reserve Table. No issues or concerns were reported regarding the site drainage.
A01.5C	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.5D	**Site Drainage**	Overland soil absorption and drainage.	**4**	-	No issues or concerns were reported regarding the site drainage.
A01.6A	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No irrigation system was observed or reported. No other concerns observed or reported.
A01.6B	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No concerns observed or reported.
A01.6C	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No other concerns observed or reported.
A01.6D	**Grassed Areas**	Ground was mostly covered by snow. No grassed areas were directly observed but assumed to be present in most areas of the site.	**4**	-	No other concerns observed or reported.
A01.7A	**Fencing**	**~1990**: The Whitehorse office compound is delimited by a chain link fence with barb wire and chain link gates throughout the perimeter of the site. Sections of fence can be found north and west of the site.	**4**	-	No concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.7B	**Fencing**	**~1990**: The Whitehorse office compound is delimited by a chain link fence with barb wire and chain link gates throughout the perimeter of the site. Sections of fence can be observed east of the site.	**4**	-	No concerns observed or reported.
A01.7B	**Fencing**	**~1990**: The Whitehorse office compound is delimited by a chain link fence with barb wire and chain link gates throughout the perimeter of the site. Sections of fence can be observed east of the site.	**4**	-	No concerns observed or reported.
A01.7D	**Fencing**	**~1990**: The Whitehorse office compound is delimited by a chain link fence with barb wire and chain link gates throughout the perimeter of the site. Sections of fence can be observed east of the site.	**4**	-	No concerns observed or reported.
A01.8A	**Amenities – Site Furnishings**	**~1999**: The site is provided with wood picnic tables, painted metal bike racks, and wood planters throughout.	**4**	-	No concerns observed or reported.
A01.9A	**Amenities - Flagpoles**	**~1999:** Two flagpoles are located south of the site.	**4**	-	No concerns observed or reported.
A01.10A	**Handrails**	**~1999**: Painted metal handrails and guardrails are provided at the main entrance steps. Unfinished wood handrails are also provided for the service stairs to access the exterior mechanical room.	**4**	-	No concerns observed or reported.
A01.11B	**Bollards**	**~1991:** Concrete filled metal bollards are provided around the hydrant.	**4**	-	No concerns observed or reported.
A01.11D	**Bollards**	**~1996:** Concrete filled metal bollards are provided around the hydrant.	**4**	-	No concerns observed or reported.
A01.12B	**Hydrant**	One hydrant is provided south of the site.	**4**	-	No concerns observed or reported.
A01.12D	**Hydrant**	One hydrant is provided south of the site.	**4**	-	No concerns observed or reported.
A01.13A	**Car Plug-ins**	**~1999**: Car plug-ins are provided in the parking lot fixed to wood rails.	**4**	-	No concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.13B	**Car Plug-ins**	**~1991**: Car plug-ins are provided fixed to the building south wall elevation.	**4**	-	No concerns observed or reported.
A01.13C	**Car Plug-ins**	**~2001**: Car plug-ins are provided fixed to the building south wall elevation.	**4**	-	Concerns about car plug-ins not properly working were reported. However, repairs are assumed to fall below the Capital Threshold; therefore no costs are included in the Capital Reserve Table. No other concerns observed or reported.
A01.13D	**Car Plug-ins**	**~1996**: Car plug-ins are provided fixed to the building south wall elevation.	**4**	-	No concerns observed or reported.
A01.14A	**Retaining Walls**	**~1999:** CIP concrete retaining walls are provided at the main entrance steps.	**4**	-	No concerns observed or reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1B	**Exterior Paint**	**~1991:** The exterior wood siding of the building is finished with exterior paint.	**3**	3	Paint is generally faded and requires replacement. No other concerns observed or reported.
A02.2A	**Metal Cladding**	**~1999:** The exterior of the building is finished with pre-finished metal cladding throughout.	**5**	-	No concerns or issues were reported.
A02.3C	**Vinyl Siding**	**~2001:** The exterior of the building is finished with pre-finished vinyl siding throughout.	**4**	-	Damaged sections of vinyl siding were observed on the lower section that covers the crawlspace. Repairs can be completed at a cost below the Capital Threshold. No concerns or issues were reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.3D	**Vinyl Siding**	**~1996:** The exterior of the building is finished with pre-finished vinyl siding throughout.	**4**	-	Impact damage was observed on the south elevation cladding. Repairs can be completed at a cost below the Capital Threshold. No concerns or issues were reported.
A02.4B	**Wood Siding**	**~1991:** Painted wood siding is provided throughout.	**3**	2	Some boards on the north elevation appear to have some water damage. It was reported that the wood is rotting in some sections on the south section of the building. Sections of rotten wood should be replaced. An allowance is included in the Capital Threshold for siding replacements. No other concerns or issues were reported.
A02.5A	**Joint Sealers**	**~1999**: Sealant at material transitions and openings.	**4**	3	No concerns observed or reported.
A02.5B	**Joint Sealers**	**~1991**: Joint sealers are provided at material transitions and openings.	**3**	3	No concerns observed or reported.
A02.5C	**Joint Sealers**	**~2001**: Sealant at material transitions and openings.	**4**	3	No concerns observed or reported.
A02.5D	**Joint Sealers**	**~1996**: Sealant at material transitions and openings.	**4**	3	No concerns observed or reported.
A02.6A	**Louvers**	**~1999**: Anodized aluminum fixed louvers are provided at the exterior walls for some of the service rooms.	**4**	-	No concerns observed or reported.
A02.7A	**Handrails and Guardrails**	**~1999**: Exterior terraces and balconies on the second and third floors include painted steel handrails and guardrails.	**4**	-	No concerns observed or reported.
A02.8B	**Skirting**	**~1991:** The building is provided with a painted wood skirting along the perimeter of the building to conceal the crawlspace.	**2**	-	The skirting pain finish is generally in poor condition and requires repainting. Costs are assumed to fall below the Capital Threshold; therefore no costs are included. No other concerns observed or reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.8C	Skirting	**~2001:** The building is provided with a prefinished vinyl skirting along the perimeter of the building to conceal the crawlspace.	3	-	Some impact damage was noted on the south elevation and one section was observed to be missing on the north elevation. Costs for repairs are assumed to fall below the Capital Threshold; therefore no costs are included. No other concerns observed or reported.
A02.8D	Skirting	**~1996:** The building is provided with an unfinished wood skirting along the perimeter of the building to conceal the crawlspace.	3	-	It is recommended to finish the skirting with exterior paint to protect the wood and improve the overall aesthetic of the building. Costs are assumed to fall below the Capital Threshold; therefore no costs are included. No other concerns observed or reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1A	Exterior Windows	**~1999**: According to drawings provided by the Client the windows for the building are polyvinyl chloride (PVC) frame type insulated windows.	4	-	No concerns were observed or reported.
A03.1B	Exterior Windows	**~1991**: The windows are PVC frame type insulated windows.	4	-	No concerns were observed or reported.
A03.1C	Exterior Windows	**~2001**: The windows are PVC frame type insulated windows.	4	-	No concerns were observed or reported.
A03.1D	Exterior Windows	**~1996**: The windows are PVC frame type insulated windows.	4	-	No concerns were observed or reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.2D	**Skylights**	**~1996**: PVC frame dome type skylight located in the washroom.	**4**	-	Skylight was covered with snow at the time of the assessment. No issues with leakage were reported and none were observed. No other concerns were observed or reported.
A03.3A	**Sun Shades**	**~1999:** Exterior windows are completed with galvanized steel sun shades.	**4**	-	No concerns were observed or reported.
A03.4D	**Windows Shutters**	**~1996:** Exterior windows are completed with decorative windows shutters.	**4**	-	No concerns were observed or reported.

A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1A	**Main Entrance Door**	**~1999**: Painted metal entrance door with painted metal frame with insulated glazing inserts, transom, and sidelites is provided at the main entrance.	**4**	-	No concerns were observed or reported.
A04.1B	**Main Entrance Door**	**~1991**: Aluminum entrance door with aluminum frames and insulated glass inserts is provided at the main entrance.	**3**	-	Operational issues were noted, door was not closing/sealing properly and ice was building up around the door frame. It is recommended to replace the entrance door at a cost below the Capital Threshold. No other concerns were observed or reported.
A04.1C	**Main Entrance Door**	**~2001**: Prefinished insulated metal entrance doors with stained wood frames and insulated glass inserts are provided at the main entrances.	**4**	-	No concerns were observed or reported.

A04.1D	**Main Entrance Door**	**~1996**: Prefinished insulated metal entrance doors in painted wood frames are provided at the main entrances. Main entrance doors are completed with PVC framed screen doors with acrylic panes	**4**	-	No other concerns were observed or reported.
A04.2A	**Utility Doors**	**~1999**: Painted metal doors in painted metal frames are provided along the building exterior with or without insulated glass inserts.	**4**	-	No concerns or issues were reported.

A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1A	**Metal Fascia**	**~1999**: Pre-finished galvanized metal fascia is provided along the roof perimeter.	**4**	-	No concerns observed or reported.
A05.1C	**Metal Fascia**	**~2001**: Pre-finished galvanized metal fascia is provided along the roof perimeter.	**4**	-	No concerns observed or reported.
A05.1D	**Metal Fascia**	**~1996**: Pre-finished galvanized metal fascia is provided along the roof perimeter.	**4**	-	No concerns observed or reported.
A05.2B	**Wood Fascia**	**~1991:** Painted wood fascia boards are installed along the perimeter of the roof.	**3**	-	Fascia finish is generally faded with some patches of mould and water damage noted. Replacement is recommended to improve the general aesthetic of the building exterior and to remove any rotten sections. Costs are assumed to fall below the Capital Threshold; therefore, no costs are included. No other concerns observed or reported.
A05.3A	**Wood Soffit**	**~1999**: Roof overhangs are finished with stained wood soffits.	**4**	-	No concerns observed or reported.
A05.4C	**Metal Soffit**	**~2001:** Pre-finished vented metal soffit is provided for roof overhangs.	**4**	-	No concerns observed or reported.
A05.4D	**Metal Soffit**	**~1996:** Pre-finished vented metal soffit is provided for roof overhangs.	**4**	-	No concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1A	**Fixed Partitions**	**~1999**: Interior partitions are wood stud frames with gypsum wall board (GWB) coverings.	**4**	-	No issues or concerns were reported.
A06.1B	**Fixed Partitions**	**~1991**: Interior partitions are wood stud frame walls with fiberglass reinforced panels (FRP).	**4**	-	No issues or concerns were reported.
A06.1C	**Fixed Partitions**	**~2001**: Interior partitions are wood stud frame walls with GWB panels.	**4**	-	No issues or concerns were reported.
A06.1D	**Fixed Partitions**	**~1996**: Interior partitions are wood stud frame walls with FRP wall panels.	**4**	-	No issues or concerns were reported.
A06.2A	**Interior Paint**	**~2014**: Most of the interior partition walls throughout the building are provided with interior paint.	**5**	-	Point of Contact reported that the interior walls are repainted on an as needed basis. Stairwells were reportedly being painted at the time of the assessment. No issues or concerns were reported.
A06.2B	**Interior Paint**	**~1991**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	3	No issues or concerns were reported.
A06.2C	**Interior Paint**	**~2001**: Most of the interior partition walls throughout the building are provided with interior paint.	**4**	3	No issues or concerns were reported.
A06.3D	**Wall Coverings**	**~1996:** Interior walls are finished with wall paper throughout.	**4**	3	Wall paper generally looks outdated but it is in acceptable condition. No concerns observed or reported.
A06.4A	**Interior Partitions**	**~1999**: Interior stud-framed partitions are provided with GWB coverings throughout. Office spaces are also provided with prefinished aluminum moveable partitions finished with plastic, glass and fabric panels.	**4**	-	No concerns observed or reported.
A06.4B	**Interior Partitions**	**~1991**: Interior stud-framed partitions are provided with wallboard or stained wood panel coverings throughout.	**4**	-	No concerns observed or reported.
A06.4C	**Interior Partitions**	**~2001**: Interior stud-framed partitions are provided with GWB coverings throughout.	**4**	-	No concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.4D	**Interior Partitions**	**~1996**: Interior stud-framed partitions are provided with wall panel coverings throughout.	**4**	-	No concerns observed or reported.
A06.5A	**Toilet Partitions**	**~1999:** Prefinished metal toilet partitions are provided in the washrooms.	**4**	-	No concerns observed or reported.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1A	**Interior Doors**	**~1999**: Interior doors are typically stained wood doors set in painted metal frames.	**4**	-	No concerns observed or reported.
A07.1B	**Interior Doors**	**~1991**: Interior doors are typically stained wood doors set in stained wood frames.	**4**	-	No concerns observed or reported.
A07.1C	**Interior Doors**	**~2001**: Interior doors are typically stained wood doors set in stained wood frames.	**4**	-	No concerns observed or reported.
A07.1D	**Interior Doors**	**~1996**: Interior doors are typically stained wood doors set in stained wood frames.	**4**	-	No concerns observed or reported.
A07.2A	**Interior Doors (Utility)**	**~1999**: Painted metal doors set in painted metal frames are provided for the electrical/mechanical rooms and staircases. Staircases doors include additionally insulated glass inserts.	**4**	-	No concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.1A	**Ceiling Tiles**	**~1999:** Ceilings for the building are acoustic ceiling tiles on a suspended T-bar grid throughout the office areas.	4	3	Some tiles presented water damage around the reception area due to possible leaks. No active leaks were reported. No other concerns observed or reported.
A08.1B	**Ceiling Tiles**	**~1991:** Ceilings for the building are texturized hardboard panels.	4	3	Some panels presented water damage in furnace area due to possible leaks. No active leaks were reported. No other concerns observed or reported.
A08.2A	**Gypsum Wall Board (GWB)**	**~1999:** The ceiling in the service rooms is finished with painted GWB ceilings throughout.	4	-	No concerns observed or reported.
A08.3C	**Textured Ceiling**	**~2001:** Ceilings are finished with GWB finished with stipple texture.	4	-	No concerns observed or reported.
A08.3D	**Textured Ceiling**	**~1996:** Ceilings are finished with GWB finished with stipple texture.	4	-	No concerns observed or reported.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1A	**Resilient Floor Sheet**	**~1999:** Floors are generally finished with resilient floor sheet on corridors and washrooms.	4	3	No concerns observed or reported.
A09.1B	**Resilient Floor Sheet**	**~1991:** Floors in the washroom and in the kitchen area are finished with resilient floor sheet.	4	-	The floor will surpass its EUL within the timeframe of this report; however, costs are estimated to fall below the Capital Threshold, therefore not included in the Capital Reserve Table. No concerns observed or reported.

A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1C	**Resilient Floor Sheet**	**~2001:** Floor in the washroom area is finished with resilient floor sheet.	**4**	-	The floor will surpass its EUL within the timeframe of this report; however, costs are estimated to fall below the Capital Threshold, therefore not included in the Capital Reserve Table. No concerns observed or reported.
A09.1D	**Resilient Floor Sheet**	**~1996:** Floor in the entrance vestibules and washroom are finished with resilient floor sheet.	**4**	-	The floor will surpass its EUL within the timeframe of this report; however, costs are estimated to fall below the Capital Threshold, therefore not included in the Capital Reserve Table. No concerns observed or reported.
A09.2A	**Resilient Floor Tiles**	**~1999:** Resilient floor tiles are provided at the SCC room on the third floor.	**4**	-	No concerns observed or reported.
A09.2C	**Resilient Floor Tiles**	**~2001:** Resilient floor tiles are provided throughout the building except the washroom.	**3**	3	Tiles seem to be lifting on some sections. Patching was observed where tiles have been replaced with a different color tile. (See Note **3A**). No concerns observed or reported.
A09.3A	**Carpet**	**~1999:** Floors for office areas, staff rooms, board rooms and similar are finished with carpet.	**4**	3	Some stained sections were observed. No other concerns observed or reported.
A09.3B	**Carpet**	**~1991:** Floors for office areas and corridors are finished with carpet.	**4**	3	Some stained sections were observed. No other concerns observed or reported.
A09.3D	**Carpet**	**~2012:** Floors for office areas are finished with carpet.	**5**	-	No concerns observed or reported.
A09.4A	**Concrete Floors**	**~1999:** Unfinished and painted concrete floors are found in the electrical/mechanical rooms	**4**	-	No concerns observed or reported.
A09.5A	**Resilient Stair Finishes**	**~1999:** Stairs treads and risers are finished with slip resistant resilient finish.	**4**	3	No concerns observed or reported.
A09.6D	**Ceramic Tiles**	**~1996:** Ceramic tiles are provided in the storage room.	**4**	-	No concerns observed or reported.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.1A	**Fixed Casework**	**~1999**: Some of the offices and printer rooms are equipped with fixed casework which generally included upper and lower cabinets, shelves and laminate countertops.	**4**	-	No concerns were observed or reported.
A10.2A	**Counters**	**~1999**: The reception area includes a fixed laminate countertop. Laminated countertops are also provided for the washrooms on the main and second floors.	**4**	-	No concerns were observed or reported.
A10.2B	**Counters**	**~1991**: Laminated countertop is provided for the washroom with a lower cabinet.	**4**	-	No concerns were observed or reported.
A10.2C	**Counters**	**~2001**: Laminated countertop is provided for the washroom with a lower cabinet.	**4**	-	No concerns were observed or reported.
A10.2D	**Counters**	**~1996**: Laminated countertop is provided for the washroom with a lower cabinet.	**4**	-	No concerns were observed or reported.
A10.3A	**Kitchen Cabinets**	**~1999**: The staff room, boardroom and the SCC room are all equipped with kitchen cabinets with laminated upper and lower cabinets and countertops.	**4**	-	No concerns were observed or reported.
A10.3B	**Kitchen Cabinets**	**~1991**: The staff kitchen is equipped with kitchen cabinets with laminated lower cabinets and countertop.	**4**	-	No concerns were observed or reported.
A10.3C	**Kitchen Cabinets**	**~2001**: The staff kitchen is equipped with kitchen cabinets with laminated upper and lower cabinets and laminated countertop.	**4**	-	No concerns were observed or reported.
A10.3D	**Kitchen Cabinets**	**~1996**: The staff kitchen is equipped with kitchen cabinets with laminated upper and lower cabinets and laminated countertop. Upper wood cabinets are also provided where the second main entrance is located.	**4**	-	No concerns were observed or reported.
A10.4A	**Lockers**	**~1999**: Full size prefinished metal lockers are provided on the third floor and the washrooms.	**4**	-	No concerns were observed or reported.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.5A	**Blinds**	**~1999**: Plastic horizontal blinds are installed on the windows throughout the building.	**4**	-	No concerns were observed or reported.
A10.5B	**Blinds**	**~1991**: Plastic horizontal blinds are installed on the windows throughout the building.	**4**	-	No concerns were observed or reported.
A10.5C	**Blinds**	**~2001**: Plastic horizontal blinds are installed on the windows throughout the building.	**4**	-	No concerns were observed or reported.
A10.5D	**Blinds**	**~1996**: Plastic horizontal blinds are installed on the windows throughout the building. Vertical fabric blinds are also provided with a decorative fabric valance.	**4**	-	No concerns were observed or reported.
A10.6A	**Washroom Accessories**	**~1999**: The washrooms accessories include mirrors; soap, hand sanitizer, paper towel dispensers, and trash receptacles. Additionally, barrier-free washroom stalls are provided with grab bars.	**4**	3	Washroom accessories will reach EUL during the period of this report. The mirrors are currently mounted too high and are not angled for barrier free compliance above one of the lavatories in each washroom - cost of replacement is below the capital threshold No other concerns were observed or reported.
A10.6B	**Washroom Accessories**	**~1991**: The washrooms accessories include mirrors; soap and paper towel dispensers.	**4**	-	No concerns were observed or reported.
A10.6C	**Washroom Accessories**	**~2001**: The washrooms accessories include mirrors; soap and paper towel dispensers, and trash receptacles.	**4**	-	No concerns were observed or reported.
A10.6D	**Washroom Accessories**	**~1996**: The washrooms accessories include mirrors; soap and paper towel dispensers.	**4**	-	No concerns were observed or reported.
A10.7A	**Mobile Storage**	**~1999**: Standard high-density mobile storage is provided for the library.	**5**	-	No concerns were observed or reported.
A10.8A	**Appliances**	**~1999:** Residential grade appliances are provided for the kitchens on the second and third floors including: fridges and stove (only for the third floor kitchen).	**4**	3	Small appliances are also provided but are not included as part of this evaluation. No concerns observed or reported.
A10.8B	**Appliances**	**~1991:** Small residential appliances are provided but are not included as part of this evaluation.	**4**	-	No concerns observed or reported.

A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.8C	**Appliances**	**~2001:** Small residential appliances are provided but are not included as part of this evaluation.	**4**	-	No concerns observed or reported.
A10.8D	**Appliances**	**~1996:** Small residential appliances are provided but are not included as part of this evaluation. One dishwasher was observed.	**4**	-	No concerns observed or reported.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1A	**Asphalt Shingles**	**~1999**: According to drawings provided, the roof is finished with asphalt shingles.	**4**	3	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. No concerns or issues were reported regarding leakage.
R01.1B	**Asphalt Shingles**	**~1999**: The roof is finished with asphalt shingles.	**4**	3	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. According to the Point of Contact in ~2011 some patching was completed to address some leaks, but most of the roof remains original. No concerns or issues were reported regarding current leaks.
R01.1C	**Asphalt Shingles**	**~2001**: The roof is finished with asphalt shingles.	**4**	-	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. No concerns or issues were reported regarding current leaks.

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1D	**Asphalt Shingles**	**~1996**: The roof is finished with asphalt shingles.	**4**	3	Roof was covered by snow and roof access was not provided at the time of the site visit; therefore a comprehensive evaluation could not be completed. No concerns or issues were reported regarding current leaks.
R01.2A	**Gutters and Downspouts**	**~1999**: Rainwater drainage for the different roofs is accomplished through galvanized steel gutters, downspouts and rain water leaders.	**4**	-	No concerns or issues were observed or reported.
R01.2B	**Gutters and Downspouts**	**~1991**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	-	No concerns or issues were observed or reported.
R01.2C	**Gutters and Downspouts**	**~2001**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	-	No concerns or issues were observed or reported.
R01.2D	**Gutters and Downspouts**	**~1996**: Rainwater drainage for the building is accomplished through pre-finished galvanized steel gutters and downspouts.	**4**	-	No concerns or issues were observed or reported.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.1A	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	An indoor quality testing was reportedly completed ~2010 with no issues detected. No concerns observed or reported
A99.1B	**Mould**	Mould was observed on the exterior wood fascia, and could potentially be present within the exterior walls. Current issues with mould were reported.	**3**	2	A remediation project has not been completed to address mould issues. However; a sampling project was reportedly executed; test results confirmed there is nontoxic mould present. An allowance is included in the Capital Reserve Table to remove any mould presence. No concerns observed or reported
A99.1C	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	No concerns observed or reported
A99.1D	**Mould**	No evidence of mould was observed, neither was reported.	**4**	-	No concerns observed or reported
A99.2A	**Exterior Stairs**	**~1999:** CIP concrete stairs are provided at the main entrance. A set of wood stairs is also provided to access the exterior mechanical room.	**4**	-	No concerns or issues were reported.
A99.2B	**Exterior Stairs**	**~1991:** Painted steel stairs with painted metal handrails is provided for the main entrance.	**4**	-	No concerns or issues were reported.
Imm.1C A99.2C	**Exterior Stairs**	**~2001:** Wood structure stairs with wood handrails and guardrails are provided for the main entrances.	**3**	1	Reportedly the stairs are not properly anchored. It is recommended to fix the stairs to avoid tripping hazards. No concerns or issues were reported.
Imm.2D A99.2D	**Exterior Stairs**	**~1996:** Wood structure stairs with wood handrails and guardrails are provided for the main entrances.	**3**	1	Reportedly the stairs are not properly anchored. It is recommended to fix the stairs to avoid tripping hazards. No concerns or issues were reported.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.3A	**Exterior Ramps**	**~1999:** CIP concrete ramp is provided for the main entrance.	**4**	-	No concerns or issues were reported.
A99.4A	**Vertical Ladder**	**~1999:** A wall fixed steel vertical ladder was observed from the third floor balcony.	**4**	-	No concerns or issues were reported.
A99.5A	**Elevators**	**~1999:** One elevator is provided for the building. The elevator appears to be solely for barrier-free mobilization within the building. Details for the elevator are as follows: Number of Cabs: One Manufacturer: Concord Type: Hydraulic Capacity: 454 Kg or 2 persons and a wheelchair. Controls: Solid-state (electronic) controls. Cab finishes: slip resistant flooring and laminate wood wall panels.	**4**	-	Elevator inspection certificate was observed to be up to date. The elevator is not completely barrier-free compliant as it is missing braille signage. No concerns or issues were reported.

NOTES:

3A) Resilient flooring EUL is typically 20 years. It is possible that the resilient tiles installed in this building are low quality or are older than assumed. Age for the building components is only an estimate based on observations or information provided by the Client or Point of Contact. Given the current conditions and although theoretically the resilient floor is not near its EUL a lifecycle replacement has been included in the Capital Reserve Table for Year 2.

3B) The pavement will reach its EUL and will require replacement within the timeframe of this report. Since evaluation was limited to issues reported it is assumed that full replacement will be required. Costs are included in the Capital Reserve Table for each site.

IMMEDIATE ITEMS :

Imm.1C) Secure exterior stairs.
Imm.2D) Secure exterior stairs.

RECOMMENDED FURTHER INVESTIGATION :

No further investigation recommended at this time.

MAIN OFFICE (SITE A):



Photo #A1A: Main entrance exterior concrete stairs.



Photo #A2A: Building typical exterior finished and components.



Photo #A3A: Typical interior finishes.



Photo #A4A: Damaged ceiling tiles.

IT TRAILER (SITE B):



Photo #A5B: Potential water damage on exterior wood siding.



Photo #A6B: Main entrance door with operational issues and ice build-up.



Photo #A7B: Possible mould growth on wood fascia.



Photo #A8B: Typical interior finishes.

ELECTRICIANS TRAILER (SITE C):



Photo #A9C: Typical exterior finishes.



Photo #A10C: Damaged siding section.

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Photo #A11C: Typical interior finishes.



Photo #A12C: Resilient floor tiles patching.

DRAFTING TRAILER (SITE D):



Photo #A13D: Typical exterior finishes.



Photo #A14D: Impact damage on vinyl siding.

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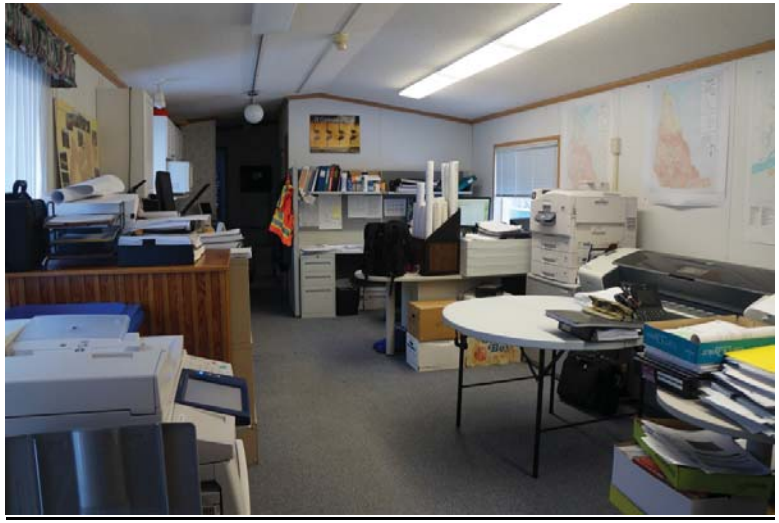


Photo #A15D: Typical interior finishes.



Photo #A16D: Staff kitchen finishes.



4.0 STRUCTURAL

Site A: Main Office

The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and standard construction methods it is assumed to be comprised of CIP concrete piers and grade beams. Structural drawings were not provided. The building floor is a reinforced CIP concrete slab on grade. The superstructure is a wood frame structure comprised of load-bearing stud walls supporting wood trusses. Exterior roof overhangs are supported by stained wood posts and glulam beams. Interior walls are wood frame and stud walls with gypsum wall board (GWB) coverings throughout. Three staircases are provided for the building, structure was mostly concealed but based on observations it is presumably comprised of wood strings, risers and treads. A galvanized steel structure is provided for the third floor balcony which is attached to the exterior load-bearing walls.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall good condition.

Site B: IT Trailer

The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and the type of building construction it is assumed that the structure is sitting on a compacted granular base. The building floor is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads. The superstructure is composed of wood frames and studs supporting wood beams and ceiling joists. Interior walls are wood frames partitions with wood studs covered with wall panels.

The roof structure is composed of wood rafters and joists presumably covered by plywood roof panels.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site C: Electricians Trailer

The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and the type of building construction it is assumed that the structure is sitting on a compacted granular base. The building floor is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads. The superstructure is composed of wood frames and studs supporting wood beams and ceiling joists. Interior walls are wood frames partitions with wood studs covered with wall panels. The superstructure is composed of wood frames and studs supporting wood beams and ceiling joists. Interior walls are wood frames partitions with wood studs covered with GWB.

The roof structure is composed of wood rafters and joists presumably covered by plywood roof panels.



Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

Site D: Drafting Trailer

The foundation system is mostly concealed and therefore not directly reviewed at the time of the Site visit. Based on observations made on site and the type of building construction it is assumed that the structure is sitting on a compacted granular base. The building floor is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads. The superstructure is composed of wood frames and studs supporting wood beams and ceiling joists. Interior walls are wood frames partitions with wood studs covered with GWB.

The roof structure is composed of wood rafters and joists presumably covered by plywood roof panels.

Capital expenditures items were not identified within the timeframe of this report.

A detailed description of Site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S01.1A	**Substructure**	**~1999**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made on site and standard construction methods it is assumed to consist of CIP concrete piers and grade beams.	**4**	-	Structural drawings were not provided. No concerns observed or reported.
S01.1B	**Substructure**	**~1991**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made on site the building is sitting on a compacted granular base.	**4**	-	Structural drawings were not provided No concerns observed or reported.
S01.1C	**Substructure**	**~2001**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made on site the building is sitting on a compacted granular base.	**4**	-	Structural drawings were not provided No concerns observed or reported.
S01.1D	**Substructure**	**~1996**: The substructure is mostly concealed; therefore, was not directly reviewed. Based on observations made on site the building is sitting on a compacted granular base.	**4**	-	Structural drawings were not provided No concerns observed or reported.

S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1A	**Slab on Grade**	The building is constructed on a CIP slab on grade.	**4**	-	No concerns were observed or reported.

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.1A	**Stairs**	**~1999**: The stairs structure was mostly concealed; therefore not directly reviewed. Based on observations it is possible that the stairs are comprised of wood strings, risers and treads.	**4**	-	No concerns were observed or reported.
S03.2A	**Suspended Floors**	**~1999:** The floor for the building is a wood framed structure comprised of wood beams and floor joists.	**4**	-	No concerns observed or reported.
S03.2B	**Suspended Floors**	**~1991:** The floor for the building is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads.	**4**	-	No concerns were observed or reported.
S03.2C	**Suspended Floors**	**~2001:** The floor for the building is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads.	**4**	-	No concerns were observed or reported.
S03.2D	**Suspended Floors**	**~1996:** The floor for the building is likely a steel framed floor structure with a plywood deck supported on wood posts and concrete pads.	**4**	-	No concerns were observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1A	**Framing**	**~1999**: The building structure is comprised of load-bearing wood frame stud walls supporting wood trusses. Some of the exterior overhangs are supported by wood posts and glulam beams.	**4**	-	No concerns or issues were observed or reported.
S04.1B	**Framing**	**~1991**: The building structure is comprised of load-bearing wood frame stud walls supporting wood beams, ceiling joists and roof rafters.	**4**	-	No concerns or issues were observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1C	Framing	**~2001**: The building structure is comprised of load-bearing wood frame stud walls supporting wood beams, ceiling joists and roof rafters.	4	-	No concerns or issues were observed or reported.
S04.1D	Framing	**~1996**: The building structure is comprised of load-bearing wood frame stud walls supporting wood beams, ceiling joists and roof rafters.	4	-	No concerns or issues were observed or reported.

S05 INTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S05.1A	Interior Walls	**~1984/2000:** Interior walls are wood frame partitions with wood studs with GWB coverings.	4	-	No concerns observed or reported.
S05.1B	Interior Walls	**~1991:** Interior walls are wood frame partitions with wood studs and wall panel coverings.	4	-	No concerns observed or reported.
S05.1C	Interior Walls	**~2001:** Interior walls are wood frame partitions with wood studs and GWB coverings.	4	-	No concerns observed or reported.
S05.1D	Interior Walls	**~1996:** Interior walls are wood frame partitions with wood studs and wall panel coverings.	4	-	No concerns observed or reported.
S05.2A	Interior Columns	**~1999:** Mostly concealed. Based on observations interior wood timber columns are assumed to be provided.	4	-	No concerns observed or reported.
S05.2B	Interior Columns	**~1991:** Mostly concealed. Based on observations interior wood timber columns are assumed to be provided for vertical support.	4	-	No concerns observed or reported.
S05.2C	Interior Columns	**~2001:** Mostly concealed. Based on observations interior wood timber columns are provided.	4	-	No concerns observed or reported.
S05.2D	Interior Columns	**~1996:** Mostly concealed. Based on observations interior wood timber columns are assumed to be provided for vertical support.	4	-	No concerns observed or reported.

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.1A	Exterior Load-bearing Walls	**~1999**: Exterior load-bearing walls are comprised of wood frame stud walls with interior GWB coverings and exterior metal cladding.	4	-	No concerns observed or reported.
S06.2B	Exterior Load-bearing Walls	**~1991**: Exterior load-bearing walls are wood stud farmed walls with wall panels covering the interior and wood siding on the exterior.	4	-	No concerns observed or reported.
S06.2C	Exterior Load-bearing Walls	**~2001**: Exterior load-bearing walls are wood stud farmed walls with wall panels covering the interior and plywood and vinyl siding on the exterior.	4	-	No concerns observed or reported.
S06.2D	Exterior Load-bearing Walls	**~1996**: Exterior load-bearing walls are wood stud farmed walls with wall panels covering the interior and plywood and vinyl siding on the exterior.	4	-	No concerns observed or reported.

S99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S99.1A	Balcony	**~1999**: The balcony on the third floor is a galvanized steel structure.	4	-	No concerns or issues were reported.

NOTES:
None.

IMMEDIATE ITEMS:
No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:
No further investigation recommended at this time.

Yukon Energy Corporation
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MAIN OFFICE (SITE A):



Photo #S1A: Exterior exposed structure. General view of glulam beams and wood posts.



Photo #S2A: Interior structure generally hidden by interior finishes.

IT TRAILER (SITE B):



Photo #S3B: Concealed crawlspace.



Photo #S4B: Structural elements generally hidden behind interior finishes.

ELECTRICIANS TRAILER (SITE C):



Photo #S5C: Crawlspace, suspended floor support.



Photo #S6C: Structural elements generally hidden behind interior finishes.

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DRAFTING TRAILER (SITE D):



Photo #S7D: Concealed crawlspace.



Photo #S8D: Structural elements generally hidden behind interior finishes.



5.0 MECHANICAL

Site A: Main Office

The building is supplied with domestic water from a well located on site. Domestic water distribution piping is a combination of copper and PVC plastic. Sanitary sewer is disposed on a septic tank. Storm water drainage is accomplished by overland soil absorption and surface drainage. Waste water piping is PVC plastic. Domestic hot water is provided by one electric hot water heater located in the battery backup room and it is completed with a recirculation system. Heating for the building is accomplished via two oil-fired boilers and one primary electric boiler located in the mechanical room. Hot water from the boiler is distributed throughout the building via fan coil units located within the ceiling space, with some cabinet units also included. Additional heating is provided by radiant ceiling panels, unit heaters and baseboard heaters. A cooling system is also incorporated in the building through a chilled well water system, assumed to be also connected to fan coils. In the case of the server rooms, Engineered Air units are provided with cooling coils. Ventilation is accomplished via air handling units. Galvanized metal ductwork is provided throughout the building. The building HVAC equipment is controlled through a building management control system (BMCS) from the IT Trailer. Localized thermostats and controls were also observed throughout the building. Exhaust ventilation units are provided for the washrooms and shower rooms. Plumbing fixtures for the washrooms are vitreous china tank type water closets, vitreous china flush valve urinals and counter mounted enamel lavatories. Pre-cast terrazzo mop sink is installed in the janitor's room. The kitchens and kitchenette are provided with single and double basin stainless steel sinks. The building is sprinklered and portable fire extinguishers in recessed cabinets are also provided throughout.

Capital expenditures with respect to water distribution and fan coils are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

Site B: IT Trailer

The building is supplied with domestic water from the Diesel Plant and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. No domestic hot water heater was observed on site but it is presumably present, most likely concealed within the ceiling space. Heating for the building is accomplished via one oil-fired furnace located in the washroom. An outdoor condenser cooling unit was observed located on the roof assumed to be connected to the furnace and providing air conditioning for the building. Ventilation is probably accomplished through heat recovery ventilators (HRV) connected to galvanized metal ductwork. Localized digital thermostats are used to control room temperatures. One exhaust ventilation unit is provided for the washroom. Plumbing fixtures for the washroom are vitreous china tank type water closet, and counter mounted enamel lavatory. The building is provided with portable ABC fire extinguishers throughout.

Capital expenditures with respect to water distribution and furnace are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.



Site C: Electricians Trailer

The building is supplied with domestic water from a well located on site and is distributed through a combination of copper and PVC plastic pipes. The domestic water distribution lines include a water filtration system. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank located on site. Storm water drainage is accomplished by overland soil absorption and surface drainage. One domestic electric water heater is in the mechanical room with 38.5 Gallon capacity. Heating for the building is accomplished via one oil-fired furnace located in the mechanical room. One outdoor compressor unit was observed east of the site connected to the building. Data label was not accessible and detailed information for this equipment was not available. It is assumed that this equipment is part of an air conditioning system, although no air conditioning system for this building was reported. Ventilation is probably accomplished through heat recovery ventilators (HRV) connected to galvanized metal ductwork. Localized digital thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by one wall mounted unit. Plumbing fixtures are vitreous china tank type water closet, and counter mounted enamel lavatory. The building is provided with portable ABC fire extinguishers throughout.

Capital expenditures with respect to the furnace are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in good overall condition.

Site D: Drafting Trailer

The building is supplied with domestic water from a well shared with the electricians' trailer and is distributed through a combination of copper and PVC plastic pipes. Sanitary sewer running on PVC plastic pipes is disposed to a septic tank located on electricians' trailer site. Storm water drainage is accomplished by overland soil absorption and surface drainage. Hot water is provided through one electric heater located in one of the offices. Heating for the building is accomplished via one oil-fired furnace located in one of the entrance vestibules. One outdoor condenser unit provides cooling for the building and it is connected to the interior furnace equipment. Ventilation is probably accomplished through heat recovery ventilators (HRV) connected to galvanized metal ductwork. Localized digital thermostats are used to control room temperatures. Exhaust ventilation in the washrooms is provided by one wall mounted unit. Plumbing fixtures are vitreous china tank type water closet, and counter mounted enamel lavatory. The washroom is additionally provided with a PVC shower insert type. The building is provided with portable ABC fire extinguishers throughout.

Capital expenditures with respect to the water distribution and furnace are anticipated to be required within the 10 year time frame of this report.

The mechanical components are in acceptable overall condition.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M01.1A	**Domestic Water Supply**	Water is supplied from a well located on site.	**4**	-	No concerns observed or reported.
M01.1B	**Domestic Water Supply**	The building is supplied with domestic potable water from the Diesel Plant.	**4**	-	No concerns observed or reported.
M01.1C	**Domestic Water Supply**	Domestic potable water is provided from a well located on site.	**4**	-	No concerns observed or reported.
M01.1D	**Domestic Water Supply**	Domestic potable water is provided from a well located in the Electricians Trailer (C).	**4**	-	No concerns observed or reported.
M01.2A	**Sanitary Sewer**	Sanitary sewage is disposed to a septic tank located on site.	**4**	-	No concerns observed or reported.
M01.2B	**Sanitary Sewer**	Sanitary sewage is disposed to a septic tank located on site.	**4**	-	No concerns observed or reported.
M01.2C	**Sanitary Sewer**	Sanitary sewage is disposed to a septic tank located on site.	**4**	-	No concerns observed or reported.
M01.2D	**Sanitary Sewer**	Sanitary sewage is disposed to a septic tank located in the Electricians Trailers (C).	**4**	-	No concerns observed or reported.
M01.3A	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3B	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**3**	-	Issues with water pouring into the building crawlspace. This issue has been addressed in the architectural section of this report, item A01.5B.
M01.3C	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.3D	**Storm Sewer**	Storm water is drained through overland soil absorption and surface drainage.	**4**	-	No concerns observed or reported.
M01.4A	**Gas Servicing**	No domestic gas connections are provided.	**-**	-	No concerns observed or reported.
M01.4B	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.
M01.4C	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.
M01.4D	**Gas Servicing**	No gas service available.	**-**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.3A M02.1A	**Water Distribution**	**~1999:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**3**	2	According to the Point of Contact several issues have been ongoing regarding the copper pipes. Pinholling and leaks are reportedly common throughout. (See Note **5B**). No other concerns observed or reported.
M02.1B	**Water Distribution**	**~1991:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**2**	2	Issues with leaks from pipes were reported within the crawlspace which leads to ice build-up in several areas. No other concerns observed or reported.
M02.1C	**Water Distribution**	**~2001:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	-	No concerns observed or reported.
Imm.4D M02.1D	**Water Distribution**	**~1996:** Copper and PVC plastic domestic water distribution piping is provided in the building.	**4**	2	According to Point of Contact water pressure is extremely low if the water filters are dirty. (See Note **5D**). No other concerns observed or reported.
M02.2A	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2B	**Backflow Prevention**	No backflow prevention was observed or reported to be on site. Main water line comes from the Diesel Plant.	**-**	-	N/A
M02.2C	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A
M02.2D	**Backflow Prevention**	No backflow prevention was observed or reported to be on site.	**-**	-	N/A

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.3A	**Domestic Hot Water Heaters**	**1999:** One electric water heater is provided for the building, completed with a recirculation system. Unit is located in room 123. Data label information is as follow: Make: GSW. Model: JW525THE. Serial Number: 9901239277. Capacity: 175 L	**4**	-	The equipment will reach its EUL by 2019, at which time it is recommended to replace it. (See Note **5A**). No other concerns or reported.
M02.3B	**Domestic Hot Water Heaters**	Domestic water heater was not observed on site. Hot water is assumed to be fed from the Diesel Plant.	**4**	-	No other concerns or reported.
M02.3C	**Domestic Hot Water Heaters**	**2001:** One electric domestic hot water heater is provided for the building. Unit is located in the mechanical room. Data label information is as follow: Make: Giant Model: 152ETE-3FSM. Serial Number: A 3184767. Capacity: 38.5 Gal.	**4**	-	The equipment will reach its EUL by 2021, at which time it is recommended to replace it. (See Note **5A**). No other concerns or reported.
M02.3D	**Domestic Hot Water Heaters**	**1996:** One electric domestic hot water heater is provided for the building. Unit is located in one of the offices. Data label information is as follow: Make: Giant Model: 152ETE-3. Serial Number: A 2210651. Capacity: 38.5 Gal.	**4**	-	The equipment will reach its EUL by 2021, at which time it is recommended to replace it. (See Note **5A**). No other concerns or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.4A	**Waste Water Piping**	**~1999**: PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4B	**Waste Water Piping**	**~1991**: PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4C	**Waste Water Piping**	**~2001:** PVC plastic waste water piping is provided in the building.	**4**	-	No concerns were observed or reported.
M02.4D	**Waste Water Piping**	**~1996:** PVC plastic waste water piping is provided in the building.	**4**	-	The storage room was observed to be previously used as a washroom. Since most of the room was occupied with storage items Golder was unable to determine if waste water pipes were properly decommissioned. (See Note **5E**) No concerns were observed or reported.
M02.5A	**Pressure Tank**	**~1999**: Two domestic water pressure tanks are located in the mechanical room. Tanks are manufactured by Flexcon Industries; model Well-rite WR260R and maximum working pressure of 125 psig.	**4**	-	No concerns were observed or reported.
M02.5C	**Pressure Tank**	**~2006**: One Aquaflo pressure tank is installed for the water well system. The tank has 126 L capacity and provides a maximum working pressure of 125 psi.	**4**	-	No concerns were observed or reported.
M02.6A	**Water Pumps**	**~1999:** Four Grundfos water pumps were observed connected to the hydronic heating system, domestic water and chill water pipe lines. The pumps are approximately ½ HP each.	**4**	3	No concerns were observed or reported.
M02.6C	**Water Pumps**	**~2001:** One Myers water pumps connected to the water well pipeline. The pump is ½ HP.	**4**	-	No concerns were observed or reported.
M02.7A	**Expansion Tank**	**~1999:** One Amtrol Extrol expansion tank is provided for the hydronic system.	**4**	-	No concerns were observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.8A	**Washroom Fixtures**	**~1999**: The washrooms are provided with vitreous china flush tank water closets, flush valve urinals and counter mounted lavatories. Fiberglass showers are also provided in the shower rooms located on the second and third floor.	**4**	-	No concerns observed or reported.
M02.8B	**Washroom Fixtures**	**~1991**: The washroom is provided with a vitreous china flush tank water closet and a counter mounted lavatory.	**4**	-	No concerns observed or reported.
M02.8C	**Washroom Fixtures**	**~2001**: The washroom is provided with a vitreous china flush tank water closet and a counter mounted lavatory.	**4**	-	No concerns observed or reported.
M02.8D	**Washroom Fixtures**	**~1996**: The washroom is provided with a vitreous china flush tank water closet, a counter mounted lavatory and a PVC shower insert.	**4**	-	No concerns observed or reported.
M02.9A	**Sinks**	**~1999**: Stainless steel double and singles basin sinks are provided for the kitchens. One precast terrazzo mop sink is provided in the janitor's room.	**4**	-	No concerns observed or reported.
M02.9B	**Sinks**	**~1991**: Stainless steel single basin sink is provided for the kitchen.	**4**	-	No concerns observed or reported.
M02.9C	**Sinks**	**~2001**: Stainless steel single basin sink is provided for the kitchen.	**4**	-	No concerns observed or reported.
M02.9D	**Sinks**	**~1996**: Stainless steel single basin sink is provided for the kitchen.	**4**	-	No concerns observed or reported.
M02.10A	**Floor Drains**	The mechanical room, washrooms and some storage rooms include floor drains.	**4**	-	No concerns observed or reported.
M02.11A	**Chemical Feeder**	**~1999**: the hydronic system is completed with an Axiom chemical feeder tank.	**4**	-	No concerns observed or reported.
M02.12B	**Water Filtration System**	**~2012:** A Homespring by GE central water filtration system is installed within the building, including chemical and mechanical filtration.	**5**	-	No concerns observed or reported.
M02.12C	**Water Filtration System**	**~2012:** A Homespring by GE central water filtration system is installed within the building, including chemical and mechanical filtration.	**5**	-	No concerns observed or reported.

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.1A	**Boilers**	The building is primarily heated by two oil-fired hot water boilers and one electric hot water boiler. Data label information is as follows: <u>B-1</u> Make: Burnham. Model: V-76 Serial: 1626C Heating Rating: 3.75 GPM Date of installation: ~1999 <u>B-2</u> Make: Burnham. Model: V-76 Serial: 1627C Heating Rating: 3.75 GPM Date of installation: ~1999 <u>B-3</u> Make: Caloritech. Model: WXF2754F8M Serial: T99-00298A Date of installation: ~1999	**4**	-	Heating was reported to be adequate for the building. No concerns observed or reported.
M03.2B	**Furnace**	~**1991**: The building is heated through an oil fired furnace, manufactured by Intertherm. Data label was not accessible and detailed information for the furnace could not be determined.	**4**	3	No concerns observed or reported.

M03 HEATING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.2C	**Furnace**	~**2001**: The building is heated through an oil fired furnace, manufactured by Intertherm, model M1SB-086. Data label was not accessible and detailed information for the furnace could not be determined.	**4**	3	No concerns observed or reported.
M03.2D	**Furnace**	~**1996**: The building is heated through an oil fired furnace, manufactured by Intertherm, model M1SB-086. Data label was not accessible and detailed information for the furnace could not be determined.	**4**	3	No concerns observed or reported.
M03.3A	**Unit Heaters**	**~1999**: Electric cabinet unit heaters are provided at the entrance vestibules and staircases.	**4**	-	No concerns observed or reported.
M03.4A	**Baseboard Heaters**	**~1999**: Heating is also provided by electric baseboard heaters in the exterior mechanical room.	**4**	-	The units will reach the end of their EUL within the timeframe of this report and should be replaced at a cost below the Capital Threshold. No concerns observed or reported.
M03.5A	**Radiant Ceiling Panels**	**~1999:** Radiant ceiling panels connected to the main heating system provides heating in the washrooms.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1A	**Air Distribution**	**~1999**: Air distribution is provided by galvanized metal ductwork throughout the building.	**4**	-	No concerns observed or reported.
M04.1B	**Air Distribution**	**~1991**: Air distribution is provided by galvanized metal ductwork distributed within the crawlspace.	**4**	-	No concerns observed or reported.
M04.1C	**Air Distribution**	**~2001**: Air distribution is provided by galvanized	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
		metal ductwork distributed within the crawlspace.			
M04.1D	**Air Distribution**	**~1996**: Air distribution is provided by galvanized metal ductwork distributed within the crawlspace.	**4**	-	No concerns observed or reported.
M.04.2A	**Ventilation**	**~1999:** The building is ventilated via several McQuay air handling units (AHU).	**4**	-	No concerns observed or reported.
M.04.2B	**Ventilation**	**~1991:** Ventilation is assumed to be accomplished through heat recovery ventilators connected to the ductwork. No units were observed on site.	**4**	-	No concerns observed or reported.
M.04.2C	**Ventilation**	**~2001:** Ventilation is assumed to be accomplished through heat recovery ventilators connected to the ductwork. No units were observed on site.	**4**	-	No concerns observed or reported.
M.04.2D	**Ventilation**	**~1996:** Ventilation is assumed to be accomplished through heat recovery ventilators connected to the ductwork. No units were observed on site.	**4**	-	No concerns observed or reported.
M04.3A	**Air Outlets & Inlets**	**~1999**: The air outlets and inlets are comprised of supply and return air diffusers.	**4**	-	No concerns observed or reported.
M04.3B	**Air Outlets & Inlets**	**~1991**: The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.
M04.3C	**Air Outlets & Inlets**	**~2001**: The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.
M04.3D	**Air Outlets & Inlets**	**~2001**: The air outlets and inlets are comprised of supply and return air grilles.	**4**	-	No concerns observed or reported.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.4A	**Exhaust Fans**	**~1999**: Ceiling mounted exhaust fans are located in the washrooms and shower rooms. Wall mounted units are provided in the service rooms.	**4**	-	No concerns observed or reported.
M04.4B	**Exhaust Fans**	**~1991**: One wall mounted exhaust fans is located in the washroom.	**4**	-	No concerns observed or reported.
M04.4C	**Exhaust Fans**	**~2001**: One wall mounted exhaust fans is located in the washroom. Roof top hellical exhaust fan units are also provided.	**4**	-	No concerns observed or reported.
M04.4D	**Exhaust Fans**	**~1996**: One wall mounted exhaust fans is located in the washroom. Roof top hellical exhaust fan units are also provided.	**4**	-	No concerns observed or reported.
M04.5A	**Fan Coils**	**~1999**: Fan coils units are provided connected to a chilled well water system as well as to the hydronic heating system.	**4**	3/2	Fan coils were reported to be constantly failing. The units that are affected the most are the ones on the third floor according to the Point of Contact. It is possible that the quality of the water is affecting the units and related pipes. (See Note **5C**). No other concerns observed or reported.
M04.6A	**Dampers**	**~1999:** Mechanically controlled dampers were observed in the exterior mechanical room.	**4**	-	No concerns observed or reported.

M05 COOLING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M05.1A	**Chilled Well Water System**	A chilled well water system is reportedly provided in the building. Unit was not observed at the time of the site visit. The system appears to be tied up to the Air Handling Unit.	**4**	**-**	No concerns observed or reported.

M05 COOLING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M05.2B	**Condenser**	~**2014**: One condenser unit for the air conditioning system is installed on the roof and connected to the interior furnace. Data label was not accessible and detailed information for this equipment was not available.	**5**	**-**	No concerns observed or reported.
M05.2C	**Condenser**	~**2001**: One outdoor condenser unit was observed east of the site connected to the building. Data label was not accessible and detailed information for this equipment was not available. It is assumed that this equipment is part of an air conditioning system, although no air conditioning system for this building was reported.	**4**	**-**	No concerns observed or reported.
M05.2D	**Condenser**	~**2011**: One outdoor condenser unit was observed east of the site. Data labels is as follows: Make: Intertherm Model: DS4QD-024KB Serial: DSA110302412 Cooling Capacity: 2 TON. Date of Manufacture: ~2011.	**4**	**-**	No concerns observed or reported.

M05 COOLING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M05.3A	**Cooling Units**	**2012**: Indoor cooling units equipped with cooling coils are provided for the server rooms on the third floor. Data labels for the units are as follows: CU#1: Make: Engineered Air Model: JMV 1000 Serial: V19200-C-1-4 Supply Capacity: 1,000 CFM Installation Date: 09/27/2012 CU#2: Make: Engineered Air Model: JMV 1000 Serial: V19200-C-1-1 Supply Capacity: 1,000 CFM Installation Date: 09/27/2012 CU#3: Make: Engineered Air Model: JMV 1000 Serial: V19200-C-1-3 Supply Capacity: 1,000 CFM Installation Date: 09/27/2012 CU#4: Make: Engineered Air Model: JMV 1000 Serial: V19200-C-1-2 Supply Capacity: 1,000 CFM Installation Date: 09/27/2012	**5**	**-**	No concerns observed or reported.

M06 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M06.1A	**Fire Extinguishers**	Portable ABC fire extinguishers are provided enclosed in recessed cabinets throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M06.1B	**Fire Extinguishers**	Portable ABC fire extinguishers are provided throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M06.1C	**Fire Extinguishers**	Portable ABC fire extinguishers are provided throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M06.1D	**Fire Extinguishers**	Portable ABC fire extinguishers are provided throughout the building.	**4**	-	Fire extinguishers are reportedly inspected on a monthly basis. Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M06.2A	**Sprinklers**	**~1999**: The building is equipped with a wet sprinkler system. The system includes a jockey pump and an electric fire pump controller.	**4**	-	Inspections were observed to be up to date according to labels found on equipment at the time of the site visit. No concerns observed or reported.
M06.3A	**Fire Pump**	**~1999**: The sprinkler system includes a jockey pump.	**4**	-	No concerns observed or reported.
M06.4A	**Electric Fire Pump Controller**	**~2009:** The sprinkler system is controlled by an electric fire pump controller.	**4**	-	No concerns observed or reported.

M07 CONTROLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M07.1A	**Building Management System (BMS)**	**~1999:** Reportedly the building mechanical equipment is managed with a Honeywell BMS controlled from the IT Trailer.	4	-	No concerns observed or reported.
M07.2A	**Electric and Electronic Controls**	**~1999**: Local manual thermostats were observed throughout the building to control temperature.	4	-	No concerns observed or reported.
M07.2B	**Electric and Electronic Controls**	**~1991**: Local digital thermostats were observed throughout the building.	4	-	No concerns observed or reported.
M07.2C	**Electric and Electronic Controls**	**~2001**: Local digital thermostats were observed throughout the building.	4	-	No concerns observed or reported.
M07.2D	**Electric and Electronic Controls**	**~1996**: Local digital thermostats were observed throughout the building.	4	-	No concerns observed or reported.

M99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M99.1A	**Heat Trace**	**~1999:** Heat traces are provided for the main pipe lines for water supply, water discharge and drainage.	4	-	No concerns observed or reported.

NOTES:

5A) This component requires repair or replacement; however, the cost associated with repairing or replacing it is anticipated to fall below the Capital Threshold, therefore it has not been included in the Capital Reserve Table.

5B) It is possible that the quality of the potable water is deteriorating the pipes from the inside leading to pinholling. It was reported that the second floor pipes were all replaced with PEX due to this issue. At the time of the site visit evidence of leaks were observed on stained ceiling tiles. Golder recommends an investigation and study to determine the possible causes on why the copper pipes are failing and ultimately determine what the best possible solution is. An allowance will be included in the Capital Reserve Table for repairs contingent on the results of the study.

5C) Replacement of the third floor units is recommended in year one to guarantee air conditioning services in critical areas like the server rooms. An allowance is included in the Capital Reserve Table; final costs will rely on the extent of damage of pipes beyond the units (see note 5B). Remaining units will surpass their expected useful life within the timeframe of this report and will require replacement; costs are also included in the Capital Reserve Table.

5D) It is possible that water pressure due to the location of the water well and water pump is not adequate for the building. A study is recommended to determine the adequacy of the water distribution system and repairs necessary related to the need for added pumps. An allowance is included in the Capital Reserve Table for the study and repairs. Final costs of repairs will rely solely on the results of the study.

5E) Plumbing fixtures were removed and pipe connections were not visible. Unused plumbing fixtures or open pipes may allow sewage odors to enter indoor spaces. However, since no odors were detected at the time of the site visit it is assumed that these pipes were decommissioned properly and do not represent a concern.

IMMEDIATE ITEMS:

Imm. 3A) Repair/Replace water distribution pipes.

Imm. 4D) Repair/Replace water distribution pipes.

No other Immediate Items were identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

RAI. 1A) Study domestic water distribution pipes damages.

RAI. 2D) Study domestic water distribution pipes adequacy.

No additional further investigation recommended at this time.

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MAIN OFFICE (SITE A):

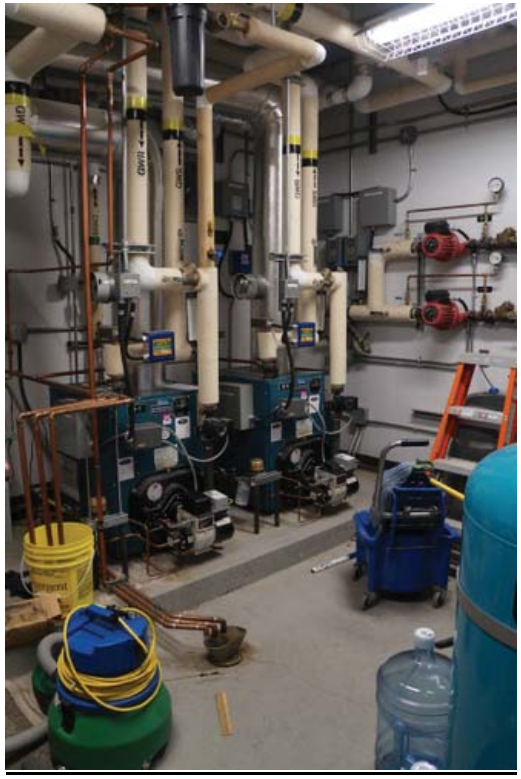


Photo #M1A: Two out of three boilers providing heating for the building.



Photo #M2A: AHU in the electrical room.



Photo #M3A: Belt-drive fan coil units (cooling units) in the server room.



Photo #M4A: Sprinkler system pipe and pump.

IT TRAILER (SITE B):



Photo #M5B: Washroom fixtures.



Photo #M6B: Water filtration system.



Photo #M7B: Furnace location.



Photo #M8B: Condenser on the roof top and oil supply for the furnace on grade.

ELECTRICIANS TRAILER (SITE C):



Photo #M9C: Water distribution system (well).



Photo #M10C: Water filtration system.



Photo #M11C: Furnace.



Photo #M12C: Outdoor condenser unit and oil tank.

DRAFTING TRAILER (SITE D):



Photo #M13D: Typical Washroom Fixtures.



Photo #M14D: Domestic hot water heater.



Photo #M15D: Furnace.



Photo #M16D: Outdoor condenser unit.



6.0 ELECTRICAL

Site A: Main Office

Electrical service is fed into the building via underground lines from a pad mounted transformer. Solar PV panels are provided fixed to the exterior walls on the south elevation. Copper wiring is reported to be present throughout the building. Power is stepped down from 600 V to 120/208V by one Federal Pioneer interior transformer rated at 150kVA. Main distribution is by one Federal Pioneer central distribution panel (CDP) located in the main electrical room. Equipment is rated at 400 Amp 120/208 V and it contains 12 circuits. One Federal Pioneer 400 Amp disconnect main disconnect switchgear unit is provided in the mechanical room. Secondary distribution is accomplished through seven secondary panelboards manufactured by Federal Pioneer and rated at 225 A 120/208V with 84 circuits each. Panels were observed to be 70% full. Several disconnect units are provided throughout the building for mechanical equipment generally rated at 60-200A and manufactured by Federal Pioneer or Square D. Lighting is provided primarily by suspended tubular fluorescent fixtures and pot lights fitted with T8 lamps and compact fluorescent (CFL) lamps. Exterior lighting is accomplished by high intensity discharge (HID) and light emitting diode (LED) lighting fixtures- both building and pole mounted. Emergency battery packs with integral lighting heads are provided throughout the building. Powered LED exit signs are provided at emergency exits and egress path of ways. One fire alarm panel is located in the main entrance vestibule, monitored by a secondary panel located on the third floor in the SCC room and connected to smoke/heat detectors, pull stations, horns and strobe lights throughout. Battery backups are provided for the main servers located in the building and also for individual computers. Intrusive and surveillance systems are also included for the building controlled from the SCC room.

Capital expenditures with respect to the interior lighting, emergency lighting, exterior lighting, fire alarm panel and detectors are anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

Site B: IT Trailer

Electrical service is provided to the building via underground conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished through a main panelboard located in the kitchen area, no data was available on equipment, but it is assumed to be rated at 100 amp, 120/240 V and is provided with 24 circuits. Panel was observed to be 100% full. Interior lighting is a combination of surface mounted tubular fluorescent lamps equipped with T8 lamps and incandescent fixtures. Some units are reported to have T12 lamps. Exterior lighting is accomplished by HID lighting fixtures. Emergency lighting was not observed at the time of assessment, but was reportedly installed during reporting.

Capital expenditures with respect to the primary distribution and interior lighting are anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.



Site C: Electricians Trailer

Electrical service is provided to the building via underground conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary electrical distribution is accomplished through a main Siemens panelboard located in the mechanical room, rated at 100 amp, 120/240 V with 24 circuits. Panel was observed to be 100% full. Interior lighting is a combination of surface mounted tubular fluorescent lamps equipped with T8 lamps and incandescent light fixtures. Some units are reported to have T12 lamps. Exterior lighting is accomplished by LED lighting fixtures. No emergency lighting was observed for the building, neither were exit signs. One Notifier fire alarm panel is provided at the main entrance vestibule. The panel monitors detection devices throughout the building including: smoke/heat detectors and pull stations.

Capital expenditures with respect to the primary distribution, interior lighting and detectors are anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

Site D: Drafting Trailer

Electrical service is provided to the building via underground conductors from an exterior pole mounted transformer. Copper wiring is reported to be present throughout the building. Primary distribution is accomplished through a Federal Pioneer main panelboard located in the entrance vestibules. Equipment is rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 100% full. Interior lighting is a combination of surface mounted tubular fluorescent lamps equipped with T8 lamps and incandescent light fixtures. Some units are reported to have T12 lamps. Exterior lighting is accomplished by LED lighting fixtures. No emergency lighting was observed for the building, neither were exit signs. One empty Notifier fire alarm cabinet is provided at the main entrance vestibule. The building is tied-in to the panel located in the Electricians Trailer (C). Devices throughout the building including: smoke/heat detectors and pull stations are being monitored.

Capital expenditures with respect to the primary distribution, interior lighting and detectors are anticipated within the 10 year time frame of this report.

The electrical components are in acceptable overall condition.

E01 INCOMING SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E01.1A	**Exterior Transformer**	A pad mounted transformer is located south of the site, and provides power for the building.	**4**	-	No concerns observed or reported.
E01.1B	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.1C	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.1D	**Exterior Transformer**	A pole mounted exterior transformer feeds power into the building.	**4**	-	No concerns observed or reported.
E01.2A	**Conductors**	Underground line conductors are provided from the exterior transformer and into the building's main electrical room.	**4**	-	No concerns observed or reported.
E01.2B	**Conductors**	Underground line conductors are provided from the exterior transformer and into the building's main panelboard.	**4**	-	No concerns observed or reported.
E01.2C	**Conductors**	Underground line conductors are provided from the exterior transformer and into the building's main panelboard.	**4**	-	No concerns observed or reported.
E01.2D	**Conductors**	Underground line conductors are provided from the exterior transformer and into the building's main panelboard.	**4**	-	No concerns observed or reported.
E01.3A	**Solar Panels**	**2015**: Solar pv panels are installed on the south elevation wall.	**4**	-	No details were provided as to what components are fed from the solar pv panels. No concerns observed or reported.

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E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.1A	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1999**: One Federal Pioneer 400 Amp disconnect main switchgear unit is provided in the mechanical room. One Federal Pioneer CDP panel was observed in the main electrical room. Equipment is rated at 400 Amp 120/208 V and it contains 12 circuits.	**4**	-	No concerns observed or reported.
E02.1B	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1991**: Primary distribution is accomplished through a main panelboard located in the kitchen area. No data was available on equipment, but it is assumed to be rated at 100 amp, 120/240 V and is provided with 24 circuits. Panel was observed to be 100% full.	**3**	4	Additional space is required for new circuit additions, as it was stated the building does not have adequate power supply. It is recommended to install a secondary panel or replace the existing panel with one with more capacity. An allowance is included in the Capital Reserve Table. No other concerns observed or reported.
E02.1C	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~2001**: Primary distribution is accomplished through a main panelboard located in the mechanical room. Panel was manufactured by Siemens it is rated at 100 amp, 120/240 V and is provided with 24 circuits. Panel was observed to be 100% full.	**4**	4	Additional space may be required for new circuit additions. It is recommended to install a secondary panel or replace the existing panel with one with more capacity. An allowance is included in the Capital Reserve Table. No other concerns observed or reported.
E02.1D	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1996**: Primary distribution is accomplished through a Federal Pioneer main panelboard located in the entrance vestibules. Equipment is rated at 200 amp, 120/240 V and is provided with 40 circuits. Panel was observed to be 100% full.	**4**	4	Additional space may be required for new circuit additions. It is recommended to install a secondary panel or replace the existing panel with one with more capacity. An allowance is included in the Capital Reserve Table. No other concerns observed or reported.
E02.2A	**Interior Transformers**	**~1999**: One Federal Pioneer transformer rated at 150 kVA steps down power from 600V to 120/208V and is located in the electrical room.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.3A	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1999:** Secondary distribution is accomplished through seven secondary panelboards manufactured by Federal Pioneer and rated at 225 A 120/208V with 84 circuits each. Panels were observed to be 70% full. Several disconnect units are provided throughout the building for mechanical equipment, units are generally rated at 60-200A and manufactured by Federal Pioneer or Square D.	4	-	No concerns observed or reported.
E02.4A	**Branch Wiring**	**~1999**: Electrical branch circuit wiring is reportedly copper throughout the building.	4	-	No concerns observed or reported.
E02.4B	**Branch Wiring**	**~1991**: Electrical branch circuit wiring is reportedly copper throughout the building.	4	-	No concerns observed or reported.
E02.4C	**Branch Wiring**	**~2001**: Electrical branch circuit wiring is reportedly copper throughout the building.	4	-	No concerns observed or reported.
E02.4D	**Branch Wiring**	**~1996**: Electrical branch circuit wiring is reportedly copper throughout the building.	4	-	No concerns observed or reported.
E02.5A	**Receptacles**	**~1999**: Electrical receptacles are provided throughout the building.	4	-	No other concerns observed or reported.
E02.5B	**Receptacles**	**~1991**: Electrical receptacles are provided throughout the building.	4	-	No other concerns observed or reported.
E02.5C	**Receptacles**	**~2001**: Electrical receptacles are provided throughout the building.	4	-	No other concerns observed or reported.
E02.5D	**Receptacles**	**~1996**: Electrical receptacles are provided throughout the building.	4	-	No other concerns observed or reported.
E02.6A	**Surge Protection**	**~1999:** Surge protection is via battery backups. Equipment was manufactured by APC. Main panel and battery is located in the battery bank room. Secondary backup battery equipment was also observed in the exterior mechanical room where a MGE UPS system is located connected to a battery charger and several backup batteries.	4	-	No concerns observed or reported.
E02.6B	**Surge Protection**	**~1991:** Surge protection is via UPS connected to computers only.	4	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.6C	**Surge Protection**	**~2001:** Surge protection is via UPS connected to computers only.	**4**	-	No concerns observed or reported.
E02.6D	**Surge Protection**	**~1996:** Surge protection is via UPS connected to computers only.	**4**	-	No concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1A	**Interior Lighting**	**~1999**: Suspended tubular fluorescent lamps with T8 bulbs are provided in the building. Pot light fixtures with compact fluorescent (CFL) lamps are also provided.	**4**	3	No concerns observed or reported.
E03.1B	**Interior Lighting**	**~1991**: Surface mounted tubular fluorescent lamps are provided in the building equipped with T8 lamps. Some units are reported to have T12 lamps.	**4**	3	Lighting fixtures have surpassed their EUL and require replacement. It is recommended to replace the older lighting fixtures for more energy efficient fixtures as T12 lamps are being phased out and replacements may no longer be available in the future. No other concerns observed or reported.
E03.1C	**Interior Lighting**	**~2001**: Interior lighting is a combination of surface mounted tubular fluorescent lamps equipped with T8 lamps and incandescent light fixtures. Some fluorescent units are reported to have T12 lamps.	**4**	3	Lighting fixtures have surpassed their EUL and require replacement. It is recommended to replace the older lighting fixtures for more energy efficient fixtures as T12 lamps are being phased out and replacements may no longer be available in the future. No other concerns observed or reported.

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E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1D	**Interior Lighting**	**~1996**: Interior lighting is a combination of surface mounted tubular fluorescent lamps equipped with T8 lamps and incandescent light fixtures. Some fluorescent units are reported to have T12 lamps.	**4**	3	Lighting fixtures have surpassed their EUL and require replacement. It is recommended to replace older lighting fixtures for more energy efficient fixtures as T12 lamps are being phased out and replacements may no longer be available in the future. No other concerns observed or reported.
E03.2A	**Lighting Controls**	**~1999**: Interior lighting is operated by in-line voltage switches throughout the building. Exterior lighting is operated by photocells.	**4**	-	No concerns observed or reported.
E03.2B	**Lighting Controls**	**~1991**: Interior lighting is operated by in-line voltage switches located throughout the building. Exterior lighting is operated by sensors.	**4**	-	Lighting controls will reach the end of their EUL and will require replacement during the timeframe of this report. . Costs for replacement are considered to be below the capital threshold. No other concerns observed or reported.
E03.2C	**Lighting Controls**	**~2001**: Interior lighting is operated by in-line voltage switches located throughout the building. Exterior lighting is operated by sensors.	**4**	-	Lighting controls will reach the end of their EUL and will require replacement during the timeframe of this report. . Costs for replacement are considered to be below the capital threshold. No other concerns observed or reported.
E03.2D	**Lighting Controls**	**~1996**: Interior lighting is operated by in-line voltage switches located throughout the building. Exterior lighting is operated by sensors.	**4**	-	Lighting controls will reach the end of their EUL and will require replacement during the timeframe of this report. . Costs for replacement are considered to be below the capital threshold. No other concerns observed or reported.
E03.3A	**Emergency Lighting**	**~1999:** Battery packs were observed throughout the building.	**4**	3	No concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.5B E03.3B	**Emergency Lighting**	No emergency lights were observed. Only alarm strobe lights are provided.	**1**	1	Emergency lights such as battery packs are recommended to be installed immediately as it poses a safety concern in an emergency event. No other concerns observed or reported.
Imm.6C E03.3C	**Emergency Lighting**	No emergency lights were observed. Only alarm strobe lights are provided.	**1**	1	Emergency lights such as battery packs are recommended to be installed immediately as it poses a safety concern in an emergency event. No other concerns observed or reported.
Imm.7D E03.3D	**Emergency Lighting**	No emergency lights were observed. Only strobe lights are provided.	**1**	1	No emergency lighting was observed on site at the time of assessment. It was reported that emergency lighting was being installed at the time of reporting. Estimated costing for the installation of emergency lighting has still been provided in the Capital Reserve Table. No other concerns observed or reported.
E03.4A	**Exit Lighting**	**~1999:** Powered LED exit signs are provided at emergency exits and egress path of ways.	**4**	-	No concerns observed or reported.
Imm.8B E03.4B	**Exit Lighting**	No exit signs were observed to be provided.	**1**	1	Exit signs are recommended to be installed immediately as it poses a safety concern in an emergency event. No other concerns observed or reported.
Imm.9C E03.4C	**Exit Lighting**	No exit signs were observed to be provided.	**1**	1	Exit signs are recommended to be installed immediately as it poses a safety concern in an emergency event. No other concerns observed or reported.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.10 D E03.4D	**Exit Lighting**	No exit signs were observed to be provided.	**1**	1	Exit signs are recommended to be installed immediately as it poses a safety concern in an emergency event. No other concerns observed or reported.
E03.5A	**Exterior Lighting**	**~1999**: Exterior light fixtures are a combination of wall and pole mounted HID and LED lights provided along the building elevations and parking lot.	**4**	3	No concerns observed or reported.
E03.5B	**Exterior Lighting**	**~2014**: Exterior wall-mounted LED lights are provided along the building elevations.	**4**	-	No concerns observed or reported.
E03.5C	**Exterior Lighting**	**~2014**: Exterior wall-mounted LED lights are provided along the building elevations.	**4**	-	No concerns observed or reported.
E03.5D	**Exterior Lighting**	**~2014**: Exterior wall-mounted LED lights are provided along the building elevations.	**4**	-	No concerns observed or reported.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1A	**Grounding**	**~1999**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1B	**Grounding**	**~1991**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.
E04.1C	**Grounding**	**~2001**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1D	**Grounding**	**~1996**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No issues or concerns were reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E05.1A	**Fire Alarm Panel**	**~1999**: The building is controlled by a AFP-200 fire alarm panel. The panel monitors detection devices throughout the building including: smoke/heat detectors and pull stations. Alarm system devices include horn/strobe lights. A secondary monitoring panel is located at the SCC room on the third floor.	**4**	3	All inspections were observed to be up to date according to labels found on equipment. Valid fire alarm certification was found on site generally located next to the fire alarm panel. No concerns observed or reported.
E05.1B	**Fire Alarm Panel**	**~1991**: One Notifier fire alarm panel is provided at the main entrance vestibule. The panel monitors detection devices throughout the building including: smoke/heat detectors and pull stations.	**4**	3	All inspections were observed to be up to date according to labels found on equipment. Valid fire alarm certification was found on site generally located next to the fire alarm panel. No concerns observed or reported.
E05.1C	**Fire Alarm Panel**	**~2001**: One Notifier fire alarm panel is provided at the main entrance vestibule. The panel monitors detection devices throughout the building including: smoke/heat detectors and pull stations.	**4**	3	All inspections were observed to be up to date according to labels found on equipment. Valid fire alarm certification was found on site generally located next to the fire alarm panel. No concerns observed or reported.

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E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E05.1D	**Fire Alarm Panel**	**~2001**: One empty Notifier fire alarm cabinet is provided at the main entrance vestibule. The building is tied-in to the panel located in the Electricians Trailer (C). Devices throughout the building including: smoke/heat detectors and pull stations are being monitored.	**4**	3	All inspections were observed to be up to date according to labels found on equipment. Valid fire alarm certification was found on site generally located next to the fire alarm panel. No concerns observed or reported.
E05.2A	**CO2 Alarm System**	**~1999**: No detector was directly observed on site but presumed to be present.	**4**	-	No concerns observed or reported.
E05.2B	**CO2 Alarm System**	**~1991**: One plug-in CO2 detector was observed connected to a receptacle in the vestibule area.	**4**	-	No concerns observed or reported.
E05.2C	**CO2 Alarm System**	**~2001**: One plug-in CO2 detector was observed connected to a receptacle in the vestibule area.	**4**	-	No concerns observed or reported.
E05.2D	**CO2 Alarm System**	**~1996**: One plug-in CO2 detector was observed connected to a receptacle in the vestibule area.	**4**	-	No concerns observed or reported.
E05.3A	**Detectors**	**~1999**: Detection and alarm equipment for the fire alarm system include smoke/heat detectors, fire bells, pull stations and horn/strobe lights.	**4**	3	No concerns observed or reported.
E05.3B	**Detectors**	**~1999**: Detection and alarm equipment for the fire alarm system include smoke/heat detectors and pull stations and horn/strobe lights.	**4**	3	No concerns observed or reported.
E05.3C	**Detectors**	**~2001**: Detection and alarm equipment for the fire alarm system include smoke/heat detectors and pull stations and horn/strobe lights.	**4**	3	No concerns observed or reported.
E05.3D	**Detectors**	**~1996**: Detection and alarm equipment for the fire alarm system include smoke/heat detectors and pull stations and horn/strobe lights.	**4**	3	No concerns observed or reported.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.1A	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.1B	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.1C	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.1D	**Telephone**	The building is provided with a phone system.	**4**	-	No concerns observed or reported.
E06.2A	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.2B	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.2C	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.2D	**LAN Systems**	The building is provided with LAN service and internet connection.	**4**	-	No concerns observed or reported.
E06.3A	**Intrusive Systems**	**~2015**: The building is protected by a security system with intrusion detection. The system is being monitored and detection devices include door contacts and motion sensors. Access to the building is controlled by a FOB system.	**4**	-	A new FOB system was being installed at the time of the site visit. No concerns observed or reported.
E06.3B	**Intrusive Systems**	**~1991**: The building is protected by a security system with intrusion detection. The system includes glass break-ins, alarms and motion sensors. Access to the building is controlled by a FOB system.	**4**	-	Glass break-in devices were reported to be damaged and not working. Replacements are assumed to fall below the Capital Threshold. No concerns observed or reported.
E06.3C	**Intrusive Systems**	**~2001**: The building is protected by a security system with intrusion detection. The system includes glass break-ins. Access to the building is controlled by a FOB system.	**4**	-	Glass break-in devices were reported to be damaged and not working. Replacements are assumed to fall below the Capital Threshold. No other concerns observed or reported.
E06.3D	**Intrusive Systems**	**~1996**: The building is protected by a security system with intrusion detection. The system includes glass break-ins. Access to the building is controlled by a FOB system.	**4**	-	Glass break-in devices were reported to be damaged and not working. Replacements are assumed to fall below the Capital Threshold. No other concerns observed or reported.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.4A	**Surveillance System**	~**2015**: A surveillance system with colour and black and white cameras is set in place. The building is being monitored 24 hours a day by SCC. Reportedly cameras record to up to 36 hours.	**4**	-	No concerns observed or reported.

NOTES:
None.

IMMEDIATE ITEMS:

Imm.5B) Install emergency lighting.
Imm.6C) Install emergency lighting.
Imm.7D) Install emergency lighting.
Imm.8B) Install exit signs.
Imm.9C) Install exit signs.
Imm.10D) Install exit signs.

No other immediate items were identified.

RECOMMENDED FURTHER INVESTIGATION:
No further investigation recommended at this time.

MAIN OFFICE (SITE A):



Photo #E1A: Solar pv panels.



Photo #E2A: Main electrical room.

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Photo #E3A: Power UPS back up components.



Photo #E4A: Fire alarm panel.

IT TRAILER (SITE B):

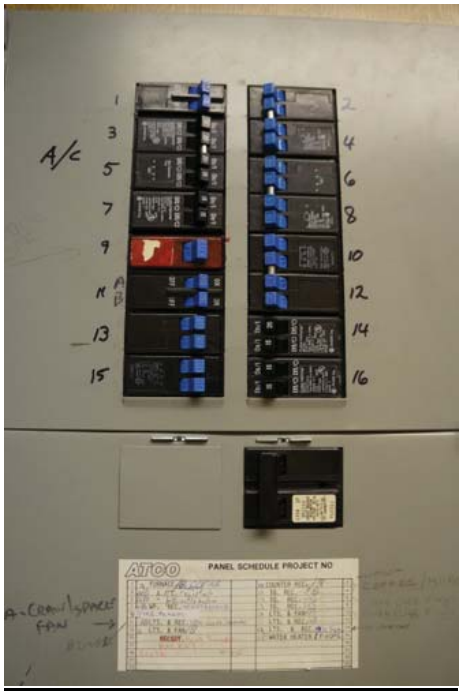


Photo #E5B: Main electrical panel.



Photo #E6B: Typical interior lighting.

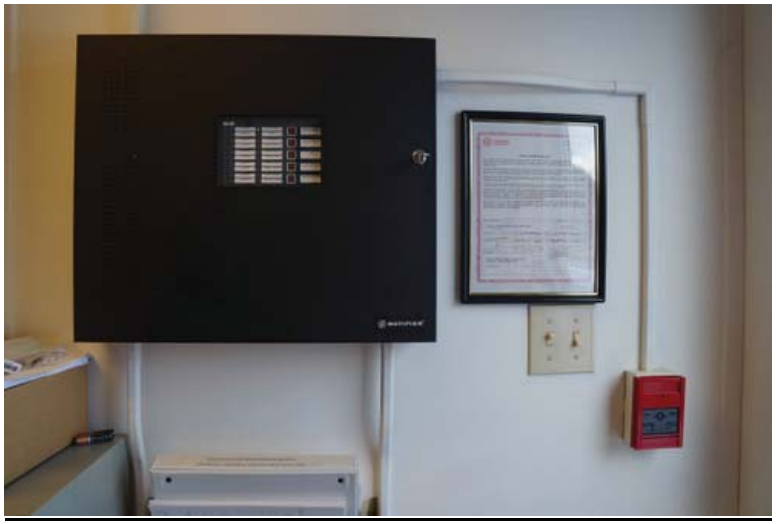


Photo #E7B: Fire alarm panel.



Photo #E8B: Horn/ Strobe lights in main corridor.

ELECTRICIANS TRAILER (SITE C):



Photo #E9C: Service meter.



Photo #E10C: Main electrical panel.



Photo #E11C: Typical interior lighting.



Photo #E12C: Fire alarm panel and horn/ strobe light.

DRAFTING TRAILER (SITE D):



Photo #E13D: Service meter.



Photo #E14D: Main electrical panel.

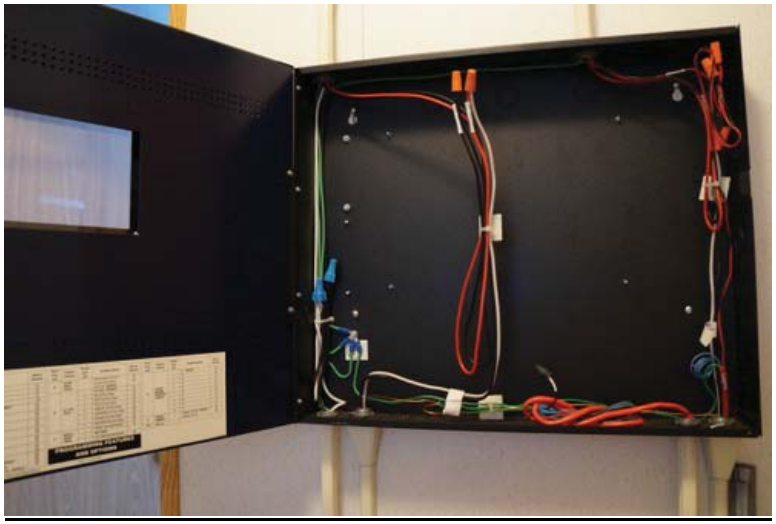


Photo #E15D: Empty fire alarm panel cabinet.



Photo #E16D: Security system panel.



7.0 HAZARDOUS MATERIAL REPORTS

Based on the year of the original development for all sites, A (~1999), B (~1991), C (~2001) and D (~1996), hazardous building construction materials such as ACMs (asbestos containing materials), and/or PCBs (polychlorinated biphenyls) are unlikely to be present in the buildings with the exception of building B. No other hazardous materials were observed to be present or stored.

Closure

GOLDER ASSOCIATES LTD.



Dave Ayriss, B.Sc., CIH, CRSP
on behalf of
Lawrence P. McSorley, M.Arch., M.C.P., RA
Senior Building Condition Specialist

LPM/rp

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APPENDIX A

Mandate & Report Resources

MANDATE AND REPORT RESOURCES

Authorization

Written Notice of Award of Building Assessment Reports for Yukon Energy Corporation (YEC) was provided on November 1st, 2015. A Facility Lifecycle Assessment (FLA) of the Sites identified in the Introduction section of the report was subsequently conducted. The Sites are currently owned and managed by YEC.

Purpose

The primary objective of the FLA was to visually examine and evaluate the present condition of the property elements, buildings and related structures. The FLA process is being undertaken to assist YEC in capital planning and evaluating the potential financial liabilities associated with the condition of the Site elements, building and related structures on the Sites. Golder understands that YEC will rely on this report for capital planning.

Scope

The FLA was conducted in general accordance with the American Society for Testing and Materials (ASTM) “Standard Guide for Property Condition Assessments: Baseline Property Condition Process E 2018-08”, as locally applicable. The Golder Assessors (identified on the first page of the report) conducted the Sites reconnaissance on the date shown. The Sites reconnaissance was limited to a walk around the Sites, a walk-through of the buildings and interview with personnel listed in the Introduction section of the report (referred to as the “Point of Contact” in this report). Copies of selected photographs documenting conditions at the time of the visit are provided throughout the report.

The purpose of the report is to communicate identified physical deficiencies, future capital projects, and the associated opinions of estimated costs where the cost is greater than the Capital Threshold and expected to occur within the time frame used for the report. In accordance with this agreed mandate, assumptions were required to delineate between capital items and routine maintenance. Please refer to the “Operating and Maintenance Item” list below. Also please refer to the attached “Discussions of Overall Concepts and Terminology” for additional explanation of assumptions used.

The review of the structural elements was limited to a visual review of the accessible, exposed portions of the buildings and related structures during our visit to the building. The roofs, walls, floors and ceilings were visually reviewed to collect information in this regard.

The review of the mechanical, electrical and fire safety systems was performed by non-specialists in conjunction with discussions with the Point of Contact. A detailed assessment by a mechanical or electrical professional consultant should be conducted if further information regarding the condition, durability and/or expected future capital expenditures related to these systems is required.

Compliance with national and provincial building codes and/or fire codes is not part of the scope of this assessment.



FLA: WHITEHORSE OFFICES

The estimated costs outlined in this report are based on the conditions encountered and observations made during the reconnaissance. Estimates of quantities and areas are based on information supplied, field observations and/or interviews. Item repair/replacement costs are approximate only. Restoration costs are sensitive to local and overall economic factors and therefore, specific quotations from qualified contractors should be obtained when a specific deficiency is addressed or a capital project is to be implemented.

Operating and Maintenance Items

Golder assumes the following items will be maintained under normal operating budgets and are therefore not included in the Capital Reserve Table.

SITE

- Buried services
- Landscaping
- Fences

STRUCTURE

- Foundations and footings

ROOF

- Periodic maintenance

WALLS AND WINDOWS

- Local periodic repairs and needle glazing
- Weather-stripping

INTERIORS

- Various common furnishings, specialty equipment
- Small residential appliances

MECHANICAL

- Sump Pits
- Irrigation System
- Motors, ductwork and in-duct equipment
- Gas supply systems
- Roof drains
- HVAC distribution piping
- Air inlets and outlets

ELECTRICAL

- Disconnects and breakers
- Buried conductors

CONVEYANCE SYSTEMS

- Controls or safety devices.
- Interior cab finishes.



Discussions of Overall Concepts and Terminology

Evaluation Period

The period of evaluation used for this report is 10 years. Capital repairs and replacement that are reasonably expected to be required within this evaluation period and that cost in excess of the Capital Threshold are included in the Capital Reserve Table.

Capital Threshold

The Capital Threshold used for this report is $3,000. This threshold is used to determine whether a capital repair item is to be included in the Capital Reserve Table. Capital repairs identified and estimated to cost less than the threshold, or that will likely to be performed in phases, as a part of routine maintenance as required, at a cost less than the threshold are not included in the Capital Reserve Table.

Costs

Costs presented in this study for future capital repairs and replacement projects are our Opinions of Probable Budgets and are intended to include taxes, permit fees, contingency and where appropriate, Engineering fees for design, specifications, tendering, project management and construction monitoring. We have generally assumed replacement will occur on a like-for-like basis except where obsolescence or technological advancements logically dictates an upgrade. More accurate costing in the future will require a condition assessment, choice and development of an appropriate repair option, designing and tendering the work to qualified contactors.

Immediate Items

Immediate repairs include deficiencies that require action in the next 60 to 90 days as a result of (i) existing or potentially unsafe conditions, (ii) negative conditions significantly impacting marketability or habitability, (iii) material building code violations, (iv) poor or deteriorated condition of a critical element or system, or (v) a condition that if left “as is” with extensive delay in addressing same, would result in or contribute to critical element or system failure within 12 months or a significant escalation in the repair cost.

Capital Reserve Analysis

The Capital Reserve Table includes a section that provides the average annual capital costs per square foot. Replacement Reserves include (i) deficiencies that may not warrant immediate attention, but require repair or replacement that should be undertaken on a priority basis over routine preventive maintenance work and (ii) components or systems that have realized or exceeded their Expected Useful Life (EUL) during the evaluation period (realization of EUL alone does not constitute an immediate repair). Replacement reserve costs are included in Appendix C.

Opinions of probable costs are provided for material physical deficiencies and not for repairs or improvements that could be classified as:

- cosmetic or decorative;
- part or parcel of a building renovation program or tenant improvement/finishes;
- enhancements to reposition the asset in the marketplace;
- for warranty transfer purposes;
- routine or normal preventative maintenance;
- less than the capital threshold for this report; and
- are expected to occur beyond the time frame of this report.



Cost Inflation Rate:

We have presented the costs in current year (2016) values. We have used 3% in the capital reserve table attached. Further sensitivity analysis using other inflation assumptions should be tested when projecting future cash-flows.

Life Expectancies:

Our estimates of the life expectancy of common element components, systems and sub-systems are based on our opinion of the observed condition during our Site visit, experience with similar material at other buildings, published industry standards, articles and recommendations made by material suppliers and manufacturers. For some materials or systems, the history of use is not sufficient to predict life expectancy accurately. Monitoring and adjustments to the assumptions are required.

The year in which the capital work is required is estimated on the basis of the current observed conditions, or the construction methods and materials used. This may be shorter or longer than the remaining time in the standard estimated life cycle based on the current age of the item. Our estimates of life cycles reflect our understanding of the standards that the prudent long-term owners would maintain. Deferring and phasing of work is often possible keeping in mind that doing so could reduce building standards, increase disruption to residents, increase costs and risks.



APPENDIX B

Limitations and Use of the Report

LIMITATIONS

This report is intended to provide an assessment of the property conditions at the subject properties, at the time of the Sites visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, Golder may be contacted to extend reliance to such parties. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, which result from reporting the factual information contained herein.

The conclusions as presented represent the judgement of Golder based on the visual observations of the accessible, exposed building elements, supplemented by information and data obtained by Golder and discussions with the Point of Contact and other representatives of the owner identified. Except as otherwise may be requested, Golder disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the FLA. No physical testing or intrusive investigations were conducted, and no samples of building materials were collected to substantiate the observations made.

In evaluating the Sites, Golder has relied in good faith on information provided by other individuals noted in this report. Golder in certain instances has been required to assume that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Point of Contact. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

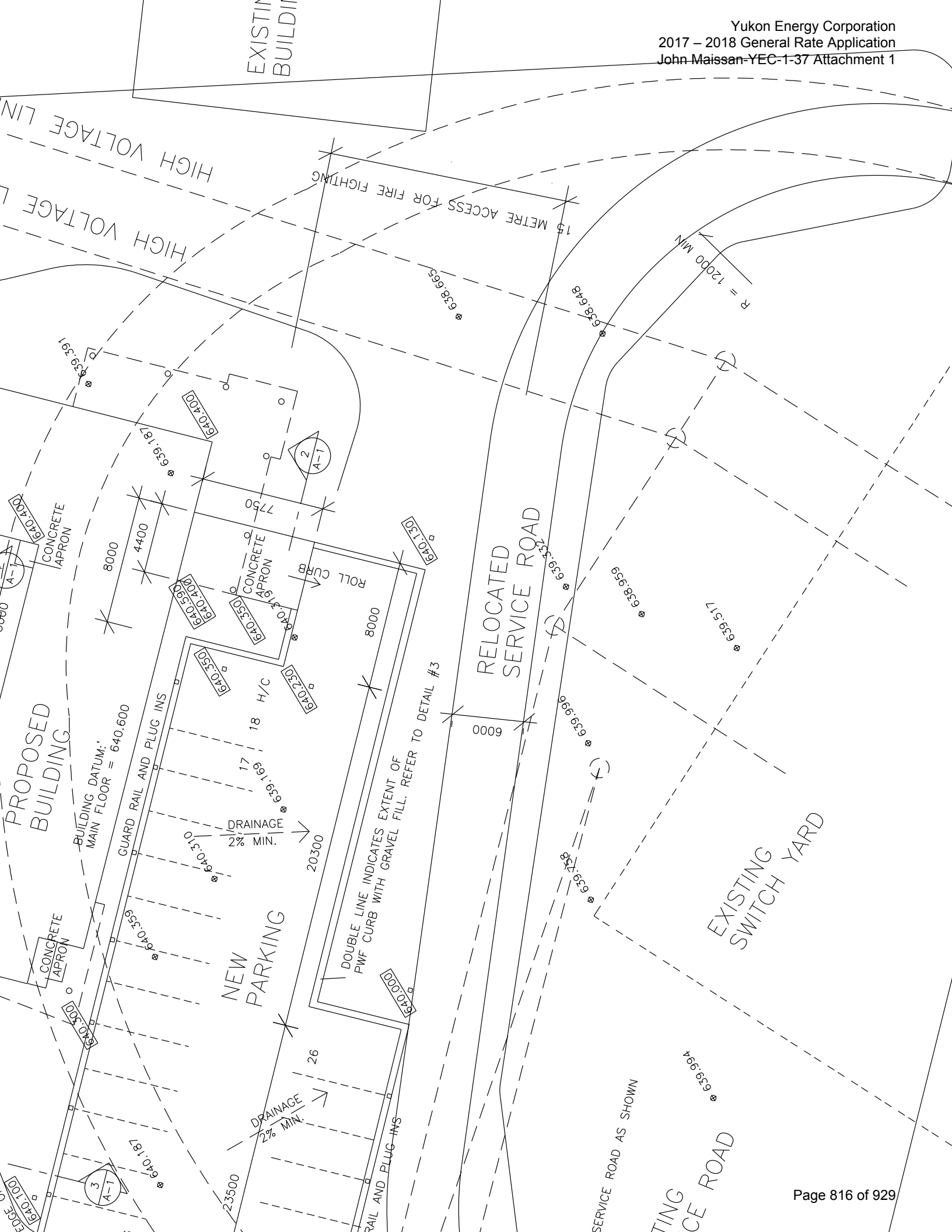
Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, thus any parties making use of this report should review these issues with appropriate legal counsel.

Should additional information become available with respect to the building elements or systems, Golder requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.



APPENDIX C

Drawings

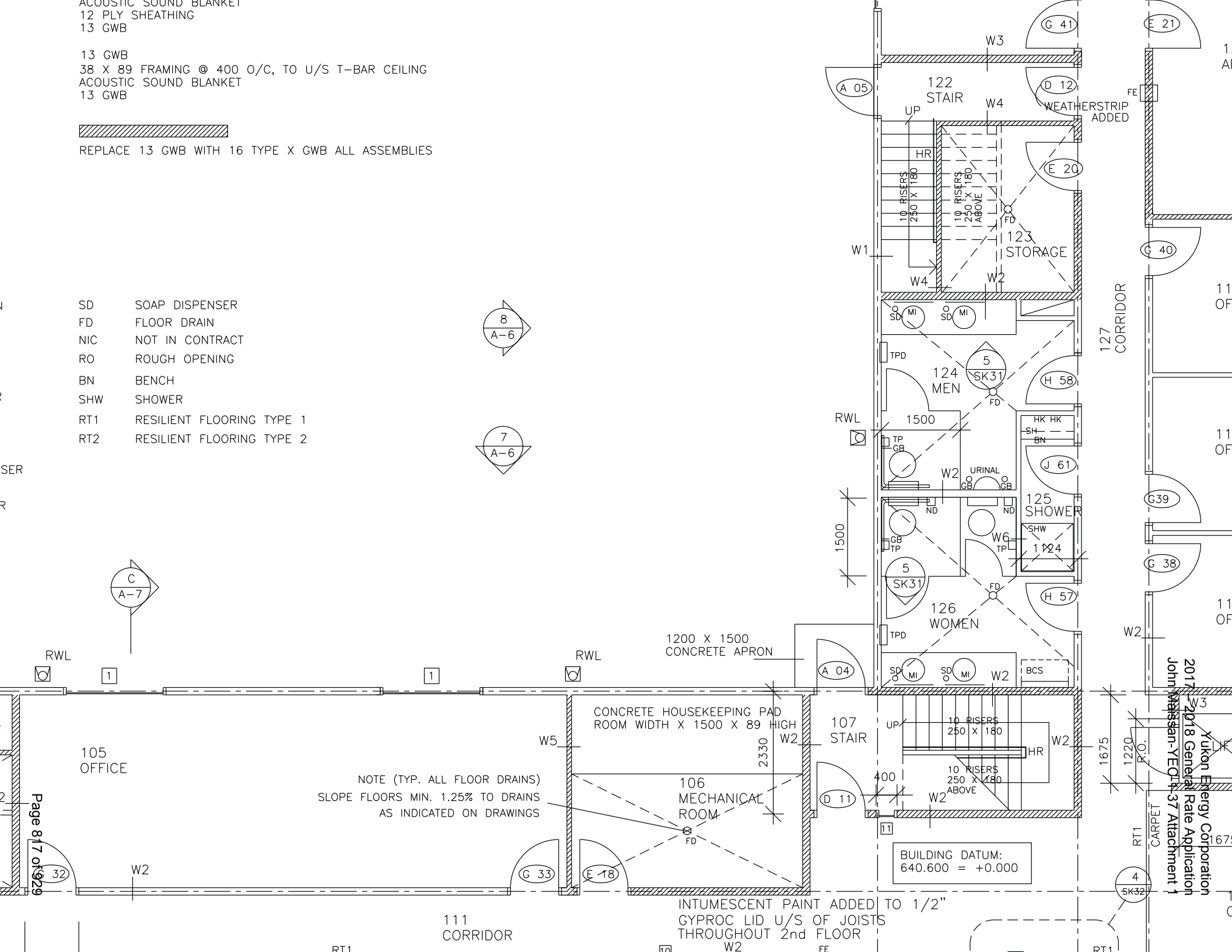

EXISTING BUILDING
HIGH VOLTAGE LINE
HIGH VOLTAGE L
15 METRE ACCESS FOR FIRE FIGHTING
R = 1200 MIN
638.665
638.648
639.391
640.400
639.187
640.400
CONCRETE APPRON
A-1
2
A-1
7750
8000
4400
ROLL CURB
640.590
640.400
CONCRETE APPRON
640.350
640.130
640.350
640.230
8000
PROPOSED BUILDING
BUILDING DATUM:'
MAIN FLOOR = 640.600
GUARD RAIL AND PLUG INS
18
H/C
17
639.691
DRAINAGE
2% MIN.
640.310
20300
DOUBLE LINE INDICATES EXTENT OF
PWF CURB WITH GRAVEL FILL. REFER TO DETAIL #3
RELOCATED
SERVICE ROAD
6000
639.332
638.959
639.517
639.996
639.328
EXISTING
SWITCH YARD
CONCRETE APPRON
640.350
640.000
NEW
PARKING
26
DRAINAGE
2% MIN.
640.187
3
A-1
23500
639.994
SERVICE ROAD AS SHOWN
640.100

ACOUSTIC SOUND BLANKET
12 PLY SHEATHING
13 GWB

13 GWB
38 X 89 FRAMING @ 400 O/C, TO U/S T-BAR CEILING
ACOUSTIC SOUND BLANKET
13 GWB

REPLACE 13 GWB WITH 16 TYPE X GWB ALL ASSEMBLIES

SD	SOAP DISPENSER
FD	FLOOR DRAIN
NIC	NOT IN CONTRACT
RO	ROUGH OPENING
BN	BENCH
SHW	SHOWER
RT1	RESILIENT FLOORING TYPE 1
RT2	RESILIENT FLOORING TYPE 2



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Yukon Energy Corporation

13 GWB

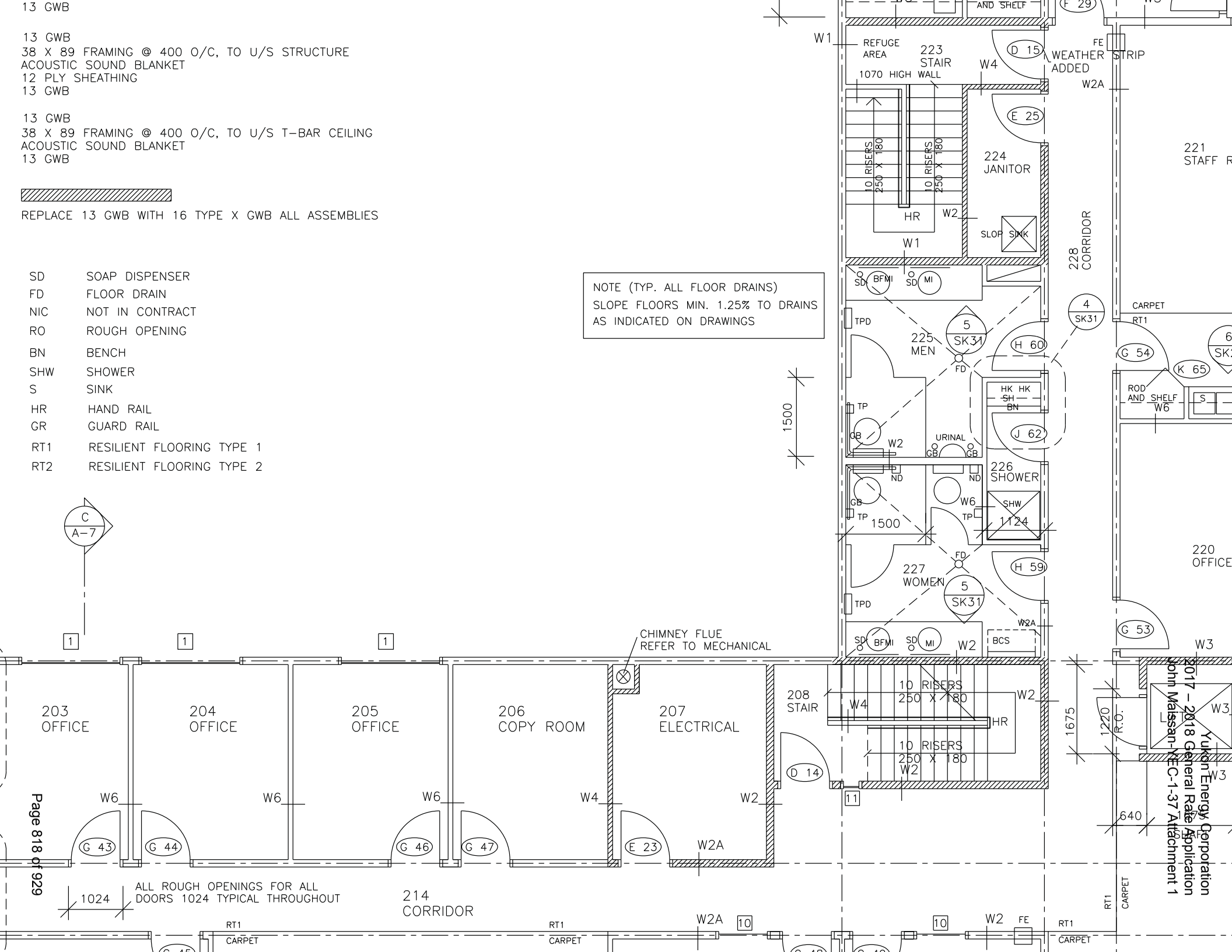
13 GWB
38 X 89 FRAMING @ 400 O/C, TO U/S STRUCTURE
ACOUSTIC SOUND BLANKET
12 PLY SHEATHING
13 GWB

13 GWB
38 X 89 FRAMING @ 400 O/C, TO U/S T-BAR CEILING
ACOUSTIC SOUND BLANKET
13 GWB

REPLACE 13 GWB WITH 16 TYPE X GWB ALL ASSEMBLIES

SD	SOAP DISPENSER
FD	FLOOR DRAIN
NIC	NOT IN CONTRACT
RO	ROUGH OPENING
BN	BENCH
SHW	SHOWER
S	SINK
HR	HAND RAIL
GR	GUARD RAIL
RT1	RESILIENT FLOORING TYPE 1
RT2	RESILIENT FLOORING TYPE 2

NOTE (TYP. ALL FLOOR DRAINS)
SLOPE FLOORS MIN. 1.25% TO DRAINS AS INDICATED ON DRAWINGS



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RO	ROUGH OPENING
BN	BENCH
SHW	SHOWER
S	SINK
HR	HAND RAIL
GR	GUARD RAIL
RT1	RESILIENT FLOORING TYPE 1
RT2	RESILIENT FLOORING TYPE 2
R	RANGE/STOVE
RH	RANGE HOOD
F	FRIDGE

FRAMING @ 400 O/C, TO U/S STRUCTURE
SOUND BLANKET

FRAMING @ 400 O/C, TO U/S STRUCTURE
S SOUND BLANKET
EATING

FRAMING @ 400 O/C, TO U/S STRUCTURE
SOUND BLANKET

FRAMING @ 400 O/C, TO U/S STRUCTURE
SOUND BLANKET
HEATHING

FRAMING @ 400 O/C, TO U/S T-BAR CEILING
SOUND BLANKET

3 GWB WITH 16 TYPE X GWB ALL ASSEMBLIES

C
A-7

GRID

WALL CENTRES

3800 1350 3800

5650 1815

1300

1675

1220
R.O.

W1

W3

20 RISERS
180 X 250

DN

307
STAIR

W4

HR

LIFT

W3

D 16

W3

3
SK18

1165 1815 1285

1635 1950

4785

8

DOOR & WALL
ADDED

H 66

301
OFFICE

308
VEST.

W4

W2

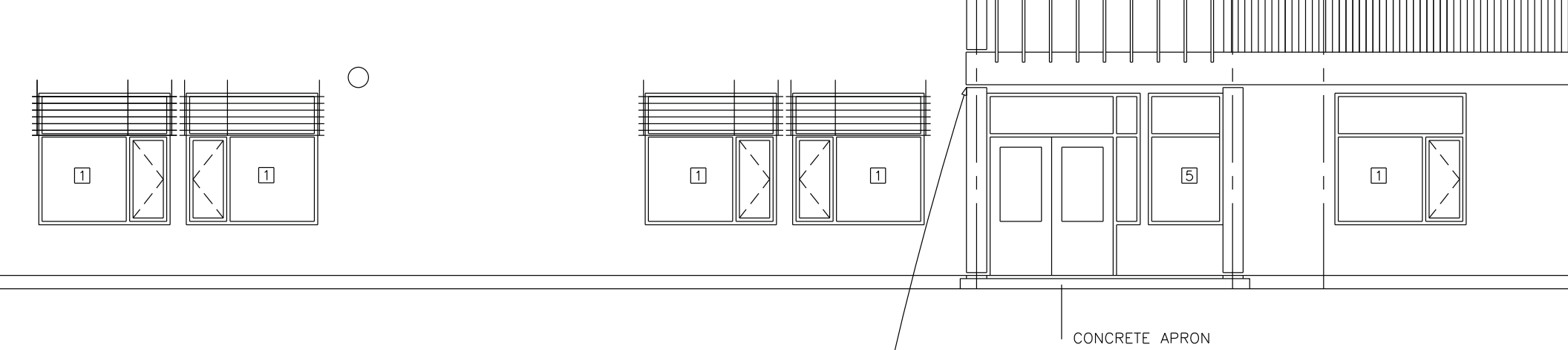
J 63

SD

BFMI

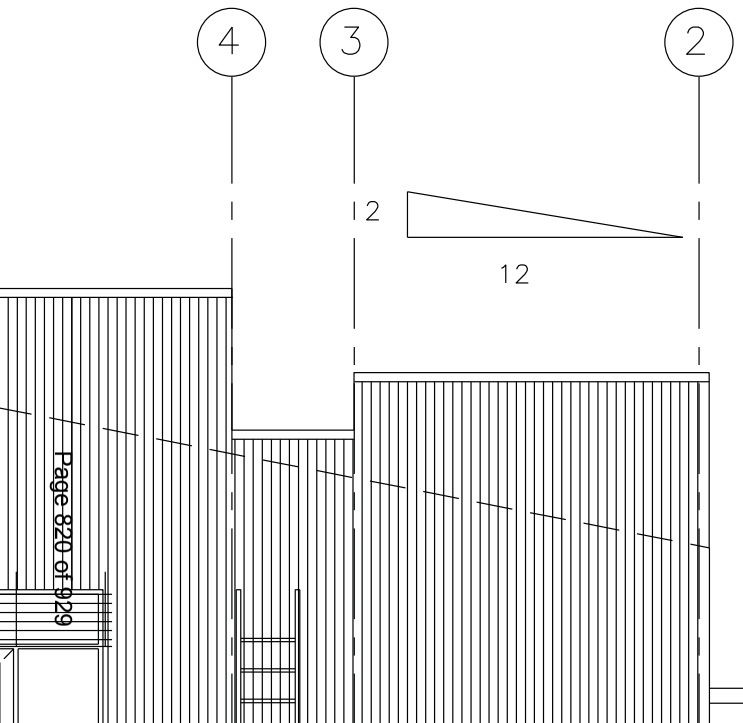
8 LOCKERS
300 X 300 X 1800
REFER TO SPEC. SECTION 10505

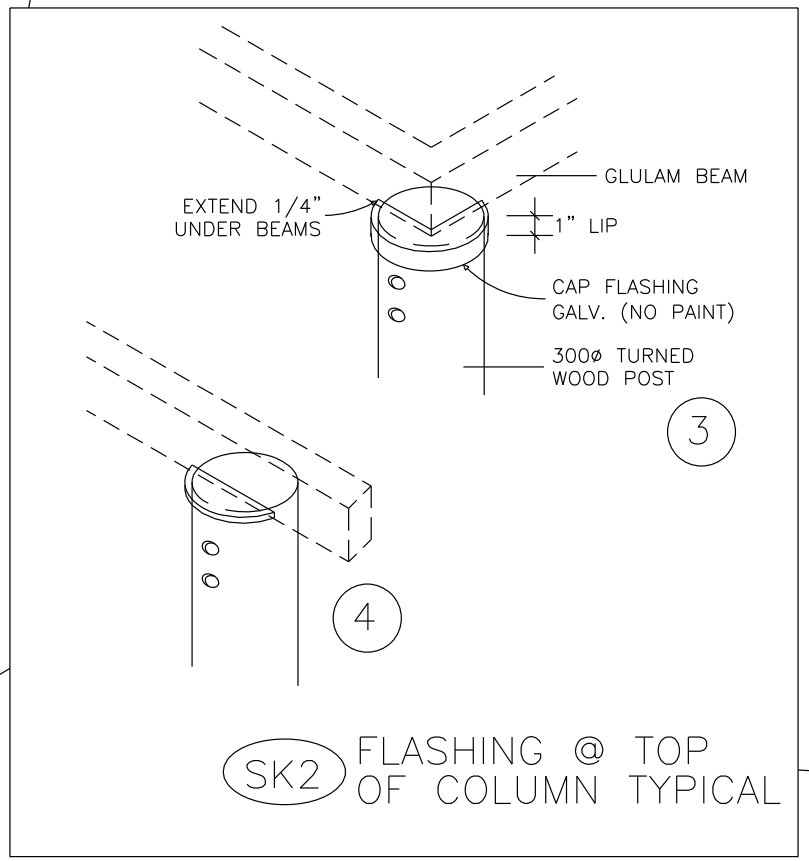
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John Maissan (YEC) 137 Attachment 1
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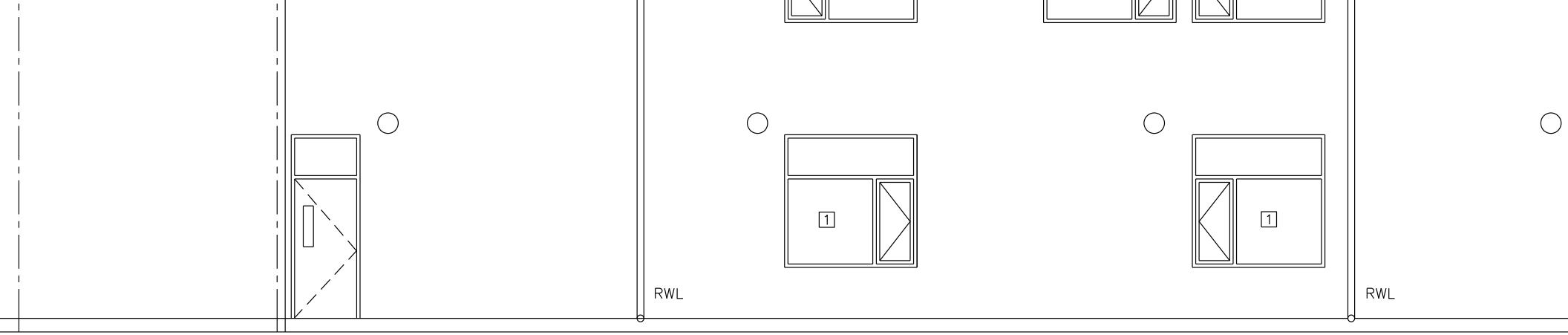
VATION 1:75

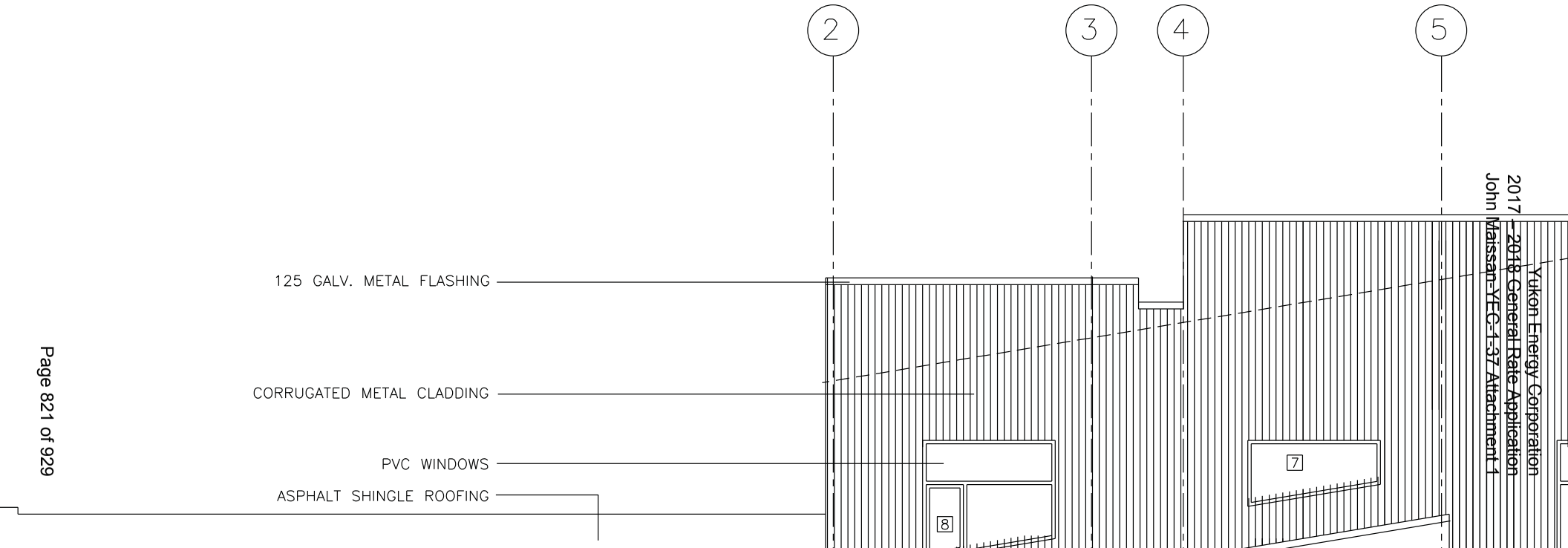
COLUMN CAPS AND BASE
ADDED TYPICAL



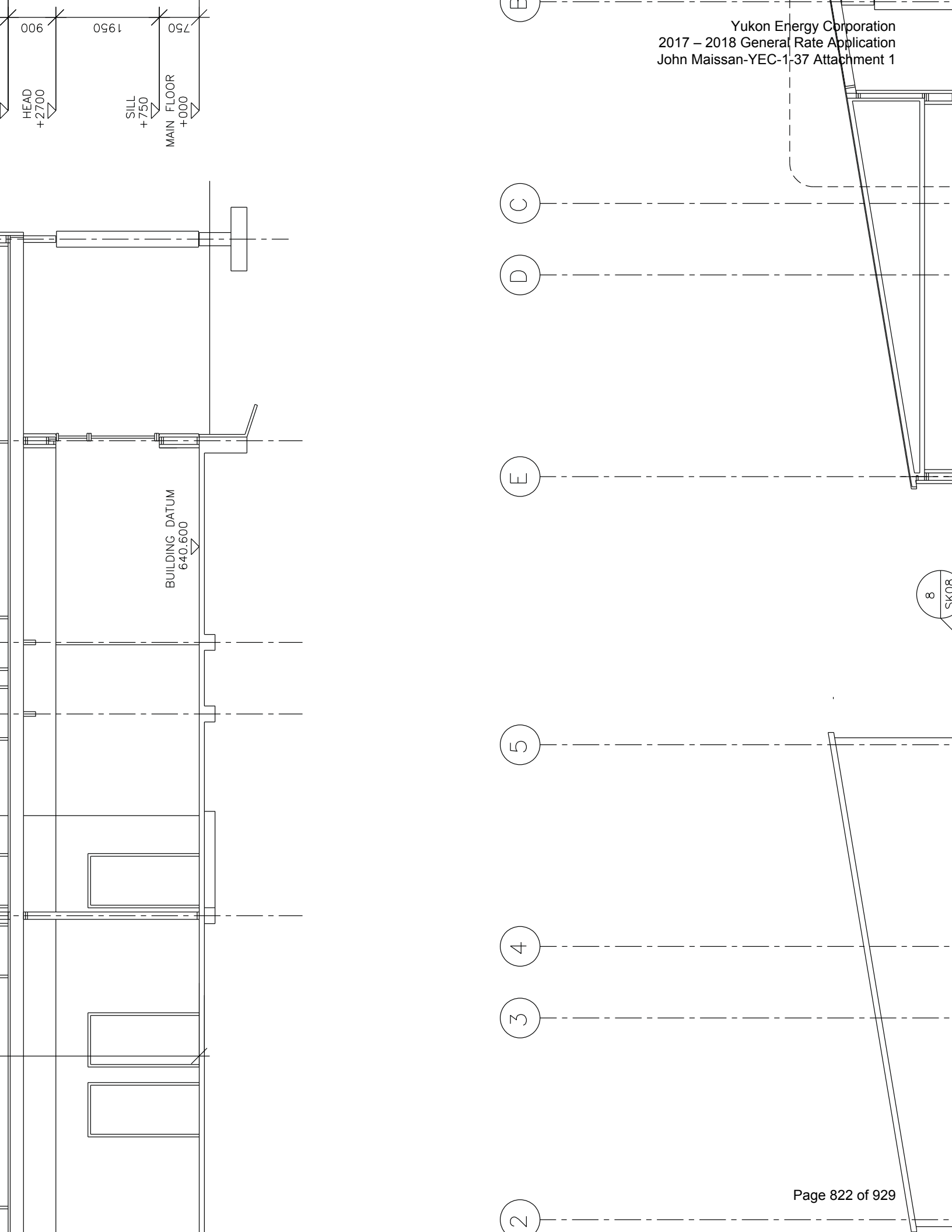


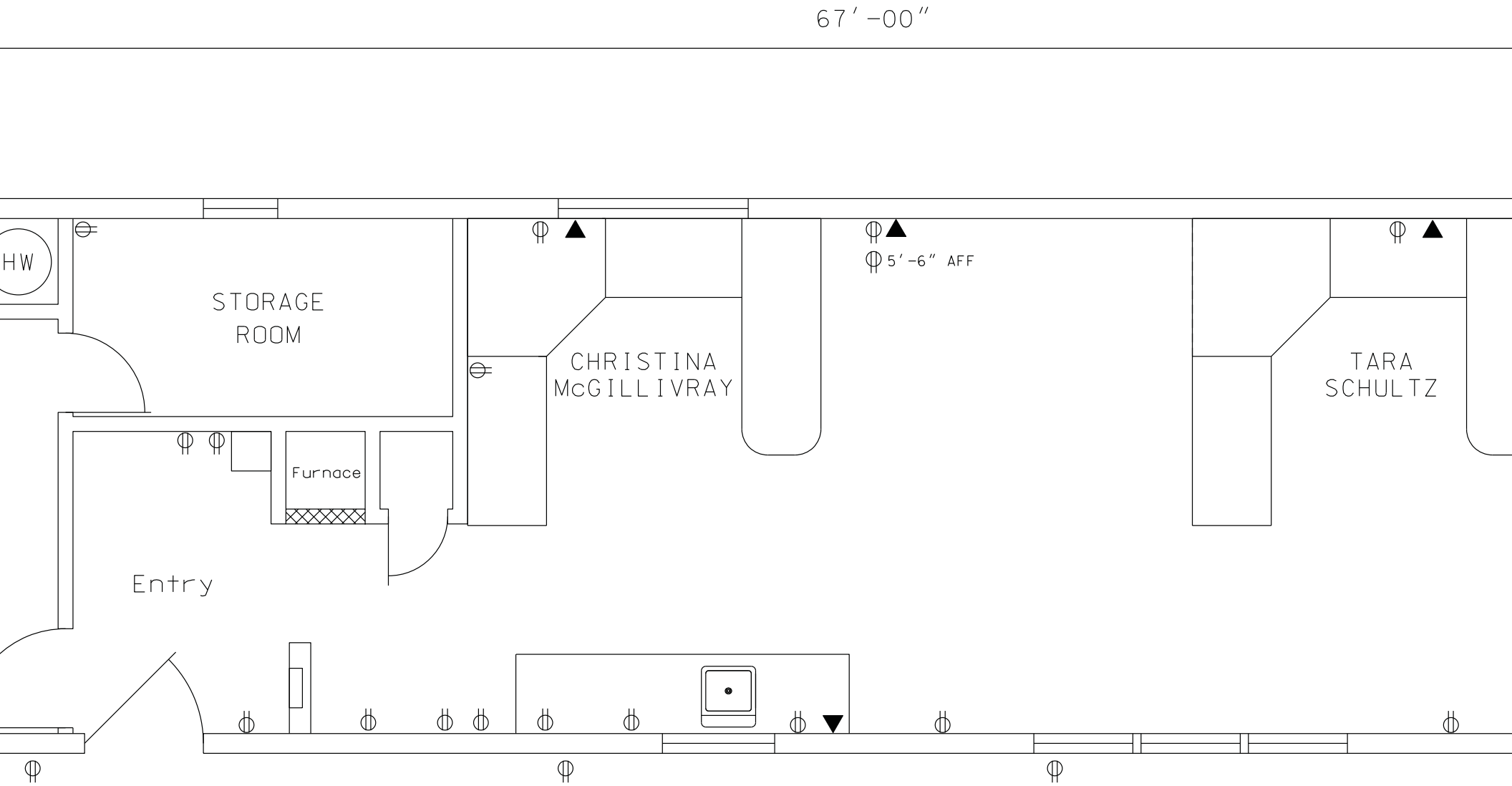
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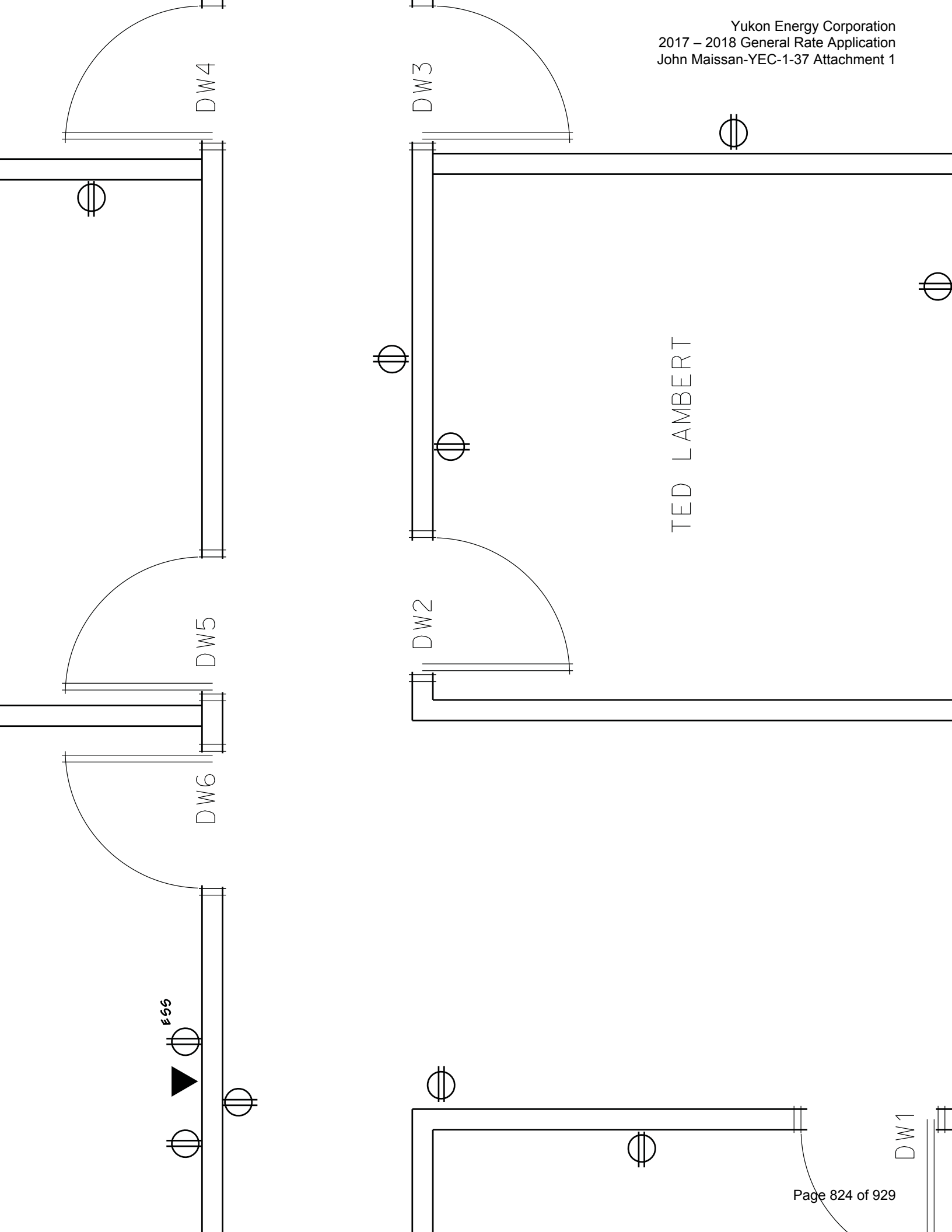


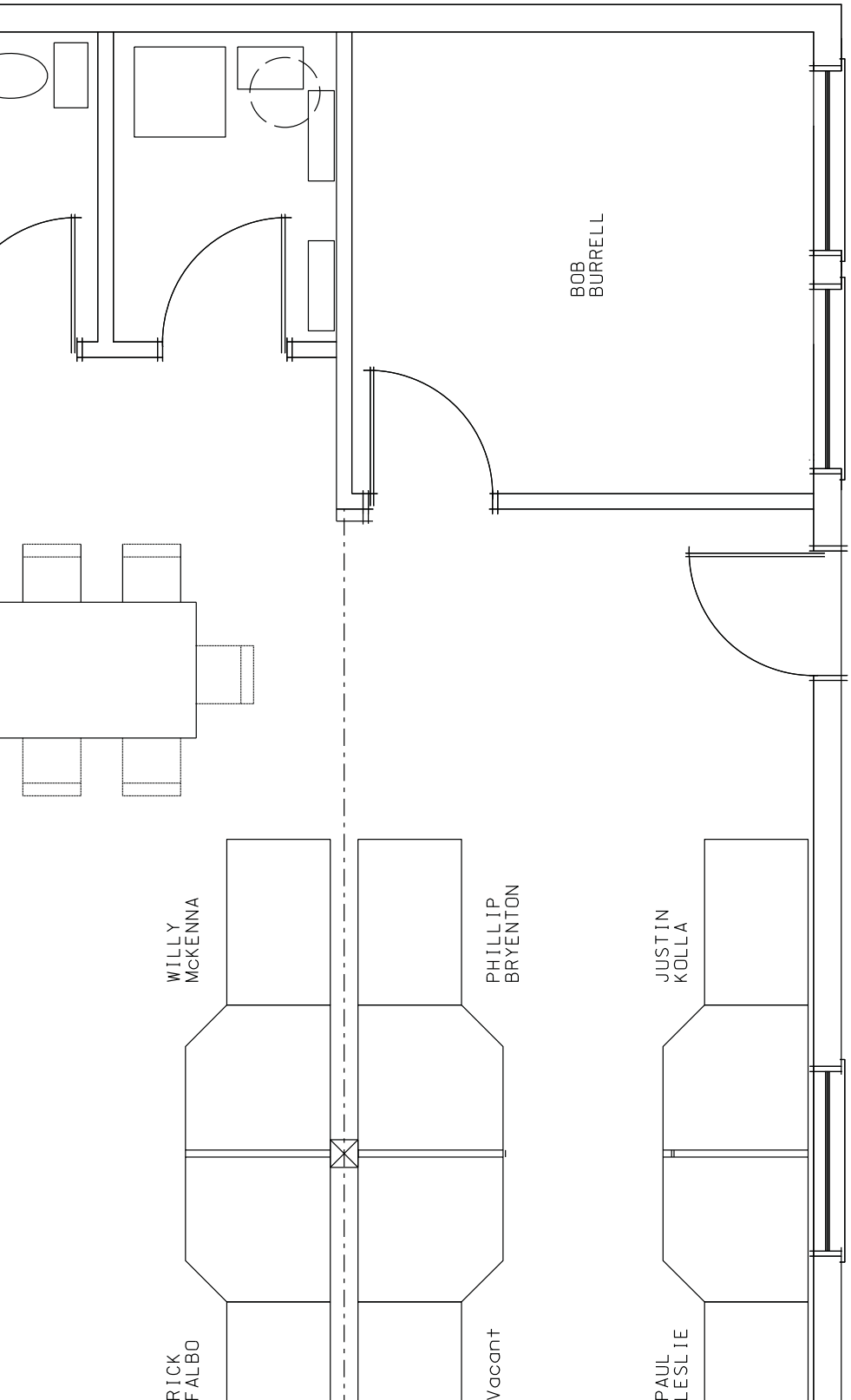
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John Maissan-YEC-1-37 Attachment 1


900
1950
750
HEAD
+2700
SILL
+750
MAIN FLOOR
+000
BUILDING DATUM
640.600
E
D
C
5
4
3
2
8



SINGLE WIDE TRAILER


DW4
DW3
TED LAMBERT
DW5
DW2
DW6
659
DW1



MAINTENANCE TRAILER



APPENDIX D

Capital Reserve Tables

on

				Threshold	$3,000
Gross Sq. m.	1,289	Year Built	1999	Reserve Term (years)	10
r of Buildings	1	Age	16	Assumed Inflation	3%

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
Aisles	1995	25	20	5	2,175 m²	$155/m²	LCR						$337,125				
	1999	25	16	9	200 m²	$35/m²	LCR										$7,000
	1999	20	16	4	500 m	$35/m	LCR					$17,500					
ntified																	
ntified																	
ntified																	
artitions																	
ntified																	
ntified																	
	1999	25	19	6	1,200 m²	$50/m²	LCR										$60,000
	1999	20	16	4	300 m²	$90/m²	LCR					$27,000					
	1999	15	16	0	1,000 m²	$80/m²	LCR			$40,000	$40,000						
es	1999	20	16	4	100 m²	$60/m²	LCR					$6,000					
ies	1999	20	16	4	Allowance		LCR					$3,000					
	1999	10	16	0	3	$1,000/each	LCR			$3,000							
	1999	25	16	9	700 m²	$55/m²	LCR										$38,500
onveyance Devices)																	
ntified																	
ntified																	
ntified																	
and Stairs																	
ntified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
olumns																	
ntified																	
Columns																	
ntified																	
ntified																	
ntified																	
	-	-	-	-	Allowance		Study	$3,000									
	1999	40	16	24	Allowance		Repair		$25,000								
	1999	20	16	4	4	$1,200/ea.	LCR					$4,800					
ntified																	
	1999	20	16	4	Allowance		LCR/Repair		$22,500			$25,000	$25,000				
ntified																	
ntified																	
ntified																	
ntified																	
ntified																	
ntified																	
ment																	
ntified																	
	1999	20	16	4	1,200 m² GFA	$65/m² GFA	LCR					$39,000	$39,000				
	1999	20	16	4	10	$1,300/ea.	LCR					$13,000					
	1999	20	16	4	Allowance		LCR					$10,000					
ntified																	
	1999	15	16	0	Allowance		LCR		$10,000								
	1999	15	16	0	1,000 m² GFA	$35/m² GFA	LCR		$35,000								
nd Security																	
ntified																	

Analysis

	Inflated	*Uninflated*
	$38,032	$33,097
/ Sq. Ft.	$29.51	$25.68

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$3,000	$92,500	$43,000	$40,000	$145,300	$401,125	$	$	$	$109,500
$CAD	$3,000	$95,275	$45,619	$43,709	$163,536	$465,014	$	$	$	$137,654

ation

				Threshold	$3,000
Gross Sq. m.	92	Year Built	1991	Reserve Term (years)	10
r of Buildings	1	Age	24	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)				
									2016	2017	2018	2019	2020	2021	2022	2023	2024
_																	
ts																	
ve Aisles	1995	25	20	5	1,500 m²	$155/m²	LCR						$232,500				
	-	-	-	-	Allowance		Repair		$5,000								
	1991	15	24	0	125 m²	$40/m²	LCR		$5,000								
	1991	40	24	16	Allowance		Repair		$3,000								
	1991	20	24	0	100 m	$35/m	LCR		$3,500								
s																	
dentified																	
dentified																	
s																	
dentified																	
d Partitions																	
	1991	15	24	0	450 m²	$35/m²	LCR			$15,750							
dentified																	
	1991	25	24	1	95 m²	$50/m²	LCR			$4,750							
	1991	15	24	0	90 m²	$80/m²	LCR		$7,200								
dentified																	
	1991	25	24	1	90 m²	$55/m²	LCR			$4,950							
nveyance Devices)																	
	-	-	-	-	Allowance		Repair		$3,000								
dentified																	
dentified																	
rs and Stairs																	
dentified																	
dentified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
d Columns																	
dentified																	
d Columns																	
dentified																	
dentified																	
dentified																	
	1991	40	24	16	Allowance		Repair		$3,000								
	1991	20	24	0	1	$3,500/ea.	LCR			$3,500						$5,000	
dentified																	
dentified																	
dentified																	
dentified																	
dentified																	
es																	
dentified																	
pment																	
on	1991	30	24	6	2	$3,000 ea.	Improvement		$6,000								
ver																	
	1991	20	24	0	90 m² GFA	$65/m² GFA	LCR		$5,850								
ng	-	-	-	-	Allowance		Safety	$2,000									
	-	-	-	-	Allowance		Safety	$2,000									
dentified																	
	1991	15	24	0	Allowance		LCR		$5,000								
	1991	15	24	0	90 m² GFA	$35/m² GFA	LCR		$3,150								
and Security																	
dentified																	

e Analysis

	Inflated	*Uninflated*
ar	$14,311	$12,646
ar / Sq. Ft.	$155.55	$137.46

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$4,000	$49,700	$28,950	$	$	$232,500	$	$	$5,000	$
$CAD	$4,000	$51,191	$30,713	$	$	$269,531	$	$	$6,334	$

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ation

				Threshold	$3,000
Gross Sq. m.	120	Year Built	2001	Reserve Term (years)	10
r of Buildings	1	Age	14	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)				
									2016	2017	2018	2019	2020	2021	2022	2023	2024
L																	
ts																	
ve Aisles	1995	25	20	5	1000 m²	$155/m²	LCR						$155,000				
	2001	20	14	6	100 m	$35/m	LCR							$3,500			
s																	
dentified																	
dentified																	
s																	
dentified																	
d Partitions																	
	2001	15	14	1	500 m²	$35/m²	LCR			$17,500							
dentified																	
dentified																	
es	2001	20	14	6	120 m²	$55/m²	LCR			$6,600							
dentified																	
dentified																	
nveyance Devices)																	
	-	-	-	-	Allowance		Safety	$1,000									
dentified																	
dentified																	
rs and Stairs																	
dentified																	
dentified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5): 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10): 2021	2022	2023	2024
d Columns																	
dentified																	
d Columns																	
dentified																	
dentified																	
dentified																	
dentified																	
	2001	20	14	6	1	$3,500/ea.	LCR							$3,500			
	1999	20	16	4	Allowance		LCR/Repair		$22,500			$25,000	$25,000				
dentified																	
dentified																	
dentified																	
dentified																	
es																	
dentified																	
pment																	
on	2001	30	14	16	Allowance		Improvement						$3,500				
ver																	
	2001	20	14	6	120 m² GFA	$65/m² GFA	LCR							$7,800			
ng	-	-	-	-	Allowance		Safety	$2,000									
	-	-	-	-	Allowance		Safety	$2,000									
dentified																	
	2001	15	15	0	Allowance		LCR		$5,000								
	2001	15	14	1	120 m² GFA	$35/m² GFA	LCR			$4,200							
and Security																	
dentified																	

e Analysis

	Inflated	*Uninflated*
ar	$12,675	$11,164
ar / Sq. Ft.	$105.63	$93.03

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$5,000	$27,500	$28,300	$	$25,000	$183,500	$14,800	$	$	$
$CAD	$5,000	$28,325	$30,023	$	$28,138	$212,727	$17,672	$	$	$

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ation

				Threshold	$3,000
Gross Sq. m.	187	Year Built	1996	Reserve Term (years)	10
r of Buildings	1	Age	19	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)				
									2016	2017	2018	2019	2020	2021	2022	2023	2024
ts																	
ve Aisles	1995	25	20	5	1000 m²	$155/m²	LCR						$155,000				
	1996	20	19	1	100 m	$35/m	LCR		$3,500								
s																	
dentified																	
dentified																	
s																	
dentified																	
d Partitions																	
	1996	15	19	0	250 m²	$20/m²	LCR		$5,000								
dentified																	
dentified																	
dentified																	
	1996	25	19	6	95 m²	$55/m²	LCR							$5,225			
nveyance Devices)																	
	-	-	-	-	Allowance		Safety	$200									
dentified																	
dentified																	
rs and Stairs																	
dentified																	
dentified																	

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
d Columns																	
dentified																	
d Columns																	
dentified																	
dentified																	
dentified																	
	1996	40	19	21	Allowance		Study	$2,500									
	-	-	-	-	Allowance		Repair		$5,000								
	1996	20	19	1	1	$3,500/ea.	LCR			$3,500							
dentified																	
dentified																	
dentified																	
dentified																	
dentified																	
es																	
dentified																	
pment																	
on	1996	30	19	11	Allowance		Improvement						$3,500				
ver																	
	1996	20	19	1	90 m² GFA	$65/m² GFA	LCR		$5,850								
ng	-	-	-	-	Allowance		Safety	$2,000									
	-	-	-	-	Allowance		Safety	20001 2D									
dentified																	
	1996	15	20	0	Allowance		LCR		$3,000								
	1996	15	19	0	90 m² GFA	$35/m² GFA	LCR		$3,150								
and Security																	
dentified																	

e Analysis

	Inflated	*Uninflated*
ar	$8,794	$7,709
ar / Sq.ft.	$47.03	$41.22

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$4,700	$25,500	$3,500	$	$3,500	$155,000	$5,225	$	$	$
$CAD	$4,700	$26,265	$3,713	$	$3,939	$179,687	$6,239	$	$	$

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February 2016

REPORT

Facility Lifecycle Assessment P126 Diesel Plant and P127 Hydro Plant #2 Miles Canyon Road, Whitehorse, YT

Submitted to:
Yukon Energy Corporation
P.O. Box 5920
Whitehorse, YT Y1A 6S7

REPORT

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Golder Associates

FLA: P126 DIESEL PLANT AND P127 HYDRO PLANT, WHITEHORSE, YT

EXECUTIVE SUMMARY

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as P126 Diesel Plant (Building A) and P127 Hydro Plant (Building B). Building A and Building B are located at #2 Miles Canyon Road, Whitehorse YT, approximately 0.5 kilometres (km) and 1.0 km off of South Access Road respectively.

Building A is a single-storey building originally constructed circa 1969 and houses a several diesel generators and an office space. Several additions have been made to the original structure, with an average construction date of ~1972. Building A has a gross floor area (GFA) of approximately 1,691 square metres (m²) (18,202 square feet [ft²]) and is situated on a site covering approximately 0.78 hectares (1.93 acres). Building B is a single-storey building constructed circa 1982 and also houses a hydroelectric turbine. Building B has a GFA of approximately 1,000 m² (10,764 ft²) and is situated on a site covering approximately 0.20 hectares (0.49 acres).

Based on the findings of this FLA, the following conclusions are made:

Building A – P126 Diesel Plant:

- The site and building were developed circa 1969. Several bays, with construction dates of approximately 1971, 1973, 1975, and 1982, have been added to the original building. As the building stands, the original section is located at the north end, with additions built consecutively towards the south. Paved asphalt parking lots and drive aisles are provided along the west side of Building A. The site is secured with a chain-link fence with barbed wire along to the south and west, and includes a motorized gate with proximity card reader and vehicle sensor. Building A is located approximately 600 m to the north of Building B at the Whitehorse Hydro Facility.

- The building is primarily clad with prefinished metal panels, with painted concrete foundation walls along the base of the building. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows are insulated glazed units set in either metal or vinyl frames. The main entrance door is a prefinished aluminum unit with glass insert set in a prefinished aluminum frame. Exterior utility doors are painted metal unit set in painted metal frames. Exterior pedestrian entrance doors are equipped with proximity card access readers and magnetic locks. Insulated, prefinished metal, overhead doors with motorized openers are provided along the west elevation of the building. Interior wall finishes include prefinished metal panels and CIP concrete or CMU walls in the bays, with painted gypsum board walls in the office area. Interior doors are a combination of painted metal units in the bays, and wood doors with wood veneer, and interior windows all in painted metal frames in the office areas. Exposed structure ceilings are generally provided throughout the bays, and the office space is provided with a combination of painted gypsum wall board and acoustic ceiling tiles. Flooring finishes throughout the bays is generally painted concrete slab, with painted diamond plate metal flooring at walkways. Sheet vinyl flooring is provided throughout the office area. Counters and cabinets are provided in the kitchen and washrooms, and are of solid surface or veneered construction or finish. Other fixtures include prefinished metal lockers and a washing machine and clothes dryer. The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and painted metal soffits are provided along the underside of the roof overhangs. The architectural components are in overall marginal condition.

- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings and a CIP concrete foundation walls. The main floor is a slab on grade throughout. The suspended floor at the office area is constructed of metal decking with concrete topping supported by steel framing. The mezzanines are framed with steel I-section beams and HSS or I-section columns which support the metal grate decking. The superstructure is composed of HSS or structural steel I-beams with tension-only cross bracing along exterior walls. Interior wall partitioning at the northern bay consists of CMU construction. The roof construction consists of metal decking supported by OWSJ or structural steel I-section beams and girders, with tension-only cross bracing for lateral resistance. The structural components are in overall acceptable condition.

- The building is supplied with domestic water from a well water system and is distributed via copper and plastic piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface runoff. Domestic hot water is provided by two electric hot water heaters, each located in one of the washrooms. A water distiller is located in the main floor washroom to provide the building with potable water. Plumbing fixtures include a solid surface lavatory, enameled iron lavatories, vitreous china flush valve water closets and urinals, a plastic wash basin, and a stainless steel sink. Natural gas lines enter the building at the east elevation. The bays are primarily heated by suspended radiant hydronic unit heaters located throughout the building. Hot water for building heat is provided by a boiler system with a natural gas fired burner. The office is heated by a combination of radiant hydronic perimeter heaters as well as a ducted forced air system. The forced air system is also equipped with air conditioning. Building ventilation is provided by air intake from the diesel engines and rooftop mounted vents, with air circulation aided by ceiling-mounted rotary fans. Building exhaust is handled by a number of ceiling-mounted and through-wall axial exhaust fans, as well as a workshop exhaust extraction arm at the south bay. The mechanical components are in acceptable overall condition.

- Electrical service is provided via buried cables from the substation located adjacent to the building. Power is fed to exterior transformers located to the east of the building that step down the power to 347/600 V. An adjacent switchgear rated at 347/600 V, 1200 A, 3 phase, 4 wire then feeds the power to the building. 600 V power is fed to a motor control centre, an interior central distribution panel rated at 347/600 V, 225 A, 3 phase, 4 wire or to interior step down transformers. The transformers step down the voltage from 347/600 V to 120/240 V. Secondary distribution is provided by electrical sub panels rated at 120/240 V and 100 to 225 A. Interior lighting is a combination of T5 tubular fluorescent lamps and high-pressure sodium fixtures in the bays, with T8 and T12 tubular fluorescent lamps in the office area. Exterior lighting is provided by building-mounted LED light fixtures controlled by photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel with audible alarm, pull stations, and smoke/heat detectors. The building is monitored by YEC's System Control Centre, with access control provided by a proximity card reader and magnetic lock on the pedestrian entrance doors. The electrical components are in acceptable overall condition.

Building B – P127 Hydro Plant:

- The site and building were developed circa 1982. No major addition or renovations have been completed since the original construction. The building is surrounded by natural vegetation, with a CIP concrete ramp to the north of the building. A CIP concrete retaining wall is provided at the front and rear of the building along its west edge. Building B is located approximately 600 m to the south of Building A at the Whitehorse Hydro Facility.

- The building is clad with prefinished metal panels along all elevations. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows are insulated glazed units set in prefinished metal frames. Exterior doors are insulated, painted metal units set in painted metal frames. An insulated, prefinished metal, sectional overhead door with glass inserts and motorized opener is provided at the north elevation of the building. Interior walls are typically CIP concrete, with prefinished metal wall panels at some areas of the generator floor, and painted gypsum board walls at the office and washroom. Two painted metal interior door with glass inserts and painted frames are provided at the office. The ceilings at the generator level are exposed to the roof structure, with the remaining sub floor having CIP concrete ceilings. The flooring throughout the building is concrete slab, with floor paint provided at the generator and turbine floors. The roof is flat and is covered with rubber EPDM membrane and gravel ballast. Roof drains and internal rainwater leaders provided roof drainage directly to the ground. Prefinished metal fascia and soffit is provided along the roof perimeter. The architectural components are in overall acceptable condition.
- The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to consist of concrete piles. CIP foundation walls and grade beams are provided around the building perimeter subgrade. All floors are constructed of CIP concrete slabs with integral concrete beams, and are on grade or supported by concrete columns. The superstructure is a combination of CIP concrete walls and columns, as well as structural steel I-sections columns and cross-bracing along exterior walls. The roof construction consists of corrugated metal decking supported by structural steel I-sections and OWSJs, with I-section cross bracing for lateral resistance. The structural components are in overall acceptable condition.
- The building is supplied with domestic water from a well water system and is distributed via plastic piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface runoff. Domestic hot water is provided by an electric hot water heater located in the washroom. Plumbing fixtures include a wall-mounted vitreous china lavatory, and a floor-mounted vitreous china flush tank water closet. The building is primarily heated by suspended electric unit heaters. Building ventilation is provided by rooftop mounted vents and external wall louvers, with air circulation aided by ceiling-mounted rotary fans. Building exhaust is handled by a number of ceiling-mounted exhaust fans, as well as a through-wall centrifugal exhaust fan in the washroom. The mechanical components are in acceptable overall condition.
- Electrical service is provided by the hydroelectric turbine generator system within the building. Primary electrical distribution to the building is provided by a motor control centre located on the generator floor, and a central distribution panel located on the turbine floor. Secondary distribution is provided by electrical sub panels rated at 120//240 V and 100 – 225 A. Interior lighting is primarily provided by a T5 tubular fluorescent lamps controlled by line voltage switches. Exterior lighting is provided by wall-mounted HID and LED fixtures controlled by photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel, bells, pull stations, and smoke/heat detectors. The building is monitored by YEC's System Control Centre, with access control provided by a proximity card reader and magnetic lock on the building's entrance doors. The electrical components are in acceptable overall condition.

Given the year of original construction of each building (~1969 and ~1982), hazardous building construction materials such as asbestos-containing materials (ACMs) and/or polychlorinated biphenyls (PCBs) may be present.

LA: P126 DIESEL PLANT AND P127 HYDRO PLANT, WHITEHORSE, YT

Immediate investigation / action items identified pertain to exposed cables to the east of Building A, emergency lighting in Building A, and the fire alarm panels and devices in Building A and B. Deficiencies and Capital Reserve Items have been identified within the 10-year time frame of this report with respect to architectural, mechanical and electrical components and systems. The Immediate Repairs and Capital Reserve Analysis are included in Appendix C. The following tables summarize our opinion of budgets for capital expenditures above the threshold value of $3,000 over the 10-year evaluation period that is identified by this report. Expenditures that are expected to be managed as part of normal operations are not shown. The budgets assume a prudent level of ongoing maintenance.

Summary of Immediate and 10-Year Capital Reserve Expenditures (uninflated)/ P126 Diesel Plant (Site A)

Section	Description	Immediate (2016)	Reserve Years 1 to 5 (2016 to 2020)	Reserve Years 6 to 10 (2021 to 2025)	10-Year Reserve Total
3.0	Architectural	$0	$967,500	$265,400	$1,232,900
4.0	Structural	$0	$5,000	$0	$5,000
5.0	Mechanical	$500	$82,700	$8,800	$91,500
6.0	Electrical	$25,500	$96,300	$68,500	$164,800
TOTALS		**$26,000**	**$1,515,500**	**$342,700**	**$1,494,200**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Summary of Immediate 10-Year Capital Reserve Expenditures (uninflated)/P126 Diesel Plant (Site A)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$26,000	$922,900	$40,000	$54,600	$53,300	$80,700

Year 6	Year 7	Year 8	Year 9	Year 10
$0	$292,900	$0	$0	$49,800

Summary of Immediate and 10-Year Capital Reserve Expenditures (uninflated)/ P127 Hydro Plant (Site B)

Section	Description	Immediate (2016)	Reserve Years 1 to 5 (2016 to 2020)	Reserve Years 6 to 10 (2021 to 2025)	10-Year Reserve Total
3.0	Architectural	$0	$268,300	$365,500	$633,800
4.0	Structural	$0	$5,000	$0	$0
5.0	Mechanical	$0	$38,000	$0	$38,000
6.0	Electrical	$9,400	$67,700	$29,700	$97,400
TOTALS		**$9,400**	**$374,000**	**$395,200**	**$769,200**

Note: Immediate (2016) expenditures are not included in the Capital Reserve Totals.

Summary of Immediate 10-Year Capital Reserve Expenditures (uninflated)/P126 Hydro Plant (Site B)

Immediate	Year 1	Year 2	Year 3	Year 4	Year 5
$9,400	$70,700	$163,800	$13,500	$9,100	$116,900

Year 6	Year 7	Year 8	Year 9	Year 10
$14,800	$357,900	$14,500	$8,000	$0

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LA: P126 DIESEL PLANT AND P127 HYDRO PLANT, WHITEHORSE, YT

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Capital Reserve Table

1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. (Golder) was retained by Yukon Energy Corporation (YEC) to conduct a Facility Lifecycle Assessment (FLA) of the properties described as P126 Diesel Plant (Building A) and P127 Hydro Plant (Building B). Building A and Building B are located at #2 Miles Canyon Road, Whitehorse YT, approximately 0.5 kilometres (km) and 1.0 km off of South Access Road respectively.

Building A is a single-storey building originally constructed circa 1969 and houses a several diesel generators and an office space. Several additions have been made to the original structure, with an average construction date of ~1972. Building A has a gross floor area (GFA) of approximately 1,691 square metres (m²) (18,202 square feet [ft²]) and is situated on a site covering approximately 0.78 hectares (1.93 acres). Building B is a single-storey building constructed circa 1982 and also houses a hydroelectric turbine. Building B has a GFA of approximately 1,000 m² (10,764 ft²) and is situated on a site covering approximately 0.20 hectares (0.49 acres).

Written authorization to proceed with the work was provided by Sean Munro, Manager, Property & Risk Management from Yukon Energy Corporation. It is understood that this FLA is required for capital planning.

1.2 Objectives

The objective of the FLA was to document the Site conditions at the time of the Site reconnaissance and, based on available sources of information and observations of surface conditions during the Site reconnaissance, to identify the exterior Site improvements as well as the building structure, envelope, interior finishes, mechanical systems, electrical systems, fire/life safety systems, conveyance devices and visually obvious signs of non-compliance with respect to building code and barrier free accessibility. Due to the age of the buildings, it is possible that hazardous building materials are present.

1.3 Methodology

Site Escort and general building information was provided by Darrell Johnson, Whitehorse Lead Hand and Operator (hereafter referred to as the “Site Representative”). Site reconnaissance was conducted by Brian Levy and Adriana Almeida of Golder on November 18, 2015. The weather at the time of assessment was -18 degrees Celsius (°C) and overcast, with no conditions limiting access to or around each Site. Snow coverage prevented observational assessment of the roof or and Site components.

The scope of work did not include sampling or testing to identify the potential presence of hazardous building construction materials such as asbestos-containing materials (ACMs), lead-based paints (LBPs), PCB-containing electrical equipment or other hazardous materials. Due to the age of the buildings (~1969 and ~1982), it is possible that hazardous building construction materials are suspected to be present on Site.

1.4 Evaluation Criteria

The FLA was completed in general accordance with accordance with the YEC stated scope of work as documented in *Request for Proposals Yukon Energy Corporation Building Condition Reports # 2015-036* (hereafter referred to as the "RFP"). The scope of the FLA was limited to identifying components, systems and potential concerns by visual examination of surface features and operating practices, and from available documented information sources. Only those items identified as being above the specified Capital Threshold will be addressed in the Capital Reserve Table. The Condition Rating system (CR) used throughout this report is based on the YEC RFP:

Code	Description
1	**Critical Unsafe**, high risk of injury or critical system failure.
2	**Poor** - does not meet requirements, has significant deficiencies. May have high operating / maintenance costs.
3	**Marginal** - Meets minimum requirements, has significant deficiencies. May have above average operating maintenance costs.
4	**Acceptable** - Meets present requirements, minor deficiencies. Average operating/maintenance costs.
5	**Good** - Meets all present requirements. No deficiencies.
6	**Excellent** - As new/state of the art, meets present and foreseeable requirements.

The capital expenditures identified with respect to deficiencies or deferred maintenance shall be identified by the following Categories ("Cat#"):

Category	Description
1	Code & Safety
2	Repair & Maintenance
3	Capital Expenditure
4	Modernization / Improvements
5	Other

Items identified with a CR rating of 1 and/or Cat1, shall be treated as “Immediate” action items, considered to have conditions that include deficiencies that require action in the next 60 to 90 days. Items identified with a CR of 2 or 3 and/or Cat2 shall be considered to have conditions that include deficiencies that can be addressed within the next five years (2016 to 2020 in the Capital Reserve Table). Preventative Maintenance (PM) items may have been identified. These PM items are items anticipated to be required to maintain specific components/systems through to the end of their Expected Useful Life (EUL) and are considered to have CR of 4 or better that can be addressed at any time within the 10 year time frame of this report (2016 to 2025 in the Capital Reserve Table).

Other non-urgent conditions identified with a CR of 4 to 6, are prioritized by their identification as Cat2 to Cat4 and are included in the Capital Reserve Table in an appropriate year. For items with no observed or reported deficiencies, a lifecycle replacement (LCR) cost estimate has been provided in the Capital Reserve Table spreadsheet in the year equal to the year of original installation plus that component’s EUL. If an item with no observed or reported deficiencies is nearing or has surpassed its EUL in the next 5 years (i.e., 2016 to 2020), an LCR cost estimate has been provided in the Lifecycle Plan spreadsheet in year 2020.

For similar components that have been replaced/installed at different times but where the age difference is equal to or less than 20% of the component’s EUL, the average install year has been used in calculating the next lifecycle replacement event (i.e., for similar vinyl floor tile installed in 1999 versus 2002, each having a 20 year TDL, an average install year of 2001 has been used to calculate a single lifecycle replacement event in 2021).

No building material sampling or testing was conducted as part of this assessment.

1.5 Recommendations for Additional Investigation or Action

- Conduct a civil study to manage the seepage within Building B.
- Determine if mould growth is present behind washroom walls in Building B.
- Conduct a structural study at Building A as to why the steel columns are lifting from the concrete slab.
- Investigate the domestic water quality and unreliable water pressure at Building A.
- Complete a drainage study at Building A.
- Design a boiler system or similar central heating system for Building B.
- Design a positive ventilation system for Building A.

1.6 Desktop Data Collection

The following documents were provided by YEC:

- Architectural drawings titled Whitehorse Diesel Plant Floor Plant, prepared by Yukon Energy Corporation, dated December 2008.
- Architectural drawings titled Whitehorse Unit No. 4 Powerhouse, prepared by Yukon Energy Corporation, dated July 2007.

1.7 Outstanding Information

All information that has been requested has been provided at the time of the completion of this report.

1.8 Building & Fire Code Compliance Overview

The Site Representative indicated that electric cables to the east of building A were exposed and required burying. The Site Representative also indicated that the emergency lighting within Building A was insufficient. No other outstanding work orders, building code violations, building code infractions, building ordinances or municipal health or fire safety by-laws violations were reported.

1.9 Evidence of Mould Presence

No evidence of mould was observed at the time of assessment; however, concerns were reported regarding suspected mould behind the gypsum board walls in the washroom of Building B.

1.10 Outline of the Report

The report that follows this section contains a summary description of the Site and building systems/components along with a detailed listing and description of systems/components. Furthermore, current, imminent or anticipated deficiencies above the Capital Threshold (if any) and excluding normal operating maintenance are presented with a CR, including a description of the risk/consequence of deferral, probability of imminent/anticipated failure and/or a further description of any failure if it has already occurred.

A more detailed Capital Reserve Table is presented in Appendix C outlining the specific systems/components, EUL, Install Date, Remaining Useful Life (RUL), replacement event type, basis of estimate and specific years for Capital Reserve planning.

1.11 Mandate and Report Resources

Please refer to Appendix A for the report mandate for this project and for additional resources related to the assumptions used in preparing this report such as:

- Operating and Maintenance Items; and,
- Discussions of Overall Concepts and Terminology.

2.0 SITE DESCRIPTION

2.1 Site Location and Setting

Golder was retained by YEC to conduct a FLA of the properties described as P126 Diesel Plant (Building A) and P127 Hydro Plant (Building B). Building A and Building B are located at #2 Miles Canyon Road, Whitehorse YT, approximately 0.5 km and 1.0 km off of South Access Road respectively.

Building A is a single-storey building originally constructed circa 1969 and houses a several diesel generators and an office space. Several additions have been made to the original structure, with an average construction date of ~1972. Building A has a gross floor area (GFA) of approximately 1,691 m² (18,202 ft²) and is situated on a site covering approximately 0.78 hectares (1.93 acres). Building B is a single-storey building constructed circa 1982 and also houses a hydroelectric turbine. Building B has a GFA of approximately 1,000 m² (10,764 ft²) and is situated on a site covering approximately 0.20 hectares (0.49 acres).

2.2 Site Physical Description

Table 1: Site Physical Description of P126 Diesel Plant (Building A)

Topic	Data
Site Area	~0.78 hectares (~1.93 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building	~1,382 m² (~14,876 ft²)
Levels above grade	One
Levels below grade	None
Date of Building Construction	~1969
Date of Major Renovations/Additions	1971, 1973, 1975, 1982
Percentage Site Coverage by Building	~20%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~80% bare/gravelled areas
Percentage Site Coverage by Paved or Other Sealed Surface Materials	N/A



Whitehorse P126 Diesel Plant – Building A.

LA: P126 DIESEL PLANT AND P127 HYDRO PLANT, WHITEHORSE, YT

Table 2: Site Physical Description of P127 Hydro Plant (Building B)

Topic	Data
Site Area	~0.20 hectares (~0.49 acres)
Number of Buildings on the Site	One
Approximate Footprint Area of Building	~500 m² (~5,382 ft²)
Levels above grade	One
Levels below grade	Three
Date of Building Construction	~1982
Date of Major Renovation/Addition	None
Percentage Site Coverage by Building	~25%
Percentage Site Coverage by Landscaped/Grassed/Bare Ground Areas	~70%
Percentage Site Coverage by Paved or Other Sealed Surface Materials	~5%



Whitehorse P127 Hydro Plant – Building B.

3.0 ARCHITECTURAL

Building A – P126 Diesel Plant:

The site and building were developed circa 1969. Several bays, with construction dates of approximately 1971, 1973, 1975, and 1982, have been added to the original building. As the building stands, the original section is located at the north end, with additions built consecutively towards the south. Paved asphalt parking lots and drive aisles are provided along the west side of Building A. The site is secured with a chain-link fence with barbed wire along to the south and west, and includes a motorized gate with proximity card reader and vehicle sensor. Building A is located approximately 600 m to the north of Building B at the Whitehorse Hydro Facility.

The building is primarily clad with prefinished metal panels, with painted concrete foundation walls along the base of the building. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows are insulated glazed units set in either metal or vinyl frames. The main entrance door is a prefinished aluminum unit with glass insert set in a prefinished aluminum frame. Exterior utility doors are painted metal unit set in painted metal frames. Exterior pedestrian entrance doors are equipped with proximity card access readers and magnetic locks. Insulated, prefinished metal, overhead doors with motorized openers are provided along the west elevation of the building. Interior wall finishes include prefinished metal panels and CIP concrete or CMU walls in the bays, with painted gypsum board walls in the office area. Interior doors are a combination of painted metal units in the bays, and wood doors with wood veneer and interior windows, all in painted metal frames, in the office areas. Exposed structure ceilings are generally provided throughout the bays, and the office space is provided with a combination of painted gypsum wall board and acoustic ceiling tiles. Flooring finishes throughout the bays is generally painted concrete slab, with painted diamond plate metal flooring at walkways. Sheet vinyl flooring is provided throughout the office area. Counters and cabinets are provided in the kitchen and washrooms, and are of solid surface or veneered construction or finish. Other fixtures include prefinished metal lockers and a washing machine and clothes dryer.

The roof is pitched and is covered with prefinished corrugated metal panels. Prefinished metal gutters and downspouts provided roof drainage directly to the ground. Prefinished metal fascia is provided along the roof perimeter, and painted metal soffits are provided along the underside of the roof overhangs.

Capital expenditures with respect to the asphalt parking lot and drive aisles, metal cladding and exterior wall insulation, exterior windows, utility doors, overhead doors, interior wall paint, acoustic ceiling tiles, interior floor paint, vinyl flooring, architectural fixtures, and the metal roofing are anticipated within the 10-year time frame of this report.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall marginal condition.

Building B – P127 Hydro Plant:

The site and building were developed circa 1982. No major addition or renovations have been completed since the original construction. The building is surrounded by natural vegetation, with a CIP concrete ramp to the north of the building. A CIP concrete retaining wall is provided at the front and rear of the building along its west edge. Building B is located approximately 600 m to the south of Building A at the Whitehorse Hydro Facility.

LA: P126 DIESEL PLANT AND P127 HYDRO PLANT, WHITEHORSE, YT

The building is clad with prefinished metal panels along all elevations. Exterior walls are provided with batt insulation and polyethylene vapour barrier within the wall cavities. Exterior windows are insulated glazed units set in prefinished metal frames. Exterior doors are insulated, painted metal units set in painted metal frames. An insulated, prefinished metal, sectional overhead door with glass inserts and motorized opener is provided at the north elevation of the building. Interior walls are typically CIP concrete, with prefinished metal wall panels at some areas of the generator floor, and painted gypsum board walls at the office and washroom. Two painted metal interior doors with glass inserts and painted metal frames are provided at the office. The ceilings at the generator level are exposed to the roof structure, with the remaining sub floor having CIP concrete ceilings. The flooring throughout the building is concrete slab, with floor paint provided at the generator and turbine floors.

The roof was not accessible at the time of the site visit, but is flat covered with a rubber EPDM membrane and gravel ballast. Roof drains and internal rainwater leaders provided roof drainage directly to the ground. Prefinished metal fascia and soffit is provided along the roof perimeter.

Capital expenditures with respect to the metal cladding, exterior windows, overhead door, concrete walls, interior wall paint, interior floor paint, membrane roofing, suspect mould, and the concrete site elements are anticipated within the 10-year time frame of this report. Additional investigation is required regarding suspect mould growth behind the washroom walls.

The building does not meet barrier free guidelines, but is likely not required due to the function of the building.

A detailed description of site and building architectural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The architectural components are in overall acceptable condition.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.1a	**Site Servicing**	**Water**: Domestic water is provided by a well system which obtains water from the Yukon River. **Sanitary Sewer**: Sanitary waste is fed to an on-site septic field. **Gas**: Natural gas lines are provided at the south and east elevations of the building. Lines enter the building at the east elevation. Natural gas lines were reportedly installed in 2015. **Electrical**: Power is fed to the building through buried cables at east elevation. **Diesel**: A diesel fuel aboveground storage tank is located to the west of Building A.	**3/4**	-	Issues were reported regarding the domestic water supply to the building. See comments related to Item M01.1a below for further information.
A01.1b	**Site Servicing**	**Water**: Domestic water is provided by a well system which obtains water from the Yukon River. **Sanitary Sewer**: Sanitary waste is fed to an on-site septic field. **Gas**: N/A **Electrical**: Power is generated within the building via a hydroelectric turbine. **Diesel**: N/A	**4**	-	No concerns observed or reported.
A01.2a	**Parking Lots & Drive Aisles**	**~1997:** Paved asphalt parking lots and drive aisles are provided along the west side of Building A.	**4**	3	The site was snow-covered at the time of assessment so the condition of the paved asphalt surfaces was not observed. Some cracking and potholes were reported, and the pavement was reported to have been installed circa 1995. Costing for repairs and eventual replacement of the asphalt has been included in the Capital Reserve Table.
A01.2b	**Parking Lots & Drive Aisles**	**~1982:** A CIP concrete ramp is provided at the north of the building.	**4**	3	No concerns reported. See Item A99.3b below for further details.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.3a	**Parking Lot Markings**	None observed.	**4**	3	The site was snow-covered at the time of assessment so pavement markings were not observed. Parking stall markings are assumed to be present, and should be repainted when the asphalt is repaved. No concerns reported.
A01.3b	**Parking Lot Markings**	N/A	**-**	-	N/A
A01.4a	**Concrete Sidewalk**	N/A	**-**	-	N/A
A01.4b	**Concrete Sidewalk**	N/A	**-**	-	N/A
A01.5a	**Concrete Curbs / Pads**	**~1995:** A small concrete pad is provided at the north elevation entrance.	**4**	-	The concrete pad was partly snow-covered at the time of assessment and not directly reviewed. No concerns were reported. Repairs will likely be required within the timeframe of this report. See Note **3A**.
A01.5b	**Concrete Curbs / Pads**	**~1982:** A concrete apron is provided at the north of the building.	**4**	-	The concrete apron was mostly snow-covered at the time of assessment and not directly reviewed. No concerns were reported. Costing for ongoing repairs to the concrete apron has been combined with Item A99.2b below.
A01.6a	**Parking Islands**	N/A	**-**	-	N/A
A01.6b	**Parking Islands**	N/A	**-**	-	N/A
A01.7a	**Parking bumpers**	N/A	**-**	-	N/A
A01.7b	**Parking bumpers**	N/A	**-**	-	N/A
A01.8a	**Site Drainage**	Overland soil absorption and runoff.	**4**	-	No concerns observed or reported.
A01.8b	**Site Drainage**	Overland soil absorption and runoff. A trench drain is provided at the base of the concrete ramp.	**4**	-	No concerns observed or reported.
A01.9a	**Grassed Areas**	N/A	**-**	-	N/A
A01.9b	**Grassed Areas**	The building is surrounded by natural vegetation along the east, south, and west elevations.	**4**	-	No concerns observed or reported.

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.10a	**Fencing**	**~1969**: Chain-link fencing with barbed wire is provided to the west and south of Building A. A motorized gate with proximity card reader and vehicle sensor is located at the main entrance to the site.	**4**	3	The fence is currently in acceptable condition, but has surpassed its EUL and should be replaced.
A01.10b	**Fencing**	**~1982**: Chain -link fencing is provided at a small section near the main entrance, as well as surrounding the transformer at the south of the building. Barbed wire is provided along the top of the fence surrounding the transformer.	**4**	3	The fence is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced.
A01.11a	**Retaining Walls**	N/A	**-**	-	N/A
A01.11b	**Retaining Walls**	**~1982:** A concrete retaining wall is provided along the west edge of the vehicle ramp.	**4**	-	No concerns observed or reported. Costing for ongoing repairs to the retaining wall has been combined with Item A99.2b below.
A01.12a	**Signage**	**~1990**: Pole-mounted and building-mounted sheet metal traffic control signage is provided. Painted sheet metal lettering with led illumination displaying YEC's name is provided on the west elevation of Building A.	**4**	-	No concerns observed or reported.
A01.12b	**Signage**	**~2000**: Plastic signage is provided on the overhead and main entrance doors.	**4**	-	No concerns observed or reported.
A01.13a	**Amenities**	**~1969**: Metal bins for waste and recycling, and a metal flag pole are located to the northwest of Building A.	**4**	-	No concerns observed or reported
A01.13b	**Amenities**	N/A	**-**	-	N/A
A01.14a	**Ancillary Buildings**	N/A	**-**	-	N/A
A01.14b	**Ancillary Buildings**	N/A	**-**	-	N/A
A01.15a	**Decks and Terraces**	N/A	**-**	-	N/A
A01.15b	**Decks and Terraces**	N/A	**-**	-	N/A
A01.16a	**Canopies**	**~1969:** A metal-framed canopy with metal covering is located at the main entrance at the north elevation.	**4**	-	No concerns observed or reported.
A01.16a	**Canopies**	N/A	**-**	-	N/A

A01 SITE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A01.17a	**Railings**	N/A	**-**	-	N/A
A01.17b	**Railings**	**~1982:** A steel guard rail with concrete anchors is provided along the vehicle ramp.	**4**	-	No concerns observed or reported.
A01.18a	**Bollards**	**~1969:** Painted steel concrete-filled bollards are provided adjacent to the proximity card reader that gains access to the Whitehorse site. Painted steel concrete-filled bollards are also provided adjacent to the diesel fuel tank and at the natural gas line at the south of Building A.	**4**	-	The bollards are in acceptable condition, but should be repainted. See Note **3A**.
A01.18b	**Bollards**	N/A	**-**	-	N/A
A01.19a	**Fire Hydrants**	None observed on site.	**-**	-	N/A
A01.19b	**Fire Hydrants**	None observed on site.	**-**	-	N/A
A1.20a	**Parking Lot Plugins**	N/A	**-**	-	N/A
A1.20b	**Parking Lot Plugins**	N/A	**-**	-	N/A

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.1a	**Metal Cladding**	**~1972**: Prefinished metal panels are provided around the exterior of Building A.	**3**	3	The metal cladding is original to each section of the building and should be replaced. See Note **3C**.
A02.1b	**Metal Cladding**	**~1982**: Prefinished metal panels are provided around the exterior of Building B.	**4**	3	The metal cladding is in overall acceptable condition but will surpass its EUL within the timeframe of this report and should be replaced.
A02.2a	**Concrete**	**~1972**: CIP concrete foundation walls are exposed along the base of the building and are finished with paint.	**4**	-	No concerns observed or reported.
A02.2b	**Concrete**	**~1982**: CIP concrete foundation walls are exposed along the base of the building. A section of the foundation wall is constructed of CMU at the south elevation.	**4**	-	No concerns observed or reported.

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A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.3a	**Exterior Paint**	**~1995:** The exposed concrete foundation walls along the base of Building A are painted.	**3**	-	The exterior paint is peeling and flaking and should be scraped and repainted. See Note **3A**.
A02.3b	**Exterior Paint**	N/A	**-**	-	N/A
A02.4a	**Joint Sealers**	**~1990:** Joint sealers are provided around the frames of the original exterior windows.	**2**	2/3	The exterior joint sealers have failed and should be replaced The original exterior windows have also surpassed their EUL and should be replaced. Replacement of sealants should be coordinated with the metal siding and replacing the original exterior windows.
A02.4b	**Joint Sealers**	**~1998:** Joint sealers are provided around the frames of the original exterior windows and at joints in the concrete retaining wall.	**3**	2/3	The joint sealers are currently in marginal condition and should be replaced.
A02.5a	**Louvers**	**~1982:** Prefinished metal louvers are provided around the exterior of Building A.	**3**	-	The louvers are original to each section of the building and should be replaced concurrently with the metal cladding. Costing for the replacement of the louvers has been included with Item A02.1a above.
A02.5b	**Louvers**	**~1982:** A prefinished metal louver with exterior metal grating is provided at the north elevation of Building B.	**4**	-	The louvers are in overall acceptable condition but will surpass its EUL within the timeframe of this report. Replacement should occur concurrently with the metal cladding. Costing for the replacement of the louvers has been included with Item A02.1b above.
A02.6a	**Insulation**	**~1972:** Insulation was concealed and not directly reviewed, but likely consists of batt insulation.	**3**	3	It was reported that Building A is too cold in the winter. It is recommended that the insulation be upgraded when the metal cladding is replaced. Costing for this has been included with Item A01.1a.
A02.6b	**Insulation**	**~1982:** Insulation was concealed and not directly reviewed, but likely consists of batt insulation.	**4**	-	No concerns reported.
A02.7a	**Vapour Barrier**	**~1969:** The vapour barrier was concealed and not directly reviewed, but likely consists of polyethylene sheets.	**4**	-	No concerns reported.

A02 EXTERIOR WALLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A02.7b	**Vapour Barrier**	**~1982:** The vapour barrier was concealed and not directly reviewed, but likely consists of polyethylene sheets.	**4**	-	No concerns reported.

A03 EXTERIOR WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A03.1a	**Exterior Windows**	**~1972**: Approximately half of the exterior windows are insulated glazed units set in metal frames and original to the building. **~2005**: Approximately half of the exterior windows have been replaced are insulated glazed units set in vinyl frames.	**3/4**	3	The original windows have surpassed their EUL and should be replaced. Issues were also reported regarding leaks and poor insulation of the original windows.
A03.1b	**Exterior Windows**	**~1982**: Approximately half of the exterior windows are insulated glazed units set in painted steel frames and original to the building. **~2005**: Approximately half of the exterior windows have been replaced are insulated glazed units set in prefinished aluminum frames.	**4**	3	The original windows will surpass their EUL within the timeframe of this report and should be replaced.

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A04 EXTERIOR DOORS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A04.1a	**Main Entrance Door**	**~1999**: A prefinished aluminum entrance door in a prefinished metal frame is provided at the main entrance at the north elevation. The unit has a glass insert and has sidelights with metal security bars on either side. The door is equipped with proximity card access and magnetic lock.	**4**	-	The door is not barrier free in its current condition. Due to the function of the building, no costing has been included for barrier free upgrades. No concerns observed or reported.
A04.1b	**Main Entrance Door**	**~1982**: An insulated, prefinished metal entrance door integrated into the overhead door is provided at the north elevation. The door is equipped with proximity card access and magnetic lock.	**4**	-	The door is not barrier free in its current condition. Due to the function of the building, no costing has been included for barrier free upgrades. Replacement of the overhead door recommended which will collectively replace the main entrance pedestrian door.
A04.2a	**Utility Doors**	**~1972**: Painted metal utility doors set in painted metal frames are provided along the east elevation of the building. The doors are equipped with proximity card access and magnetic lock.	**4**	3	The doors have surpassed their EUL and should be replaced.
A04.2b	**Utility Doors**	**~1982**: A painted metal utility door set in in a painted metal frame is provided at the south elevation.	**4**	-	The door is currently in acceptable condition but will surpass its EUL within the timeframe of this report and should be replaced. See Note **3A**.
A04.3a	**Overhead Doors**	**~1992**: Insulated, prefinished metal, overhead doors with motorized openers are provided along the west elevation of the building.	**3/4**	3	Operational issues were reported regarding the overhead door at the south bay. The remaining overhead doors are in acceptable condition but are approaching the end of their EUL. It is recommended to replace the south bay overhead door in Year 1 and the remaining doors in year 5.
A04.3b	**Overhead Doors**	**~1982**: An insulated, prefinished metal, sectional overhead door with glass inserts and motorized opener is provided at the north elevation of the building.	3	3	The overhead door reportedly leaks and has surpassed its EUL. An allowance to replace the door has been included in the Capital Reserve Table.

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A05 FASCIA AND SOFFITS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A05.1a	**Fascia**	**~1972**: Prefinished metal fascia is provided along the roof perimeter.	**4**	3	The fascia is original to each section of the building and should be replaced concurrently with the roofing. Costing for the replacement of the louvers has been included with Item R01.1a below.
A05.1b	**Fascia**	**~1982**: Prefinished metal fascia is provided along the roof perimeter.	**4**	3	The fascia is in overall acceptable condition but will surpass its EUL within the timeframe of this report. Replacement should occur concurrently with the membrane roofing. Costing for the replacement of the fascia has been included with Item R01.2b below.
A05.2a	**Soffit**	**~1972**: Painted metal soffits are provided along the underside of the roof overhangs.	**4**	3	The soffit is original to each section of the building and should be replaced concurrently with the roofing. Costing for the replacement of the louvers has been included with Item R01.1a below.
A05.2b	**Soffit**	**~1982**: Prefinished metal fascia is provided along the roof perimeter.	**4**	3	The soffits are in overall acceptable condition but will surpass their EUL within the timeframe of this report. Replacement should occur concurrently with the membrane roofing. Costing for the replacement of the soffits has been included with Item R01.2b below.

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A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A06.1a	**Fixed Partitions**	**~1969**: Interior partitions in the bays are a combination of steel columns frames with prefinished metal coverings, and CMU walls with paint finishes. The interior partitions in the office area are wood stud framed walls with gypsum board coverings.	**4**	-	No concerns observed or reported.
A06.1b	**Fixed Partitions**	**~1982**: Interior partitions typically consist of concrete walls. Wood stud walls with gypsum board walls are provided around the office and washroom.	**4**	-	No concerns observed or reported.
A06.2a	**Metal**	**~1972**: Prefinished metal wall panel finishes are provided throughout the majority of the main floor.	**4**	-	No concerns observed or reported.
A06.2b	**Metal**	**~1982**: Prefinished metal wall panel finishes are provided at some of the walls on the generator floor.	**4**	-	No concerns observed or reported.
A06.3a	**Gypsum Board**	**~1969**: Painted gypsum board walls are provided at the north vestibule, and at the main floor office and adjacent storage room and hallway. The second floor office space is also entirely finished with painted gypsum board walls.	**4**	-	A small damaged area of drywall was observed in the gypsum wallboard at the second floor kitchen and should be repaired (see Note **3A**). No other concerns observed or reported.
A06.3b	**Gypsum Board**	**~1982**: Painted gypsum board walls are provided at the office and washroom.	**4**	-	No concerns observed or reported.
A06.4a	**Plywood**	N/A	**-**	-	N/A
A06.4b	**Plywood**	N/A	**-**	-	N/A
A06.5a	**Concrete**	**~1972**: Concrete masonry unit walls finished with paint are provided at the main floor washroom, as well as the wall between the first addition and original building. Painted concrete foundation walls are exposed along the base of some of the interior walls.	**4**	-	No concerns observed or reported.

A06 INTERIOR WALLS AND PARTITIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
RAI.1b A06.5b	**Concrete**	**~1982**: Interior walls are typically CIP concrete or CMU throughout the building.	**3**	2	Signs of significant water seepage were observed throughout the upper and lower galleries, as well as in some areas on the turbine floor. Evidence included efflorescence, staining, and wet surfaces. Seepage was also reported through the west wall of the generator floor during spring thaw. Costing has been included to conduct a civil study, and to repair the concrete and outside waterproof membrane (below grade) in order to minimize the amount of water entering the building. The actual cost of repair will depend on the result of the study.
A06.6a	**Interior Paint**	**~2004**: The gypsum board walls and concrete walls are finished with paint.	**4**	3	The interior wall paint is generally in acceptable condition, but will likely require repainting within the timeframe of this report.
A06.6b	**Interior Paint**	**~2001**: The gypsum board walls and ceilings, and the concrete walls are finished with paint.	**4**	-	The interior paint finishes are approaching their EUL and should be repainted.

A07 INTERIOR DOORS/WINDOWS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A07.1a	**Interior Doors**	**~1972**: Interior doors at the main floor are painted metal units set in metal frames. Interior doors at the second floor office space are wood units with wood veneer, set in painted metal frames.	**4**	-	The interior doors are generally in acceptable condition. Some units may require replacement within the timeframe of this report. See Note **3A**. No concerns observed or reported.
A07.1b	**Interior Doors**	**~1982**: Two painted metal doors with glass inserts and set in metal frames are provided at the office.	**4**	-	No concerns observed or reported.
A07.3a	**Interior Windows**	**~1969**: Interior windows set in painted metal frames are provided at the main entrance vestibule and second floor hallway.	**4**	-	No concerns observed or reported.
A07.3b	**Interior Windows**	**~1982**: Interior windows set in painted metal frames are provided around the office.	**4**	-	No concerns observed or reported.

A08 CEILINGS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A08.1a	**Exposed Structure**	**~1972**: The ceilings throughout the bays of Building A are typically exposed structure consisting of metal decking supported by steel beams.	**4**	-	No concerns observed or reported.
A08.1b	**Exposed Structure**	**~1982**: The ceilings throughout Building B are exposed structure. The generator floor ceiling is exposed roof structure consisting of metal decking supported by structural steel I-section beams. CIP concrete slabs with integral beams form the ceilings of the lower levels.	**4**	-	No concerns observed or reported.
A08.2a	**Gypsum Board**	**~1972**: Painted gypsum board ceiling is provided at the vestibule at the north end of the building, as well as the second floor washroom.	**4**	-	No concerns observed or reported.
A08.2b	**Gypsum Board**	**~1982**: Painted gypsum board ceiling is provided at the office and washroom.	**4**	-	No concerns observed or reported.
A08.3a	**Interior Paint**	**~2004**: The gypsum board ceilings are finished with paint.	**4**	-	Due to the limited painted ceiling surfaces, no separate costing has been included for repainting. It is recommended to repaint the ceilings when wall painting is completed, or as needed.
A08.3b	**Interior Paint**	**~1982**: The concrete ceilings of the turbine floor, as well as the gypsum board ceilings in the office and washroom are finished with paint.	**4**	-	The painted ceiling finishes are currently in acceptable condition. Repainting of the ceilings should occur periodically and can be combined with painting of the interior walls.
A08.4a	**Acoustic Ceiling Tile**	**~1990**: Acoustic ceiling tiles on a suspended T-bar system are provided at the main floor office and adjacent storage room, north stairwell, and the second floor kitchen and office space.	**3**	3	Several ceiling tiles in were damaged, stained from roof leaks, or missing. An allowance has been made to replace the acoustic ceiling tiles as required.
A08.4b	**Acoustic Ceiling Tile**	N/A	**-**	-	N/A
A08.5a	**Wood**	**~1969**: Painted wood material drop panels are provided in the hallway outside the main floor office.	3	-	The wood panels have surpassed their EUL and should be replaced. See Note **3A**.
A08.5b	**Wood**	N/A	**-**	-	N/A

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A09 FLOORING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A09.1a	**Concrete**	**~1972**: Painted concrete slab flooring is provided throughout the majority of the main floor of the building.	**4**	-	Minor cracks were observed in the concrete slab throughout. No other concerns observed or reported.
A09.1b	**Concrete**	**~1982**: The floors throughout the building are concrete. The flooring of the generator and turbine levels are painted; the flooring of the upper and lower galleries is unfinished.	**4**	-	No concerns observed or reported.
A09.2a	**Metal Plate**	**~1972:** Painted diamond plate metal walkways are provided throughout the main floor bays, as well as the mezzanine at the second most northerly bay.	**4**	-	No concerns observed or reported.
A09.2b	**Metal Plate**	**~1982:** Painted diamond plate metal flooring is provided in some areas on the generator floor.	**4**	-	No concerns observed or reported.
A09.3a	**Interior Paint**	**~1990:** Interior paint is provided on the concrete and the metal plate flooring finishes.	**3**	2	The painted interior flooring finishes require repainting.
A09.3b	**Interior Paint**	**~2010:** Interior paint finishes are provided on the floors throughout the generator and turbine floors.	**4**	3	Floor paint is stripped near the overhead door of the generator floor, but is in generally in acceptable condition. Capital expenditure has been included for future painting projects.
A09.4a	**Metal Grating**	**~1972**: Metal grating floor finishes are provided on the main floor and at the south bay mezzanine. Metal grating stair treads are provided at the south bay mezzanine and at the north stair to the office area.	**4**	-	No concerns observed or reported.
A09.4b	**Metal Grating**	N/A	**-**	-	N/A
A09.5a	**Vinyl**	**~1990:** Approximately half of the main floor washroom is finished with sheet vinyl flooring. **~2005:** Sheet vinyl flooring is provided throughout the second floor office space, kitchen, and washroom.	**3/4**	3	The vinyl flooring in the main floor washroom has surpassed its EUL and should be replaced. See Note **3A**. The vinyl flooring in the office area will reach its EUL within the timeframe of this report and should be replaced.
A09.5b	**Vinyl**	N/A	**-**	-	N/A

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A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.1a	**Counters/Cabinets**	**~1990:** The main floor washroom is provided with plastic laminate cabinets. **~2005:** The second floor washroom and kitchen are provided with plastic laminate counters. The kitchen is also provided with cabinets finished with a combination of plastic laminate and wood veneer. **~2011**: The main floor washroom is provided with a solid surface counter with integral lavatory.	**3/4**	-	The main floor washroom cabinets are approaching their EUL and should be replaced (see Note **3A**.) No other concerns observed or reported.
A10.1b	**Counters/Cabinets**	N/A	**-**	-	N/A
A10.2a	**Railing**	**~1972:** Painted steel pipe railing is provided around the diesel engines, along the edge of the mezzanines, and at the interior stairs.	**4**	-	No concerns observed or reported.
A10.2b	**Railing**	**~1982:** Painted steel pipe railing is provided at the stairs throughout the building.	**4**	-	No concerns observed or reported.
A10.3a	**Lockers**	**~1969/2005:** Prefinished metal lockers are provided at main floor at the north bay of the building. Prefinished metal lockers are also provided in the second floor washroom.	**3/4**	3	The main floor lockers have surpassed their EUL and should be replaced.
A10.3b	**Lockers**	N/A	**-**	-	N/A
A10.4a	**Interior Signs**	**~1972**: Interior signs are typically self-adhesive vinyl labels for equipment.	**4**	-	No concerns observed or reported.
A10.4b	**Interior Signs**	**~1982**: Interior signs are a combination of sheet metal, and self-adhesive vinyl labels for equipment.	**4**	-	No concerns observed or reported.
A10.5a	**Washroom Accessories**	**~1990/2005**: The washrooms are provided with mirrors, soap dispensers, toilet paper dispensers, paper towel dispensers, and painted wood or prefinished metal toilet partitions.	**4**	3	The main floor washroom accessories will likely require replacement within the timeframe of this report.
A10.5b	**Washroom Accessories**	**~2005**: The washroom is provided with a mirror, soap dispenser, toilet paper dispenser, and paper towel dispenser.	**4**	-	The washroom accessories will likely require replacement within the timeframe of this report. See Note **3A**.

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A10 FIXTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A10.6a	**Appliances**	**~2005**: A residential washing machine and clothes dryer are provided at the north bay. A mini Fridge and Microwave are provided in the break room.	**4**	3	Issues were reported regarding the drainage of the washing machine. Costing for a drainage study has been included with Item M02.5a below.
A10.6b	**Appliances**	N/A	**-**	-	N/A

R01 ROOFING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
R01.1a	**Metal Roofing**	**~1972**: Building A is provided with a pitched roof covered with prefinished corrugated metal panels.	**3**	2/3	The roof was snow-covered at the time of assessment and was not directly observed. Several issues regarding the roof which are outlined in Note **3B**.
R01.1b	**Metal Roofing**	N/A	**-**	-	N/A
R01.2a	**Membrane Roofing**	N/A	**-**	-	N/A
R01.2b	**Membrane Roofing**	**~1982**: Building B is provided with a flat roof covered with a rubber EPDM membrane and gravel ballast.	**4**	2/3	Access was not provided to the roof, which was snow-covered at the time of assessment. Although the roof has reached its EUL, it is reportedly still in acceptable condition. The only concerns reported were improper ballast coverage caused by birds. Costing for ongoing roof maintenance has been provided, as well for a full roof replacement in 2020.
R01.3a	**Gutters and Downspouts**	**~1972**: Prefinished metal gutters and downspouts provide roof drainage directly to the ground.	**3**	3	Concerns were reported regarding the roof drainage and are outlined in Note **3B**.
R01.3b	**Gutters and Downspouts**	**~1982**: Roof drainage is provided by roof drains and internal rainwater leaders.	**4**	-	Access was not provided to the roof, so the roof drains were not directly observed. No concerns or reported.

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A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.1a	**Mould**	N/A	**-**	-	N/A
RAI.2b A99.1b	**Mould**	Potential mould growth was reported within the gypsum board walls in the washroom.	**3**	2	No visible mould growth was observed at the time of assessment. An allowance has been made to determine if mould growth exists, and to remediate affected areas as required.
A99.2a	**Elevators**	N/A	**-**	-	N/A
A99.2b	**Elevators**	N/A	**-**	-	N/A
A99.3a	**Exterior Stairs and Ramps**	N/A	**-**	-	N/A
A99.3b	**Exterior Stairs and Ramps**	**~1982**: A CIP concrete ramp is located to the north of the building.	**4**	2/4	The ramp was mostly snow-covered at the time of assessment so the condition of the ramp was not directly observed. The ramp is reportedly in acceptable condition. See Note **3D** and **3E**.
A99.4a	**Interior Stairs**	**~1969**: Access to the second floor office area is provided by a steel-framed stair complete with metal grate treads and painted steel pipe railing. **~1992**: Access to the south bay mezzanine is provided by a steel-framed stair complete with metal grate treads and painted steel pipe railing.	**4**	-	No concerns observed or reported.
A99.4b	**Interior Stairs**	**~1982**: The stairs throughout the building are primarily steel-framed with steel pipe railing. The stairs are painted and have diamond plate or metal grate treads. CIP concrete stairs are also provided.	**4**	-	Corrosion was observed the base of the west spiral stair at the lower gallery. It is recommended to remove the rust and repaint the affected area (See Note **3A**). The interior stairs are generally in acceptable condition. No concerns observed or reported.
A99.5a	**Ladders**	**~1972**: An interior painted metal ladder provides access to the mezzanine in the central bay.	**4**	-	No concerns observed or reported.
A99.5b	**Ladders**	**~1982**: Two galvanized steel ladders are provided to gain access over the exterior retaining wall. One ladder is located directly to the north of the building and one is located directly south of the building.	**4**	-	No concerns observed or reported.

A99 OTHER (STAIRS AND CONVEYANCE DEVICES)

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
A99.6a	**Crane**	**~1972**: Four industrial cranes were observed throughout the building ranging in capacity from 2 tonnes to 10 tonnes.	**4**	-	No concerns observed or reported.
A99.6b	**Crane**	**~1982**: One industrial crane with 80 tonne capacity is provided in the building.	**4**	-	No concerns observed or reported.

NOTES:

3A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

3B) The roof of Building A reportedly leaks primarily around roof vents and at the wall between the second and third additions. Drainage issues were also reported regarding leakage and ice damning at the gutters at the addition transitions. The roofing of Building A is reportedly original to each section of the building, ranging from approximately 46 to 33 years of age. The majority of the roof (~90%) has surpassed the 40-year EUL of a metal roof and should be replaced. Costing has been provided for the replacement of the metal roof and associated components where required (such as gutters, downspouts, fascia, etc.) Allowances have also been provided for ongoing roof repairs.

3C) Some holes were observed in areas of the cladding and sealing issues were reported. Birds were reported nesting in the ceiling space of the building and under the gutters of the EMD bay. Additionally, other vermin were reported in the building despite pest control procedures. It was also reported the building was generally too cold in the winter due to insufficient insulation and sealant issues. Replacement of the building's metal cladding, with an upgrade to the insulation of the exterior walls is recommended.

3D) The vehicle ramp frequently ices up due to water from the adjacent spillway. This increases a risk for vehicles using the ramp, especially as there is little room between the base of the ramp and Building B. It is recommended to install an ice melt system to control the ice buildup. Costing for the system has been included in Year 1 in the Capital Reserve Table.

3E) Approximately 2/3 of the ramp has reportedly been recently repaired. Costing for the ongoing maintenance and repair of the concrete ramp has been included in the Capital Reserve Table. Additionally, costing for repairs of the adjacent concrete apron and retaining wall has been included. (See Items A01.05b and A1.11b above).

IMMEDIATE ITEMS:

No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

RAI.1b) Conduct a civil study regarding the water seeping into the building.
RAI.2b) Determine if mould growth is present behind washroom walls.
No further investigation recommended at this time.

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Photo #A1a: General view of the P126 Diesel Plant (Building A).



Photo #A2a: Original metal-framed window with failing joint sealer.

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Photo #A3a: Interior finishes of one of the bays.



Photo #A4a: Concrete floor at the north vestibule requiring repainting.

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Photo #A5a: Interior finishes of the office space with missing ceiling tile.



Photo #A6a: Interior finishes and fixtures in the kitchen.



Photo #A7a: Interior finishes and fixtures in the second floor washroom.



Photo #A8b: General view of the P127 Hydro Plant (Building B).



Photo #A9b: View of the rear of Building B.



Photo #A10b: CIP concrete ramp and retaining wall.

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Photo #A11b: Interior finishes of the generator level.



Photo #A12b: Interior finishes of the office.



Photo #A13b: Interior finishes of the turbine level.

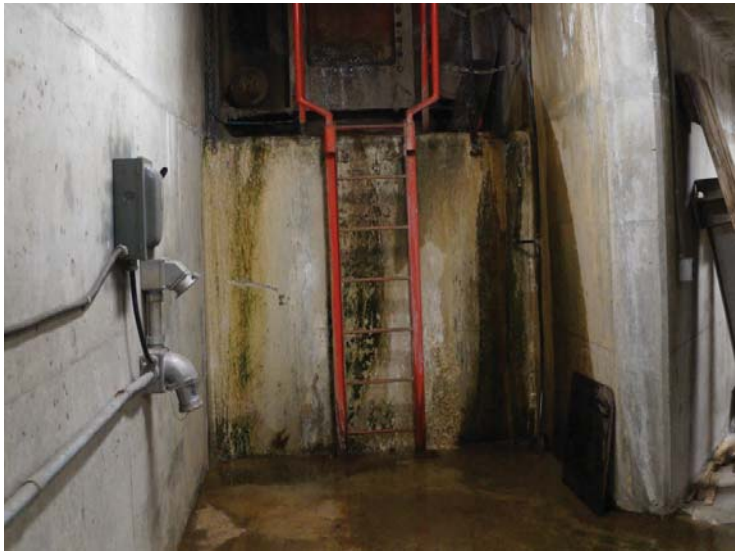


Photo #A14b: Interior finishes of the lower gallery with evidence of significant water seepage.

4.0 STRUCTURAL

Building A – P126 Diesel Plant:

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to be CIP concrete strip and spread footings and a CIP concrete foundation walls. The main floor is a slab on grade throughout. The suspended floor at the office area is constructed of metal decking with concrete topping supported by steel framing. The mezzanines are framed with steel I-section beams and HSS or I-section columns which support the metal grate decking. The superstructure is composed of HSS or structural steel I-beams with tension-only cross bracing along exterior walls. Interior wall partitioning at the northern bay consists of CMU construction. The roof construction consists of metal decking supported by OWSJ or structural steel I-section beams and girders, with tension-only cross bracing for lateral resistance.

Capital expenditures with respect to the interior walls are anticipated within the 10-year timeframe of this report.

A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below. Additional investigation is recommended regarding the structural columns lifting from the concrete slab.

The structural components are in overall acceptable condition.

Building B – P127 Hydro Plant:

The foundation system is mostly concealed and therefore was not directly reviewed at the time of assessment. Based on observations made on site, the foundations are generally assumed to consist of concrete piles. CIP foundation walls and grade beams are provided around the building perimeter subgrade. All floors are constructed of CIP concrete slabs with integral concrete beams, and are on grade or supported by concrete columns. The superstructure is a combination of CIP concrete walls and columns, as well as structural steel I-sections columns and cross-bracing along exterior walls. The roof construction consists of corrugated metal decking supported by structural steel I-sections and OWSJs, with I-section cross bracing for lateral resistance.

No capital expenditures with respect to the structural elements of the building were identified.

A detailed description of site and building structural systems/components including (if any) current, imminent or anticipated deficiencies above the Capital Threshold and excluding normal operating maintenance are presented below.

The structural components are in overall acceptable condition.

S01 FOUNDATIONS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S01.1a	**Footings**	**~1972**: The substructure is mostly concealed and was not directly reviewed. Based upon standard construction methods and observations made on Site, it is estimated the substructure consists of CIP strip and spread footings.	**4**	-	No concerns observed or reported.
S01.1b	**Footings**	**~1982**: The substructure is mostly concealed; therefore, was not directly reviewed. Based upon standard construction methods and observations made on Site, it is estimated the substructure consists of concrete piles.	**4**	-	No concerns observed or reported.
S01.2a	**Foundation Walls**	**~1972**: CIP concrete foundation walls are provided around the perimeter of the building.	**4**	-	No concerns observed or reported.
S01.2b	**Foundation Walls**	**~1972**: CIP concrete foundation walls and grade beams are provided around the perimeter of the building.	**4**	-	Minor cracks were observed in the foundation walls. No concerns reported.

S02 FLOORS ON GRADE

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S02.1a	**Slab on Grade**	**~1972**: A CIP slab on grade is provided throughout the building.	**4**	-	Minor cracking was observed throughout the concrete slab. No concerns were observed or reported.
S02.1b	**Slab on Grade**	**~1982**: CIP concrete slabs are provided on each level of the building. Based on observations, slab of the lower gallery and the majority of the turbine floor are on grade.	**4**	-	The concrete in the building was reportedly placed in two separate pours. The second pour is pulling away from the first pour, causing some cracking. The cracks are being monitored and do not currently require repair.

S03 SUSPENDED FLOORS AND STAIRS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S03.1a	**Suspended Floor**	**~1969**: The second floor office area is constructed of metal decking with concrete topping supported by steel framing. **~1971/1992**: The mezzanine is steel-framed with steel I-section beams, and HSS or I-section and columns. The mezzanine is covered with metal grate flooring.	**4**	-	No concerns observed or reported.
S03.1b	**Suspended Floor**	**~1982**: Suspended floors are of CIP concrete construction with integral concrete beams.	**4**	-	No concerns observed or reported.
S.03.2a	**Crawlspace**	N/A	**-**	-	N/A
S.03.2b	**Crawlspace**	N/A	**-**	-	N/A
S03.3a	**Stairs**	**~1972/1992**: Interior stairs are steel-framed with metal grate treads and painted steel pipe railing.	**4**	-	No concerns observed or reported.
S03.3b	**Stairs**	**~1982**: The stairs throughout the building are steel-framed with steel pipe railing and diamond plate or metal grate treads. CIP concrete stairs are also provided.	**4**	-	No concerns observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.1a	**Framing**	**~1972**: The roof structure is framed with a combination of OWSJs and structural steel I-section beams and girders.	**4**	-	No concerns observed or reported.
S04.1b	**Framing**	**~1982**: The roof structure is framed with a combination of OWSJs and structural steel I-section beams and girders.	**4**	-	No concerns observed or reported.
S04.2a	**Decking**	**~1972**: Metal decking is provided at all sections of roof construction.	**4**	-	No concerns observed or reported.

S04 ROOF STRUCTURES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S04.2b	**Decking**	**~1982**: Metal decking is provided at all sections of roof construction.	**4**	-	No concerns observed or reported.
S04.3a	**Lateral Resistance**	**~1972**: Tension-only cross bracing is provided for lateral resistance in the roof structure of some of the sections of the building.	**4**	-	No concerns observed or reported.
S04.3b	**Lateral Resistance**	**~1982**: I-section cross bracing is provided for lateral resistance in the roof structure.	**4**	-	No concerns observed or reported.

S05 INTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
RAI.3a S05.1a	**Interior Walls**	**~1972:** Interior walls generally consist of HSS or I-section structural steel columns with prefinished sheet metal coverings. The partition at the north bay is a CMU wall finished with interior paint. Interior walls of the office space are framed with wood studs with gypsum board coverings.	**3/4**	2	The structural steel columns in the EMD bay have reportedly lifting from the concrete slab. An allowance has been made to conduct a structural study and make appropriate repairs as required. The actual cost of repairs will depend on the results of the study.
S05.1b	**Interior Walls**	**~1982:** Interior walls are CIP concrete throughout the majority of the building. Interior walls of at the office and washroom are framed with wood studs with gypsum board coverings.	**4**	-	No concerns observed or reported.
S05.2a	**Interior Columns**	**~1972:** Interior columns consist of a combination of HSS or I-section structural steel.	**4**	-	No concerns observed or reported.
S05.2b	**Interior Columns**	**~1982:** Interior columns are CIP concrete.	**4**	-	No concerns observed or reported.

S06 EXTERIOR WALLS AND COLUMNS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S06.1a	Exterior Load-bearing Walls	**~1972**: Exterior walls generally consist of HSS or I-section structural steel columns with prefinished sheet metal coverings.	4	-	No concerns observed or reported.
S06.1b	Exterior Load-bearing Walls	**~1982**: Exterior load-bearing walls are a combination of CIP concrete walls and columns, or structural steel I-section columns with no interior wall coverings	4	-	No concerns observed or reported.
S06.2a	Exterior Columns	**~1972:** Exterior columns consist of a combination of HSS or I-section structural steel.	4	-	No concerns observed or reported.
S06.2b	Exterior Columns	**~1972:** Exterior columns consist of a combination of CIP concrete, and I-section structural steel.	4	-	No concerns observed or reported.
S06.3a	Lateral Resistance	**~1972:** Tension-only cross bracing is provided for lateral resistance in the exterior walls.	4	-	No concerns observed or reported.
S06.3b	Lateral Resistance	**~1982**: I-section cross bracing is provided for lateral resistance in the exterior walls.	4	-	No concerns observed or reported.

S99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
S99.1a	Specially Engineered Construction	N/A	-	-	N/A
S99.1b	Specially Engineered Construction	**~1982:** A penstock allows for water to flow through the building to turn the turbine and produce electricity.	4	-	Concealed and not directly reviewed. No concerns reported.

NOTES:

4B) Due to the age of Building A (~1969 to ~1992 construction), there is potential for lead paint to have been used on the structural steel members. No lead sampling has been conducted on the buildings discussed in this report. If modifications are to be made where lead paints may be present, it is recommended to test the suspect materials and proceed with work accordingly.

IMMEDIATE ITEMS:

No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

RAI.3a) Structural study.

No other further investigation recommended at this time.

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Photo #S1a: Exterior view of the foundation wall.



Photo #S2a: View of the concrete slab, exterior wall, and mezzanine construction.



Photo #S3a: CMU interior wall.



Photo #S4a: Roof construction.



Photo #S5b: Structural elements of the generator level (superstructure).



Photo #S6b: Structural elements of the turbine level.

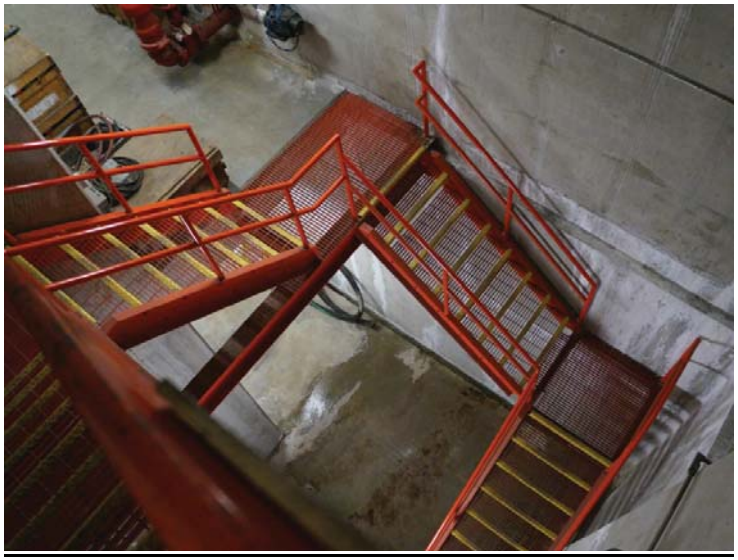


Photo #S7b: Steel framed staircase.



Photo #S8b: Foundation walls, column, and slab of the lower gallery.

5.0 MECHANICAL

Building A – P126 Diesel Plant:

The building is supplied with domestic water from a well water system and is distributed via copper and plastic piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface runoff. Domestic hot water is provided by two electric hot water heaters, each located in one of the washrooms. A water distiller is located in the main floor washroom to provide the building with potable water. Plumbing fixtures include a solid surface lavatory, enameled iron lavatories, vitreous china flush valve water closets and urinals, a plastic wash basin, and a stainless steel sink.

Natural gas lines enter the building at the east elevation. The bays are primarily heated by suspended radiant hydronic unit heaters located throughout the building. Hot water for building heat is provided by a boiler system with a natural gas fired burner. The office is heated by a combination of radiant hydronic perimeter heaters as well as a ducted forced air system. The forced air system is also equipped with air conditioning. Building ventilation is provided by air intake from the diesel engines and rooftop mounted vents, with air circulation aided by ceiling-mounted rotary fans. Building exhaust is handled by a number of ceiling-mounted and through-wall axial exhaust fans, as well as a workshop exhaust extraction arm at the south bay.

Capital expenditures with respect to the domestic water supply, waste water piping, the boiler, unit heaters, baseboard heaters, and the ventilation system are anticipated to be required within the 10-year time frame of this report. Additional investigation is recommended regarding the domestic water supply and wastewater system, as well as the design of a positive ventilation system.

The mechanical components are in acceptable overall condition.

Building B – P127 Hydro Plant:

The building is supplied with domestic water from a well water system and is distributed via plastic piping. Sanitary waste is fed to an on-site septic field via ABS plastic piping. Storm water is drained through overland soil absorption and surface runoff. Domestic hot water is provided by an electric hot water heater located in the washroom. Plumbing fixtures include a wall-mounted vitreous china lavatory, and a floor-mounted vitreous china flush tank water closet.

The building is primarily heated by suspended electric unit heaters. Building ventilation is provided by rooftop mounted vents and external wall louvers, with air circulation aided by ceiling-mounted rotary fans. Building exhaust is handled by a number of ceiling-mounted exhaust fans, as well as a through-wall centrifugal exhaust fan in the washroom.

Capital expenditures with respect to a central heating system and a ventilation system are anticipated to be required within the 10-year time frame of this report. Additional investigation is recommended regarding the design of a boiler system or similar central heating system.

The mechanical components are in acceptable overall condition.

M01 SITE SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
RAI.4a M01.1a	**Domestic Water Supply**	Domestic water is provided by a well system which obtains water from the Yukon River.	**4**	-	Several issues and concerns were reported regarding the domestic water supply to Building A. See Note **5A**.
M01.1b	**Domestic Water Supply**	Domestic water is provided by a well system which obtains water from the Yukon River.	**4**	-	No concerns observed or reported.
M01.1a	**Sanitary Sewer**	Sanitary waste is fed to an on-site septic field.	**4**	-	No concerns observed or reported.
M01.2b	**Sanitary Sewer**	Sanitary waste is fed to an on-site septic field.	**4**	-	No concerns observed or reported.
M01.3a	**Storm Sewer**	Storm water is drained through overland soil absorption and surface runoff.	**4**	-	No concerns observed or reported.
M01.3b	**Storm Sewer**	Storm water is drained through overland soil absorption and surface runoff.	**4**	-	No concerns observed or reported.
M01.4a	**Gas**	Natural gas is fed to the building at the east elevation.	**4**	-	No concerns observed or reported.
M01.4b	**Gas**	N/A	**-**	-	N/A

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.1a	**Water Distribution**	**~1969:** Plastic and copper domestic water distribution piping is provided in Building A.	**4**	-	No concerns observed or reported.
M02.1b	**Water Distribution**	**~2010:** Plastic domestic water distribution piping is provided in Building B.	**4**	-	The plumbing throughout the building was reportedly redone circa 2010. No concerns observed or reported.
M02.2a	**Backflow Prevention**	None observed.	**-**	-	N/A
M02.2b	**Backflow Prevention**	**~2012:** A backflow prevention device was observed on the domestic water piping exiting the well water storage tank.	**4**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.3a	**Domestic Hot Water Heaters**	**~2011:** An electric domestic hot water heater is located in the closet of the 2nd floor washroom. Technical specifications for the unit are given below: Manufacturer: John Wood Model Number: JW525DET Serial Number: 9111113617 Capacity: 151 L (40 USG) Input: 2 elements x 4.5 kW each A second electric domestic hot water heater is located in the ceiling space of the main floor washroom. The unit is manufactured by Jetglas, but no technical data was observable.	**4**	-	No concerns observed or reported.
M02.3b	**Domestic Hot Water Heaters**	**~2010:** An electric domestic hot water heater is located in the washroom. Technical specifications for the unit are given below: Manufacturer: GSW Water Heating Model Number: SS12SEB15 Serial Number: S1008 J701465 Capacity: 45 L (12 USG) Input: 1 element x 1.5 kW each	**4**	-	No concerns observed or reported.
M02.4a	**Water Tank**	N/A	**-**	-	N/A
M02.4b	**Water Tank**	**~2012:** A Well-X-Trol well water tank manufactured by Amtrol is provided for domestic water and is located on the turbine floor. A pump supplies the water from the turbine level to the generator level.	**4**	-	No concerns observed or reported.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
RAI.5a M02.5a	**Waste Water Piping**	**~1969**: ABS plastic waste water piping is provided in the building.	**3**	2	Issues were reported with drainage of the sump as well as the washing machine. An allowance has been made to conduct a drainage study with preliminary costs for repair. The actual cost of repair will depend on the result of the study.
M02.5b	**Waste Water Piping**	**~1969**: ABS plastic waste water piping is provided in the building.	**4**	-	No concerns observed or reported.
M02.6a	**Irrigation System**	N/A	**-**	-	N/A
M02.6b	**Irrigation System**	N/A	**-**	-	N/A
M02.7a	**Washroom Fixtures**	**~2000:** The main floor washroom is provided with a floor-mounted, vitreous china, flush tank water closet, and a wall mounted, flush valve, vitreous china urinal. **~2004:** The second floor washroom is provided with counter-mounted, enameled iron lavatories, a floor-mounted, flush tank, vitreous china water closet, and a wall-mounted, flush valve, vitreous china urinal. **~2011:** The main floor washroom is provided with a solid surface lavatory integrated into the countertop. Additionally, the washroom is provided with a water distiller with the following technical specifications: Manufacturer: Precision Water Systems Model Number: PWS 8-8 Serial Number: 8-8, 1100567	**4**	-	No concerns observed or reported.
M02.7b	**Washroom Fixtures**	**~1982**: The washroom is provided with a floor mounted, vitreous china, flush tank water closet. **~2000**: The washroom is provided with a wall-mounted, vitreous china lavatory.	**4**	-	The water closet will surpass its EUL within the timeframe of this report and should be replaced. See Note **5B**.

M02 PLUMBING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M02.8a	**Sinks**	**~1990**: A plastic wash basin is located at main floor of the north bay. **~2004**: A counter-mounted stainless steel sink is located in the kitchen.	**3/4**	-	The plastic wash basin has surpassed its EUL and should be replaced. See Note **5B**.
M02.8b	**Sinks**	N/A	**-**	-	N/A
M02.9a	**Oil Interceptor**	N/A	**-**	-	N/A
M02.9b	**Oil Interceptor**	N/A	**-**	-	N/A
M02.10a	**Sumps**	**~1972:** The building is provided with a gravity sump that drains to the Yukon River.	**3**	-	Issues were reported regarding the sump drainage. Costing for a drainage study has been included with Item M02.5a above.
M02.10b	**Sumps**	**~1982:** The building is provided with a sump which is equipped with a sump pump, with back-up dewatering pump, and check valve.	**4**	-	No concerns observed or reported.

M03 HEATING AND COOLING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.1a	**Boilers**	**~1984**: A natural gas fired boiler is located in the south bay. The boiler system was converted to a gas/LNG fired system in 2015.	**4**	3	The boiler is currently in acceptable condition but will require replacing within the timeframe of this report.
RAI.6 M03.1b	**Boilers**	None.	**-**	4	Primary heating of the building is provided by a number of electric unit heaters. It was reported that the heaters are insufficient for the building when the machines are shut down. It was requested to install a provide costing for a proper central heating system (likely involving a boiler system). Costing has been provided for the design study of the system, as well as preliminary costing for installation. The actual cost of installation will depend on the result of the design used.
M03.2a	**Unit Heaters**	**~1972**: Suspended radiant hydronic unit heaters manufactured by Trane are provided throughout the building.	**4**	3	The unit heaters are currently in acceptable condition, but have surpassed their EUL. Replacement of the units has been provided in Year 3 of the Capital Reserve Table.
M03.2b	**Unit Heaters**	**~1982**: Suspended electric unit heaters are provided throughout the building.	**4**	3	The unit heaters are currently in acceptable condition, but have surpassed their EUL. Replacement of the units has been provided in Year 4 of the Capital Reserve Table.
M03.3a	**Burners**	**~2015**: A natural gas fired burner is provided in the south bay of Building A.	**5**	-	The boiler system was converted to a gas/LNG fired system in 2015.No concerns observed or reported.
M03.3b	**Burners**	N/A	**-**	-	N/A
M03.4a	**Heat Exchanger**	N/A	**-**	-	N/A
M03.4b	**Heat Exchanger**	N/A	**-**	-	N/A
M03.5a	**Baseboard Heaters**	**~2000**: A number of radiant hydronic baseboard and fan forced wall heaters are provided throughout the stairwell and office area.	**4**	3	The baseboard heaters are currently in acceptable condition, but will require replacement within the timeframe of this report.
M03.5b	**Baseboard Heaters**	N/A	**-**	-	N/A

M03 HEATING AND COOLING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M03.6a	**Furnace**	None observed.	**4**	-	No furnaces were observed at the time of assessment. However, HVAC diffusers were observed on the ceiling throughout the office space. It is estimated a ducted furnace is located within the ceiling space which provides heating to the office area. The condensing unit is likely connected to the furnace to provide air conditioning to the area.
M03.6b	**Furnace**	N/A	**-**	-	N/A
M03.7a	**Air Conditioning**	**~2000**: The office area is provided with air conditioning, with the condensing unit located on the canopy above the north entrance.	**3**	-	The air conditioning reportedly only works intermittently and is not sealed at the vents. Repairs to the system should be completed. See Note **5B**.
M03.7b	**Air Conditioning**	N/A	**-**	-	N/A

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M04.1a	**Air Distribution**	**~1969**: Concealed and not directly reviewed, but likely consists of galvanized metal ductwork throughout the ceiling space in the office area.	**4**	-	No concerns reported.
M04.1b	**Air Distribution**	N/A	**-**	-	N/A
RAI.7a M.04.2a	**Ventilation**	**~1972**: General building ventilation is provided by a combination of air intake from the diesel engines and several exhaust fans throughout the building. Further air circulation is provided by a number of ceiling-mounted rotary fans.	**3**	4	The building reportedly gets very cold in the winter when the engines are running, as the engines draw cold air into the building. It is recommended to install a positive ventilation system to combat this effect. Costing for a study and design of the system, as well as a preliminary installation cost has been included in the Capital Reserve Table. Actual installation costs will depend on the results of the study.

M04 VENTILATION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M.04.2b	**Ventilation**	**~1982**: General building ventilation is provided by rooftop mounted vents, and louvers on the exterior walls of the building. Further air circulation is provided by a number of ceiling-mounted rotary fans on the generator floor.	**3**	4	It was reported that the building has insufficient ventilation, causing the building to overheat during the summer when in operation. Additional ventilation for the building was reportedly requested in 2009 by YEC, but has not yet been installed. Costing has been provided for the installation of additional ventilation equipment within the building.
M04.3a	**Air Outlets & Inlets**	**~1969**: Prefinished metal diffusers are provided for forced air outlets. Metal grilles are provided at exhaust outlets.	**4**	-	No concerns observed or reported.
M04.3b	**Air Outlets & Inlets**	N/A	**-**	-	N/A
M04.4a	**Exhaust Fans**	**~2000**: Building exhaust is handled by a number of ceiling-mounted and through-wall axial exhaust fans. A Neederman workshop exhaust extraction arm is located in the south bay.	**4**	-	No concerns observed or reported.
M04.4b	**Exhaust Fans**	**~2011**: Building exhaust is handled by a number of ceiling-mounted exhaust fans, as well as a through-wall centrifugal exhaust fan in the washroom.	**4**	-	No concerns observed or reported.

M05 FIRE PROTECTION

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M06.1a	**Suppression**	The building is fully covered with a wet-type sprinkler system.	**4**	-	No concerns observed or reported. . Inspections on the fire suppression equipment were up to date.
M06.1b	**Suppression**	The building is fully covered with a wet-type sprinkler system. The building is also provided with a standpipe system which interior fire hoses and a Siamese fire department connection and the exterior near the main entrance. The fire pump is located on the turbine level.	**4**	-	No concerns observed or reported. Inspections on the fire suppression equipment were up to date.
Imm. M06.2a	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building A.	**4**	1	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Some fire extinguishers did not have up to date inspections and should be tested. No other concerns observed or reported.
M06.2b	**Fire Extinguishers**	ABC dry-type fire extinguishers are provided throughout Building B.	**4**	-	The fire extinguishers are inspected monthly by YEC and tested annually by Total Fire Protection. Inspections were up to date. No concerns observed or reported.

M06 CONTROLS

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M07.1a	**Electric and Electronic Controls**	**~1972**: A programmable digital thermostat is located in the office area. Localized analog thermostats were observed throughout the remainder of the building.	**4**	-	No concerns observed or reported.
M07.1b	**Electric and Electronic Controls**	**~1982**: Manual thermostats were observed throughout the building.	**4**	-	No concerns observed or reported.

M99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
M99.1a	**Humidifiers**	N/A	**-**	-	N/A
M99.1b	**Humidifiers**	N/A	**-**	-	N/A

NOTES:

5A) The Issues related to unreliable water pressure, as well as pressure valves were identified. Additionally, concerns were voiced regarding the water quality due to deposits and build-up on the domestic water supply lines. It is recommended to conduct a study to determine an adequate solution to all problems related to the domestic water supply (**RAI.4a**). Preliminary costs have been included for repair, which will vary depending on the results of the study.

5B) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

IMMEDIATE ITEMS:

Imm.1a) Test fire extinguishers.
No immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:

RAI.4a) Domestic water supply study.
RAI.5a) Waste water drainage study.
RAI.6b) Boiler system design.
RAI.7a) Positive ventilation system design.
No other further investigations recommended at this time.



Photo #M1a: Domestic hot water heater above the main floor washroom.



Photo #M2a: Second floor washroom plumbing fixtures.



Photo #M3a: Typical hydronic unit heater.



Photo #M4a: Hydronic baseboard heater in the second floor washroom.

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Photo #M5a: Air conditioning condenser unit above the north entrance.

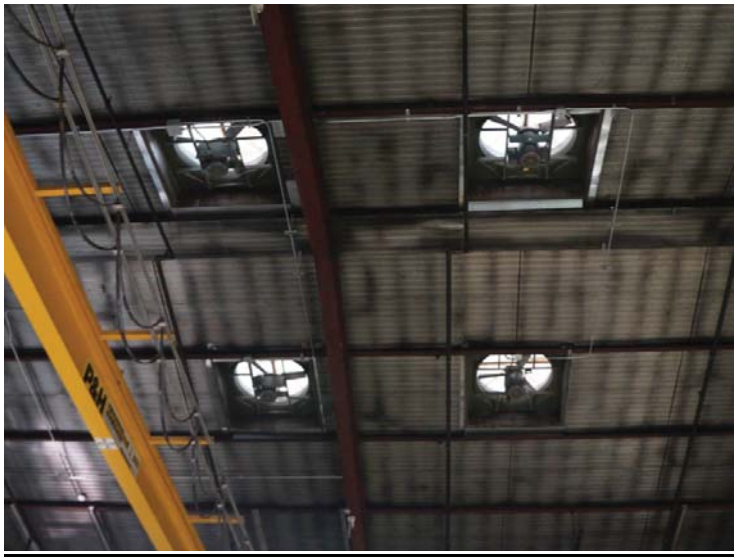


Photo #M6a: Roof-mounted axial exhaust fans.



Photo #M7b: Domestic hot water heater in the washroom.



Photo #M8b: Domestic well water storage tank.



Photo #M9b: Vitreous china lavatory in the washroom.



Photo #M10b: Suspended electric unit heater.



Photo #M11b: Centrifugal exhaust fan for the washroom.



Photo #M12b: Fire pump.

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6.0 ELECTRICAL

Building A – P126 Diesel Plant:

Electrical service is provided via buried cables from the substation located adjacent to the building. Power is fed to exterior transformers located to the east of the building that step down the power to 347/600 V. An adjacent switchgear rated at 347/600 V, 1200 A, 3 phase, 4 wire then feeds the power to the building. 600 V power is fed to a motor control centre, an interior central distribution panel rated at 347/600 V, 225 A, 3 phase, 4 wire or to interior step down transformers. The transformers step down the voltage from 347/600 V to 120/240 V. Secondary distribution is provided by electrical sub panels rated at 120/240 V and 100 to 225 A. Interior lighting is a combination of T5 tubular fluorescent lamps and high-pressure sodium fixtures in the bays, with T8 and T12 tubular fluorescent lamps in the office area. Exterior lighting is provided by building-mounted LED light fixtures controlled by photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel with audible alarm, pull stations, and smoke/heat detectors. The building is monitored by YEC's System Control Centre, with access control provided by a proximity card reader and magnetic lock on the pedestrian entrance doors.

Capital expenditures with respect to the primary and secondary distribution equipment, interior transformers, branch wiring, interior, exterior, and emergency lighting, the fire alarm panel and devices, and surveillance system are anticipated within the 10-year time frame of this report.

The electrical components are in acceptable overall condition.

Building B – P127 Hydro Plant:

Electrical service is provided by the hydroelectric turbine generator system within the building. Primary electrical distribution to the building is provided by a motor control centre located on the generator floor, and a central distribution panel located on the turbine floor. Secondary distribution is provided by electrical sub panels rated at 120//240 V and 100 – 225 A. Interior lighting is primarily provided by a T5 tubular fluorescent lamps controlled by line voltage switches. Exterior lighting is provided by wall-mounted HID and LED fixtures controlled by photocells. Emergency lighting is provided by battery packs with integral heads, with LED exit signs above exit ways. Fire alarm and detection devices include a fire alarm panel, bells, pull stations, and smoke/heat detectors. The building is monitored by YEC's System Control Centre, with access control provided by a proximity card reader and magnetic lock on the building's entrance doors.

Capital expenditures with respect to the primary distribution, the interior transformer, secondary distribution, and exit lighting, the fire alarm panel and devices, and surveillance system are anticipated within the 10-year time frame of this report.

The electrical components are in acceptable overall condition.

E01 INCOMING SERVICES

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E01.1a	**Exterior Transformer**	Exterior transformers are located to the east of the building and step down the incoming voltage to 347/600 V.	**4**	-	No concerns observed or reported.
E01.1b	**Exterior Transformer**	N/A	**-**	-	N/A
E01.2a	**Cables**	Power is fed to the building through buried cables at the east elevation.	**4**	-	Concealed and not directly reviewed. No concerns reported.
E01.2b	**Cables**	Power is generated within the building from the hydroelectric turbine generator system.	**4**	-	No concerns observed or reported.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.1a	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1972**: The main electrical switchgear servicing the building is located to the east exterior. The unit is manufactured by Westinghouse and is rated at 347/600 V, 1200 A, 3 phase, 4 wire. The main interior distribution panel is manufactured by Square D and is rated at 600 V, 225 A, 3 phase, 4 wire. A motor control centre is located within the building and is rated at 600 V, 600 A.	**4**	3	The primary electrical distribution equipment has surpassed its EUL but is currently in acceptable condition. An allowance to replace the equipment has been made in Year 5.
E02.1b	**Primary Distribution: (Switchgear, CDPs, splitters and disconnects)**	**~1982**: A Siemens motor control centre with integral metering is located on the generator floor. A central distribution panel manufactured by General Electric is located on the turbine floor. The panel is rated at 120/240 V, 300 A.	**4**	3	The primary electrical distribution equipment is currently in acceptable condition, but will surpass its EUL within the timeframe of this report.
E02.2a	**Interior Transformers**	**~1972**: Two interior transformers are located within the building and step-down the incoming voltage from 347/600 V to 120/240 V. One unit is manufactured by Hammond Manufacturing and is rated at 75 kVA. The second unit is manufactured by Westinghouse and is rated at 25 kVA.	**4**	3	The interior transformers have surpassed their EUL but are currently in acceptable condition. An allowance to replace the transformers has been made in Year 5.

E02 DISTRIBUTION EQUIPMENT

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E02.2b	**Interior Transformers**	**~1982**: One interior transformer was observed on the generator floor and steps-down voltage from 347/600 V to 120/240 V.	**4**	3	No concerns observed or reported.
E02.3a	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1972**: Secondary distribution sub panels are provided throughout the building. The panels are manufacture by a combination of Square D, Westinghouse, and I-T-E. The panels are rated at 120/240 V and from 100 – 225 A. Panel sizes range from 24 to 42 circuits. **~1972**: A number of general duty and heavy duty safety switches are provided throughout the building. The units are manufactured by Square D or Westinghouse, and are rated at 220 – 600 V, and 100 – 200 A.	**3/6**	3	Many of the sub panels and safety switches have surpassed their EUL and should be replaced. In addition, the existing panels are generally at or near full capacity. It is recommended to replace the sub panels with larger units to accommodate additional circuits if needed.
E02.3b	**Secondary Distribution: (Disconnects, splitters & Sub-Panels)**	**~1982**: Secondary distribution sub panels are provided throughout the building. The panels are manufacture by a combination of Square D, General Electric, and Siemens. The panels are rated at 120/240 V and from 100 – 225 A. Panel sizes range from 12 to 42 circuits.	**3/4**	3	Many of the sub panels and safety switches have surpassed their EUL and should be replaced. In addition, the existing panels are generally at or near full capacity. It is recommended to replace the sub panels with larger units to accommodate additional circuits if needed.
Imm.2a E02.4a	**Branch Wiring**	**~1972**: Electrical branch circuit wiring is reportedly copper throughout the building.	**2**	1	Some cables rated at 120/240 V were reported to be exposed at the east of the building. It is recommended to properly bury the cables to code.
E02.4b	**Branch Wiring**	**~1982**: Electrical branch circuit wiring is reportedly copper throughout the building.	**4**	-	No concerns reported.
E02.5a	**Receptacles**	**~1972**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.
E02.5b	**Receptacles**	**~1982**: Electrical receptacles are provided throughout the building.	**4**	-	No concerns observed or reported.
E02.6a	**Surge Protection**	**~2000**: Surge-protected power bars are provided at the computers in the office space.	**4**	-	No concerns observed or reported.
E02.6b	**Surge Protection**	None observed.	**-**	-	N/A

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.1a	**Interior Lighting**	**~1992/2000**: Interior lighting is a combination of T5 tubular fluorescent lamps and high-pressure sodium fixtures in the bays. The office area is provided with a combination of T8 and T12 tubular fluorescent lamps.	**4**	3	No concerns observed or reported. An allowance for interior lighting upgrades has been provided in the Capital Reserve Table to replace the older fixtures.
E03.1b	**Interior Lighting**	**~2014**: Interior lighting primarily consists of T5 tubular fluorescent lamps throughout the majority of the building.	**5**	-	No concerns observed or reported.
E03.2a	**Lighting Controls**	**~1972/2010**: Interior lighting is controlled by line voltage switches. Exterior lighting is reportedly controlled by photocells.	**4**	-	No concerns observed or reported.
E03.2b	**Lighting Controls**	**~1982/2010**: Interior lighting is controlled by line voltage switches. Exterior lighting is reportedly controlled by photocells.	**4**	-	No concerns observed or reported.
Imm.3a E03.3a	**Emergency Lighting**	**~2000:** Battery packs with integral lighting heads are provided throughout the building.	**3**	1/3	The existing emergency lighting is currently in acceptable condition; however, the number of emergency lights was deemed insufficient for the size of the building. It is recommended to install additional emergency lights throughout the building. Additionally, no emergency exit diagrams were posted throughout the building at the time of assessment. It is recommended to post diagrams concurrently as the emergency lighting is installed.
E03.3b	**Emergency Lighting**	**~2007:** Battery packs with integral lighting heads are provided throughout the building.	**4**	-	No concerns observed or reported.
E03.4a	**Exit Lighting**	**~2000**: LED exit signs are provided at emergency exits.	**4**	3	The exit signs will likely reach the end of their EUL within the timeframe of this report and should be replaced. Costing for this item has been combined with Item E03.3b below.

E03 LIGHTING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E03.4b	**Exit Lighting**	**~2000**: LED exit signs are provided at emergency exits.	**4**		The exit signs will likely reach the end of their EUL within the timeframe of this report and should be replaced. Costing for this item has been combined with Item E03.3a above.
E03.5a	**Exterior Lighting**	**~2010**: Wall-mounted LED light fixtures are provided around the building exterior.	**4**	-	No concerns observed or reported.
E03.5b	**Exterior Lighting**	**~1982/2010**: Wall-mounted HID and LED light fixtures are provided around the building exterior.	**4**	-	The original HID exterior light fixtures will require replacement within the timeframe of this report. See Note **6A**.

E04 GROUNDING

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E04.1a	**Grounding**	**~1972**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.
E04.1b	**Grounding**	**~1982**: The grounding components are concealed.	**4**	-	Concealed and not directly reviewed. No concerns reported.

E05 FIRE ALARM

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
Imm.4a E06.1a	**Fire Alarm Panel**	**~2000**: An EST 6632 fire alarm panel with audible alarm is located at the north bay. The panel is provided with backup booster battery pack.	**1**	1	The fire alarm panel monitors smoke and heat detectors throughout the building, as well as cold temperature in one of the bays. The panel is reportedly insufficient for the building. There is no exterior alarm and the interior alarm is reportedly not loud enough for when the engines are running. It is recommended to replace the unit immediately as it is a FLS device. The fire alarm panel is tested monthly and inspected annually by Total Fire Protection. The last inspection tag observed was January 2014.
Imm.5b E06.1b	**Fire Alarm Panel**	**~1982**: An EST fire alarm panel with audible alarm is located at the main entrance. The panel is provided with backup booster battery pack.	**1**	1	The fire alarm panel has surpassed its EUL and should be replaced. Additionally, the unit reportedly does not service the lower gallery which poses a threat to workers on this level. It is recommended to replace the unit immediately as it is a FLS device. The fire alarm panel monitors smoke and heat detectors throughout the building. The unit is tested monthly and inspected annually by Total Fire Protection. The last inspection tag observed was January 2014.
E06.2a	**Devices**	**~1972**: Fire alarm and detection devices include pull stations, strobes, and smoke/heat detectors.	**1**	-	Many of the fire alarm and detection devices have surpassed their EUL and should be replaced. Replacement of the devices is recommended to occur with the replacement of the fire alarm panel. Costing has been combined with Item E06.1a above.
E06.2b	**Devices**	**~1982**: Fire alarm and detection devices include pull stations, bells, and smoke/heat detectors.	**1**	-	Many of the fire alarm and detection devices have surpassed their EUL and should be replaced. Replacement of the devices is recommended to occur with the replacement of the fire alarm panel. Costing has been combined with Item E06.1b above.

E06 COMMUNICATIONS, DATA, & SECURITY

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E06.1a	**Telephone**	**~2000**: Telephone services are provided by Circa Telcom.	**4**	-	No concerns observed or reported.
E06.1b	**Telephone**	**~2000**: Telephone services are provided by Circa Telcom.	**4**	-	No concerns observed or reported.
E06.2a	**LAN Systems**	**~2005**: The building is provided with fibre optic internet service.	**4**	-	No concerns observed or reported.
E06.2b	**LAN Systems**	None observed.	**-**	-	N/A
E06.3a	**Intrusive Systems**	**~2000**: The building is monitored by YEC's System Control Centre.	**4**	-	No concerns observed or reported.
E06.3b	**Intrusive Systems**	**~2000**: A Maxsys security system panel was observed in the office. The building is monitored by YEC's System Control Centre.	**4**	-	No concerns observed or reported.
E06.4a	**Surveillance System**	**~1990**: Building-mounted surveillance cameras were observed at the north and south ends of the building exterior.	**3**	3	The installation of surveillance cameras within the building interior has been requested by YEC. Costing for the installation of these cameras has been provided.
E06.4b	**Surveillance System**	**~1990**: The exterior of the building is monitored by one surveillance camera.	**2**	3	The existing camera has surpassed its EUL and should be replaced. Additionally, YEC has requested for the installation of surveillance cameras throughout the interior of the building. Costing has been provided.
E06.5a	**Access Control**	**~2015**: The pedestrian entrance doors of the building are equipped with proximity card access and magnetic lock.	**6**	-	No concerns observed or reported.
E06.5b	**Access Control**	**~2015**: The building's two entrance doors are equipped with proximity card access and magnetic lock.	**6**	-	No concerns observed or reported.

E99 OTHER

I.D. #	SYSTEM/COMPONENT	DESCRIPTION	CR	Capital Reserve & Cat#	COMMENT/ASSESSMENT
E99.1a	**Emergency Generator**	N/A	**-**	-	N/A
E99.1b	**Emergency Generator**	**~1982**: A diesel emergency generator is located on the generator floor. Fuel is supplied by a ~500 L tank.	**4**	3	The generator is currently in acceptable condition, but will surpass its EUL within the timeframe of this report and should be replaced. The fuel tank is reportedly tested monthly for leaks.

NOTES:
6A) The cost associated with the repair/replacement of this item is expected to fall below the minimum Capital Threshold; as such, no costing has been included in the Capital Reserve Table.

IMMEDIATE ITEMS:
Imm.2a) Bury exposed electrical cables to code.
Imm.3a) Install adequate emergency lighting throughout the building.
Imm.4a) Install new fire alarm panel and fire devices.
Imm.5b) Install new fire alarm panel and fire devices.
No other immediate items identified at this time.

RECOMMENDED FURTHER INVESTIGATION:
No further investigation recommended at this time.



Photo #E1a: Exterior transformers and switchgear.



Photo #E2a: Interior transformer and secondary distribution equipment.

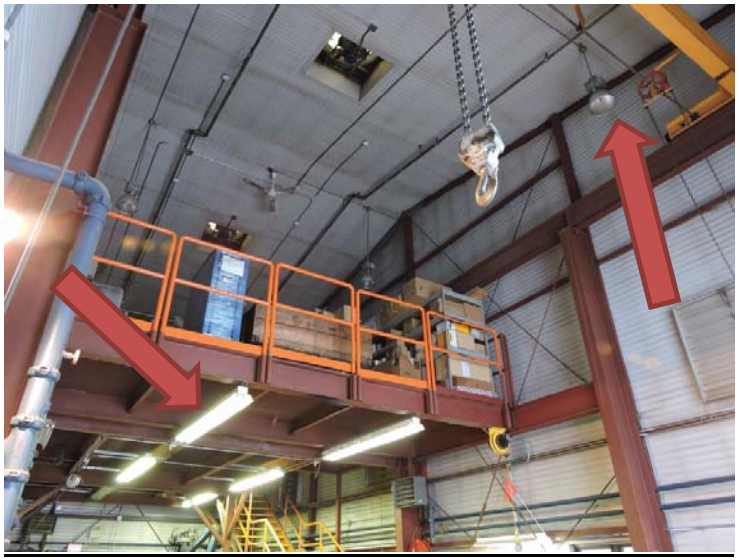


Photo #E3a: Interior fluorescent and HPS light fixtures.



Photo #E4a: Emergency lighting and exit sign.



Photo #E5a: Exterior LED light fixture.



Photo #E6a: Fire alarm panel and pull station.



Photo #E7b: Motor control centre on the generator level.



Photo #E8b: Interior step-down transformer.



Photo #E9b: Secondary distribution equipment on the turbine level.



Photo #E10b: Interior T5 tubular fluorescent lamps.



Photo #E9b: Exterior LED light fixture.



Photo #E10b: Fire panel and emergency exit sign.



7.0 HAZARDOUS MATERIAL REPORTS

No previous hazardous materials reports were made available by the YEC. Based on the year of the construction of the buildings outlined in this report (~1969 and ~1982), hazardous building construction materials such as ACMs (asbestos containing materials), lead paints, and/or PCBs (polychlorinated biphenyls) are possible to be present in the building. The site representative reported that wrappings around some of the pipes in Building A were previously found to contain asbestos. The wrappings at ground level were abated circa 2008. The rotor of the turbine in Building B is also reportedly made of ACMs, but is self-contained. The remaining ACMs have been left in place and are managed by an Asbestos Management Plan. The site representative also reported that lead paint was used on the catwalks of the mezzanines in Building A. The paint has since been painted over and is encapsulated.

Report Signature Page

GOLDER ASSOCIATES LTD.



Kara Snelling, BA
on behalf of
Brian Levy, E.I.T.
Building Conditions Assessor



Dave Ayriss, B.Sc., CIH, CRSP
on behalf of
Lawrence P. McSorley, M.Arch., M.C.P., RA
Senior Building Condition Specialist

BL/LPM/rp

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APPENDIX A

Mandate & Report Resources

MANDATE AND REPORT RESOURCES

Authorization

Written Notice of Award of Building Assessment Reports for Yukon Energy Corporation (YEC) was provided on November 1st, 2015. A Facility Lifecycle Assessment (FLA) of the Sites identified in the Introduction section of the report was subsequently conducted. The Sites are currently owned and managed by YEC.

Purpose

The primary objective of the FLA was to visually examine and evaluate the present condition of the property elements, buildings and related structures. The FLA process is being undertaken to assist YEC in capital planning and evaluating the potential financial liabilities associated with the condition of the Site elements, building and related structures on the Sites. Golder understands that YEC will rely on this report for capital planning.

Scope

The FLA was conducted in general accordance with the American Society for Testing and Materials (ASTM) “Standard Guide for Property Condition Assessments: Baseline Property Condition Process E 2018-08”, as locally applicable. The Golder Assessors (identified on the first page of the report) conducted the Sites reconnaissance on the date shown. The Sites reconnaissance was limited to a walk around the Sites, a walk-through of the buildings and interview with personnel listed in the Introduction section of the report (referred to as the “Point of Contact” in this report). Copies of selected photographs documenting conditions at the time of the visit are provided throughout the report.

The purpose of the report is to communicate identified physical deficiencies, future capital projects, and the associated opinions of estimated costs where the cost is greater than the Capital Threshold and expected to occur within the time frame used for the report. In accordance with this agreed mandate, assumptions were required to delineate between capital items and routine maintenance. Please refer to the “Operating and Maintenance Item” list below. Also please refer to the attached “Discussions of Overall Concepts and Terminology” for additional explanation of assumptions used.

The review of the structural elements was limited to a visual review of the accessible, exposed portions of the buildings and related structures during our visit to the building. The roofs, walls, floors and ceilings were visually reviewed to collect information in this regard.

The review of the mechanical, electrical and fire safety systems was performed by non-specialists in conjunction with discussions with the Point of Contact. A detailed assessment by a mechanical or electrical professional consultant should be conducted if further information regarding the condition, durability and/or expected future capital expenditures related to these systems is required.

Compliance with national and provincial building codes and/or fire codes is not part of the scope of this assessment.



The estimated costs outlined in this report are based on the conditions encountered and observations made during the reconnaissance. Estimates of quantities and areas are based on information supplied, field observations and/or interviews. Item repair/replacement costs are approximate only. Restoration costs are sensitive to local and overall economic factors and therefore, specific quotations from qualified contractors should be obtained when a specific deficiency is addressed or a capital project is to be implemented.

Operating and Maintenance Items

Golder assumes the following items will be maintained under normal operating budgets and are therefore not included in the Capital Reserve Table.

SITE

- Buried services
- Landscaping
- Fences

STRUCTURE

- Foundations and footings

ROOF

- Roof drains
- Periodic maintenance

WALLS AND WINDOWS

- Local periodic repairs and needle glazing
- Weather-stripping

INTERIORS

- Various common furnishings, specialty equipment
- Small residential appliances

MECHANICAL

- Sump pits
- Motors, ductwork and in-duct equipment
- Gas and diesel supply systems
- HVAC distribution piping
- Air inlets and outlets

ELECTRICAL

- Disconnects and breakers
- Buried conductors

CONVEYANCE SYSTEMS

- Cranes and hoists

Discussions of Overall Concepts and Terminology

Evaluation Period

The period of evaluation used for this report is 10 years. Capital repairs and replacement that are reasonably expected to be required within this evaluation period and that cost in excess of the Capital Threshold are included in the Capital Reserve Table.

Capital Threshold

The Capital Threshold used for this report is $3,000. This threshold is used to determine whether a capital repair item is to be included in the Capital Reserve Table. Capital repairs identified and estimated to cost less than the threshold, or that will likely to be performed in phases, as a part of routine maintenance as required, at a cost less than the threshold are not included in the Capital Reserve Table.

Costs

Costs presented in this study for future capital repairs and replacement projects are our Opinions of Probable Budgets and are intended to include taxes, permit fees, contingency and where appropriate, Engineering fees for design, specifications, tendering, project management and construction monitoring. We have generally assumed replacement will occur on a like-for-like basis except where obsolescence or technological advancements logically dictates an upgrade. More accurate costing in the future will require a condition assessment, choice and development of an appropriate repair option, designing and tendering the work to qualified contactors.

Immediate Items

Immediate repairs include deficiencies that require action in the next 60 to 90 days as a result of (i) existing or potentially unsafe conditions, (ii) negative conditions significantly impacting marketability or habitability, (iii) material building code violations, (iv) poor or deteriorated condition of a critical element or system, or (v) a condition that if left “as is” with extensive delay in addressing same, would result in or contribute to critical element or system failure within 12 months or a significant escalation in the repair cost.

Capital Reserve Analysis

The Capital Reserve Table includes a section that provides the average annual capital costs per square foot. Replacement Reserves include (i) deficiencies that may not warrant immediate attention, but require repair or replacement that should be undertaken on a priority basis over routine preventive maintenance work and (ii) components or systems that have realized or exceeded their Expected Useful Life (EUL) during the evaluation period (realization of EUL alone does not constitute an immediate repair). Replacement reserve costs are included in Appendix C.

Opinions of probable costs are provided for material physical deficiencies and not for repairs or improvements that could be classified as:

- cosmetic or decorative;
- part or parcel of a building renovation program or tenant improvement/finishes;
- enhancements to reposition the asset in the marketplace;
- for warranty transfer purposes;
- routine or normal preventative maintenance;
- less than the capital threshold for this report; and
- are expected to occur beyond the time frame of this report.



Cost Inflation Rate:

We have presented the costs in current year (2016) values. We have used 3% in the capital reserve table attached. Further sensitivity analysis using other inflation assumptions should be tested when projecting future cash-flows.

Life Expectancies:

Our estimates of the life expectancy of common element components, systems and sub-systems are based on our opinion of the observed condition during our Site visit, experience with similar material at other buildings, published industry standards, articles and recommendations made by material suppliers and manufacturers. For some materials or systems, the history of use is not sufficient to predict life expectancy accurately. Monitoring and adjustments to the assumptions are required.

The year in which the capital work is required is estimated on the basis of the current observed conditions, or the construction methods and materials used. This may be shorter or longer than the remaining time in the standard estimated life cycle based on the current age of the item. Our estimates of life cycles reflect our understanding of the standards that the prudent long-term owners would maintain. Deferring and phasing of work is often possible keeping in mind that doing so could reduce building standards, increase disruption to residents, increase costs and risks.

APPENDIX B

Limitations and Use of the Report

LIMITATIONS

This report is intended to provide an assessment of the property conditions at the subject properties, at the time of the Sites visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, Golder may be contacted to extend reliance to such parties. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, which result from reporting the factual information contained herein.

The conclusions as presented represent the judgement of Golder based on the visual observations of the accessible, exposed building elements, supplemented by information and data obtained by Golder and discussions with the Point of Contact and other representatives of the owner identified. Except as otherwise may be requested, Golder disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the FLA. No physical testing or intrusive investigations were conducted, and no samples of building materials were collected to substantiate the observations made.

In evaluating the Sites, Golder has relied in good faith on information provided by other individuals noted in this report. Golder in certain instances has been required to assume that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Point of Contact. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, thus any parties making use of this report should review these issues with appropriate legal counsel.

Should additional information become available with respect to the building elements or systems, Golder requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

APPENDIX C

Capital Reserve Table

eserve Table (Site A)

				Threshold	$3,000
Sq. m.	1,691	Year Built	1969	Reserve Term (years)	10
uildings	1	Age	47	Assumed Inflation	3%

nponent	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024
e Aisles	1997	25	18	7	3,500 m²	$64/m²	Repair/LCR			$10,000					$224,000		
	2012	10	3	7	Allowance		LCR								$3,000		
	1969	40	385	2	170 m	$101/m	LCR				$17,200						
on	1972	40	43	0	1,225 m²	$344/m²	LCR		$421,400								
	1990	20	25	0	Allowance		LCR		$3,000								
	1972	40	43	0	20 m²	$564/m²	LCR		$11,300								
	1972	40	43	0	3 units	$1,200/unit	LCR						$3,600				
	1992	25	23	2	4 units	$7,041/unit	LCR		$7,000		$21,100						
ns																	
	2004	15	11	4	250 m²	$21/m² GFA	LCR					$5,300					
	1990	25	25	0	130 m²	$51/m²	Repair		$6,600								
	1990	10	25	0	1,382 m²	$11/m²	LCR		$15,200								
	2005	20	10	10	220 m²	$88/m²	LCR										
	1969	30	46	0	12 units	$536 ea.	LCR		$6,400								
	1990	30	25	5	Allowance		LCR						$6,000				
	2005	20	10	10	Allowance		LCR										
	1972	40	43	0	1,500 m²	$280/m²	LCR/Repair		$420,000			$8,000			$8,000		
	1972	30	43	0	32 m	$170/m²	LCR		$5,400								
e Devices)																	
airs																	

ponent	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year										
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)				
									2016	2017	2018	2019	2020	2021	2022	2023	2024	
ns																		
	1972	150	43	107	Allowance		Study/Repair		$2,000	$3,000								
ns																		
	1969	150	46	104	Allowance		Study/Repair		$3,000	$6,000								
	1969	150	46	104	Allowance		Study/Repair		$3,000	$3,000								
	1984	35	31	4	1 unit	$20,600 ea.	LCR						$20,600					
	1972	30	43	0	13 units	$1,250 ea.	LCR				$16,300							
	1982	30	33	0	7 units	$1,250 ea.	LCR					$8,800						
	2000	25	15	10	30 m	$292/m	LCR											
	-	-	-	-	Allowance		Study/Improvement		$4,000	$18,000								
	-	-	-	-	Allowance		Safety	$500										
	1972	40	43	0	Allowance		LCR						$42,000					
	1972	40	43	0	Allowance		LCR						$21,800					
	1972	30	43	0	Allowance		LCR		$10,600			$10,600			$10,600			
	1972	80	43	37	Allowance		Code	$5,000										
	1992	30	23	7	845 m²	$55.92/m² GFA	LCR								$47,300			
	2000	20	15	5	1,691 m²	$5.72/m² GFA	Safety	$9,700										
	2000	20	15	5	12 units	$608 ea.	LCR						$7,300					
	2000	25	15	10	Allowance		Safety	$10,800										
curity																		
	1990	25	25	0	Allowance		LCR		$4,000									

Inflated	*Uninflated*
$65,335	$59,768
#REF!	#REF!

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024	
$CAD	$26,000	$922,900	$40,000	$54,600	$53,300	$80,700	$	$292,900	$	$	$
$CAD	$26,000	$950,587	$42,436	$59,663	$59,990	$93,553	$	$360,230	$	$	$

apital Reserve Table (Site B)

ation

				Threshold	$3,000
Gross Sq. m.	1,000	Year Built	1982	Reserve Term (years)	10
r of Buildings	1	Age	34	Assumed Inflation	3%

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year: Immediate (<60-90 days)	SHORT TERM (YEAR 1-5) 2016	2017	2018	2019	2020	LONG TERM (YEAR 6-10) 2021	2022	2023	2024
L																	
nts																	
	1982	40	33	7	70 m	$101/m	LCR								$7,100		
	1982	40	33	7	975 m²	$344/m²	LCR								$335,400		
	1998	20	17	3	Allowance		LCR				$3,000						
rs																	
	1982	40	33	7	8 m²	$564/m²	LCR								$4,500		
	1982	25	33	0	1 unit	$7,041/unit	LCR		$7,000								
ts																	
dentified																	
d Partitions																	
	1982	150	33	117	Allowance		Repair		$5,000	$80,000							
	2001	15	14	1	825 m²	$21/m² GFA	LCR			$17,300							
indows																	
dentified																	
dentified																	
	2009	10	6	4	825 m²	$11/m²	LCR					$9,100					
g	1982	25	20	5	500 m²	$224/m²	LCR/Repair		$2,500		$2,500		$112,000			$2,500	
nveyance Devices)																	
	-	-	-	-	Allowance		Study/Repair		$3,000								
leat Tracing	-	-	-	-	Allowance		Improvement		$18,900								
Concrete Elements	1982	150	33	117	565 m²	$128/m²	Repair				$8,000			$8,000			$8,000
dentified																	
dentified																	
rs and Stairs																	
dentified																	
dentified																	

s

g Component	Year Installed	Expected Useful Life	Effective or Actual Age	Remaining Useful Life	Quantity	Unit Rate	Event Type	Event Year									
								Immediate (<60-90 days)	SHORT TERM (YEAR 1-5)					LONG TERM (YEAR 6-10)			
									2016	2017	2018	2019	2020	2021	2022	2023	2024
d Columns																	
dentified																	
nd Columns																	
dentified																	
dentified																	
dentified																	
dentified																	
	-	-	-	-		Allowance	tudy/Improvement		$5,000	$18,000							
	-	-	-	-		Allowance	Improvement		$15,000								
dentified																	
dentified																	
es																	
dentified																	
ipment																	
on	1982	40	33	7		Allowance	LCR									$12,000	
ers	1982	40	33	7		Allowance	LCR								$10,900		
ution	1982	30	33	0		Allowance	LCR		$6,800					$6,800			
	2000	20	15	5	8 units	$608 ea.	LCR						$4,900				
dentified																	
	1982	25	33	0		Allowance	Safety	$9,400									
s and Security																	
em	1990	25	25	0		Allowance	LCR		$7,500								
rator	1982	35	33	2	1 unit	$48,500 ea.	LCR			$48,500							

e Analysis

	Inflated	*Uninflated*
ear	$35,750	$30,768
ear / Sq.Ft.	$35.75	$30.77

	Immediate	2016	2017	2018	2019	2020	2021	2022	2023	2024
$CAD	$9,400	$70,700	$163,800	$13,500	$9,100	$116,900	$14,800	$357,900	$14,500	$35,000
$CAD	$9,400	$72,821	$173,775	$14,752	$10,242	$135,519	$17,672	$440,172	$18,368	$50,038

Replacement
acement

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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YUB-YEC-1-52 Attachments 1-4

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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER G-158-09

TELEPHONE: (604) 660-4700
BC TOLL FREE: 1-800-663-1385
FACSIMILE: (604) 660-1102

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by
Terasen Gas Inc. ("TGI"), Terasen Gas (Vancouver Island) Inc. ("TGVI") and
Terasen Gas (Whistler) Inc. ("TGW") (collectively the "Terasen Utilities")
for Return on Equity and Capital Structure

BEFORE: A.J. Pullman, Panel Chair
D.A. Cote, Commissioner
M.R. Harle, Commissioner

December 16, 2009

O R D E R

WHEREAS:

A. By letter dated May 15, 2009, the Terasen Utilities filed with the British Columbia Utilities Commission (the "Commission") pursuant to sections 59 and 60 of the *Utilities Commission Act* (the "*Act*"), an application for Return on Equity and Capital Structure (the "Application"); and

B. TGI applied for an increased Return on Equity ("ROE") for rate-setting purposes, and that the so determined ROE for TGI be used in establishing the ROE of TGVI and TGW used for rate-setting. The Application requests that the revised ROE be effective from July 1, 2009. In addition TGI applied for an increase of the equity ratio in its Capital Structure to 40 percent effective January 1, 2010. Terasen Utilities further requested that the Commission set their current rates as interim, effective July 1, 2009, until such time as permanent rates were established; and

C. By Order G-53-09 dated May 21, 2009, the Commission established a Procedural Conference to take place on June 9, 2009 to hear submissions regarding the regulatory process for the review of the Application; and

D. Further to the Procedural Conference, the Commission issued Order G-70-09 dated June 9, 2009 which established a Regulatory Timetable for an Oral Hearing Process as well as a schedule for written argument to hear submissions from the Parties on the subject of the request for interim rates; and

E. By Order G-78-09 dated June 24, 2009, the Commission ordered, with Reasons for Decision attached as Appendix A to the Order, that the current rates of TGI and TGW be set as interim effective July 1, 2009 and that the changes to the allowed ROE from this proceeding be treated as changes to TGVI's cost of service, effective July 1, 2009; and

BRITISH COLUMBIA UTILITIES COMMISSION	
ORDER NUMBER	G-158-09

F. The Oral Hearing took place from September 28, 2009 to October 1, 2009. The following Intervenors took an active role in the proceedings, filed written argument or took part in the Oral Phase of Argument; the British Columbia Old Age Pensioners' Organization *et al.* ("BCOAPO"), the Commercial Energy Consumers of British Columbia ("CEC"), FortisBC Inc. ("FortisBC"), Pacific Natural Gas Ltd. ("PNG"), the Joint Industry Electricity Steering Committee ("JIESC") and the Industrial Customer Group ("ICG"); and

G. The schedule of written Argument provided for Final Submissions to be filed as follows: i) Terasen Utilities, FortisBC and PNG on or before October 20, 2009; ii) Intervenors on or before November 6, 2009; and iii) Reply from Terasen Utilities, FortisBC and PNG on or before November 13, 2009; and

H. An Oral Phase of Argument was held on November 24, 2009; and

I. The Commission Panel has considered the Application, the evidence, and the submissions of the Parties all as set forth in the Decision issued concurrently with this Order.

NOW THEREFORE the Commission orders as follows:

1. The appropriate equity ratio for TGI is 40 percent effective January 1, 2010.

2. TGI is to file within 30 days a document setting out how and when it will implement the change to its capital structure in compliance with the ring-fencing conditions approved by Commission Order G-49-07.

3. A return on equity for TGI of 9.50 percent for rate-setting purposes is approved effective July 1, 2009.

4. The TGI ROE approved in paragraph 3 of this Order is to be used as the Benchmark ROE in establishing the return on equity of TGVI and TGW used for rate-setting purposes and the allowed return on equity for TGVI and TGW is effective July 1, 2009.

5. TGVI's request to continue to set its allowed return on equity with reference to the Benchmark ROE by adding a utility specific risk premium of 70 basis points is denied. TGVI is allowed a utility specific risk premium of 50 basis points above the Benchmark ROE.

6. TGW's request to continue to set its allowed return on equity with reference to the Benchmark ROE by adding a utility specific risk premium of 50 basis points is approved.

BRITISH COLUMBIA UTILITIES COMMISSION	
ORDER NUMBER	G-158-09

7. TGVI and TGW are to file in their respective next revenue requirement applications evidence on the equity component that best reflects their respective long-term business risks.

8. The TGI ROE approved in paragraph 3 of this Order can continue to serve as the Benchmark ROE for FortisBC and any other utility in British Columbia that uses a Benchmark ROE to set rates.

9. The automatic adjustment mechanism is eliminated.

10. TGI is to complete its study of alternative formulae to an automatic adjustment mechanism and report to the Commission on the study results by December 31, 2010.

DATED at the City of Vancouver, in the Province of British Columbia, this 16th day of December, 2009

BY ORDER

Original signed by:

A.J. Pullman
Panel Chair and Commissioner

IN THE MATTER OF

TERASEN GAS INC.
TERASEN GAS (VANCOUVER ISLAND) INC.
TERASEN GAS (WHISTLER) INC.

AND

RETURN ON EQUITY AND CAPITAL STRUCTURE

DECISION

December 16, 2009

BEFORE:

Anthony J. Pullman, Commissioner/Panel Chair
D.A. Cote, Commissioner
M.R. Harle, Commissioner

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EXECUTIVE SUMMARY

In this Decision the Commission considers an application by Terasen Gas Inc. ("TGI"), Terasen Gas (Vancouver Island) Inc. ("TGVI") and Terasen Gas (Whistler) Inc. ("TGW") (collectively, "Terasen") regarding Return on Equity and Capital Structure.

TGI requested a change in the common equity component of its capital structure from 35.01 percent to 40 percent and that the increased common equity component be included in the setting of its rates effective January 1, 2010.

The Commission considered, among other matters, its jurisdiction, the fair return standard, evidence on TGI's business risks, and credit ratings and metrics and concluded that TGI's business risk had increased since 2005 and that the appropriate equity ratio for TGI was 40 percent effective January 1, 2010.

TGI also requested an increased in its return on equity ("ROE") from the existing 8.47 percent to 11 percent for rate setting purposes, and that the new ROE for TGI be used in establishing the ROE for TGVI and TGW for rate setting at a premium of 70 basis points and 50 basis points respectively over TGI's ROE, and that the revised ROE for TGI, TGVI and TGW be effective July 1, 2009.

The Commission considered the various approaches used to determine ROE and the expert evidence called on behalf of Terasen and of the Intervenors on ROE. It concluded that primary weight should be accorded to the Discounted Cash Flow approach, lesser weight to the Equity Risk Premium approach (including the Capital Asset Pricing Model) and minimal weight to the Comparable Earnings approach. The Commission concluded that the appropriate ROE for TGI is 9.50 percent. Noting that the Intervenors did not oppose the request that the ROE be effective July 1, 2009 the Commission granted that request.

The July 1, 2009 effective date results in the ROE for TGI for 2009 being 8.47 percent for six months and 9.50 percent for six months, or an average annual ROE of 8.98 percent. The ROEs for TGVI and TGW become on average respectively 60 and 50 basis points higher as a result of the Commission's conclusion on their level of business risk compared to that of TGI.

The Commission considered evidence on whether the existing automatic adjustment mechanism used in the determination of the ROE of TGI, TGVI and TGW still met the fair return standard and determined that it did not. The automatic adjustment mechanism would only have produced an ROE of 8.43 percent for TGI in 2010 compared to the 9.50 percent determined by the Commission. The Commission has accordingly directed that the automatic adjustment mechanism be eliminated. However, it has also directed TGI to complete its study of alternative formulae and report to the Commission by December 31, 2010.

The Commission declined to continue to allow TGVI a premium of 70 basis points over TGI's ROE. It determined the premium should be reduced to 50 basis points as a result of a reduction in TGVI's risk since 2005. TGW was allowed a risk premium of 50 basis points over TGI's ROE.

The Commission has also determined that the ROE for TGI will continue to serve as the Benchmark ROE for FortisBC and any other utility in BC that uses the Benchmark ROE to set rates.

1.0 INTRODUCTION

On May 15, 2009 Terasen Gas Inc. ("TGI"), Terasen Gas (Vancouver Island) Inc. ("TGVI"), and Terasen Gas Whistler Inc. ("TGW") filed an application under sections 59 and 60 of the *Utilities Commission Act* with the British Columbia Utilities Commission (the "Application"). In this Decision the three utilities are collectively referred to as "Terasen"; the *Utilities Commission Act* as the "*Act*" or "*UCA*"; and the British Columbia Utilities Commission as the "Commission" or "BCUC."

The Application seeks the following relief:

- that the Commission determine an increased return of 11 percent on common equity ("ROE") for TGI for rate-setting purposes, that the so determined ROE for TGI be used in establishing the ROE of TGVI and TGW used for rate-setting, and that the revised ROE for TGI, TGVI and TGW be effective July 1, 2009;
- that the Commission eliminate the use of an ROE automatic adjustment mechanism ("AAM") in the determination of the ROE to be used by Terasen for rate-setting;
- that, in replacement of the use of an AAM in the determination of their ROE, the ROE determined in the proceeding to be appropriate for TGI be used as the benchmark or generic ROE ("Benchmark ROE") for the determination of the ROE of TGVI and TGW. TGVI and TGW request that the Commission continue to set their respective allowed returns on equity with reference to the Benchmark ROE established in the proceeding by adding a utility specific risk premium of 70 basis points in the case of TGVI and 50 basis points in the case of TGW to the Benchmark ROE;
- that the Commission alter and increase the common equity component of TGI's capital structure for rate-setting purposes from 35.01 percent to 40 percent and that the increased common equity component be included in the setting of TGI's rates effective January 1, 2010;
- that the Commission set the current rates of TGI and TGW as interim, effective July 1, 2009, until such time as permanent rates are established which give effect to the relief requested; and
- that, pursuant to the provisions of the Special Direction [issued to the Commission under section 7 of the *Vancouver Island Natural Gas Pipeline Act*], the increase in TGVI's allowed ROE resulting from the Commission's determinations in this proceeding be treated as an increase to TGVI's cost of service, effective July 1, 2009, which will result in an adjustment

to the 2009 Revenue Deficiency or Revenue Surplus and will be reflected in the Revenue Deficiency Deferral Account ("RDDA") balance.

The process the Commission followed to hear the Application is described in greater detail in Appendix A to this Decision.

The allowable return on a utility's invested capital is a combination of two factors when determining a fair return:

1) the percent of its invested capital that is held as equity relative to the percent held as debt, that is, its capital structure; and
2) the rate of return allowed on the equity portion of the capital structure.

Kathleen C. McShane provided expert evidence on behalf of Terasen on capital structure and fair return on equity. Her testimony is found at Exhibit B-1, Tab 3. Ms. McShane refers to this combination when she states that, "varying both capital structures and ROEs is used by the BCUC" and is one approach to determining a fair return (Exhibit B-1, Tab 3, p. 21). She also states that, "the capital structure and the return on equity are inextricably linked." (Exhibit B-1, Tab 3, p. 3)

The capital structure and ROE for Terasen are established by the Commission for use in the calculation of rates. The actual achieved ROE and return on invested capital for a given year may differ from the ROE established by the Commission for that year because of such factors as variances between actual and forecast revenues or costs of service.

Since 1994 the Commission has annually set the ROE for utilities in British Columbia based on the Benchmark ROE for TGI using a formula that ties the utilities' rates of return on equity to the forecast yield on long-term Canada (30 year) bonds for the forthcoming year. This formula has commonly been referred to as the AAM. The capital structure of utilities has been reviewed less frequently, generally when there has been an application to the Commission for such a review. The

background of ROE awards in BC, Canada, and the US since 1994, including the use of a formula to establish ROE is set out in Appendix B to this Decision.

Terasen submits that:

- The fair return standard is not being met;
- The formula that produces the ROE is "broken";
- The recent turbulence in credit markets has further highlighted the formula's flaws; and
- TGI's business risks are increasing.

Combined, in Terasen's view, these four realities mean that the results of the current formulaic approach to ROE are inadequate, and the current equity component in the capital structure of TGI should be increased. Terasen urges the Commission to update both the Benchmark ROE and TGI's capital structure and make the required determination to enable utilities in BC to operate from a healthy and sustainable foundation and continue to appropriately serve the public interest. (Exhibit B-1, pp. 9, 10)

The Joint Industry Electricity Steering Committee ("JIESC") submits that the fair return standard is being met, that TGI's business risks have not increased, and the AAM has demonstrated remarkable strength in the face of the largest disruption to financial markets in the last 70 years. This is in part evidenced by the $900 million premium (1.7 times the net book value of the equity) paid by Fortis Inc. for Terasen Inc. ("TI") (the parent company of the three Terasen utilities) in the spring of 2007 and by TGI's ability to issue $100 million in debt in February 2009. (JIESC Argument, p. 4)

In order to assess the reasonableness of the relief sought by Terasen, it is necessary to consider the legal and regulatory bases for determining an appropriate capital structure and ROE, and the issues flowing therefrom. These considerations are made in the context of the recent economic situation, including the challenges in financial markets in 2008-2009, as well as recent relevant regulatory developments, particularly the 2009 National Energy

Board ("NEB") Trans Quebec & Maritimes Pipeline Decision RH-1-2008 ("TQM Decision"), the NEB's Reasons for Decision-review of the Multi-Pipeline Cost of Capital Decision (RH-2-94) dated October 8, 2009 ("NEB Letter Decision"), in which it determined that the RH-2-94 Decision will not continue in effect, that is, the return on equity for the pipelines regulated by the NEB will not be determined by an automatic adjustment mechanism, and the Alberta Utilities Commission ("AUC") 2009 Generic Cost of Capital Decision, Decision 2009-216 ("AUC Decision 2009-216") issued on November 12, 2009.

This Decision is divided into the following Sections which address the issues that the Commission Panel needs to determine:

Section 2.0 - Jurisdiction and the Fair Return Standard

This Section discusses the following issues: What are the interests of the parties and the Commission's obligations under the *Utilities Commission Act?* What is the fair return standard and how does the Commission Panel determine whether it is currently being met? Are US data relevant in this determination? If the fair return standard is not being met for TGI, how should the Commission Panel proceed to ensure that it is met?

Section 3.0 - Risks and Capital Structure

This Section discusses the following issues: Have TGI's risks increased since 2005 and if so how should this be reflected in TGI's capital structure? What is TGI's appropriate capital structure?

Section 4.0 - The Appropriate Return on Equity for TGI

This Section discusses the following issues: Given TGI's capital structure what is the appropriate ROE for TGI and what approaches to its determination should the Commission Panel give weight?

Section 5.0 - The Automatic Adjustment Mechanism

This Section discusses the following issues: Given TGI's appropriate ROE, does the Commission's AAM produce an ROE that meets the fair return standard? If not, should the Commission retain, amend, or eliminate its AAM?

Section 6.0 - The Appropriate Return on Equity for TGVI and TGW

This Section discusses the following issue: Given TGI's appropriate capital structure and ROE what are the appropriate ROEs for TGVI and TGW?

Section 7.0 - TGI as the Benchmark Utility

This Section discusses the following issue: What impact should the Commission Panel's determination have on the remaining utilities in BC that might be affected, namely, FortisBC Inc. ("FortisBC") and Pacific Northern Gas Ltd. ("PNG")?

2.0 JURISDICTION AND THE FAIR RETURN STANDARD

In this Section the following issues are addressed:

- What are the interests of the parties and the Commission's obligations under the *Act*?
- What is the fair return standard and how does the Commission Panel determine whether it is currently being met?
- Are US data relevant in this determination?
- If the fair return standard is not being met for TGI, how should the Commission Panel proceed to ensure that it is met?

2.1 The Interests of the Parties and the Commission's Obligations under the *Act*

Terasen states that the impact of its Application is to increase TGI's revenue requirements by $44.9 million, an increase of approximately 3.6 percent ($38 per year) to the annual bill of a TGI residential customer in the Lower Mainland. Further, Terasen states that the impact can be broken down as follows:

Company	Impact of 1% Equity Increase ($000)	Impact of .25% ROE Increase ($000)
TGI	$2,400	$3,100
TGVI	N/A	$800[(1)]

(1) Terasen notes that the revenue requirement increase for TGVI may not necessarily translate to a customer rate impact because of the soft cap mechanism.

(Source: Exhibit B-3, BCUC 3.5, 3.6)

The Intervenors take exception to the timing and amount of the increases being sought. Counsel for JIESC characterizes them as "worse than unreasonable, they are blatantly opportunistic and must be denied" (T2:23). The British Columbia Old Age Pensioners Organization *et al.* ("BCOAPO") submits that, "these increases would occur despite the Applicant…providing the exact same service

quality and reliability as it currently does. In other words, it represents money for nothing." (BCOAPO Argument, para 1)

It is clear that Terasen has a significant interest in receiving the relief sought in the Application and the Intervenors have a significant stake in minimizing it.

Terasen has made the Application pursuant to sections 59 and 60 of the *Act*. Those sections are quoted in their entirety in Appendix C to this Decision.

Under section 60(1)(b) of the *Act*, when setting a rate the Commission must have due regard to the setting of a rate that:

(i) is not unjust or unreasonable within the meaning of section 59;
(ii) provides to the public utility for which the rate is set a fair and reasonable return on any expenditure made by it to reduce energy demands; and
(iii) encourages public utilities to increase efficiency, reduce costs, and enhance performance.

Under section 59(5) of the *Act* a rate is "unjust" or "unreasonable" if it is:

(a) more than a fair and reasonable charge for service of the nature and quality provided by the utility;
(b) insufficient to yield a fair and reasonable compensation for the service provided by the utility, or a fair and reasonable return on the appraised value of its property; and
(c) unjust and unreasonable for any other reason.

The Industrial Customer Group ("ICG") submits that the *Act* requires the Commission to balance the interests of the parties and set a just and reasonable rate that provides the utility with a fair return on the rate base. ICG submits that section 59 of the *Act* explicitly requires the Commission to consider the rates from the customer perspective, specifically whether the proposed rate is fair and reasonable for the nature and quality of the service. Part of that consideration must include the economic impact of the rate for the service on customers. The Commission's primary

responsibility is to regulate rates as a surrogate for competition and to keep rates within the reasonableness one would expect in a properly functioning market. Considering the customer perspective is one-half of the balance equation in a regulated environment. When acting as the surrogate for competition, the Commission cannot and must not protect Terasen from all competitive risk by raising the ROE at the expense of customers. Doing so would ignore the interest of the customers who are captive to the monopoly. (ICG Argument, p. 5)

Terasen submits that the following quotation from page eight of the Commission's 2006 Decision on Terasen's ROE, Capital Structure and the AAM ("2006 ROE Decision") correctly sets out that the Commission has a duty to approve rates that will provide a reasonable opportunity to earn a fair return on invested capital:

> "The Commission Panel does not accept that the reference by Martland J. to a "balancing of interests" to mean that the exercise of determining a fair return is an exercise of balancing the customers' interests in low rates, assuming no detrimental effects on the quality of service, with the shareholders' interest in a fair return. In coming to a conclusion of a fair return, the Commission does not consider the rate impacts of the revenue required to yield the fair return. Once the decision is made as to what is a fair return, the Commission has a duty to approve rates that will provide a reasonable opportunity to earn a fair return on invested capital." (Terasen Reply, para 6)

2.2 The Fair Return Standard

Terasen cites the TQM Decision, which summarizes the fair return standard at page 6:

> "The Fair Return Standard requires that a fair or reasonable overall return on capital should:
>
> - be comparable to the return available from the application of the invested capital to other enterprises of like risk (comparable investment requirement);
> - enable the financial integrity of the regulated enterprise to be maintained (financial integrity requirement); and

- permit incremental capital to be attracted to the enterprise on reasonable terms and conditions (capital attraction requirement)." (Terasen Argument, para 12)

Terasen and the Intervenors address the fair return standard from the perspectives of the return on invested capital of the utility, the return on the equity, the level of financial risk, the creditworthiness and financial integrity of the utility, and, on the premium paid over book value for TI by Fortis Inc. in 2007.

In her evidence, Ms. McShane states: "The capital structure and the return on equity are inextricably linked; the fair return on equity cannot be established without reference to the level of financial risk inherent in the capital structure adopted for regulatory purposes." (Exhibit B-1, Tab 3, p. 3)

Ms. McShane addresses the maintenance of the creditworthiness and financial integrity of the utility and opines that the capital structure of TGI, in conjunction with the returns allowed on its sources of capital, should provide the basis for a stand-alone investment grade debt ratings in the A category. Debt ratings in the A category assure that Terasen should be able to access the capital markets on reasonable terms and conditions during both robust and difficult, or weak, capital market conditions. (Exhibit B-1, Tab 3, p.26; Terasen Argument, para 101)

The Intervenors do not disagree with the A rating but observe that Terasen has enjoyed an A rating for many years. (JIESC Argument, p. 12)

JIESC points out that:

- in 2007, Fortis Inc. "purchased the TGI equity (sic) paying a premium of $900 million for it. A premium over book value upon which Terasen is not permitted to allow either a debt or equity return. This amounts to 1.7 times the equity value";
- in February 2009, a time when "debt markets were still recovering from the 2008 financial turmoil" TGI was able to issue $100 million debt; and

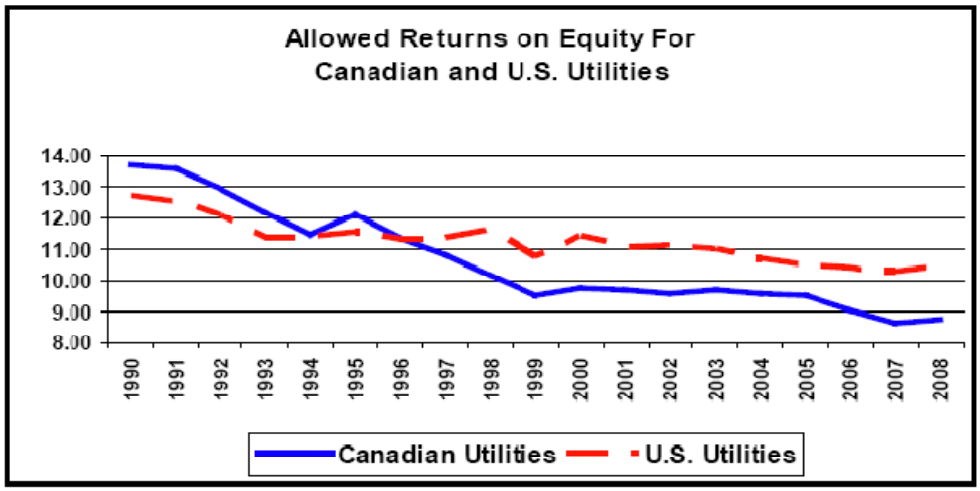
- in May 2009 TGI's bond rating was confirmed at "A" by both DBRS Limited ("DBRS") and Moody's Investors Services ("Moody's"). (JIESC Argument, p. 13)

Terasen points out that TGI's Moody's rating actually is A3 and submits that the rating is "only one notch above BBB+, which is a level at which even Dr. Booth believes TGI should not be." (Terasen Reply, para 82)

Terasen also addresses the issue of acquisition premia and refers the Commission to its 2006 ROE Decision where the Commission addressed the acquisition of TI by Kinder Morgan Inc. ("KMI") and stated at page 13: "There is no evidence before the Commission that any of the premium paid by KMI will be included in either of the Companies' rate bases and recovered from their customers. The Commission's role is to determine a suitable capital structure for the Applicants and return on equity for a benchmark low-risk utility and the KMI/TI transaction is not relevant to the Commission's determination." (Terasen Reply, para 94)

2.3 The Applicability of US Data in Determining the Fair Return Standard

Terasen provides the following chart to compare the differences between ROEs allowed to electric and natural gas utilities by state regulatory agencies in the US with the ROEs allowed by Canadian regulatory agencies:



(Exhibit B-1, p. 14)

Terasen includes two reports as appendices to the Application:

i) a report sponsored by the Ontario Energy Board ("OEB") entitled "A Comparative Analysis of Return on Equity of Natural Gas Utilities" dated June 14, 2007 and authored by Concentric Energy Advisors ("CEA") (the "CEA Report"); and

ii) a report sponsored by the Canadian Gas Association ("CGA") entitled "Allowed Return on Equity in Canada and the United States: An Economic, Financial and Institutional Analysis" authored by National Economic Research Associates, Inc ("NERA") dated February 2008 (the "NERA Report").

The CEA Report made ten conclusions, of which three are germane:

1. "(6) On the whole, there are no evident fundamental differences in the business and operating risks facing Ontario utilities as compared to those facing US companies or other provinces' utilities that would explain the difference in ROEs";

2. "(7) Other market related distinctions and resulting financial risk differences, particularly between Canada and the US, do exist. These factors, including differences in market structure, investor bases, regulatory environments, and other economic factors may have an impact on investors' return requirements for Canadian versus US utility investments. However, through analysis and interviews with key market participants, representatives of customer groups, and other individuals with past involvement in ROE proceedings in Canada and the US, these differences are determined to be negligible"; and

3. "(9) As a result of the interplay between the Canadian and US markets, Canadian utilities compete for capital essentially on the same basis as utilities in the US." (Exhibit B-1, Appendix 3)

The NERA Report concludes, in part:

"We find that the regulatory institutions and customs for setting regulated prices for investor owned Canadian and US utilities are very alike. That is, in accounting, administrative procedures, regulatory legislation, and basic constitutional protections of private property, little or nothing separates the average Canadian from the average US regulatory jurisdictions…"

> "We examine the definition of risk to investors of placing their capital at the use of the public, for which the ROE provides compensatory payment. We look at how those risks could be different in Canada versus the US. What we find is that the basic sources of risk—regulatory, business and financial—are comparable with respect to both jurisdictions. Objective and disinterested analyses of the relative risks between Canadian and US utilities are rare, but what we have found points to no smaller risks in Canada. As such, we conclude that there is no objective evidence showing that business or regulatory risks are sufficiently lower in Canada to account for the divergences in Figure 1 [A Figure showing the Allowed Return Differential (Canada - US) for Gas Distribution Utilities in the period 1992-2007]." (Exhibit B-1, Appendix 4, Executive Summary)

Terasen filed the evidence of Mr. Donald A. Carmichael, a financial consultant and advisor, as Tab 2 to the Application. His opinion evidence addresses the integration of markets and competition for capital. Mr Carmichael states that the globalization of Canadian capital markets and the removal of various personal and institutional restrictions on foreign investment have caused the Canadian and international capital markets to become substantially more integrated than in the past, and points to the fact that:

- many of Canada's largest institutional investors have become major players on international stock markets and non-Canadian private equity situations;
- the market in Canada for the new issuance of foreign bonds and debentures has grown rapidly reflecting Canadian lenders' desire to diversify their portfolios with new issuers and to achieve higher returns than those available from domestic issuers; and
- the funding requirements for announced infrastructure projects in Canada will be significant and will directly compete with debt and equity financing for utilities. (Exhibit B-1, Tab 2, pp. 32-35)

Terasen submits that restrictions on foreign investments by Canadians have been removed and that competition for capital is not constrained by provincial or national borders. Canadian and international capital markets have become more integrated than in the past. Large amounts of capital are required for infrastructure projects in Canada and around the world. Terasen submits that TGI's capital structure and return on equity must be comparable to other companies of similar risk to allow it to successfully compete for capital. (Terasen Argument, para 19)

The NEB addressed the issue in the TQM Decision where it stated:

> "In the Board's view, global financial markets have evolved significantly since 1994. Canada has witnessed increased flows of capital and implemented tax policy changes that facilitate these flows. As a result, the Board is of the view that Canadian firms are increasingly competing for capital on a global basis.
>
> A fair return on capital should, among other things, be comparable to the return available from the application of the invested capital to other enterprises of like risk and permit incremental capital to be attracted to the regulated company on reasonable terms and conditions. TQM needs to compete for capital in the global market place. The Board has to ensure that TQM is allowed a return that enables TQM to do so. …As a result, the Board is of the view that pipeline companies operating in the U.S. have the potential to act as a useful proxy for the investment opportunities available in the global market place." (TQM Decision, pp. 66-67)

In addition, the AUC stated that it would, "review the market based return data available on the record in respect of the sample US utility proxy groups and employ this data in its CAPM [Capital Asset Pricing Model] and DCF [Discounted Cash Flow] determinations." (AUC Decision 2009-216, para 205)

Terasen submits that global competition for capital means that TGI's capital structure must be comparable to its North American peers. In Terasen's view, the TQM Decision recognizes this capital requirement, which should also be recognized by the Commission. (Terasen Argument, para 95)

In the 2006 ROE Decision the Commission addressed what it saw as the two issues of relying on US data to establish appropriate capital structures and ROEs for utilities. On the first issue (i.e. that there are opportunities for Canadian investors to commit capital globally) the Commission noted that Canadian investors faced a considerable foreign exchange risk when investing and was not convinced that the Federal Government's relaxation of foreign content rules in retirement portfolios should be a reason to increase the equity return of a benchmark low-risk utility.

On the second issue (i.e. that in measuring the risk premium it is necessary to look beyond Canadian data) the Commission stated that it was prepared to accept the use of historical and forecast data of US utilities when applied: as a check to Canadian data, as a substitute for Canadian data when those data do not exist in significant quantity or quality, or as a supplement to Canadian data when Canadian data give unreliable results; based on the fact that the US and Canadian economy and capital markets were closely integrated. (2006 ROE Decision, p. 50)

BCOAPO submits that "select US utilities...are not useful in determining comparable returns and comparable risk." (BCOAPO Argument, para 7)

Dr. Laurence Booth provided a written opinion of the fair return for TGI on behalf of the Intervenors. In his evidence, Dr. Booth states: "The message from these….disasters of US regulatory policy [i.e. the bankruptcy of Pacific Gas and Electric; the Enron and WorldCom frauds; the failure of US entities such as Lehman Brothers; and 'stock market disasters represented by pipelines like Duke Energy'] is that the US is not Canada, no matter what American witnesses before the Canadian regulatory tribunals seem to think. Regulation in the US has followed a different path to that in Canada, as is patently obvious to anyone who looks at its results. Drawing any insights from how investors perceive US utilities (or banks) given this different regulatory approach in my judgment is of very little value. I would strongly advise Canadian regulatory tribunals to ignore the advice of experts, who have US experience in mind when they from (sic) their judgments. Instead, they should focus on Canadian solutions that have worked rather than US solutions that have resulted in disaster." (Exhibit C11-5, p. 103)

Terasen submits that the evidence demonstrates that Dr. Booth's attempt to use Enron and WorldCom as examples of light-handed US utility regulation fails; neither Enron nor WorldCom were US utilities or utility holding companies, and Dr. Booth's citation of Enron, WorldCom, or Duke Energy fails to support the argument that the Commission should not consider US utilities in its determination of a fair return on equity. (Terasen Argument, para 352-53)

Commission Determination

In view of the fact that no party took issue with the articulation of the fair return standard by the NEB in the TQM Decision, the Commission Panel endorses it. It also agrees with Terasen that the combination of the equity ratio and the allowed return thereon should be adequate to attract capital on reasonable terms and conditions and allow TGI to maintain the A3 rating on its debt and unsecured debt from Moody's.

As for the Intervenors' submissions that this is not the time for a rate increase, and ICG's submission that the Commission must balance the requirements of customers with those of Terasen, the Commission Panel adopts the Commission's statement in the 2006 ROE Decision where it made it clear that its obligation was and is to set rates that are fair and reasonable, and to allow a utility the opportunity to earn a fair rate of return.

The Commission Panel has considered the premium paid by Fortis Inc. to acquire the equity capital of TI in 2007. As was the case with respect to the premium paid by KMI for the shares of TI discussed in the 2006 ROE Decision there is no evidence before the Commission that any of the premium paid by Fortis Inc. will be included in any of the Companies' rate bases and recovered from their customers. Further, as was the case with the KMI acquisition, the Commission imposed "ring-fencing" conditions upon Fortis Inc. The Commission Panel considers that the Commission's role is to determine an appropriate capital structure and return on equity for Terasen and that the acquisition of TI by Fortis Inc. is not relevant to the Commission Panel's determination in this regard.

As for the US data, the Commission Panel agrees with the NEB and AUC that utilities in Canada need to compete for capital in the global market place, and regulatory agencies in Canada have to ensure that utilities subject to their jurisdiction are allowed a return that enables them to do so.

In addition, the Commission Panel continues to be prepared to accept the use of historical and forecast data of US utilities when applied: as a check to Canadian data, as a substitute for Canadian data when Canadian data do not exist in significant quantity or quality, or as a supplement to Canadian data when Canadian data gives unreliable results. Given the paucity of relevant Canadian data, the Commission Panel considers that natural gas distribution companies operating in the US have the potential to act as a useful proxy in determining TGI's capital structure, ROE, and credit metrics.

Having determined what the fair return comprises and that US data may be relevant in its determination, the Commission Panel considers that there are enough data before it to bring into question whether the fair return standard is being met in TGI's case. Accordingly, in the following sections the Commission Panel examines the evidence and determines whether an increase in TGI's equity ratio is justified, following which it determines the approaches to which it will give weight in its determination of TGI's allowed ROE. The Commission Panel examines the result of these determinations to ensure that the fair return standard is met for TGI.

3.0 RISKS AND CAPITAL STRUCTURE

This Section defines risk in the utility regulatory environment, considers TGI's business risk and determines a suitable capital structure for TGI for regulatory purposes. The following issues are addressed:

- Have the business, regulatory and financial risks of TGI increased since 2005 and, if so, how should they be reflected in TGI's capital structure?
- What is TGI's appropriate capital structure?

Terasen sets out the following reasons why TGI's common equity ratio should be increased from 35.01 percent to 40 percent:

1) TGI's level of business risk has increased;
2) there have been material increases in the allowed common equity ratios of some of TGI's Canadian utility peers;
3) its credit metrics are weak for its credit ratings, and in isolation fall below investment grade guidelines;
4) its equity ratio of 35 percent, together with lower allowed ROEs and lower corporate income tax rates have caused its interest coverage ratios to be the lowest in Canada and to continue to fall;
5) rating agencies continue to view a common equity ratio of 35.01 percent as weak. At 40 percent TGI would still lie at the lower end of Moody's guideline range for an investment grade rating on this credit metric;
6) the further global integration of the Canadian capital markets warrants a strengthening of TGI's financial parameters; and
7) the forecast North American and global investment requirements for infrastructure point to significant competition for capital going forward. TGI should be positioned so that it can compete successfully. At the existing capital structure, TGI's credit metrics compare unfavourably to those of its US peers. (Exhibit B-1, Tab 3, pp. 39-40)

The assessment of risks has significant bearing on the application of the fair return standard and the determination of an appropriate common equity ratio for regulatory purposes.

3.1 The Definition of Risk in the Utility Regulatory Environment

In discussing business risk in its Argument, Terasen refers to page 17 of the 2006 ROE Decision. At that reference, the Commission defined risk as follows:

> "The Applicant and Intervenors broadly agree on the definition of risk to a benchmark low-risk utility. Investment risk comprises the sum of business risk, financial risk and regulatory risk."
>
> "Business risk is the risk that the utility will not be able to earn a return on its capital or of its capital. Dr. Booth summarized those elements that constitute business risk as:
>
> > '…stemming from uncertainty in the demand for the firm's product resulting, for example, from changes in the economy, the actions of competitors, and the possibility of product obsolescence. This demand uncertainty is compounded by the method used by the firm and the uncertainty in the firms' cost structure, caused, for example, by uncertain input costs, like those for labour or critical raw or semi-manufactured materials.' "
>
> "Financial risk is measured through the debt equity ratio of a utility."
>
> "Regulatory risks are those that might arise from regulatory lag, from disallowed operating or capital costs or from punitive awards." (2006 ROE Decision, p. 17 [references omitted]; Terasen Argument, para 23)

Terasen discusses the business risk of TGI and states that it is useful to consider short-term and long-term risks. In the short-term the focus is generally on TGI's ability to earn a fair return on its investments from year to year. In the longer term the risk relates to whether or not the utility will be able to recover the cost of its investments over their useful lives and earn a fair return on such investment over the long run. (Exhibit B-3, BCUC 14.1)

Terasen notes that business risk has both short-term and long-term aspects and that since a local distribution company's ("LDC") investments have a useful life that extends over a long period of time, it is the longer-term fundamental business risks that must be given primary consideration when evaluating the business risk of a gas distribution utility.

Ms. McShane observes that regulatory agencies in Canada have followed two separate approaches to addressing utility risk. The NEB and the AUC have adopted one approach whereby each utility subject to their jurisdiction has an individual equity ratio which is determined by its respective long and short-term business risks, to which is applied a uniform ROE. The other approach, followed by the Commission, the OEB and the *Regie de l'Energie*, is to establish the capital structure and ROE for a benchmark utility and to set capital structures and ROEs for all other utilities in their jurisdiction with reference to the benchmark. (Exhibit B-1, Tab 3, p. 21)

Commission Determination

The Commission Panel notes that no party took issue with the Commission's characterization of risk in its 2006 ROE Decision and accordingly accepts the definition for the purposes of this proceeding.

The Commission Panel accepts Terasen's characterization of its business risk as having long-term and short-term aspects and it will consider them separately in Sections 3.2 and 3.3 of this Decision.

In its 2006 ROE Decision the Commission stated: "The Commission Panel concludes that the appropriate capital structure range for consideration of TGI is in the range of 35 percent to 38 percent and that given the effect of deferral accounts in reducing the risk of TGI, the appropriate equity component for TGI is 35 percent. Given the preferred shares in the capital structure of all other Canadian gas distribution utilities, the equity component of TGI will remain the lowest in Canada for gas distribution utilities." (2006 ROE Decision, p. 36)

In this Decision, however, the Commission Panel considers the effect of deferral accounts in reducing the risk of TGI as reducing the short-term, and not the long-term, business risk of TGI, and will accordingly adjust TGI's ROE rather than its capital structure.

3.2 TGI's Long-Term Business Risk

In Tab 1 of its Application, Terasen sets out key factors that have affected TGI's business risks in recent years:

1) Provincial climate change and energy policies have increased the risk inherent to TGI's core natural gas business;
2) the effect of aboriginal rights issues on utilities in BC;
3) the competitive position of natural gas relative to electricity has been weakened;
4) TGI is capturing a smaller percentage of new construction;
5) electricity is increasingly the choice of high-density housing;
6) alternative energy sources further weaken TGI's competitive position;
7) fuel switching has also diminished demand for natural gas; and
8) the use of natural gas per (customer) account continues to decline. (Exhibit B-1, p. 24 and Tab 1)

Terasen states that the first two factors are new in that they have emerged since its last ROE application in 2005, and that the remaining key factors were identified by it as factors affecting its business risk in 2005. These risk factors are addressed below.

3.2.1 Provincial Climate Change Policies

Terasen states that the Throne Speech delivered on February 13, 2007 outlined the province's Greenhouse Gas ("GHG") reduction target. A second announcement on February 19, 2008 introduced a carbon tax in BC. These two policies and their subsequent implementation into law have increased TGI's business risk since 2005. Since the publication of, "The BC Energy Plan: A Vision for Clean Energy Leadership" ("2007 Energy Plan") in February 2007, the provincial government has taken a leadership role in the fight against climate change/global warming and, in the spring 2008 Legislative Session, introduced the following bills:

- Bill 15 – *Utilities Commission Amendment Act*;

- Bill 16 – *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act*;
- Bill 18 – *Greenhouse Gas Reduction (Cap and Trade) Act*;
- Bill 31 – *Greenhouse Gas Reduction (Emission Standards) Statutes Amendment Act*;
- Bill 27 – *Local Government (Green Communities) Statutes Amendment Act, 2008*; and
- Bill 37 – *Carbon Tax Act*.

Under the *Greenhouse Gas Reduction Target Act* (passed in 2007), and under Ministerial Order dated November 25, 2008, BC's GHG emission targets levels have been established as:

- 2012 6 percent below 2007 levels;
- 2016 18 percent below 2007 levels;
- 2020 33 percent below 2007 levels;
- 2050 80percent below 2007 levels. (Exhibit B-1, Tab 1, pp. 3, 5)

Terasen states that as of March 31, 2009, pursuant to a climate action charter between the Province and the Union of BC Municipalities establishing, among other things, a commitment to a goal of becoming carbon neutral by 2012, 174 local governments had become signatories. In addition the Province has set emission targets for universities, schools and hospitals.

Terasen states that TGI's risk profile has increased substantially due to the climate change challenge, the provincial GHG reduction targets, and how these targets have shaped customers' views of natural gas. In its view, there can be no doubt that these actions will have an impact on the use of natural gas, TGI's opportunities, and TGI's ability to recover its investment over the long term.

Terasen states that the BC Carbon Tax, implemented effective July 1, 2008, to help the Province reach its GHG reduction targets, reduces the competiveness of natural gas relative to alternative energy sources that are not subject to the carbon tax, and provides a direct pricing signal to customers in relation to GHG emissions. The tax started at $10/tonne of GHG and will increase by $5/tonne each year to $30/tonne by 2012. Terasen cites the BC Climate Action Team's

recommendation that: "After 2012, if required to achieve the emissions targets, increase the British Columbia carbon tax in a manner that aligns with the policies of other jurisdictions and key economic facts." (Exhibit B-1, Tab 1, pp. 10-11).

A Terasen witness testified that "and there are calls...from certain academics and others that say in order for the government to get the consumption of GHGs down, it's going to have to move to $300. So, that's $15 a GJ [gigajoule], not $1.50, on top of the commodity and the delivery rates" (T2:155). $300 per tonne is also the carbon tax assumed by 2026 in the Nyboer Report discussed later in this Section (Exhibit B-11, Panel 1.1).

Terasen submits that the carbon tax reduces natural gas' competiveness relative to alternative energy sources that are not subject to the carbon tax and will help to sensitize customers to the level of GHG emissions they generate by sending them price signals. The provincial carbon tax increases the business risks of TGI. (Terasen Argument, para 52)

Terasen states that government policy that discourages consumers from using natural gas will have the effect of reducing throughput volumes on the TGI system and reducing the attachment of new customers. The recovery of fixed costs from a smaller customer base, and on lower throughput, leads to rate pressure for the remaining customers. Left unmitigated and unchecked, these effects can lead to loss of existing natural gas customers and a potential "downward spiral" in which the risk of non-recovery of invested capital increases and assets potentially become stranded. (Exhibit B-11, Panel 1.1)

Terasen filed a report entitled, "A Technology Roadmap to Low Greenhouse Gas Emissions in the Canadian Economy: A sectoral and regional analysis," dated August 22, 2008, and prepared for the National Round Table on the Environment and the Economy by J & C Nyboer and Associates, Inc, (the "Nyboer Report") which describes itself as a "technology roadmap derived from the *Getting to 2050* deep emissions reductions pathways that simulates a 20 percent reduction in Canada's GHG emissions from 2006 levels by 2020 and a 65 percent reduction in emissions by 2050." The Nyboer Report's findings are that by 2050 virtually all residential and commercial space and water heating

in BC will have migrated from natural gas to electricity. (Exhibit B-11, Panel 1.1, and Attachment 1.0)

TGI's President agreed that under this scenario TGI would be out of business by 2050, but testified "We think it's one of many (possible scenarios). Our concern is what degree of influence it seems to be having in certain circles amongst policy makers." (T3:279-80)

Terasen stated that:

> "Reports of this type to policy makers, with access by consumers, can and does shape the long-term view of policy makers and the broader community respecting a product (in this case, natural gas) and may well be influential in formulating public policy that has long-term negative impacts on the demand for that product (i.e. natural gas). The outcome identified in the Report would reduce throughput on the Terasen natural gas delivery systems, which all else equal, will increase the unit costs to the remaining natural gas customers. In the extreme, the Company could have stranded assets if the roadmap that is outlined in the Report materializes." (Exhibit B-11, Panel 1.1, p. 2)

TGI's President summed up his testimony as follows:

> "We believe that natural gas is a foundational fuel, not a transitional fuel, but we're not sure that all the necessary parties are in alignment with that. We have an absence of a continental carbon policy, we have an absence of a national one, and we've got a lot of vulcanization [balkanization] going on that ultimately needs to be and I think will be resolved. I'm just not sure how all the crumbs are going to fall from that. We're not sitting before this Panel saying the sky is falling. Let us be clear on that. Chicken Little is not in the hearing room...we're not here saying that this company is going out of business." (T3:227-28)

The Commercial Energy Consumers Association of British Columbia ("CEC") submits that the overall result of its evaluation of TGI's risk in 2009 versus 2005 is that significant new positive reductions of risk are now in sight, whereas in 2005 these did not exist. Offsetting this are the new provincial GHG reduction policies which would potentially limit any throughput growth for the utility.

CEC considers the net balance of these overall results to be the key focus of determining if the business risk has changed sufficiently enough to warrant a change to either the allowed ROE or the equity ratio. CEC's assessment of the evidence is: i) that TGI's business risk has not increased appreciably enough to warrant a change to allowed ROE or its equity ratio, and ii) that the Province's GHG policies are so new, and Terasen's analysis and mitigation response are so limited at this time, that Terasen has not established a persuasive case for increased business risk.

CEC submits that it would be premature for the Commission to make assumptions that the business risk surrounding TGI's inability to recover its investment capital has increased until the Commission has one or more scenario projections in evidence which lay out how the targeted reductions might unfold for Terasen and its customers. (CEC Argument, p. 15)

ICG submits that Provincial climate change and energy policies do not necessarily increase TGI's business risks as Provincial energy conservation measures affect throughput, but Terasen's profits are not dependent on volume. ICG characterizes Terasen's concerns about carbon tax impacts after 2012 as "purely speculative," and submits that: "[i]t is premature for Terasen to assume the worst, and seek to impose additional economic burden on its customers that cannot be supported by the current circumstances." (ICG Argument, p. 8)

JIESC submits that "these alleged "risks" (i.e. climate change and First Nations) must be considered in the context of their likely impact on Terasen's capability to earn a return on and a return of, its capital." To the extent there are increased risks arising out of GHGs or First Nation issues, JIESC submits that these risks are "more than offset by the improvements in the competitive position of natural gas in comparison to electricity." (JIESC Argument, p. 20)

Terasen submits that such submissions "should be seen for what they are, and that is an attempt to distract the Commission from addressing the evidence before it," and that the evidence establishes, as even CEC acknowledges, that government policies and legislation have created uncertainty and will have long-term impacts on Terasen's natural gas distribution business. (Terasen Reply, para 28)

3.2.2 First Nations

Terasen submits that the lack of certainty of the nature and extent of aboriginal rights and title in BC together with the lack of treaties combine to create operational and regulatory complexity, and a risk of litigation, that: i) are greater than those faced by similar businesses in other jurisdictions, and ii) contribute to TGI facing a higher degree of risk than utility operations in other provinces. (Exhibit B-1, p. 14)

The Intervenors characterize First Nations' risk to Terasen as "minimal" (JIESC Argument, p. 26) and of "little impact." (BCOAPO Argument, para 29)

In Reply, Terasen submits that the primary issue in respect of First Nations risks is the increase in these risks since 2005, and none of the Intervenors suggested that there has been no increase in this risk in the past five years. (Terasen Reply, para 76)

3.2.3 Other Key Factors

As for the other key factors, Terasen submits that natural gas' competitive position relative to electricity has been weakened, that TGI is capturing a smaller percentage of new construction; electricity is increasingly the choice of high-density housing; alternative energy sources further weaken TGI's competitive position; that fuel switching has also diminished demand for natural gas; and that the use of gas per account continues to decline. Terasen states that many factors have been exacerbated by the uncertainty created by the provincial climate change initiatives and the introduction of the carbon tax.

BCOAPO rejects Terasen's claim that TGI's competitive position relative to electricity in BC has decreased since 2005 and submits that the exact opposite is true, citing the introduction by BC Hydro of the Residential Inclining Block rate as having actually made natural gas more competitive relative to electricity, especially for single family dwellings. BCOAPO submits that "the alleged

threat" faced by Terasen due to government policies taken as a whole is not 'profound' and has not materially increased Terasen's business risk such that their common equity ratio should be changed. (BCOAPO Argument, para 19, 20)

ICG submits that the competitive position of natural gas relative to electricity has not been weakened, and that "at the very least, Terasen is currently maintaining its competitive position with BC Hydro." (ICG Argument, p. 8)

Terasen submits that future electricity prices are uncertain due to the extent of, and cost of, resource additions and other factors, but "what is known is that BC Hydro does have major, historic low-cost, hydro-electric resources...and due to the size of those resources, relatively low electric prices will continue long into the future. On the other side of the cost comparison between the cost of natural gas and electricity to consumers is the commodity price of natural gas. It appears to be common ground between the Terasen Utilities and Intervenors that natural gas commodity prices are volatile." (Terasen Reply, para 48-49)

Terasen also submits that the submissions of the Intervenors would have the Commission believe that if the annual cost of natural gas to the consumer is less than the annual cost of electricity then TGI does not have an increase in business risk from 2005. Terasen further submits that by focusing on cost comparisons the Intervenors' submissions fail to take into account the uncertainty and business risks associated with non-cost factors such as public perception and changes in behaviour that are required by government regulation. According to Terasen: "There can be no doubt that the mantras of provincial government energy policy are the promotion of 'clean' forms of energy, such as 'clean electricity,' and the reduction in GHG emissions." (Terasen Reply, para 57)

3.3 TGI's Short-Term Business Risk

Terasen provides a comparison of TGI's earned ROE with its allowed ROE for the years 1992-2008. In the 15 years since the introduction of the AAM in 1994 the comparison shows that it has earned more than its allowed ROE in 13 years and earned less in two years. TGI's allowed and achieved

ROEs for the years 2004-2009 are set out in the table below. In these years, TGI has been operating under a performance based regulation regime under which it shares any over-achievements with its customers. (Exhibit B-6, BCUC 91.1)

Year	Allowed ROE (%)	Achieved ROE (%) Pre-sharing	Achieved ROE (%) Post-sharing	Incentives Earned ($000)
2004	9.15	9.344	9.247	1,179
2005	9.03	10.784	9.907	6,969
2006	8.80	10.472	9.636	7,147
2007	8.37	10.729	9.550	10,018
2008	8.62	10.637	9.628	8,726

(Source: Exhibit B-6, BCUC 91.1)

Terasen states that in July 2003 TGI received Commission approval of a negotiated settlement for a 2004-2007 Performance Based Review ("PBR") which established a process for determining its delivery charges and incentive mechanisms for improved operating efficiencies and included incentives for it to operate more efficiently through the sharing of the benefits between it and its customers.

The PBR Settlement included ten service quality measures designed to ensure TGI maintained adequate service levels and set out the requirements for an annual review process between TGI and interested parties regarding its current performance and future activities. The PBR Settlement provided for a 50/50 sharing mechanism of earnings above or below the allowed return on equity beginning in 2004.

Terasen states that in 2007 TGI applied to extend the 2004-2007 PBR Settlement agreement to 2008-2009, which the Commission approved (Exhibit B-3, Attachment 39.1), and that with the expiry of PBR and related incentive earnings, it becomes more important that the Commission ensure that TGI's investors are afforded a fair return. (Exhibit B-3, BCUC 39.2)

TGI's short-term business risk and its ability to earn a return on its capital in the short-term is affected by the Commission's approval of a number of deferral accounts which permit TGI to defer variances relating to gas commodity costs, the effect of weather, variations in residential and commercial customer usage and certain expense categories such as property taxes and short-term interest rates.

TGI provided the following table showing the dollar value and percentage of its 2009 total revenue requirement and its 2009 delivery margin revenue requirement covered by deferral accounts:

	Revenue Requirement		Revenue Requirement Covered by Deferred Charges			Revenue Requirement Not Covered by Deferred Charges	
Revenue Requirement Item	$000's	% of Total	% Covered by Deferred Charges	($000's)	% of Total Revenue Requirement	($000's)	% of Total Revenue Requirement
Cost of Gas	$ 1,187,999	70.3%	100.0%	$ 1,187,999	70.3%	$ -	0.0%
Operation & Maintenance Expenses	174,942	10.4%	4.9%	8,570	0.5%	166,372	9.9%
Property and Sundry Taxes	47,593	2.8%	100.0%	47,593	2.8%	-	0.0%
Depreciation and Amortization	89,685	5.3%	0.0%	-	0.0%	89,685	5.3%
Other Operating Revenue	(23,444)	-1.4%	4.3%	(1,000)	-0.1%	(22,444)	-1.3%
Income Taxes *	26,331	1.6%	0.0%	-	0.0%	26,331	1.6%
Interest	110,953	6.6%	94.4%	104,691	6.2%	6,262	0.4%
Equity Earned Return	75,360	4.5%	0.0%	-	0.0%	75,360	4.5%
Total Revenue Requirement	**1,689,419**	**100.0%**		**1,347,853**	**79.8%**	**341,566**	**20.2%**
Total Delivery Margin Revenue Requirement	**501,420**	**100.0%**		**159,854**	**31.9%**	**341,566**	**68.1%**

* Since deferral accounts are maintained on a net-of-tax basis, to the extent any amounts were charged to or credited to deferral accounts, there would be an offsetting income tax impact

(Exhibit B-3, BCUC 88.2)

Terasen submits that TGI's deferral accounts have changed little since 2005, and points to the Commission's finding relating to TGI's gas commodity costs deferral accounts at page 25 of the 2006 ROE Decision that, "the vast majority of gas distribution companies in North America have some form of commodity deferral account, and that this protects both the utility from commodity risk and the customers from imprudent purchasing and from the utilities profiting from the purchase, transportation and storage of gas."

In the 2006 ROE Decision, the Commission also observed that for many of the other costs that have deferral account treatment, "that TGI is not penalized for underestimating or rewarded for overestimating a cost over which it has little or no control." Terasen submits that this observation of the Commission remains valid.

Terasen also cites the Commission's discussion of TGI's Revenue Stabilization Adjustment Mechanism ("RSAM") deferral account in the 2006 ROE Decision, where it referred to two facets of the account, the first as a weather normalization account, and the second to enable TGI to defer margin variances arising from residential and commercial customers consuming more or less gas than forecast. As for weather normalization, the Commission was of the view that TGI was similar to a number of utilities in North America that can defer the effects of temperature on usage. Since weather is a symmetrical risk, with equal odds of over and underachieving, the Commission determined that it should not be taken into account when establishing return on equity.

The Commission considered the second facet of the RSAM to be a short-term business risk mitigant, which was not available to TGI's comparators.

Terasen points out that the RSAM does not mitigate the risk associated with TGI's forecast customer additions, as it only relates to use per account, and submits that with regard to the statement that margin variance accounts are not available to other utilities, that an increasing number of other utilities both in Canada and the US now have decoupling protection, which is required to ensure that a utility is not deterred from or economically disadvantaged by undertaking energy conservation programs. In those instances where per customer usage varies from forecast because incorrect values were accepted by the regulator, Terasen submits that the values would have been accepted with no symmetrical bias. Accordingly Terasen submits that neither facet of the RSAM should be taken into account when determining return on equity, and that the RSAM should not be taken into account in considering the long-term business risks of TGI. (Terasen Argument, para 46)

3.4 Capital Structure

All three of Terasen's expert witnesses commented on the equity ratio of TGI and compared it with major natural gas LDCs in Canada, utilities in Ontario, and US utilities.

Terasen sets out the equity ratios of the other major natural gas LDCs in Canada as follows:

Company	Equity Ratio (%)
TGI	35.01
ATCO Gas[1]	38.00
Union Gas	36.00
Enbridge Gas ("EGDI")	36.00
Gaz Metro	38.50

(1)ATCO Gas' equity ratio was increased to 39 percent by AUC Decision 2009-216.

(Source: Exhibit B-1, p. 13)

Ms. McShane also observes that ATCO Gas, Union Gas and EGDI all have preferred shares in their capital structures, whereas TGI does not, and that since 2005, the NEB has approved increases in the equity ratios of a number of gas pipelines it regulates. (Exhibit B-1, Tab 3, pp. 32-33)

Ms. McShane testified that TransCanada's increase of equity ratio to 40 percent was a result of a negotiated settlement and that she was not aware of what was traded off in return for the increase. She acknowledged that she was not aware of any regulatory agency putting weight on the equity ratios that come out of negotiated settlements. (T4:475-77)

Mr. Carmichael recommends that the Commission increase TGI's deemed equity base to at least 40 percent to achieve an appropriate stand alone financing structure. According to Mr. Carmichael, such an increase would be consistent with decisions in other Canadian regulatory jurisdictions, and primarily in Ontario, which has chosen to increase the common equity bases of i) natural gas LDCs to 36 percent for Union Gas and EGDI (in addition to their preferred shares) and ii) electric LDCs to 40 percent for Toronto Hydro and other major LDCs. The increase would also recognize that TGI must compete for debt and equity funds against thicker equity capitalized gas distribution companies from the US. (Exhibit B-1, Tab 2, p. 50)

Dr. James H. Vander Weide was retained by Terasen to: i) assess the validity of the AAM, ii) conduct an analysis of the cost of equity for TGI, and iii) recommend an appropriately fair ROE and deemed equity ratio for TGI. In his filed evidence he states that during the period 2006-08 the average approved equity ratio for US electric utilities, and for US natural gas utilities, was 48 percent and 49 percent, respectively, and that these were significantly higher than the approved equity ratio for TGI. (Exhibit B-1, Tab 4, p. 35)

JIESC submits that the only relevant changes in common equity ratios are the changes for Union Gas and EGDI, whose common equity ratios have both increased from 35 percent to 36 percent since 2005 (with the increase in Union Gas's common equity ratio being, "the result of a negotiated settlement under which presumably the interveners received value"). Since it considers TGI to be less risky than these utilities, it submits that TGI should continue to have a lower equity ratio. (JIESC Argument, p. 29)

In Reply, Terasen submits that Union Gas and EGDI have less business risk in that electric prices in the service areas of Union Gas and EGDI are higher than BC Hydro prices, and in that neither Union Gas nor EGDI are subject to government policies and legislation similar to the energy-related policies of the BC provincial government. Terasen submits that the risks of TGI are greater than those of both Union Gas and EGDI. (Terasen Reply, para 84)

3.5 Credit Ratings and Metrics

Terasen states that TGI's debt is currently rated by all three major debt rating agencies, Moody's, DBRS, and Standard & Poor's (on an unsolicited basis only), and that Moody's debt rating of A3 for TGI's senior unsecured debentures is the lowest rating of the three agencies and is only one level above the Baa rating category. Since it believes that bond investors are more likely to focus on the lowest rating, TGI focuses on Moody's ratings and guidelines. (Exhibit B-1, Tab 3, p. 33)

Terasen filed a Moody's report entitled *"Rating Methodology: North American Regulated Gas Distribution Industry (Local Distribution Companies),"* dated October 2006 which covers 30 gas utilities in North America (Canada and the United States). (Exhibit B-6, BCUC Attachment 111.1, p. 1)

Moody's states that the focus of its rating methodology is on the "pure" gas LDCs in North America and is concerned principally with operating utilities regulated by their local jurisdictions and not with gas utilities owned by parent holding companies that have other non-regulated businesses. TGI is the only Canadian utility included in the report, which focuses on the following core rating factors:

- sustainable profitability;
- regulatory support;
- ring fencing; and
- financial strength and flexibility.

In addition, the report analyzes factors that are common across all industries such as liquidity, corporate governance, event risk, and legal structure.

The report describes the methodology used to rate a gas utility company which focuses on the following factors and gives them the following weights:

- Sustainable Profitability
  - Return on Equity (15 percent)
  - EBIT [Earnings before Income Taxes] to Customer Base (5 percent)
- Regulatory Support
  - Regulatory Support and Relationship (10 percent)
- Ring Fencing
  - Ring Fencing (10 percent)

- Financial Strength and Flexibility
  EBIT/Interest (15 percent)
  Retained Cash Flow/Debt (15 percent)
  Debt to Book Capitalization (excluding goodwill) (15 percent)
  Free Cash Flow/Funds from Operations (15 percent).

The following table sets out TGI's ratings by Moody's and where on the "factor mapping" the ratings place TGI:

Category	**Metric/Comment**	**Indicated Rating**
Return on Equity	9%-14%	A
EBIT to Customer Base	>$350/customer	Aaa
Regulatory Support and Relationship	"Very good, proactive support"	Aa
Ring Fencing	"Very good provisions"	Aa
EBIT/Interest	1 – 2x	Ba
Retained Cash Flow/Debt	5 – 10%	Ba
Debt to Book Capitalization	65 – 85%	Ba
Free Cash Flow/Funds from Operations	(15%) – (30%)	A

The report notes with respect to TGI that: "Notwithstanding TGI's relatively low risk business profile, its financial profile is considered weak at the A3, senior unsecured rating level. Accordingly, further sustained weakening of TGI's financial metrics, for instance ROE below 8 percent, EBIT/Interest below 2x, RCF [Retained Cash Flow]/Debt below 5 percent and/or Debt/Book Capitalization (excluding goodwill) above 65 percent, would likely lead to a downgrade of TGI's rating." The report concludes that TGI's model rating would be a Baa1.

In its May 2009 report affirming TGI's A3 rating, Moody's cautions:

> "However, in the context of the current low interest rate environment and weaker economy, Moody's is becoming concerned that TGI's credit metrics could deteriorate to levels that, despite the relative supportiveness of TGI's regulatory environment, are not commensurate with the company's existing A3 senior unsecured rating and therefore could lead to a negative rating action...Moody's will be following the progress of TGI's cost of capital application and its pending application for 2010 rates to determine their impact on TGI's financial profile." (Exhibit B-3, BCUC 1.86.2)

Terasen states that a credit rating downgrade below the A rating category could lead to TGI being required to post letters of credit with its counterparties, which would incur a direct cost in the form of letter of credit fees. In addition, and of more concern, would be the potential restriction this could place on TGI's commodity hedging activities, which can extend out three years, and where given the volatility in gas prices, the mark to market exposure on a derivative can vary significantly. When TGI enters into financial hedges, it restricts its activities to A or higher rated counterparties, and, with a B rating, could face similar restrictions and be constrained in pursuing its hedging activity, to the potential detriment of its customers. (Exhibit B-1, p. 37)

The impact of a downgrade by Moody's is also considered by Ms. McShane who opines that a downgrade increases the cost of the new debt, but also affects outstanding debt. An increase in the cost of debt to a utility increases the required yield on the outstanding debt and reduces the value of that debt. Since existing holders are the most likely purchasers of future issues, a debt rating downgrade, with resulting negative impact on the value of their existing holdings, would likely make them less willing to purchase future issues. (Exhibit B-1, Tab 3, p. 27)

JIESC submits that TGI's consistent "A" bond ratings are due to the regulatory regime and the constancy of TGI's earnings and do not appear to be in jeopardy. The JIESC submits that if the Commission does conclude that TGI's "A" rating is in jeopardy, it should "pick a low cost alternative to protect it, like the issuance of preferred shares rather than increase the equity ratio." JIESC also points out that while TGI may appear to have weak credit metrics in comparison to US utilities, it

has a higher bond rating than most US utilities and submits that the credit rating which looks at utilities' total risk profile is more important than credit metrics, which represent one item assessed in determining the bond rating. (JIESC Argument, pp. 29-30)

In Reply, Terasen submits that preferred shares are inefficient, and not the appropriate means of addressing credit rating metrics, since: i) Moody's views such preferred shares more as debt instruments, and therefore the issuance of preferred shares would not address concerns with credit rating metrics, and ii) the dividends on preferred shares are not tax deductible, on a debt equivalent basis, the debt component is an expensive form of debt. (Terasen Reply, para 83)

3.6 Interest Coverage Ratios

Terasen states that TGI currently has one of the weaker credit metrics of the sample Canadian utilities, and is lower than the group average. Terasen compares TGI's interest coverage ratio with those of its Canadian peers as follows:

Utility	2005	2006	2007	2008
EGDI	2.29	1.80	2.24	2.27
Gaz Metro	2.65	2.45	2.30	2.21
Union	2.09	1.91	2.24	2.28
TGI	1.94	2.00	1.95	1.96

(Source: Exhibit B-1, Table 7.4, p. 40)

Terasen states that TGI's trust indenture provides that TGI will not issue debentures or other debt instruments other than Purchase Money Mortgages ("PMM") maturing 18 months or more after date of issue unless consolidated available net earnings are at least two times the annual interest requirements on all additional obligations (including the additional debt to be issued).

Terasen states that TGI has outstanding PMMs totalling approximately $275 million, which fall due in 2015/16 and that, while a determination has not been made, it is currently of the view that it may not be able to reissue the PMM's on maturity with the result that they will be refinanced with unsecured debentures. Since the PMM's are not subject to the issuance coverage test, while the unsecured debentures that refinance them would be, Terasen states that the refinancing of its PMM's on their maturity will lead to further constraints on the issuance coverage test.

Terasen provides Exhibit B-28, which discusses the coverage test and attaches a table which demonstrates that at 35 percent equity and an 8.43 percent ROE it would have difficulty in issuing $100 million of unsecured debt in 2009. (Exhibit B-28)

Commission Determination

Based on the Commission's assessment of TGI's long-term business risk in its 2006 ROE Decision, the fact that TGI has no preferred shares in its capital structure, and a comparison with the other major natural gas LDCs in Canada, the Commission Panel considers that the equity ratio of TGI, remains in the range of 35 percent to 38 percent before considering the impact of any change in TGI's long-term business risk that has occurred since 2005.

The Commission Panel agrees with the Intervenors that all risks cited by Terasen existed in 2005 with the exception of the climate change related risks and those related to First Nations.

As for the existing risks, the Commission Panel does not see how TGI's ability to earn a return on or of its capital has been adversely affected since 2005. Although all Intervenors identify the competitive position of natural gas compared with electricity as one risk which has diminished since 2005, the Commission Panel considers that natural gas' competitive edge over electricity is dependent on too many significant variables, such as the level of the carbon tax, the volatility of natural gas prices and the impact of government policy on BC Hydro's rates, to be considered permanent.

As for concerns about the risks posed by First Nations, the Commission Panel agrees with Terasen that the risks did not exist in 2005, to the extent they are currently perceived, and that they constitute an increase in risk over natural gas LDCs operating in other provinces. The Commission Panel does not consider that the risks presently cast doubt over TGI's ability to earn a return on or of its capital.

The Commission Panel agrees with Terasen that the introduction of climate change legislation by the provincial government has created a level of uncertainty that did not exist in 2005 and that the change in government policy will quite probably cause potential customers not to opt for natural gas and persuade potential retrofitters to opt for electricity. In addition, the Commission Panel considers that the Nyboer Report presents a scenario that did not exist in 2005 under which the three Terasen utilities might not earn a return of their capital. The scenario that now exists is described in a publication of a reputable consulting group which appears to have the attention of policymakers.

As for the evidence that US natural gas LDCs have thicker equity ratios than their Canadian counterparts, the Commission Panel notes that no reasons for the difference were entered into evidence. The Commission Panel concludes that the difference between US and Canadian natural gas LDCs' equity ratios is not of itself determinative.

The Commission Panel considers that TGI's business risk has increased since 2005. In the Commission Panel's opinion the additional risk suggests an equity ratio for TGI of 40 percent. **Accordingly, the Commission Panel determines that the appropriate equity ratio for TGI is 40 percent effective January 1, 2010.**

As it did in its 2006 ROE Decision, the Commission Panel requires TGI to file within 30 days of this Decision a document setting out how and when it will implement this change to its capital structure in compliance with the ring-fencing conditions approved by the Commission in its Order G-49-07.

4.0 THE APPROPRIATE RETURN ON EQUITY FOR TGI

The issue that is addressed in this Section is: Given TGI's capital structure, what is the appropriate ROE for TGI and what approaches to its determination should the Commission Panel give weight?

There are several approaches used to determine ROE, none of which is universally preferred. Therefore, in order to determine the appropriate ROE for TGI, the Commission Panel must first review the main approaches for determining an appropriate ROE and decide how much weight to accord the results from each.

The approaches are reviewed in Section 4.1, below. Once they have been reviewed and the Commission Panel has determined how much weight to give to each, it then reviews, in Section 4.2, the results from each of the approaches as calculated by the various experts, to determine the appropriate ROE for TGI.

4.1 The Approaches used to Determine ROE

Terasen identifies three approaches used to determine ROE:

1) Discounted cash flow ("DCF");
2) Equity risk premium ("ERP");and
3) Comparable earnings ("CE").

Ms. Mc Shane states that: "Each of the tests is based on different premises and brings a different perspective to the fair return on equity. None of the individual tests is, on its own, a sufficient means of estimating the fair return; each of the tests has its own strengths and weaknesses. Individually, each of the tests can be characterized as a relatively inexact instrument; no single test can pinpoint the fair return." (Exhibit B-1, Tab 3, p. 42)

4.1.1 Discounted cash flow approach

Terasen submits that the discounted cash flow approach for the determination of the return on equity of regulated utilities is an approach that has been widely accepted, and widely used for many years, even though in recent years the use of the DCF approach by Canadian regulatory agencies has been limited. Terasen cites an article by Dr. Makholm from *Public Utilities Fortnightly* dated May 15, 2003 entitled, "In Defence of the Gold Standard," where Dr. Makholm stated that, "the DCF method has endured [in the US] for most of the past two decades for three basic reasons:

- It rests on a solid, straightforward theoretical base;
- It capitalizes on the depth of U.S. capital markets-meaning analysis can use "proxy groups" of publicly traded companies in the same industry to manage the variability of individual company DCF calculations; and
- It makes use of company growth projections from disinterested industry analysts-a key attribute for a method to gauge the opportunity cost of capital in the mind of investors." (Exhibit B-20)

Dr. Booth states that, "…the DCF estimate is particularly appropriate for use in determining the fair rate of return for a regulated utility." (Exhibit C11-5, Appendix C, p. 4)

JIESC submits that, "By comparison [with the Capital Asset Pricing Model ("CAPM")] DCF and comparable earnings are black boxes with numerous judgements and are much less constrained by the facts." (JIESC Argument, p. 2)

JIESC points out that the DCF approach has not been accepted by a Canadian regulator in the last 10 years. In addition it points out that Ms. McShane's discounted cash flow test uses a sample of US gas and electricity utilities and relies on *Value Line* and Thomson Reuters I/B/E/S ("I/B/E/S") forecasts for estimating earnings growth. The JIESC submits that "this [reliance] still suffers from the strong possibility of upward bias and should be subject to considerable caution before being used." (JIESC Argument, p. 39)

Terasen replies that there is no suggestion that *Value Line* forecasts suffer from upward bias, and that Dr. Vander Weide testified that studies that have purported to show upward bias have statistical errors.

Terasen takes issue with the characterization of the DCF and CE tests by JIESC as "black boxes" and submits that the criteria used by Ms. McShane in selecting companies of comparable risk are objective and explicit, and focus on characteristics to ensure comparability. The way the returns are measured in both the DCF and comparable earnings approaches are transparent, and the tests, in contrast to the CAPM, are compatible with meeting the comparable returns requirement. (Terasen Reply, para 104)

4.1.2 Equity Risk Premium Approach

Terasen submits that the equity risk premium test is derived from the concept that there is a direct relationship between the level of risk assumed and the return required. Since an investor in common equity takes greater risk than an investor in bonds the equity investor requires a premium above bond yields in compensation for the greater risk.

Terasen states that the Capital Asset Pricing Model ("CAPM") is one of the equity risk premium models, and is the most common, but not the only one. CAPM is based on a portfolio investment theory and relies on the premise that an investor requires compensation for non-diversifiable risks only. Non-diversifiable risks are those risks that are related to overall market factors (e.g., interest rate changes, economic growth), while company-specific risks, according to CAPM, can be diversified away by investing in a portfolio of securities; therefore, the investor requires no compensation to bear those risks. (Terasen Argument, para 296)

Under the CAPM approach, ROE is calculated using the following formula:

ROE = Risk-Free Rate + {Relative Risk Adjustment x Market Risk Premium}

In CAPM, risk is measured using the relative risk adjustment, known as beta. Theoretically, the beta is a forward looking estimate of the contribution of a particular stock to the overall risk of a portfolio. In practice, the beta is a calculation of the historical correlation between the overall equity market returns, as proxied in Canada by the returns on S&P/TSX Composite Index, and the returns on individual stocks or portfolios of stocks. (Exhibit B-1, Tab 3, p. 45)

Ms. McShane states that the "raw" betas for publicly-traded Canadian regulated gas and electric companies, the TSE Gas/Electric Index, and the S&P/TSX Utilities Sector declined significantly in the periods between 1993 and 1998 and between 1999 and 2005, and that following an increase in 2007 to 0.50, the utility betas again declined in 2008 to approximately 0.25. These "raw" betas of approximately 0.25 for Canadian utilities provide virtually no explanatory power in terms of capturing utility investors' return expectations. While that is clear, the more difficult task is to determine if and how the "raw" beta values can be translated into a relative risk adjustment that does provide an indication of the return requirements of utility investors. In order to arrive at a reasonable relative risk adjustment, the normative ("what should happen") CAPM needs to be integrated with what has been empirically observed ("what does or has happened").

Ms. McShane states that the practice of adjusting betas toward the equity market beta of 1.0, rather than the calculated "raw" betas, takes account of the observed tendency of stocks with low betas to achieve higher returns than predicted by the simple CAPM and vice-versa. Adjusted betas are a standard means of estimating betas, and are widely disseminated to investors by investment research firms, including Bloomberg, *Value Line* and Merrill Lynch. All three of these firms use a similar methodology to adjust "raw" betas toward the equity market beta of 1.0 and give approximately 2/3 weight to the calculated "raw" beta and 1/3 weight to the equity market beta of 1.0. (Exhibit B-1, Tab 3, p. 56)

Terasen contends that if beta is to be considered a reasonable measure of risk, then the use of the traditional estimate of beta in the CAPM should produce a reasonable estimate of a utility's cost of equity. It calculates that applying conventionally estimated betas for Canadian utilities using the last five years of data in the range 0.25 to 0.30 to a 5-6 percent risk premium on the Canadian

market index yields a utility risk premium of 1.5 percent to 1.8 percent. Adding this utility risk premium to the May 2009 forecast yield on long Canada bonds of 3.69 percent produces a cost of equity in the range 5.19 percent to 5.49 percent. Since this result is "absurdly low" in comparison to current yields on utility bonds, Terasen concludes either that: (1) betas as traditionally measured do not correctly measure the risk of utility stocks; or (2) the CAPM does not apply to the Canadian marketplace. (Exhibit B-3, BCUC 14.5.1)

Ms. McShane calculates the "raw" beta for PNG Ltd. ("PNG") to be 0.26 for 2008 (Exhibit B-1, Tab 3, Schedule 11). Dr. Booth testified that PNG was "the riskiest Canadian utility" (T5:603).

JIESC addresses adjustment to beta, noting that Dr. Booth concluded that it is unreasonable to just use the statistical estimate without recognising the underlying events that caused it, and then to make the appropriate adjustments. JIESC submits that Ms. McShane confirmed that no regulatory agency in Canada has accepted adjusted betas and that in the TQM Decision the NEB specifically rejected adjusted betas. (JIESC Argument, p. 37)

Terasen submits that an ROE based on CAPM fails to meet the Commission's obligation to provide Terasen with the opportunity to earn a fair return on its investment in utility assets in that the CAPM methodology does not, and is not intended to, relate to the business risk associated with an investment in utility assets. Rather, it relates to how the investment in one asset (usually a security) affects the overall riskiness of a basket (or portfolio) of investments. CAPM assumes that an investor has a diversified portfolio of investments and that risk is measured only by reference to the impact that a specific investment has on the overall diversified portfolio; CAPM is not attempting to measure the business risk of a utility or other company. (Terasen Argument, para 146)

The May 2003 article from *Public Utilities Fortnightly* cited above states that:

> "CAPM, by comparison, is abstruse as a piece of theory. Further, because most of the components of the calculation are common to all companies (i.e., the risk-free rate and the market risk premium), the CAPM cannot make use of the law of large

> numbers. That is to say, the problems associated with which risk-free rate to pick, or which market risk premium to adopt, hinder the result, no matter how many companies the calculation are performed upon. Finally, the CAPM has no tie to disinterested company analysts that not only reflect, but also shape, the opinions of investors. It is thus no surprise that the CAPM is vastly less popular among US regulatory commissions as a rate of return method." (Exhibit B-20)

JIESC points to page 35 of Dr. Booth's evidence where he states that CAPM is, "overwhelmingly the most important model used by a company in estimating their cost of equity capital," and cites a 2001 survey of 392 US chief financial officers ("CFOs") in the Journal of Financial Economics. Dr. Booth points out that 70 percent of the US CFOs use CAPM and a further 30 percent use a multi-beta approach similar to his two factor model to measure their own cost of equity. (JIESC Argument, pp. 33, 34)

4.1.3 Comparable Earnings Approach

Terasen states that the comparable earnings approach calculates the achieved earnings returns of a sample of low-risk competitive unregulated Canadian firms over a business cycle.

The comparable earnings test is the only test that explicitly recognizes that, in the North American regulatory framework, the return is applied to an original cost (book value) rate base. The concept that regulation is a surrogate for competition means that the combination of an original cost rate base and a fair return should result in a value to investors commensurate with that of competitive ventures of similar risk.

JIESC cites six basic reasons why Dr. Booth does not use a comparable earned rate of return or comparable earnings approach:

- it is an average not a marginal rate of return;
- it is an accounting rate of return not an economic rate of return;
- it may include the impact of market power;
- it is based on non-inflation adjusted numbers;

- it is earned on historic accounting book equity that does not reflect what can be earned on investments today; and
- it varies with the firms selected in the "comparable earnings" sample.

In addition, the JIESC submits that no regulatory board or commission in Canada has given support to the comparable earnings approach in recent years and that the Alberta Energy and Utilities Board ("AEUB") very explicitly rejected its use in its 2004 Generic Cost of Capital Decision (2004-052). (JIESC Argument, pp. 40-41)

At the Oral Phase of Argument, JIESC noted that the AUC had confirmed the AEUB's 2004 finding about CE at paragraph 281 of AUC Decision 2009-216. (T6:774)

Terasen points out that in his evidence, Dr. Booth, as he had in 2005, agreed in that some of his problems with the CE test also appear in the process of setting rates under regulation, notably that both use an accounting rate of return; it is an average, not a marginal, return; it is based on historic book equity; and based on non inflation-adjusted numbers. (Terasen Argument, para 330)

Terasen submits that the *Act* requires the Commission, "to provide a fair return to the utility and what the utility invests in its infrastructure. It's a fair return to the utility. The *Act* doesn't say it has to be a fair return to the investors in the utility" and notes that the Alberta board rejected CE, "because they said it didn't deal with returns available to investors," which is not the case in BC. (T6:807)

Commission Determination

The Commission Panel has considered the three approaches to determining ROE for a regulated utility and agrees with Terasen that it should take all three into account when establishing an ROE. The Commission Panel agrees that the DCF and ERP are the most common approaches used by regulatory agencies in the US and that CAPM has been widely used in Canada in the period since 1994. The Commission Panel has seen no evidence that suggests: i) it should ignore the fact that

the Commission gave the DCF approach weight in the 2006 ROE Decision, or ii) that would persuade it to depart from the Commission's finding in that decision that the CE methodology had not outlived its usefulness when it commented: "However, the Commission Panel is not convinced that the CE methodology has outlived its usefulness, and believes that it may yet play a role in future ROE hearings."

As for the two most commonly used approaches, the Commission Panel finds that the DCF approach has the more appeal in that it is based on a sound theoretical base, it is forward looking and can be utility specific. The Commission Panel has considered the submission of the JIESC concerning "upward bias" of analysts' estimates and considers that no allegations of upward bias have been levelled against utility analysts and that *Value Line* estimates will be free from any suggestion of upward bias. Accordingly the Commission Panel will not give any weight to suggestions of analyst bias.

The Commission Panel notes that CAPM is based on a theory that can neither be proved nor disproved, relies on a market risk premium which looks back over nine decades and depends on a relative risk factor or beta. The fact that the calculated beta for PNG (considered by Dr. Booth to be the most risky utility in Canada) was 0.26 in 2008 causes the Commission Panel to consider that betas conventionally calculated with reference to the S&P/TSX are distorted and require adjustment.

The Commission Panel will give weight to the CAPM approach, but considers that the relative risk factor should be adjusted in a manner consistent with the practice generally followed by analysts so that it yields a result that accords with common sense and is not patently absurd.

Accordingly the Commission Panel determines that in determining a suitable ROE for TGI, it will give most weight to the DCF approach, some lesser weight to the ERP and CAPM approaches and a very small amount of weight to the CE approach.

4.2 The Evidence Concerning ROE

This part of Section 4 examines the approaches used by the witnesses to develop their recommended ROEs and the results of the tests they applied.

4.2.1 Discounted Cash Flow

The DCF approach was used by both Ms. McShane and Dr. Vander Weide.

Ms. McShane states that there are multiple versions of the DCF model available to estimate the investor's required return. An analyst can employ a constant growth model or a multiple period model to estimate the cost of equity. The constant growth model rests on the assumption that investors expect cash flows to grow at a constant rate throughout the life of the stock. Similarly, a multiple period model rests on the assumption that growth rates will change over the life of the stock.

Ms. McShane states that to estimate the DCF cost of equity she used both models and applied the discounted cash flow test to a sample of low risk US "pure-play" electric and gas distributors that were intended to serve as a proxy for TGI. In applying the DCF test, she states she relied solely on published forecast growth rates that were readily available to investors. In applying the constant growth model, she relied primarily on the consensus (mean) of analysts' earnings growth rate forecasts as the proxy for investors' long-term growth expectations.

To estimate the ROE, Ms. McShane selected a sample of low risk US electric and natural gas distribution utilities, which met the following criteria: were classified by *Value Line* as a gas distributor or an electric utility; had a *Value Line* Safety Rank of "2" or better; had a Standard & Poor's business risk profile of "Excellent" and a debt rating of A- or higher; was not presently being acquired; and had a consistent history of analysts' forecasts.

Thirteen utilities met these criteria of which four (Dominion Resources, Duke Energy, FPL, and Southern Co.) were electric utilities with significant regulated generating assets. (Exhibit B-1, Tab 3, pp. 64-66 and Appendix C)

Ms. McShane agreed that, with the possible exception of Southern Co., such utilities would have to raise considerable amounts of capital replacing their generating assets. (T4:570)

Dr. Vander Weide applied the DCF model to the *Value Line* electric and natural gas utilities which he selected from all the utilities in *Value Line*'s electric and natural gas industry groups that had paid dividends during every quarter and did not decrease dividends during any quarter of the past two years, had at least three analysts included in the I/B/E/S mean growth forecast, were not in the process of being acquired, had a *Value Line* Safety Rank of 1, 2, or 3, and had investment grade S&P bond ratings.

Dr. Vander Weide's selection criteria captured ten natural gas LDCs (a number of which were also featured in Moody's report attached to Exhibit B-6, BCUC 111.1) and 24 *Value Line* electric utilities. The latter included some of the largest generating utilities in the US as well as a number of combination gas and electric utilities. (Exhibit B-1, Tab 4, pp. 33, 60, 61)

Ms. McShane states that her constant growth models indicate a cost of equity of approximately 11 percent. Her two-stage model is based on the premise that investors expect the growth rate for the utilities to be equal to the analysts' forecasts (which are five year projections) for the first five years, but, in the longer-term (from year six onward) to migrate to the expected nominal long-run growth rate of 5 percent per annum in the economy, and indicates a cost of equity of approximately 10.4 percent (Exhibit B-1, Tab 3, p. 66 and Schedule 18). Ms. McShane updated her constant growth model in Exhibit B-3, BCUC 65.3 and found the result of 11 percent to be "virtually identical."

Dr. Vander Weide concludes that the cost of equity using a constant growth approach is 12.4 percent for the 24 *Value Line* electric utilities in his study and 11.5 percent for the ten *Value Line* natural gas utilities. In response to an Information Request ("IR"), he updated these percentages as of July 2009 to 11.5 percent and 11.9 percent respectively. (Exhibit B-6, BCUC 107.1)

Dr. Vander Weide testified that he did not seek to eliminate utilities which were not "pure-play" natural gas distribution utilities from his study, and that had he done so he might have eliminated Equitable Resources and Questar Corp from his *Value Line* LDCs on the grounds that both companies have significant upstream operations. This would have reduced the cost of equity for his remaining eight "pure-play" *Value Line* LDCs to "something like" 10.5 percent. (T3:388)

JIESC submits that since dividend yields for the period of January 2009 to March 2009 are "biased upwards because stock market prices were at all time lows," the utilization of these yields together with long term I/B/E/S growth forecasts by Ms. McShane will substantially overstate investors' required returns.

Terasen replies that in the response to IR in Exhibit B-3, BCUC 65.3.1, Ms. McShane had updated her results and concluded that the estimated "bare-bones" ROE derived from the constant growth DCF model was virtually identical to the 11.0 percent she had estimated at the time her evidence was filed. (Terasen Reply, para 113)

Terasen discusses the regulatory treatment of US LDCs and of TGI in its Argument. It cites the CEA report for the CGA which states in its Executive Summary: "There are of course differences in regulatory treatment from province to province and from state to state. But we find generally that there is no persistent difference in regulatory legislation or rule making between Canada and the US."

Terasen submits that the rate setting methodologies of the *Value Line* US LDCs and TGI are quite similar. Both the *Value Line* US LDCs and TGI are subject to rate of return regulations which are designed to provide the companies an opportunity to recover prudently incurred costs and earn a

fair rate of return on their investments. In addition, the US LDCs and TGI both benefit from the availability of cost recovery mechanisms that are designed to reduce regulatory lag. (Terasen Argument, para 346-347)

Terasen states that most US gas utilities have automatic rate adjustment mechanisms for purchased gas costs and weather normalization, and that many US gas utilities have decoupling mechanisms that seek to stabilize revenues by "decoupling" gas rates from gas volumes. Decoupling occurs either through a rate design that allows recovery of fixed costs from fixed monthly charges, or through a revenue normalization adjustment mechanism that increases rates or refunds rates to customers for the difference between actual revenues and authorized revenues. (Exhibit B-3, BCUC 74.3)

Terasen identifies another difference in regulatory treatment in that Canadian regulatory agencies do not allow natural gas LDCs to recover deferred income taxes in the rates they charge their customers while US state regulators in the most part do (Exhibit B-11, Panel 1.1). Terasen testified that, at December 2008, TGI had $261 million of income taxes it had not collected from its customers (T3:286).

Dr. Booth states that in 1978 many US utilities faced, "significant regulatory lag that exposed utilities to inflation risk...Subsequently, two factors have largely removed this risk: the decline in inflation and the adoption of forward test years." (Exhibit C11-5, Appendix C, p. 9)

Dr. Vander Weide testified that it was no longer a "rule of thumb" that US regulatory bodies used historic test years to set rates, that there are now many that have forward-looking test years, and that those without forward-looking test periods are able to adjust their historical test periods for known and measurable changes such as commissioning a new plant or a negotiated pay increase settlement. (T3: 391)

Terasen filed the actual earned ROEs of the *Value Line* LDCs which demonstrate that of the eight "pure-play" LDCs (that is ignoring Equitable and Questar), three consistently earned less than their allowed returns and the remaining five earned at or around their allowed ROEs. By excluding Equitable and Questar, the average ROE earned by the 8 remaining *Value Line* LDCs ranged from 10.1 percent to 11.3 percent in the period 2004-2008. (Exhibit B-28)

In its Argument, JIESC quotes Dr. Booth's evidence that:

> "The regulation of US utilities suffers from the same philosophical and cultural factors in the US and there is no reason to believe that the results are any different. Without examining US regulatory practise in detail, since much of it is the result of individual state regulation, Canadian utilities seem to be regulated on a much more pro-active basis with very little regulatory lag. In contrast, it appears that US utilities sometimes go several years between rate hearings. Canadian utilities also seem to make more use of deferral accounts. As a result, there is little to be gained from looking at US utilities without making significant risk adjustments which is rarely done. However, since the underlying operations are similar and there is increasing uncontested evidence presented on behalf of the utilities, I have started to examine them". (Exhibit C11-5, Appendix G, p. 2 cited at JIESC Argument, p. 46)

Commission Determination

The Commission Panel agrees that Canadian data do not lend themselves to the DCF approach due to the very limited universe of stand-alone utilities in Canada and the lack of sufficient analysts' forecasts. However, the Commission Panel has also found that US data can act as a proxy for Canadian data where adequate Canadian data do not exist. Accordingly, the Commission Panel determines that the four DCF tests before it are relevant.

The Commission Panel places no weight to Dr. Vander Weide's US *Value Line* electric utilities test, since it included a large number of very large US vertically integrated utilities with significant amounts of generation assets. Not only did the inclusion of these very large US vertically integrated utilities tend to skew the results upwards, but they were not in the Commission Panel's view suitable comparators for a "pure-play" natural gas LDC like TGI.

The Commission Panel gives the most weight to Dr. Vander Weide's *Value Line* natural gas LDC DCF test and to both Ms. McShane's DCF tests. The Commission Panel eliminates the two *Value Line* gas utilities which had significant non-utility operations (Equitable and Questar) from Dr. Vander Weide's test and the four large vertically integrated electric utilities from Ms. McShane's two-stage DCF test. The Commission Panel considers a return in the range of 10.0 percent to 10.5 percent to be a starting point for determining TGI's ROE using the DCF approach.

The Commission Panel agrees with Dr Booth that "significant risk adjustments" to US utility data are required in this instance to recognize the fact that TGI possesses a full array of deferral mechanisms which give it more certainty that it will, in the short-term, earn its allowed return than the *Value Line* US natural gas LDCs enjoy. The Commission Panel notes Dr. Booth's suggestion that the risk premium required by US utilities is between 90 and 100 basis points more than utilities in Canada require may set an upper limit on the necessary adjustment. Accordingly, the Commission Panel will reduce its DCF estimate by between 50 and 100 basis points to a range of 9.0 percent to 10.0 percent, before any allowance for financing flexibility.

The Commission Panel's determination on the allowance for financing flexibility appears later in this Section.

4.2.3 Equity Risk Premium

Ms. McShane performs three ERP tests: i) a risk-adjusted equity market risk premium test; ii) a DCF-based equity risk premium test; and iii) a historic utility equity risk premium test. (Exhibit B-1, Tab 3, pp. 43-63)

Dr. Vander Weide performs two ERP tests, an *ex post* risk premium and an *ex ante* risk premium test. His *ex post* risk premium test measures the required risk premium on an equity investment in TGI from historical data on the returns experienced by investors in Canadian utility stocks compared to investors in long-term Canada bonds. His *ex ante* risk premium test is based on

studies of the expected return on comparable groups of utilities in each month of the study period compared to the interest rate on long-term government bonds. (Exhibit B-1, Tab 4, pp. 30 and 32)

Dr. Booth relies on what he terms a 'classic' CAPM risk premium model and a two-factor model. The 'classic' CAPM estimate is based on an historic average market risk premium "adjusted" for the changing risk profile of the long Canada bond, while his two-factor model takes into account the interest rate sensitivity of utility stocks. As a check to his results he uses a DCF based utility risk premium test. (Exhibit C11-5, p. 56)

The table below summarizes the results of the tests performed:

Witness	Test	Indicated ROE	FFA	Total ROE
Ms. McShane	Risk-Adjusted Equity Market Risk Premium Test	8.75%	0.50%	9.25%
	DCF-Based Equity Risk Premium Test	10.00%[1]	0.50%	10.50%
	Historic Utility Equity Risk Premium Test	10.50%	0.50%	11.00%
Dr. Vander Weide	*Ex post* Risk Premium	9.20%	0.50%	9.70%
	Ex ante Risk Premium	11.40%	N/A	11.40%
Dr. Booth	"Classic" CAPM	7.00%	0.75%	7.75%
	Two-stage CAPM	7.00%	0.75%	7.75%

([1]) Revised by Ms. McShane to 9.5 percent. (T4:452)
(Source: Exhibits B-1, Tab 3, p. 63; B-1, Tab 4, p. 35; and C11-5, p. 56)

A comparison of Ms. McShane's risk-adjusted equity market risk premium test and Dr. Booth's "classic" CAPM tests show the following assumptions and results:

	Ms. McShane	Dr. Booth
Long-term Canada bond yield	4.25%	4.50%
Equity risk premium	6.75%	5.00%
Relative risk adjustment	0.65-0.70	0.50
Indicated ROE	8.75%	7.00%
Allowance for financial flexibility	0.50%	0.75%
Total	9.25%	7.75%

Prior to the Oral Phase of Argument, the Commission circulated a letter dated November 18, 2009. The letter had, as an attachment, a document similar to that which Commission staff has prepared each November in accordance with the Commission's Order G-25-94, as amended by Orders G-80-99, G-109-01, and G-14-06 for the purpose of determining the allowed return on common equity for a benchmark low-risk utility for the ensuing year. The document shows that the forecast yield on long-term Canada bonds for 2010 is 4.302 percent. (Exhibit A-12)

4.2.3.1 Ms. McShane's Results

(a) Risk-Adjusted Equity Market Risk Premium Test

For her risk-adjusted equity market risk premium test, Ms. Mc Shane uses a long-term Canada bond yield of 4.25 percent, an equity risk premium of 6.75 percent and a relative risk adjustment of 0.65-0.70 (the relative risk adjustment or beta was described in Section 4.1.2). To derive her equity risk premium of 6.75 percent she used an expected value of the future equity market return in a range of 11.0 percent-12.0 percent, based on both the Canadian and US equity market returns, from which she deducted both the near-term (2010) and the longer-term forecasts for long-term Canada bond yields of 4.25 percent and 5.25 percent respectively. (Exhibit B-1, Tab 3, p. 51)

Terasen submits that because equity risk premium tests are forward-looking, historic risk premium data need to be evaluated in light of prevailing economic and capital market conditions. If available, direct estimates of the forward-looking risk premium should supplement estimates of the risk premium made using historic data. (Terasen Argument, para 202)

Ms. McShane states that the "raw" calculated betas for the five-year period ending March 2009 of her sample of fifteen US utilities averaged 0.41, while the average reported *Value Line* beta for the sample (and the beta more likely to be relied upon by analysts and investors) was 0.66. (Exhibit B-1, Tab 3, Schedule 15)

Based on her analysis of standard deviations of market returns and betas, Ms. McShane adopts a relative risk adjustment in the range of 0.65-0.70. (Exhibit B-1, Tab 3, p. 57)

JIESC cites Dr. Booth's evidence in response to Ms. McShane's evidence: "I don't believe you can subtract the current LTC [long-term Canada bond] yield from a long run average equity return since it mismatches the underlying inflationary environments…so her procedures may over estimate the market risk premium by at least 1.0%." (JIESC Argument, p. 36)

JIESC describes Ms. McShane's adjustment to beta as" unreasonable" and submits that no regulatory agency in Canada has accepted adjusted betas and that in the TQM Decision, the NEB specifically rejected adjusted betas. (JIESC Argument, p. 37)

Terasen replies that Ms. McShane's relative risk adjustment of 0.65-0.70 is not based on the premise that the utility risk will rise to that of an average risk firm, but rather is based on the following:

- relative standard deviations of utility returns compared to the returns of other sectors of the market composite;
- the empirical evidence generally that the actual returns of low beta stocks have been higher than the theoretical CAPM would predict;

- the empirical evidence specific to Canadian utilities that the actual returns have historically been higher than the "raw" regression betas would predict; and
- the published betas, which incorporate the adjustment toward the market mean of 1.0, and which investors and analysts are likely to rely on when forming their return expectations. (Terasen Reply, para 121)

(b) DCF-Based Equity Risk Premium Test

Ms. McShane performed her DCF-based equity risk premium test by constructing monthly cost of equity estimates for a sample of low risk US gas and electric utilities as a proxy for TGI for the period 1991-March 2009 using the DCF model. Using a single variable and a two variable approach Ms. McShane concludes that the indicated cost for utility equity before any allowance for financing flexibility lay in the 9.7 percent to 10.25 percent range. (Exhibit B-1, Tab 3, pp. 59-61)

In her written evidence, Ms. McShane noted that as of the end of March 2009 the spread between A rated Canadian utility bonds and 30-year Canada bonds was approximately 345 basis points. When preparing her evidence Ms. McShane forecast that spread to decrease to approximately 225 to 250 basis points. In her direct examination at page 452 of the transcript Ms. McShane noted that the spreads had declined more than she had anticipated to a level of approximately 165 to 175 basis points. Using the spread of 170 basis points, she testified that the indicated utility cost of equity before any adjustment for financing flexibility was 9.5 percent (T4:452).

(c) Historic Utility Equity Risk Premium Test

Ms. McShane's historic utility premium test involves comparing the returns of utilities in Canada for the period 1956-2008 and electric utilities and natural gas utilities in the US for the period 1947-2008, on the grounds that, "Reliance on achieved equity risk premiums for utilities as an indicator of what investors expect for the future is based on the proposition that over the longer term, investors' expectations and experience converge. The more stable an industry, the more likely it is that this convergence will occur." An analysis of the underlying data indicates there has been no upward or downward trend in the utility equity returns and that the utility returns in both the US

and Canada have, "clustered in the range of 11.0-12.0%, with a mid-point of approximately 11.5%."

Ms. McShane adopts a long-run forecast of 5.25 percent for long-term Canada bond yields, and deducts that long-run forecast from the mid-point of utility returns (11.5 percent) to derive a utility risk premium of 6.25 percent. To that utility risk premium she adds the 4.25 percent long Canada forecast for 2010 to derive an ROE of 10.5 percent for TGI for 2010. (Exhibit B-1, Tab 3, pp. 62-63)

JIESC submits that Ms. McShane's return recommendation is "excessive and unreasonable." (JIESC Argument, p. 3)

4.2.3.2 Dr. Vander Weide's Results

(a) *Ex post* Risk Premium

Dr. Vander Weide measures the return experienced by investors in Canadian utility stocks from historical data on returns earned by investors in: (1) the S&P/TSX utilities stock index for the period 1956 -2008; and (2) a basket of Canadian utility stocks created by the BMO Capital Markets ("BMO CM") for the period 1963-2008, which suggests that the former had an equity risk premium of 4.3 percent and the latter 6.6 percent, which Dr. Vander Weide averages and adds the current long bond rate of 3.69 percent to derive an *ex post* risk premium ROE calculation of 9.7 percent.

Dr. Vander Weide states that the BMO CM basket contains Canadian companies that receive a higher percentage of revenues from traditional utility operations than the companies currently in the S&P/TSX utilities stock index, and includes Enbridge Inc. and TransCanada Corporation. (Exhibit B-1, Tab 4, pp. 31-32)

(b) *Ex ante* Risk Premium

Dr. Vander Weide's *ex ante* risk premium test is based on studies of the expected return on comparable groups of utilities in each month of his study period (September 1999 to February

2009) compared to the interest rate on long-term government bonds. The electric utility group yields an *ex ante* risk premium estimate of 8.0 percent, and the natural gas comparable group an *ex ante* risk premium estimate of 7.5 percent. To these percentages he adds the current long-Canada bond yield of 3.69 percent for an average indicated ROE of 11.4 percent. (Exhibit B-1, Tab 4, pp. 32-33)

JIESC submits that the methodology used by Dr. Vander Weide was selective in the period studied and used bond returns rather than bond yields in a period of falling interest rates and thus over estimates utility returns by roughly 3.4 percent. (JIESC Argument, p. 44)

4.2.3.3 Dr. Booth's Results

(a) "Classic" CAPM

Dr. Booth estimates the market risk premium to be 5.0 percent and a uses a beta of 0.50 to develop a utility risk premium of 2.50 percent, to add to his long Canada yield forecast of 4.5 percent to arrive at a required rate of return of 7.0 percent. Adding in 0.50 percent for issue cost and 0.25 percent as a margin for error, he recommends a 7.75 percent fair ROE.

In his written evidence, Dr. Booth states that at the height of the financial crisis, Professor Fernandez surveyed finance professors around the world to find out what they used for the market risk premium. Dr. Booth presented the results of this survey which show that the median in the US is 6.0 percent and in Canada is 5.1 percent. Furthermore, Dr. Booth concluded that "the survey of Fernandez indicated that the 5.8 percent used by the BCUC is within the range of common values used by Canadian Professors of Finance of 5.0% and 6.0 %." (Exhibit C11-5, pp. 50-2)

Terasen submits that the Commission should put no weight on the results of the classic CAPM model of Dr. Booth. (Terasen Argument, para 299)

(b) Two Factor Model CAPM

Dr. Booth estimated a two factor model for utilities where their returns were driven by the common market factor, the TSX Composite return, as well as the return on the long-term Canada bond.

Given the measurement error involved in any statistical estimation and the sensitivity of the estimates to economic conditions, Dr. Booth regards the two models "as being the same." Terasen submits that Dr. Booth's application of the two-factor model understates the utility equity return requirement, because it uses a market risk premium which is even lower than that used by Dr. Booth in his classic CAPM approach (5.0 percent vs. 5.5 percent), and ignores other factors which have generated utility returns. This understates the actual utility market returns by close to 20 percent.

Terasen submits that the Commission should put no weight on the results of Dr. Booth's two-factor model. (Terasen Argument, para 301-305)

(c) DCF Based Utility Risk Premium

As a check for his CAPM results, Dr. Booth uses data for the US electric and gas utilities followed by Standard and Poors to estimate a DCF required rate of return from which he subtracts the ten-year US government bond yield to estimate the utility risk premium for these US utilities at 2.21 percent to 2.68 percent, which he increases to 2.96 percent. He states that if the risk premiums are valid for Canada, they would imply a fair return of 7.50 percent (long Canada yield forecast of 4.50 percent plus the 2.96 percent risk premium) to which the 0.50 percent flotation cost would be added. Although this is slightly higher than his direct estimates from the CAPM and two factor models, he states that it "needs adjusting for the yield gap between ten and 30 year debt yields but indicates that the estimates are in the right ball-park." (Exhibit C11-5, p. 77)

Terasen points out that Dr. Booth's calculations show: i) negative growth expectations in some instances, and ii) negative calculated utility risk premiums in a significant number of instances. Terasen submits that Dr. Booth's growth rate and resulting utility risk premiums do not reflect investors' expectations. Terasen further submits that the results of Dr. Booth's DCF check, and the utility risk premiums that he estimates using the DCF approach, should be rejected by the Commission. (Terasen Argument, para 311)

Commission Determination

For the ERP approach, the Commission Panel has considered the four "non-CAPM" tests applied by Ms. McShane and Dr. Vander Weide. The Commission Panel considers that both Ms. McShane's DCF-based equity risk premium test and Dr. Vander Weide's *ex ante* risk premium test cover too short a period to be determinative. In addition Ms. McShane computes the risk premium by deducting the current, rather than the experienced, long-term Canada bond forecast from the derived returns. In the Commission Panel's view these two tests can at best be considered checks for the witnesses' DCF tests and the Commission Panel accords them no weight.

The Commission Panel notes that Dr. Vander Weide's *ex post* risk premium test gave 50 percent weight to a BMO CM basket of companies which, in the Commission Panel's view, covered too short a period, contained too few utilities, and included energy holding companies with significant non-regulated operations. Accordingly, the Commission Panel places no weight on this basket.

The Commission Panel considers that the results of Ms. McShane's historic equity risk premium test and Dr. Vander Weide's *ex post* risk premium test yield comparable results on historic Canadian utility data. The Commission Panel finds the Canadian data adequate and, for the reasons set out in its Determination in Section 2 above, gives weight to the Canadian data and no weight to the results of US utility data contained in Ms. McShane's historic equity risk premium test. The Canadian utility data can be summarized as follows:

	Utility Equity Return (%)	Bond Return (%)	Utility Risk Premium (%)
Ms. McShane	12.00	7.80	4.20
Dr. Vander Weide	11.84	7.54	4.30
Average	11.92	7.67	4.25

The Commission Panel considers that the Canadian utility premium of 4.25 percent should be adjusted to reflect the fact that it was calculated over a period when long-term Canada bonds averaged 7.67 percent and that there is not a one-for-one relationship between the increase or decrease in long-term Canada bond yields and the utility equity risk premium. The Commission Panel accepts the evidence of Dr. Vander Weide in this proceeding described in Section 5.0 below that this relationship may range between 0.50 and 0.75 and, using the 2010 forecast long-term Canada bond yield of 4.30 percent in Exhibit A-12, establishes a range of 9.25 percent to 10.25 percent for the ERP approach, before an allowance for financing flexibility.

For the CAPM approach, the Commission Panel has considered Ms. McShane's risk-adjusted equity market risk premium test and Dr. Booth's "classic" CAPM test. The Commission Panel notes that Dr. Booth's two-factor model CAPM test is essentially the same as his "classic" CAPM test and accords it no extra weight. As Dr. Booth's DCF based utility risk premium test was used by him as a check the Commission Panel finds that it need not accord it any additional weight.

The Commission Panel establishes a CAPM estimate by using the Consensus estimate of 4.30 percent for the risk free rate, establishing an equity market premium in the range of the consensus estimate of Canadian professors of finance of 5 percent to 6 percent, and using an adjusted beta in the range of 0.60 to 0.66. This produces a "bare-bones" CAPM estimate in the range of 7.30 percent to 8.30 percent before an allowance for financing flexibility.

4.2.4 Comparable Earnings

Ms. McShane states that her selection of Canadian unregulated companies was limited to industries that are characterized by relatively stable demand characteristics, as well as consistent dividend payments and relatively low earnings and share price volatility. The initial universe consisted of 490 firms on the TSX in Global Industry Classification Standard sectors 20-30, being Industrials, Consumer Discretionary and Consumer Staples and comprising thirteen major industries.

The initial selection was narrowed down to 27 companies by eliminating companies which:

- had 2007 equity less than $100 million;
- had missing or negative common equity during 1991-2007;
- were income trusts;
- had less than five years of market data;
- paid no dividends in any year 2004-2008;
- traded fewer than 5 percent of their outstanding shares in 2007;
- had stock ranked “higher risk” or “speculative by the Canadian Business Service;
- had debt rated non-investment grade, i.e., BB+ or below by either DBRS or Standard & Poor’s, or for which none of the agencies report a rating; or
- had average five-year “raw” betas ending December 2007 and December 2008 in excess of 1.0.

Ms. McShane states that since unregulated companies’ returns on equity tend to be cyclical, the appropriate period for measuring unregulated company returns should encompass an entire business cycle, covering years of both expansion and decline. The cycle should be representative of a future normal cycle, e.g., relatively similar in terms of inflation and real economic growth. The period 1991-2007 constitutes a full business cycle including the recession of 1991-1992.

Ms. McShane estimates that the average level of returns for low risk Canadian unregulated companies over a normal business cycle is in the approximate range of 12.5-12.75 percent. The comparative risk data indicate, on balance, that Canadian unregulated companies are somewhat riskier than utilities. The somewhat higher risk of the unregulated companies relative to the typical Canadian utility requires a modest downward adjustment. A downward adjustment of 75-100 basis points (based on the typical spread between Moody's BBB rated long-term industrial bond yields and long-term A rated utility bond yields and the relative betas of the unregulated companies and the Canadian and US utility samples) reduces the ROE to a range of 11.5-11.75 percent.

Ms. McShane states that although she considers that the arguments that a downward adjustment to the comparable earnings test results for market/book ratios are without merit, the data indicate that the market/book ratio for the overall Canadian equity market averaged approximately 2.0 times from 1991-2007, the period over which the comparable earnings test was conducted, while the market/book ratio for the sample of comparable Canadian unregulated companies averaged 2.1 times. In her view, the similarity of the lower average market/book ratio of the low risk unregulated Canadian companies relative to the Canadian equity market composites permits the inference that the sample average returns are not characterized by market power. Thus, she submits the comparable earnings results do not warrant an adjustment for market/book ratios.

Ms. McShane also does a comparable earnings test on a larger sample of US unregulated companies which suggests a higher return on equity. (Exhibit B-1, Tab 3, pp. 67-72)

Commission Determination

As for the CE approach, the Commission Panel has reviewed Ms. Mc Shane's selection process, the period of the study, and the results. The companies display conservative stock and debt ratings, an average market to book ratio of 2.1, and an average adjusted beta of 0.71. The Commission Panel considers that the initial results of 12.5 percent which Ms. McShane reduced to 11.5 percent suggest that an estimate of what unregulated Canadian companies of low business risk are earning

on the book values of their equity may lie in the range of 10.5 percent to 11.5 percent.

4.2.5 Allowance for Financing Flexibility

Ms. McShane states that a financing flexibility allowance is an integral part of the cost of capital as well as a required element of the concept of a fair return. It is intended to cover three distinct aspects:

- flotation costs, comprising financing and market pressure costs arising at the time of the sale of new equity;
- a margin, or cushion, for unanticipated capital market conditions; and
- recognition of the "fairness" principle.

Ms. McShane contends that, at a minimum, the financing flexibility allowance should be adequate to allow a utility to maintain its market value, notionally, at a slight premium to book value, i.e., in the range of 1.05-1.10, where a utility would be able to recover actual financing costs, as well as be in a position to raise new equity (under most market conditions) without impairing its financial integrity. A financing flexibility allowance adequate to maintain a market/book in the range of 1.05-1.10 is approximately 50 basis points. As this financing flexibility adjustment is minimal, it does not fully address the comparable returns standard. (Exhibit B-1, Tab 3, pp. 66-67)

Terasen states that the application of a return estimated on the basis of market values and applied to book values implies a market value just equal to book value, and drew the Commission's attention to the conclusion drawn by Alberta's Independent Assessment Team in its review of the cost of capital for the Power Purchase Arrangements in 1999, where it stated: "This is sometimes associated with flotation costs but is more properly regarded as providing a financial cushion which is particularly applicable given the use of historic cost book values in traditional rate of return regulation in Canada." TGI states that the adjustment to the market derived cost for financing flexibility rate provides a minimal increment to preserve financial integrity (i.e. market price slightly in excess of book value). (Exhibit B-3, BCUC 64.1)

Both Ms. McShane and Dr. Vander Weide propose the addition of an allowance for financing flexibility of 50 basis points to what they term the return on equity estimates derived from their DCF and equity risk premium tests, although Dr. Vander Weide does not propose to add it to his *ex ante* risk premium test.

Dr. Vander Weide testified that in the DCF model an issue discount of 2-3 percent on a utility's stock price coupled with issue costs of 5 percent "would amount to approximately 25 basis points." (T3:393)

Similarly Dr. Booth adds an allowance for issue costs of 50 basis points and 25 basis points as a "margin of error." Dr. Booth states: "However, I normally add 50 basis points as a cushion to the direct estimates in line with this practice of many regulators. This is mainly to ensure that there is no dilution and stock prices are more variable than a 10 percent floatation cost allowance would indicate." (Exhibit C11-5, p. 60)

The AUC adjusts CAPM results by adding 50 basis points to CAPM estimates on the grounds that "CAPM results likely underestimate the required market equity return by at least 50 basis points." (AUC Decision 2009-216, para 326)

Commission Determination

The Commission Panel finds no evidence before it to suggest that utilities in Canada trade in the market/book range of 1.05 to 1.10 that prompts Ms. McShane's recommended 50 basis point allowance for flotation costs. The Commission Panel agrees with Dr. Vander Weide that under normal circumstances flotation costs, comprising financing and market pressure costs arising at the time of the sale of new equity, require a 25 basis point addition to a ROE estimate.

The Commission Panel notes that the margin, or cushion, for unanticipated capital market conditions was used in Alberta in a situation where a formula for 20 year Power Purchase Arrangements was being established. It does not find the reference relevant in this proceeding.

As for the fairness principle, the Commission Panel agrees with the practice of the AUC of adding 50 basis points to CAPM estimates and adopts it in this proceeding.

Accordingly the Commission Panel determines that for DCF, ERP and CAPM estimates it will add a 25 basis point allowance to recognize the cost of issuing additional equity. The Commission Panel will add an additional 50 basis point fairness allowance to CAPM estimates. The Commission Panel will make no allowance for CE estimates.

4.2.6 Fair Return on Equity

Having determined that it will accord weight to each of the three approaches and determined the appropriate ROE ranges that the approaches yielded, the Commission Panel can determine TGI's ROE.

Commission Determination

Earlier in this Decision the Commission Panel found that the suitable equity ratio for TGI is in the 40 percent range, and that it would consider the effect of its short-term business risk mitigators (such as RSAM and deferral accounts) in the determination of TGI's ROE.

The Commission Panel also determined that it would give most weight to the DCF approach, lesser weight to the ERP and CAPM approaches and a very small amount of weight to the CE approach.

The following table sets out the Commission Panel's determined ranges for each approach:

Approach	Range (%)	Allowance (%)	Total (%)
DCF	9.00-10.00	0.25	9.25-10.25
ERP	9.25-10.00	0.25	9.50-10.25
CAPM	7.30-8.30	0.75	8.05-9.05
CE	10.5-11.5	0.0	10.5-11.5

Accordingly, after attaching the weight that it considers appropriate to each of the three approaches the Commission Panel determines that the ROE for TGI is 9.50 percent.

4.3 Interim Rates and the Effective Date of the ROE Increase

Terasen requests that any increase in the ROE of the three utilities should be reflected in their rates effective from July 1, 2009. Prior to the commencement of the Oral Hearing, the Commission Panel considered an application by Terasen pursuant to section 89 of the *Act*, that the rates of the three utilities be made interim effective July 1, 2009. Section 89 of the *Act* is included in Appendix C to the Decision.

All Intervenors opposed Terasen's request at that time. The CEC submitted that all parties had agreement on the equity ratio and the ROE in the Commission approved settlement documents that can be found in Commission Order G-33-07. CEC acknowledged that while the 2008/2009 Negotiated Settlement Agreement ("NSA") did not preclude Terasen from applying to the Commission for a variation in its equity ratio or ROE, it submitted that it was inequitable that Terasen would seek and receive an adjustment for a period of six months of the 2008/2009 settlement period on what it termed a retroactive basis. (Exhibit C3-2)

Terasen's Reply pointed out that its request was in no way retroactive and that it was perfectly within the terms of the NSA. (Exhibit B-2)

In Order G-78-09 dated June 24, 2009, the Commission Panel agreed with Terasen Utilities that an Order approving the requested relief that their current rates be made interim would be on a 'without prejudice' basis, and that "all Parties will have the opportunity to fully participate in the hearing process and no final order will be made until all evidence has been heard and considered." (Exhibit A-4)

In its Reply, Terasen notes that no Intervenor disputed that the change to the ROE of Terasen should be effective July 1, 2009 (Terasen Reply, para 1). During the Oral Argument Phase counsel for JIESC, CEC ICG and BCOAPO all stated that they took no position on the issue (T6:837).

Commission Determination

The Commission Panel notes that the Intervenors take no position on this issue and grants the relief requested by Terasen. The effect of this determination will result in the ROE for TGI for 2009 being 8.47 percent for 6 months and 9.50 percent for six months or an average annual ROE of 8.98 percent, with that of TGVI being on average 60 basis points higher for 2009 (in accordance with the Commission Panel's determination at Section 6.1 below) and that of TGW 50 basis points higher for 2009.

4.4 The Impact of the Determinations on the Fair Return Standard

Having established an equity ratio of 40 percent, and a ROE of 9.5 percent , the Commission Panel revisits the fair return standard to ensure that TGI's overall return will be comparable to the return available from the application of the invested capital to other enterprises of like risk (comparable investment requirement), enable TGI's financial integrity to be maintained (financial integrity requirement), and permit TGI to attract incremental capital on reasonable terms and conditions (capital attraction requirement).

In this regard it has considered Moody's credit metrics and its rating of TGI.

The Commission Panel notes that the ROE of 9.5 percent should enable TGI, following the end of its PBR regime, to maintain its earnings in the 9.0 to 14.0 percent range and maintain this metric at its present level in Moody's A range.

The Commission Panel considers that the combination of a 40 percent equity level and a ROE of 9.5 percent will improve the financial metrics such as EBIT/Interest, Retained Cash Flow/Debt, Debt to Book Capitalization and Free Cash Flow/Funds from Operations.

The Commission Panel observes that a 40 percent equity level would move TGI from a Ba to Baa under Moody's factor mapping and that this metric alone is worth 15 percent of a Moody's rating. Similarly the combination of a 40 percent equity level and a ROE of 9.5 percent will result in an increase in EBIT/Interest from between 1-2 to between 2-3 and would move TGI from Ba to Baa, under Moody's factor mapping and that this metric is worth another 15 percent of a Moody's rating.

These improvements in metrics should, in the Commission Panel's opinion, enable TGI both to maintain its A3 rating with a margin of comfort and to attract the capital it requires on reasonable terms and conditions.

In addition, the Commission Panel considers that the combination of a 40 percent equity level and a ROE of 9.5 percent will increase TGI's times interest covered ratio and will thus enable it to raise comfortably more than the $100 million of unsecured debentures its current equity level and ROE allow.

As a result the Commission Panel considers that its decision meets the fair return standard for TGI.

5.0 THE AUTOMATIC ADJUSTMENT MECHANISM

This Section addresses the issues:

- Given TGI's appropriate ROE, does the Commission's adjustment mechanism produce an ROE that meets the fair return standard?
- If not, should the Commission retain, amend, or eliminate the adjustment mechanism?

Terasen requests that the adjustment mechanism be eliminated, with all three of its expert witnesses urging the Commission to abandon the formula.

Ms. McShane states that reliance on a formula which tracks changes in the long-term Canada bond yield, rather than the composite of factors that bear on equity return requirements, has resulted in allowed ROEs falling below levels commensurate with a fair return and that the extent to which this has happened since 1994 can be assessed by the table which compares the allowed ROEs of Canadian and US utilities set out in Section 2.3 of this Decision.

Terasen submits that the adoption of adjustment mechanism in Canada in the mid-1990s coincided with the almost exclusive use of equity risk premium and CAPM approaches for the determination of allowed ROE for utilities in Canada.

Ms. McShane testified that the crossover between Canadian and US utility returns started when regulatory commissions in Canada started to place almost all the weight on the CAPM and equity risk premium tests. (T4:565)

Terasen states that since the adjustment mechanisms were first adopted in the mid 1990s, yields on long-term Canada bonds have steadily decreased and returns on equity allowed for Canadian utilities have decreased to unprecedented low levels.

In addition the turbulence in the capital markets experienced in the last three years has led to a "flight to quality" which has created an abnormal demand for long-term Canada bonds that were already in short supply. This flight to quality has driven down the yield on the long-term Canada bonds, and consequently driven down the formulaic ROE that uses the long-term Canada bonds as a benchmark. Yet even as the allowed ROE has declined, the cost of capital for utilities has risen dramatically, as investors have demanded higher premiums for risk.

Terasen contends that if it cannot offer a return to equity to investors similar to returns available to comparable risk investments, it will be disadvantaged in competing for capital in the future, even if the capital markets return to historical norms. (Exhibit B-1, p. 23)

Mr. Carmichael points to credit rating agencies which have recently highlighted their concerns regarding the weak state of credit metrics achieved by utilities such as TGI that are regulated with an ROE formula, and which have compared such utility's lower metrics with those of US utilities that the rating agencies believe to be comparable.

Mr. Carmichael states that the financial performance of utilities in Canada lags the performance of US based utilities. This has prompted an equity analyst to suggest that ROE formulae in use by regulators in Canada are "confiscatory and fail to meet the fair return standard," while other analysts suggest that the formulae are now "broken." According to the latter group of analysts, under current financial market circumstances such formulas result in lower rates of return on common equity, while all evidence indicates that capital markets require higher returns on corporate securities reflecting the re-pricing of risk which has taken place. Debt analysts have opined that ROE results produced by the formulas "have not reflected the real world increase in the cost of capital" and "the annual ROE adjustment is not even yielding the right direction of change in the cost of capital." (Exhibit B-1, Tab 2, p. 7)

Dr. Vander Weide performs a number of tests to determine the validity of the adjustment mechanism ROE formula, the most significant of which were to examine evidence on the sensitivity of the forward looking, or *ex ante*, required equity risk premium on utility stocks to changes in

interest rates in Canada and the US. He states that while the ROE adjustment formula implies that the cost of equity for TGI declines by 75 basis points for every 100-basis-point decline in the yield to maturity on long-Canada bonds, his findings support the conclusions that i) the cost of equity declines by less than 50 basis points for every 100-basis-point decline in the yield to maturity on long-Canada bonds, and ii) US regulators typically reduce the allowed ROE by less than 50 basis points when the yield to maturity on long-term government bonds declines by 100 basis points. (Exhibit B-1, Tab 4, p. 9)

According to Terasen the process of designing an automatic adjustment formula should involve a balance among the following criteria:

- it should be relatively simple to understand and apply;
- it should be based on changes in one or more reasonably available and verifiable variables;
- it should exclude changes in variables due to abnormal market events;
- it should incorporate variables which vary in a quantifiable way with the utility cost of equity; and
- it should incorporate variables which are not vulnerable to changes caused by company-specific circumstances which may not impact on the cost of equity for the utilities to which the formula applies. (Exhibit B-1, pp. 31-32)

Terasen stated that it was working on the design of such a formula, but had nothing to show for its efforts so far. (T2:87-88)

FortisBC supports Terasen's Application, including the elimination of the AAM. (FortisBC Argument, para 2)

PNG submits that, "the evidence in this proceeding demonstrates overwhelmingly that the automatic adjustment formula does not produce a fair return on common equity for BC utilities and should therefore be eliminated, at least until a more appropriate automatic adjustment mechanism can be determined." (PNG Argument, para 4)

On the other hand, Dr. Booth states that, "…I would recommend that the BCUC maintain their ROE formula indefinitely since like most such formulae in Canada it has done a remarkably good job of awarding ROEs that are within a zone of reasonableness, while minimising repetitive testimony. It is also broadly consistent with awarding allowed ROEs consistent with adjustment formulae used elsewhere in Canada." (Exhibit C11-5, pp. 3, 4)

JIESC submits that Terasen's analysis comparing US with Canadians ROEs is "oversimplified and incorrect. All of the data shows that risk premiums generally, not just for utilities, for Canada are lower that (sic) in the US. ...Canadian and US Utility and market risk premiums departed company, not when the AAM came into place, but when Canada got its financial house in order in 1997 and the US failed to do so. Up until last year Canada generally had financial surpluses and the US has faced increasing deficits." (JIESC Argument, p. 45)

Terasen observes that while in 1995 the NEB adopted an AAM similar to that adopted in BC in 1994, that in the NEB Letter Decision, the NEB determined that the RH-2-94 Decision will not continue in effect. As a result, the return on equity for the pipelines regulated by the NEB will not be determined by an automatic adjustment mechanism (Terasen Argument, para 4).

At the Oral Phase of Argument, counsel for FortisBC pointed out that the AUC had "moved away from" its automatic adjustment formula in AUC Decision 2009-216. (T6:743)

Commission Determination

A key consideration in the determination of whether to retain, amend or eliminate the AAM is whether the ROE produced by application of the formula for 2010 is reasonably comparable to the ROE determined by the Commission Panel from the evidence before it. The Commission's calculation of the ROE for 2010, as derived from the adjustment mechanism, is 8.43 percent, compared to the Commission Panel's determination that the appropriate ROE for TGI in 2010 is 9.50 percent. The Commission Panel determines that, in its present configuration, the AAM will not provide an ROE for TGI for 2010 that meets the fair return standard.

The Commission Panel agrees that a single variable is unlikely to capture the many causes of changes in ROE and that in particular the recent flight to quality has driven down the yield on long-term Canada bonds, while the cost of risk has been priced upwards.

In the Commission Panel's opinion, reliance on CAPM by Canadian regulatory agencies has also contributed to the divergence between Canadian and US allowed ROEs. In light of the limited weight given by the Commission Panel to CAPM in determining the ROE for TGI for 2010, it would seem inconsistent to retain the adjustment mechanism.

Accordingly the Commission Panel directs that the AAM be eliminated. TGI is directed to complete its study of alternative formulae and report to the Commission by December 31, 2010.

6.0 THE APPROPRIATE RETURN ON EQUITY FOR TGVI AND TGW

This Section looks at TGVI and TGW. The business risks of each are considered and a suitable capital structure and ROE for each are determined. It addresses the issue: Given TGI's appropriate capital structure and ROE what are the appropriate ROEs for TGVI and TGW?

TGVI and TGW request that the Commission continue to set their respective allowed returns on equity with reference to the Benchmark ROE established in this proceeding for TGI by adding a utility specific premium of 70 basis points for TGVI and 50 basis points for TGW to the Benchmark ROE.

Terasen submits that the business risks relating to TGI also relate to TGVI and TGW. All three companies are in the natural gas distribution business in British Columbia, and all three are subject to the provincial policies and legislation, and other factors that have increased the risk of TGI.

6.1 TGVI

TGVI requests that the Commission continue to set it's allowed ROE with reference to TGI's ROE established in the proceeding by adding a utility specific risk premium of 70 basis points to TGI's ROE.

In addition to TGI's business risk Terasen cites additional sources of business risk faced by TGVI:

- TGVI is a relatively immature LDC seeking to build a new market on Vancouver Island where it is at a competitive disadvantage caused by the differences in gas versus electric rate design methodologies;
- TGVI is burdened with the recovery of an accumulated deficit that peaked at approximately $88 million in 2002;
- TGVI faces the elimination of Provincial royalty revenues in 2012 that have ranged from $35 to $40 million in recent years and cover approximately 20 percent of the current cost of service;

- TGVI is highly dependent on industrial load related to the Vancouver Island Pulp Mill Joint Venture which is taking transportation service at its minimum allowed levels and whose contracts expire at the end of 2012, and the Island Cogeneration Project ("ICP") contract with BC Hydro whose future has been made less certain by the current climate change legislation and policy;
- TGVI faces a greater security of supply risk due the fact that all gas to the Island flows from a single source on the mainland and is also dependent on the use of undersea high pressure transmission facilities; and
- TGVI will become liable to repay $75 million of non-interest-bearing senior government debt, currently sitting as a credit to rate base, which when repaid will contribute to higher cost of service and impact the competitive position of the utility.

Terasen cites Ms. McShane's testimony in the 2005 ROE hearing as follows:

> "In my opinion, to equate TGVI to the benchmark low risk utility, an allowed common equity ratio of no less than 45-50% would be required (compared to the range of 35-40% for Terasen Gas). Terasen Gas is proposing a 40% common equity ratio for TGVI. I view the proposal as reasonable; however, the difference between the proposed 40% and the indicated range of 45-50% (mid-point of 47.5%) requires an incremental equity risk premium relative to the benchmark low risk utility return." (Exhibit B-11, Panel 1.6)

In the 2006 ROE Decision, the Commission found: "that the uncertainty surrounding the contract with BC Hydro beyond 2007 creates a significant incremental change to TGVI's business risk together with uncertainty as to the ultimate recovery of the balance on the RDDA. In addition, the uncertainty regarding the cessation of royalty payments from the Provincial Government and the need to repay the interest free loans from senior levels of government demonstrate that TGVI is exposed to considerably greater business risk than a benchmark low-risk utility. It is evident to the Commission Panel that in TGVI's case the probability of not earning a return on and of capital is considerably higher than is the case with the five "mature" gas distribution companies in Canada" (2006 ROE Decision, page 30). Based on these findings the Commission approved an equity ratio of 40 percent for TGVI and ROE 70 basis points higher than TGI.

6.2 TGW

TGW requests that the Commission continue to set its respective allowed ROE with reference to TGI's ROE established in the proceeding by adding a utility specific risk premium of 50 basis points to TGI's ROE.

Terasen submits that the relative risk of TGW as compared to TGI since the proceeding that led to the Commission's Order G-35-09 in April 2009, which found that a premium of 50 basis points over the Benchmark ROE was appropriate, has not changed. (TGI Argument, para 364)

Commission Determination

The Commission has in the past awarded both increased equity ratios and ROEs for both TGVI and TGW over those awarded TGI. The Commission Panel considers that TGVI's risk has declined since 2005 because of i) the resolution of the contract with BC Hydro at ICP and ii) greater certainty around the recovery of its RDDA balance.

Accordingly the Commission Panel determines that TGVI's premium over TGI's ROE should be reduced from 70 basis points to 50 basis points. The Commission Panel determines that TGW's premium over TGI's ROE should remain at 50 basis points for the reasons set out in the Commission Order G-35-09.

The Commission Panel notes that in determining TGI's equity ratio and ROE in this proceeding it has sought to determine an equity ratio for TGI that reflects its long-term business risks, while adjusting its ROE to reflect its short-term business risks. It also notes that the evidence suggests that both TGVI and TGW have greater long-term business risk than TGI while possessing similar deferral mechanisms to enable them to earn their allowed ROEs in the short-term. The Commission Panel further notes Ms. McShane's testimony that both utilities require greater equity thickness than 40 percent**.**

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Accordingly, the Commission directs TGVI and TGW to file with their next revenue requirement applications evidence as to what equity component best reflects their respective long-term business risks.

7.0 TGI AS THE BENCHMARK UTILITY

This Section discusses the concept of the benchmark utility and what effect the Commission Panel's determination should have on other utilities in BC primarily FortisBC and PNG. It addresses the issue: What impact should the Commission Panel's determination have on the remaining utilities in BC that may be affected, namely FortisBC and PNG.

Ms. McShane observes that, "it is important to recognize that, while it may be administratively efficient to designate one utility as the "benchmark," it does not necessarily follow that (1) the designated benchmark is the lowest risk utility, or (2) that the risk of the designated benchmark utility does not change over time relative to its peers." (Exhibit B-1, Tab 3, p. 24)

In response to an Information Request as to whether TGI still considered itself a "benchmark low-risk utility" for the purposes of setting allowed ROEs, TGI replies that it has been designated "a benchmark low-risk utility" by the Commission, and points out that BC Hydro and BC Transmission Corporation have their ROE set with reference to the most comparable investor owned utility, which by virtue of size and geography has defaulted to TGI.

TGI accepts that it is has been, and will be, the benchmark utility in respect of being the "benchmark" or "standard" used to set the ROE of other utilities in BC, but does not consider itself to be "a benchmark low-risk utility" now, if it ever was. Any utility could act as the benchmark and TGI due to its size has been selected as the benchmark by the Commission in the past. (Exhibit B-3, BCUC 2.1)

PNG submits that if the Commission determines that the AAM no longer produces a fair return for the Terasen, it follows that the formula no longer produces a fair return for the other utilities subject to the formula, including PNG.

PNG states that it will assess whether any adjustment to its utility specific risk premiums are required as a result of the Commission's decision and, if adjustments are required, that it will file an update to its 2010 Capital Structure and Equity Risk Premium Application. (PNG Argument, para 3)

FortisBC seeks an order of the Commission maintaining the current regulatory framework in British Columbia whereby TGI's ROE is established as the Benchmark ROE for utilities in British Columbia, including FortisBC, as previously ordered by the Commission in Order G-14-06.

FortisBC submits that the Commission determined in 1994 that the use of a benchmark was in the public interest, and that there is no evidence in the record of this proceeding to suggest that the benchmark concept should be abandoned in British Columbia. FortisBC identifies a number of advantages that flow from a Benchmark ROE for utilities including:

- cost savings to the Commission and to Intervenors in avoiding additional, unnecessary hearings; the evidence related to economic outlook and capital market conditions need not be presented nor heard more than once;
- a consistent approach to economic outlook and capital market conditions, considered with reference to expert evidence gathered at a single point in time; and
- greater consistency with respect to ROE determinations for individual utilities from a common base.

FortisBC submits that the NSA approved by the Commission in Order G-193-08 is a performance based regulation settlement and contemplates the application of the TGI's ROE as the Benchmark ROE for FortisBC through to, at a minimum, 2011. The NSA provides for FortisBC to receive the "allowed return on equity" which is calculated by reference to the Benchmark ROE with adjustments and sharing as contemplated in the approved NSA.

Commission Determination

The Commission Panel notes that PNG seeks no relief in this proceeding and that it proposes to consider this Decision and to determine if any amendments to its 2010 Capital Structure and Equity Risk Premium Application are merited.

The Commission Panel agrees with FortisBC that there is no evidence on the record in this proceeding suggesting that the use of a Benchmark ROE is not in the public interest. **Accordingly the Commission Panel determines that the ROE for TGI it has determined in this proceeding should continue to serve as the Benchmark ROE for FortisBC and any other utility in BC that uses the Benchmark ROE to set rates.**

DATED at the City of Vancouver, in the Province of British Columbia, this 16th day of December 2009.

Original signed by:
A.J. (TONY) PULLMAN
PANEL CHAIR/COMMISSIONER

Original signed by:
DENNIS A. COTE
COMMISSIONER

Original signed by:
MICHAEL R. HARLE
COMMISSIONER

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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER G-158-09

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IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by
Terasen Gas Inc. ("TGI"), Terasen Gas (Vancouver Island) Inc. ("TGVI") and
Terasen Gas (Whistler) Inc. ("TGW") (collectively the "Terasen Utilities")
for Return on Equity and Capital Structure

BEFORE: A.J. Pullman, Panel Chair
D.A. Cote, Commissioner
M.R. Harle, Commissioner

December 16, 2009

O R D E R

WHEREAS:

A. By letter dated May 15, 2009, the Terasen Utilities filed with the British Columbia Utilities Commission (the "Commission") pursuant to sections 59 and 60 of the *Utilities Commission Act* (the "*Act*"), an application for Return on Equity and Capital Structure (the "Application"); and

B. TGI applied for an increased Return on Equity ("ROE") for rate-setting purposes, and that the so determined ROE for TGI be used in establishing the ROE of TGVI and TGW used for rate-setting. The Application requests that the revised ROE be effective from July 1, 2009. In addition TGI applied for an increase of the equity ratio in its Capital Structure to 40 percent effective January 1, 2010. Terasen Utilities further requested that the Commission set their current rates as interim, effective July 1, 2009, until such time as permanent rates were established; and

C. By Order G-53-09 dated May 21, 2009, the Commission established a Procedural Conference to take place on June 9, 2009 to hear submissions regarding the regulatory process for the review of the Application; and

D. Further to the Procedural Conference, the Commission issued Order G-70-09 dated June 9, 2009 which established a Regulatory Timetable for an Oral Hearing Process as well as a schedule for written argument to hear submissions from the Parties on the subject of the request for interim rates; and

E. By Order G-78-09 dated June 24, 2009, the Commission ordered, with Reasons for Decision attached as Appendix A to the Order, that the current rates of TGI and TGW be set as interim effective July 1, 2009 and that the changes to the allowed ROE from this proceeding be treated as changes to TGVI's cost of service, effective July 1, 2009; and

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F. The Oral Hearing took place from September 28, 2009 to October 1, 2009. The following Intervenors took an active role in the proceedings, filed written argument or took part in the Oral Phase of Argument; the British Columbia Old Age Pensioners' Organization *et al.* ("BCOAPO"), the Commercial Energy Consumers of British Columbia ("CEC"), FortisBC Inc. ("FortisBC"), Pacific Natural Gas Ltd. ("PNG"), the Joint Industry Electricity Steering Committee ("JIESC") and the Industrial Customer Group ("ICG"); and

G. The schedule of written Argument provided for Final Submissions to be filed as follows: i) Terasen Utilities, FortisBC and PNG on or before October 20, 2009; ii) Intervenors on or before November 6, 2009; and iii) Reply from Terasen Utilities, FortisBC and PNG on or before November 13, 2009; and

H. An Oral Phase of Argument was held on November 24, 2009; and

I. The Commission Panel has considered the Application, the evidence, and the submissions of the Parties all as set forth in the Decision issued concurrently with this Order.

NOW THEREFORE the Commission orders as follows:

1. The appropriate equity ratio for TGI is 40 percent effective January 1, 2010.

2. TGI is to file within 30 days a document setting out how and when it will implement the change to its capital structure in compliance with the ring-fencing conditions approved by Commission Order G-49-07.

3. A return on equity for TGI of 9.50 percent for rate-setting purposes is approved effective July 1, 2009.

4. The TGI ROE approved in paragraph 3 of this Order is to be used as the Benchmark ROE in establishing the return on equity of TGVI and TGW used for rate-setting purposes and the allowed return on equity for TGVI and TGW is effective July 1, 2009.

5. TGVI's request to continue to set its allowed return on equity with reference to the Benchmark ROE by adding a utility specific risk premium of 70 basis points is denied. TGVI is allowed a utility specific risk premium of 50 basis points above the Benchmark ROE.

6. TGW's request to continue to set its allowed return on equity with reference to the Benchmark ROE by adding a utility specific risk premium of 50 basis points is approved.

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ORDER NUMBER	G-158-09

7. TGVI and TGW are to file in their respective next revenue requirement applications evidence on the equity component that best reflects their respective long-term business risks.

8. The TGI ROE approved in paragraph 3 of this Order can continue to serve as the Benchmark ROE for FortisBC and any other utility in British Columbia that uses a Benchmark ROE to set rates.

9. The automatic adjustment mechanism is eliminated.

10. TGI is to complete its study of alternative formulae to an automatic adjustment mechanism and report to the Commission on the study results by December 31, 2010.

DATED at the City of Vancouver, in the Province of British Columbia, this 16th day of December, 2009

BY ORDER

Original signed by:

A.J. Pullman
Panel Chair and Commissioner

THE APPLICATION

On May 15, 2009 Terasen Gas Inc. ("TGI"), Terasen Gas (Vancouver Island) Inc. ("TGVI"), and Terasen Gas Whistler Inc. ("TGW") filed a return on equity and capital structure application under sections 59 and 60 of the *Utilities Commission Act* with the British Columbia Utilities Commission ("Application").

The following Intervenors took an active role in the proceedings, filed written argument or took part in the Oral Argument Phase of the proceedings:

- Joint Industry Electricity Steering Committee ("JIESC")
- Commercial Energy Consumers of BC ("CEC")
- British Columbia Old Age Pensioners Organization

  Active Support Against Poverty
  B.C. Coalition of People with Disabilities
  Council of Seniors' Organizations of B.C.
  End Legislated Poverty
  Federated Anti-Poverty Groups of B.C., and
  Tenants' Rights Action Coalition (collectively "BCOAPO")
- Industrial Customer Group, comprising:

  Certainteed Gypsum Canada Inc.
  Domtar Pulp and Paper Products Inc.
  Federated Co-operatives Ltd.
  Teck Metals Ltd., Weyerhaeuser Company Ltd. and
  Zellstoff Celgar Limited Partnership (collectively"ICG")
- FortisBC Inc.
- Pacific Northern Gas Ltd.

Following receipt of the Application, the Commission issued Order G-53-09 dated May 21, 2009 establishing a Preliminary Regulatory Timetable, including a notice of procedural conference to be held on June 9, 2009.

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By Order G-70-09 dated June 9, 2009 following the procedural conference, the Commission published the final Regulatory Timetable which set dates for two rounds of Information Requests and an Oral Hearing to commence on September 28, 2009.

Order G-70-09 also established a schedule for written argument on the subject of Terasen's request pursuant to section 89 of the *Act* for interim rates. Intervenor submissions were due on June 15, 2009 and Terasen reply by June 22nd, 2009.

By Order G-78-09 and Reasons for Decision dated June 24, 2009, the Commission approved, pursuant to section 89 of the *Act*, of the request of TGI and TGW that their respective current rates be set as interim, effective July 1, 2009. In addition, pursuant to the provisions of the Special Direction made under section 7 of the Vancouver Island Natural Gas Pipeline Act, the Commission ordered that changes to the allowed ROE from the proceeding were to be treated as changes to TGVI's cost of service, effective July 1, 2009.

The Commission Panel accepted Terasen's submission that the application for interim relief should be reviewed pursuant to section 89 of the *Act* which does not refer to special circumstances. It further agreed with Terasen that a Commission Order approving the requested relief that the current rates be made interim was on a 'without prejudice' basis, that all parties would have the opportunity to fully participate in the hearing process and that no final order would be made until all evidence had been heard and considered. (Exhibit A-4)

The Oral Hearing commenced on September 28, 2009 and concluded on October 1, 2009. Argument was received from the Terasen, PNG and FortisBC on October 20, 2009. Argument was filed by the following Intervenors on November 6, 2009: JIESC, BCOAPO, CEC and ICG. Reply was filed by Terasen on November 13, 2009.

The Oral Phase of Argument was scheduled to take place on November 24, 2009. Parties were originally asked to address the following issues:

- Whether the Commission Panel can take into account the Alberta Utilities Commission 2009 Generic Cost of Capital Decision, Decision 2009-216, dated November 12, 2009 (Decision 2009-216) in arriving at its decision?
- Whether the Commission Panel should take into account Decision 2009-216 in arriving at its decision?
- If the Commission Panel were to eliminate the automatic adjustment mechanism ("adjustment mechanism") as requested by the Terasen Utilities, upon what evidentiary basis can the Commission Panel conclude that the return on common equity ("ROE") that it determines for TGI in this proceeding should be used as the benchmark or generic ROE for FortisBC and Pacific Northern Gas?
- If the Commission Panel were to eliminate the adjustment mechanism as requested by the Terasen Utilities and conclude that the ROE that it determines for TGI in this proceeding should not be used as the benchmark or generic ROE for FortisBC and Pacific Northern Gas, what are the consequences for FortisBC and Pacific Northern Gas?

By letter dated November 18, 2009 the Commission added two additional issues to the Agenda and requested that parties address a document prepared by Commission staff in accordance with the Commission's Order G-25-94, as amended by Orders G-80-99, G-109-01, and G-14-06 for the purpose of determining the allowed return on common equity for a benchmark low-risk utility for the ensuing year, which showed that the current formula resulted in an allowed return on common equity of 8.43 percent for a low-risk benchmark utility in 2010. The two further issues to be addressed were:

- Whether any party objects to the Commission Panel relying upon the staff document in arriving at its decision; and
- If there is no objection, now that the formula has produced an allowed return on common equity for 2010 of 8.43 percent, does it follow that, for the purposes of the JIESC Final Argument, the Panel no longer needs to consider the JIESC alternative position to set the return on equity on the basis of Dr. Booth's recommendation of 7.75 percent?

The Oral Phase of Argument took place on November 24, 2009 as scheduled.

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THE HISTORY OF ROE AWARDS IN BC, CANADA AND THE US SINCE 1994, AND THE USE OF A FORMULA TO ESTABLISH ROE

Prior to 1994 the ROE and capital structures of utilities in North America for rate setting purposes were established as part of the periodic revenue requirement applications the utilities would file with their regulators. In 1994, the BCUC held a public hearing into the appropriate rates of return on common equity and capital structure for BC Gas (now TGI), West Kootenay Power (now FortisBC) and PNG. In addition, the Commission heard evidence on processes or mechanisms that might be employed to improve the determination of ROE and capital structures in future years. In its decision dated June 10, 1994 attached to Order G-35-94, the Commission, for the purpose of setting the 1995 rate of return on common equity for utilities subject to its jurisdiction, accepted an automatic adjustment mechanism, based on long-term Canada bond yields. The formula has remained in place since that time and was adjusted by Orders G-80-99 and G-109-01. Following the 2005 ROE hearing the Commission issued Order G-14-06 and its 2006 ROE Decision on March 2, 2006, amending the formula.

As a result of Order G-14-06 the benchmark ROE now rises or falls by 75 basis points for each 100 basis point increase or decrease in the forecast long-Canada bond yield, as follows: ROEt = 9.145% - [0.75 x (5.25% - YLDt)], where YLDt equals the forecast long-term Government of Canada bond.

By Letter L-55-08 dated November 20, 2008, the Commission determined that the current ROE automatic adjustment mechanism resulted in an allowed return on common equity of 8.47 percent for a low-risk benchmark utility in 2009. This was calculated by averaging the November 2008 Consensus Forecasts of the 10-year Canada bond yield at the end of [both?] February and of November, 2009, and adding the average yield spread between 10-year and 30-year bonds of 0.50 percent reported by the Bank of Canada for all trading days in October, 2008 to arrive at the forecast yield on long-term Canada bonds for 2009 of 4.35 percent.

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Commission Order G-14-06 set the approved benchmark return on equity (ROE) at 9.145 percent assuming a 30-year long Canada bond yield of 5.25 percent, and directed that where the forecast yield was greater or less than 5.25 percent, a sliding scale adjustment would raise or lower the benchmark ROE by 75 percent of the change in the forecast yield on long-term Canada bonds which would be rounded to the nearest 2 decimal places as follows:

$$9.145 – (0.75 * (5.25 – 4.35)) = 8.470\%$$

Based on L-55-08 the following ROEs were approved for 2009 for the following utilities in BC on their capital structures: Terasen Gas (Vancouver Island) Inc., Terasen Gas (Whistler) Inc., Fortis BC Inc. and Pacific Northern Gas Ltd.

Section 4(d) of Special Direction No. HC2 obliges the Commission to set rates for BC Hydro that enable it to achieve an annual rate of return on equity equal to the pre-income tax annual rate of return allowed by the commission to the most comparable investor-owned energy utility regulated under the *Act.*

Similarly, section 3(c) of Special Direction No. 9 obliges the Commission to set rates for BCTC that generate for the transmission corporation an annual rate of return on deemed equity that is equal to the annual rate of return that is allowed by the commission on the authority's equity as that term is defined in Special Direction HC2.

In Canada an adjustment mechanism was employed by a number of regulatory bodies including the NEB (1995), the OEB (1997) and the AEUB (2004).

In the US an attempt to develop an adjustment mechanism was made by only two regulatory agencies – the Federal Energy Regulatory Commission ("FERC") and the New York Public Service Commission ("NYPSC"). The FERC generally dropped its pursuit of a generic formula by about 1992 over legal concerns that a company-specific record must support the finding of a fair return. The FERC since has

not departed from a case-by-case examination of the cost of equity. The NYPSC formula was created after an extensive process but was never adopted formally by the NYPSC.

Both FERC and NYSPC focused on a formula for deriving the cost of equity, rather than the long bond rates plus a pre-determined spread (Exhibit B-1, Appendix x, p.17).

In its Letter Decision, the NEB determined that the RH-2-94 Decision would not continue in effect and that the return on equity for the pipelines it regulates will no longer be determined by an adjustment mechanism.

In its Decision 2009-216, the AUC, following a generic hearing, determined that it would not employ an adjustment formula for 2010, but would initiate a process in 2011 "in order to allow the capital markets some time to return to traditional relationships or show evidence of what the new relationships may be." (AUC Decision, para 423-24)

The OEB is undertaking a consultative process on the cost of capital for the utilities it regulates, while proceedings are ongoing in Newfoundland and Québec.

EXCERPTS FROM UTILITIES COMMISSION ACT

Discrimination in rates

59 (1) A public utility must not make, demand or receive

(a) an unjust, unreasonable, unduly discriminatory or unduly preferential rate for a service provided by it in British Columbia, or

(b) a rate that otherwise contravenes this Act, the regulations, orders of the commission or any other law.

(2) A public utility must not

(a) as to rate or service, subject any person or locality, or a particular description of traffic, to an undue prejudice or disadvantage, or

(b) extend to any person a form of agreement, a rule or a facility or privilege, unless the agreement, rule, facility or privilege is regularly and uniformly extended to all persons under substantially similar circumstances and conditions for service of the same description.

(3) The commission may, by regulation, declare the circumstances and conditions that are substantially similar for the purpose of subsection (2) (b).

(4) It is a question of fact, of which the commission is the sole judge,

(a) whether a rate is unjust or unreasonable,

(b) whether, in any case, there is undue discrimination, preference, prejudice or disadvantage in respect of a rate or service, or

(c) whether a service is offered or provided under substantially similar circumstances and conditions.

(5) In this section, a rate is "unjust" or "unreasonable" if the rate is

(a) more than a fair and reasonable charge for service of the nature and quality provided by the utility,

(b) insufficient to yield a fair and reasonable compensation for the service provided by the utility, or a fair and reasonable return on the appraised value of its property, or

(c) unjust and unreasonable for any other reason.

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Setting of rates

60 (1) In setting a rate under this Act

(a) the commission must consider all matters that it considers proper and relevant affecting the rate,

(b) the commission must have due regard to the setting of a rate that

(i) is not unjust or unreasonable within the meaning of section 59,

(ii) provides to the public utility for which the rate is set a fair and reasonable return on any expenditure made by it to reduce energy demands, and

(iii) encourages public utilities to increase efficiency, reduce costs and enhance performance,

(b.1) the commission may use any mechanism, formula or other method of setting the rate that it considers advisable, and may order that the rate derived from such a mechanism, formula or other method is to remain in effect for a specified period, and

(c) if the public utility provides more than one class of service, the commission must

(i) segregate the various kinds of service into distinct classes of service,

(ii) in setting a rate to be charged for the particular service provided, consider each distinct class of service as a self contained unit, and

(iii) set a rate for each unit that it considers to be just and reasonable for that unit, without regard to the rates fixed for any other unit.

(2) In setting a rate under this Act, the commission may take into account a distinct or special area served by a public utility with a view to ensuring, so far as the commission considers it advisable, that the rate applicable in each area is adequate to yield a fair and reasonable return on the appraised value of the plant or system of the public utility used, or prudently and reasonably acquired, for the purpose of providing the service in that special area.

(3) If the commission takes a special area into account under subsection (2), it must have regard to the special considerations applicable to an area that is sparsely settled or has other distinctive characteristics.

(4) For this section, the commission must exclude from the appraised value of the property of the public utility any franchise, licence, permit or concession obtained or held by the utility from a municipal or other public authority beyond the money, if any, paid to the municipality or public authority as consideration for that franchise, licence, permit or concession, together with necessary and reasonable expenses in procuring the franchise, licence, permit or concession.

Partial relief

89 On an application under this Act, the commission may make an order granting the whole or part of the relief applied for or may grant further or other relief, as the commission considers advisable.

APPENDIX D
to Order G-158-09

LIST OF APPEARANCES

G.A. FULTON, Q.C.	Commission Counsel
C.B.JOHNSON, Q.C. T. AHMED	Terasen Gas Inc. Terasen Gas (Vancouver Island) Inc. Terasen Gas (Whistler) Inc.
R.B. WALLACE	Joint Industry Electricity Steering Committee
C. WEAFER	Commercial Energy Consumers of BC
E. KUNG L. WORTH	British Columbia Old Age Pensioners Organization ("BCOAPO") Active Support Against Poverty B.C. Coalition of People with Disabilities Council of Seniors' Organizations of B.C. End Legislated Poverty Federated Anti-Poverty Groups of B.C. Tenants' Rights Action Coalition
D. BURSEY	Industrial Customer Group, comprising Certainteed Gypsum Canada Inc., Domtar Pulp and Paper Products Inc., Federated Co-operatives Ltd., Teck Metals Ltd., Weyerhaeuser Company Ltd. and Zellstoff Celgar Limited Partnership
R.J. McDONELL	FortisBC Inc.
C. DONOHUE	Pacific Northern Gas Ltd.

E. Cheng	Commission Staff
F.Metcalfe	Contract Staff
Court Reporters	Allwest Reporting Ltd.

APPENDIX E
to Order G-158-09

LIST OF PANELS

Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc., Terasen Gas (Whistler) Inc

PANEL 1 – Company and Policy Panel

RANDY JESPERSEN	President and Chief Executive Officer
SCOTT THOMPSON	Vice President, Regulatory Affairs
ROGER DALL'ANTONIA	Vice President, Treasurer

PANEL 2 - Expert Opinion on a Benchmark Fair Return

JAMES H. VANDER WEIDE, PhD	Duke University

PANEL 3 - Expert Opinion on Capital Markets with Company View

DONALD A. CARMICHAEL, MBA	Financial Consultant
ROGER DALL'ANTONIA	Vice President, Treasurer

PANEL 4 - Expert Opinion on a Benchmark Fair Return

KATHLEEN C. MCSHANE, MBA, CFA	President, Foster Associates Inc.

The Joint Industry Electricity Steering Committee, the Commercial Energy Consumers Association of British Columbia and the British Columbia Old Age Pensioners Organization

LAURENCE G. BOOTH, DBA	University of Toronto

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

Terasen Gas Inc.
Terasen Gas (Vancouver Island) Inc. and
Terasen Gas (Whistler) Inc.
collectively the "Terasen Utilities"
Return on Equity and Capital Structure Application

EXHIBIT LIST

Exhibit No.	Description
COMMISSION DOCUMENTS	
A-1	Letter dated May 21, 2009 appointing the Commission Panel for the review of the Terasen Utilities Application for a Return on Equity and Capital Structure Application
A-2	Letter dated May 21, 2009 Preliminary Regulatory Timetable, Notice of Procedural Conference and Written Public Hearing.
A-2-1	Submitted at hearing September 28, 2009 Monthly Price Report - Canadian Natural Gas Focus dated September 2009
A-2-2	Submitted at hearing September 28, 2009 Newspaper article in the Vancouver Sun from September 2nd
A-2-3	Submitted at hearing September 29, 2009 Recalculated ROE without any adjustments
A-2-4	Submitted at hearing September 30, 2009 NATIONAL BANK FINANCIAL, SEPTEMBER 14, 2009 Corporate Indicative Issuance Spreads based on Government of Canada Yield Curve
A-2-5	Submitted at hearing October 1, 2009 Article entitled "How did economists get it so wrong" by Paul Krugman from the New York Times September 6, 2009
A-3	Letter dated June 9, 2009 Regulatory Timetable

Exhibit No.	Description
A-4	Letter dated June 24, 2009 – Reasons for Decision for Interim rate Relief
A-5	Letter dated June 29, 2009 BCUC IR No. 1 to Terasen Utilities
A-6	Letter dated July 31, 2009 BCUC IR No. 2 to Terasen Utilities
A-7	Letter dated September 2, 2009 Commission Panel Information Request No. 1 to Terasen Utilities
A-8	Letter dated September 3, 2009 Information Request No. 1 on the Evidence of Dr. Laurence Booth
A-9	Letter dated September 21, 2009 – Opening Statement
A-10	Letter dated October 27, 2009 – Oral Phase of Argument
A-11	Letter dated November 16, 2009 – Oral Phase of Argument
A-12	Letter dated November 18, 2009 - Oral Phase of Argument
APPLICANT DOCUMENTS TERASEN UTILITIES	
B-1	Letter dated May 15, 2009 Terasen Utilities application for Return on Equity and Capital Structure.
B-2	Letter dated June 18, 2009 Terasen Utilities Reply Comments on Interim Relief
B-3	Letter dated July 20, 2009 Response to BCUC IR No. 1
B-3-1	Response to BCUC IR No. 1 Attachments Parts 1of 5
B-3-2	Response to BCUC IR No. 1 Attachments Parts 2 of 5
B-3-3	Response to BCUC IR No. 1 Attachments Parts 3 of 5
B-3-4	Response to BCUC IR No. 1 Attachments Parts 4 of 5
B-3-5	Response to BCUC IR No. 1 Attachments Parts 5 of 5
B-4	Letter dated July 20, 2009 Terasen Utilities Response to CEC IR No. 1

Exhibit No.	Description
B-5	Letter dated July 20, 2009 Terasen Utilities Response to JIESC-BCOAPO-CEC IR No. 1
B-6	Letter dated August 13, 2009 Terasen Utilities Response to BCUC IR No. 2
B-7	Letter dated August 13, 2009 Terasen Utilities Response to JIESC-BCOAPO-CEC IR No. 2
B-8	Letter dated August 13, 2009 Terasen Utilities Response to CEC IR No. 2
B-9	Letter dated September 3, 2009 Terasen Utilities IRs on the Evidence of Dr. L. Booth
B-10	Letter dated September 21, 2009 Erratum Response to IR No. 1.24.2 - page 80 of Exhibit B-3 correcting the table and highlighting the affected cells.
B-11	Letter dated September 21, 2009 Response to Commission Panel IR No. 1
B-12	Letter dated September 21, 2009 Terasen Utilities Witness Panels and Direct Testimony
B-12-1	Letter dated September 21, 2009 REPLACEMENT with corrections - Terasen Utilities Witness Panels and Direct Testimony
B-13	Letter dated September 24, 2009 Opening Statement of R.L. (Randy) Jespersen, CEO on Behalf of the Terasen Utilities
B-14	Submitted at hearing September 28, 2009 Speech from the Throne August 25, 2009
B-15	Submitted at hearing September 28, 2009 Response from the Terasen Gas Inc. revenue requirement application to a Commission Staff Request 2.31.2
B-16	Submitted at hearing September 28, 2009 Full BC Hydro Service Plan, the August, 2009 update
B-17	Submitted at hearing September 29, 2009 Moody's A-rated and Baa-rated Utility Bond Yields
B-18	Submitted at hearing September 29, 2009 common equity component of Fortis
B-19	Submitted at hearing September 30, 2009 Consumer Prices Consensus Economics, Consensus Forecasts, Long-Term Forecasts
B-20	Submitted at hearing October 1, 2009 TGI 2005 ROE Exhibit B-3, Response to BCUC IR 74.1, Appendix 74.1

Exhibit No.	Description
B-21	Submitted at hearing October 1, 2009 (PAGES 193 AND 194 FROM FINANCIAL THEORY AND CORPORATE POLICY BY COPELAND AND WESTON WITH ATTACHED TRANSCRIPT PAGES 795 AND 796 FROM 2005
B-22	Submitted at hearing October 1, 2009 PAPER BY DR. BOOTH ENTITLED "CAPITAL MARKET DEVELOPMENTS IN THE POST-OCTOBER 1987 PERIOD: A CANADIAN PERSPECTIVE
B-23	Submitted at hearing October 1, 2009 COLOURED GRAPH, WITH PAGES 790 TO 804 FROM TGI-TGVI ROE HEARING, NOVEMBER 17, 2005, VOLUME 5
B-24	Submitted at hearing October 1, 2009 TAB 2, APPENDIX A, RISK-ADJUSTED EQUITY MARKET RISK PREMIUM TEST
B-25	Submitted at hearing October 1, 2009 TWO TABLES, BOTH HEADED "EXHIBIT, COMPARISON OF DR. BOOTH'S COST OF EQUITY RESULTS TO THE YIELDS ON MOODY'S A-RATED AND BAA-RATED UTILITY BONDS"
B-26	Submitted at hearing October 1, 2009 SCHEDULE 12, SPREADS SINCE 1990, WITH ATTACHED PAGE 15
B-27	Submitted at hearing October 1, 2009 70 REFERENCE: APPENDIX B, PAGE 1, LINES 18-25", PAGE 78
B-28	Letter dated October 20, 2009 Submission of Outstanding Undertakings

INTERVENOR DOCUMENTS

C1	**BRITISH COLUMBIA OLD AGE PENSIONERS' ORGANIZATION (BCOAPO) -** Letter dated May 29, 2009 filing request by Leigha Worth for Intervenor Status
C1-2	Letter dated June 15, 2009 via Email BCOAPO submissions on interim relief
C2-1	Changed to Interested Party
C3-1	**COMMERCIAL ENERGY CONSUMERS ASSOCIATION OF BRITISH COLUMBIA (CEC) VIA EMAIL -** dated June 4, 2009, 2009 filing request by Christopher Weafer for Intervenor Status
C3-2	Letter dated June 12, 2009 CEC submissions on interim relief

Exhibit No.	Description
C3-3	Letter dated July 07, 2009 CEC information Request No. 1
C3-4	Letter dated July 31, 2009 CEC information Request No. 2
C4-1	**LOUELLA VINCENT VIA EMAIL -** dated May 31, 2009, 2009 filing request for Intervenor Status
C5-1	**BC HYDRO (BCH) ONLINE REGISTRATION -** dated June 5, 2009, filing request for Intervenor Status
C6-1	**FORTIS BC (FBC) ONLINE REGISTRATION -** dated June 5, 2009, filing request by Dennis Swanson for Intervenor Status
C6-2	Removed exhibit: under Arguments
C7-1	**MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES (MEMPR)** letter dated June 8, 2009, filing request by Duane Chapman for Intervenor Status
C8-1	**VANCOUVER ISLAND GAS JOINT VENTURE (VIGJV)** letter dated June 5, 2009, filing request by Karl Gustafson for Intervenor Status
C9-1	**ZELLSTOFF CELGAR (ZC)** letter dated June 8, 2009, filing request by Brian Merwin for Intervenor Status
C9-2	Letter dated June 8, 2009 Via Email ZC submissions on interim relief
C10-1	**PACIFIC NORTHERN GAS (PNG) - VIA EMAIL** letter dated June 8, 2009 filing request by Craig Donohue for Intervenor Status
C11-1	**JOINT INDUSTRY ELECTRICITY STEERING COMMITTEE (JIESC)** letter dated June 8, 2009 filing request by Brian Wallace for Intervenor Status
C11-1-1	Submitted at hearing September 30, 2009 EXHIBIT C11-11, AMENDED Page 5 CIA-Canadian Institute of Actuaries data Exhibits of Dr.Vander Weide taken from CIA
C11-2	Letter dated June 8, 2009 JIESC submissions on interim relief
C11-3	Letter dated July 6, 2009 **- VIA EMAIL** Joint Information Request on behalf of JIESC, BCOAPO and CEC
C11-4	Letter dated July 30, 2009 **- VIA EMAIL** Joint Information Request 2 on behalf of JIESC, BCOAPO and CEC
C11-5	Letter dated August 2009 JIESC submission Evidence of Laurence D. Booth

Exhibit No.	Description
C11-6	Letter dated September 15, 2009 Response of Dr. Booth to BCUC IR No. 1
C11-7	Letter dated September 15, 2009 Dr. Booth responses to TGI IR No.1
C11-8	Submitted at hearing September 28, 2009 Excerpt from BC Hydro Service Plan 2009/10 - 2011/12
C11-9	Submitted at hearing September 28, 2009 Excerpt from BC Hydro Service Plan 2009/10 - 2011/12 August 2009 Update
C11-10	Submitted at hearing September 29, 2009 Alberta EUB Decision Generic Cost of Capital
C11-11	Submitted at hearing September 29, 2009 JIESC materials for cross-examination of Terasen panel number two
C11-12	Submitted at hearing September 30, 2009 Scotia Bank Group Global Economic Research Weekly Trends from September 25, 2009
C11-13	Submitted at hearing September 30, 2009 Scotia Bank Group Global Economic Research – Global Forecast Update September 3, 2009
C11-14	Submitted at hearing September 30, 2009 Excerpt of Direct Testimony of James M Coyne on Behalf of ATCO Utilities ET AL November 20, 2008 in Alberta Utilities Commission 2009 Generic Cost of Capital Proceeding
C11-15	Submitted at hearing September 30, 2009 Bank of Montreal Capital Markets report on Fortis Dated June 11, 2009
C11-16	Submitted at hearing October 1, 2009 ARTICLE FROM *THE JOURNAL OF FINANCE*, VOL. XLVI, NO. 4, SEPTEMBER 1991 ENTITLED "LIQUIDITY, MATURITY AND THE YIELDS ON U.S. TREASURY SECURITIES BY Y. AMIHUD AND H. MENDELSON
C11-17	Letter received October 14, 2009 JIESC/CEC/BCOAPO joint submission Dr. Booth's Responses to Undertakings
C12-1	**TECK COAL LTD (TC) – VIA EMAIL** Letter Dated July 06, 2009 filing by J. David Newlands to register as Intervenor

Exhibit No.	Description
C13-1	**INDUSTRIAL CUSTOMER GROUP (ICG) – VIA EMAIL** Letter Dated July 24, 2009 filing by and for David Bursey, Katie Seymour and Harold Todd to register as Intervenor (Certainteed Gypsum Canada Inc., Domtar Pulp and Paper Products Inc., Federated Co-operatives Ltd., Teck Metals Ltd., Weyerhaeuser Company Ltd., Zellstoff Celgar Limited Partnership)

INTERESTED PARTY DOCUMENTS

D-1	**CENTRAL HEAT DISTRIBUTION (CHD)** Letter Dated May 22, 2009 John Barnes filing to register as Interested Party
D-2	**COPE 378 (COPE) ONLINE REGISTRATION -** dated June 5, 2009, filing request by Kevin Smyth to register as Interested Party
D-3	**BP CANADA ENERGY COMPANY ONLINE REGISTRATION-** dated June 3, 2009, filing request by Cheryl Worthy to register as Interested Party
D-4	**BRITISH COLUMBIA TRANSMISSION CORPORATION (BCTC) ONLINE REGISTRATION -** dated June18, 2009, filing request by Gordon Doyle to register as Interested Party
D-5	**ACCESS GAS SERVICES INC. – ONLINE REGISTRATION** dated July 20, 2009 filing request by Tom Dixon for Interested party status

SIXTH FLOOR, 900 HOWE STREET, BOX 250
VANCOUVER, BC V6Z 2N3 CANADA
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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER G-75-13

TELEPHONE: (604) 660-4700
BC TOLL FREE: 1-800-663-1385
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IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

Generic Cost of Capital Proceeding

BEFORE: D.A. Cote, Commissioner/Panel Chair
M.R. Harle, Commissioner
L.A. O'Hara, Commissioner
R. Giammarino, Commissioner

May 10, 2013

O R D E R

WHEREAS:

A. By Order G-20-12 dated February 28, 2012, the British Columbia Utilities Commission (Commission) established a Generic Cost of Capital (GCOC) proceeding to review: (a) the setting of the appropriate cost of capital for a benchmark low-risk utility; (b) the possible return to a Return on Equity Automatic Adjustment Mechanism (ROE AAM) for setting an ROE for the benchmark low-risk utility; and (c) the establishment of a deemed capital structure and deemed cost of capital methodology, particularly for those utilities without third party debt;

B. Appendix C to Order G-20-12 divided public utilities into two categories for the purpose of the proceeding: "Affected Utilities" and "Other Utilities;"

C. FortisBC Energy Inc. (FEI), FortisBC Energy (Vancouver Island) Inc., FortisBC Energy (Whistler) Inc. and FortisBC Inc. (FortisBC)[collectively (FBCU)]; Corix Multi-Utility Services Inc. (Corix); and Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd. (PNG) registered as Affected Utilities. The British Columbia Hydro and Power Authority (BC Hydro) and the River District Energy (RDE) registered as Other Utilities;

D. Among the Interveners who registered for the proceeding, the Association of Major Consumers of BC (AMPC), British Columbia Pensioners' and Seniors' Organization (BCPSO), Commercial Energy Consumers (CEC) [collectively B.C. Utility Customers], and the Industrial Customers Group of FortisBC Inc. (ICG) actively participated;

E. By Order G-47-12 dated April 18, 2012, the Commission issued the Final Scoping Document for the proceeding. The Scoping Document sets out the purpose and the scope of the proceeding. Matters within the scope of the proceeding included, among others, the appropriate cost of capital and its effective date for a benchmark low-risk utility, the establishment of a benchmark ROE, the consideration of an automatic adjustment mechanism, and the deemed capital structure and deemed cost of capital for small utilities without third-party debt;

…/2

F. By Order G-50-12 dated April 19, 2012, the Commission, among other matters, set out the further procedural matters to be addressed in the proceeding and a Preliminary Minimum Filing Requirements (MFR) for Affected Utilities document. Parties were invited to make submissions on the Preliminary MFR for Affected Utilities by May 3, 2012, and on the allocation of Participant Assistance/Cost Awards (PACA), PACA eligibility, and/or the Draft Preliminary Regulatory Timetable by May 9, 2012;

G. By Order G-72-12 dated June 1, 2012, the Commission, among other matters, issued the Final Minimum Filing Requirements for Affected Utilities and the Preliminary Regulatory Timetable for the proceeding;

H. On June 8, 2012, the Commission released "A Survey of Cost of Capital Practices in Canada" prepared by The Brattle Group for the Commission (Brattle Report). Utilities and Interveners were provided with the opportunity to ask Information Requests on the Brattle Report;

I. By Order G-84-12 dated June 20, 2012, the Commission amended the Preliminary Regulatory Timetable, establishing, among other things, a Procedural Conference for October 2, 2012 and the commencement date for an oral hearing, if required, on December 12, 2012. The Procedural Conference was subsequently rescheduled to October 4, 2012;

J. At the Procedural Conference the Commission received, among others, submissions on the following items: (1) the appropriate benchmark utility for the determination of the generic cost of capital; (2) whether a Stage 2 for the purpose of determining an appropriate cost of capital for Affected and Other Utilities to immediately follow Stage 1 was desirable; (3) whether an oral phase was required and (4) the proposed timetable going forward;

K. By Order G-148-12 dated October 11, 2012, the Commission determined that : (1) FEI in its present pre-amalgamation state, would serve as the benchmark for the proceeding and whether FEI in 2012 is a pure play gas distribution utility would be determined following the hearing of further evidence; (2) a Stage 2 would be added to the proceeding with the schedule to be determined prior to the end of Stage 1; and (3) the review of the proceeding would continue by way of an oral hearing commencing on December 12, 2012;

L. By Order G-187-12 dated December 10, 2012, the Commission ordered that: (1) the current ROE and capital structure for FEI, the designated benchmark utility, and all regulated entities in B.C. that rely on the benchmark utility, except British Columbia Hydro and Power Authority, are to be maintained and made interim, effective January 1, 2013; and (2) any determinations of the premiums on the benchmark ROE and capital structure of regulated utilities that depend on the benchmark utility for rate setting will be made following the decision in Stage 2; M. The oral public hearing took place over a period of seven days between December 12, 2012 and December 21, 2012. A total of eight witness panels from FBCU and Interveners gave evidence;

N. FBCU, PNG, Corix, AMPC/CEC, ICG and BCPSO filed Final Submissions. FBCU filed a Reply Submission; and

O. The Commission has considered the evidence and the submissions of the Parties all as set forth in the Decision issued concurrently with this Order.

.../3

BRITISH COLUMBIA UTILITIES COMMISSION	
ORDER NUMBER	G-75-13

NOW THEREFORE, the Commission orders as follows:

1. The common equity component appropriate for the benchmark utility, FEI, effective January 1, 2013 is 38.5 percent.

2. A Return on Equity (ROE) for the benchmark utility, FEI, is established at 8.75 percent effective January 1, 2013.

3. An Automatic Adjustment Mechanism (AAM) formula for annually setting the ROE of the benchmark utility between ROE proceedings is adopted commencing January 1, 2014. The AAM formula will operate until December 31, 2015. The implementation of the model will be subject to conditions outlined in the Decision.

4. FEI is directed to file an application for the review of the common equity component and the ROE approved in Paragraphs 1 and 2 of this Order by no later than November 30, 2015.

5. The common equity component and the ROE approved in Paragraphs 1 and 2 of this Order will continue to serve as the Benchmark cost of capital for any other utility in British Columbia that uses a Benchmark Utility to set rates.

6. Within 30 days of the date of this Order, FEI is to file:

   (a) a document setting out how and when it will implement the change to its capital structure;

   (b) amended rate schedules in accordance with paragraphs 1 and 2 of this Order as well as a proposal on the treatment of the refundable portion of the rates collected since January 1, 2013.

7. Small utilities without third-party debt are to include a deemed component of short-term debt of 4 percent.

DATED at the City of Vancouver, in the Province of British Columbia, this 10th day of May 2013.

BY ORDER

Original signed by:

D.A. Cote
Commissioner/Panel Chair

IN THE MATTER OF

BRITISH COLUMBIA UTILITIES COMMISSION

GENERIC COST OF CAPITAL PROCEEDING
(STAGE 1)

DECISION

May 10, 2013

Before:

D.A. Cote, Commissioner/Panel Chair
R. Giammarino, Commissioner
M.R. Harle, Commissioner
L.A. O'Hara, Commissioner

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EXECUTIVE SUMMARY

By Order G-20-12 on February 28, 2012, the British Columbia Utilities Commission (Commission) initiated the Generic Cost of Capital (GCOC) proceeding pursuant to section 82 of the *Utilities Commission Act* to review and determine among other things, the following:

- The setting of the appropriate cost of capital for a benchmark low-risk utility;
- The possible return to an automatic adjustment mechanism (AAM) for setting the return on equity (ROE) for the benchmark utility each year; and
- The establishment of a deemed capital structure and deemed cost of capital methodology, particularly for those utilities without third party debt.

By Order G-48-12 on October 11, 2012, the Commission established the following:

- The proceeding will have two stages; Stage 1 will determine the cost of capital for the benchmark utility and Stage 2 will establish the cost of capital for other utilities as compared to the benchmark.
- Fortis Energy Inc. (FEI) in its pre-amalgamation state will serve as the benchmark utility for the GCOC proceeding; and
- An oral public hearing commencing on December 12, 2012, will be held to determine the cost of capital for the benchmark utility.

Fair Return Standard

The Fair Return Standard is foundational for cost of capital proceedings and has three requirements for a fair and reasonable return on capital: the comparable investment requirement, the financial integrity requirement, and the capital attraction requirement. The Commission Panel, consistent with previous decisions and the regulatory compact, confirms that the Commission has a duty to approve rates that will provide a reasonable opportunity to earn a fair return on invested capital. In the current proceeding, the Commission Panel has not considered the rate impacts of the revenue required to yield the fair return but has noted that by seeking an optimal capital structure and the opportunity cost of capital, the needs of customers are being served.

Contextual Issues

Three important issues were raised that were contextual in nature; the significance of past cost of capital decisions, the significance of decisions from other jurisdictions and the relevance of the disparity between "allowed" and "actual" ROE.

With respect to past cost of capital decisions and appropriate points of reference, the Commission Panel accepts that the 2009 Decision is a reasonable point of reference with respect to long-term risk as this is the most recent proceeding and has been used extensively by the parties. The Panel also remains open to looking back to the 2006 ROE Decision where appropriate.

With respect to reliance upon data from US jurisdictions, the Commission Panel has determined that it is appropriate to continue to accept the use of historical and forecast data but do not accept that US data should be considered to be the same or be given equal weight as data for Canadian utilities. Concerning Canadian jurisdictional decisions, the Panel acknowledges the importance of considering methodologies, approaches, and regulatory principles related to other jurisdictions' decisions but does not accept the use of results and values for the purpose of calibration.

Concerning the relevance of disparity between FEI's "allowed" and "actual" ROE, the Panel concludes that debt and equity investors, who in their risk assessment consider both long and short-term cash flows as well as risk of financial disruption, will derive some comfort from FEI's positive track record. However, the relevance of disparity between allowed and actual ROE of FEI is entrenched in the regulatory compact, revenue requirements proceedings, and management's proactive approach. Additionally, the Panel is of the view that these differences are assessed in revenue requirement proceedings.

Capital Structure

In determining an appropriate capital structure for the benchmark utility, the Commission Panel considered FEI's long and short-term risk, development of an optimal capital structure, credit ratings and metrics and experiences of other jurisdictions.

The Commission Panel is supportive of maintaining an "A" category credit rating but only to the extent that it can be maintained without going beyond what is required by the Fair Return Standard. The Commission Panel finds that reductions in long-term risk are warranted with respect to provincial climate and energy policies as well as the competitive position of natural gas relative to electricity. While acknowledging that there has been little change in short-term risk since the 2009 Decision, the Panel has determined that only minimal weight can be given to short-term risk as an impediment to earning a fair return. In consideration of both long and short-term risks, the Commission Panel has determined that a reduction in common equity ratio of 1.5 percent to 38.5 percent is appropriate. The Commission Panel considers a 38.5 percent common equity ratio reflects the reduced long-term risk, yet balances this against potential disruption caused by a significant weakening of credit metrics. The awarded common equity ratio falls within the upper end of the range of comparative utilities in other Canadian jurisdictions.

Return on Equity

The Commission Panel considered expert evidence on various model approaches to determine ROE. The Panel finds that the discounted cash flow model and the capital asset pricing model should be given equal weight in determining the ROE of the benchmark utility. No weight was given to the equity risk premium and comparative earnings models. The Commission has determined that an ROE of 8.75 percent inclusive of a 0.50 percent allowance for financial flexibility is appropriate for the benchmark utility. The benchmark utility ROE will be effective January 1, 2013 and will be effective until December 31, 2015, subject to updating as a result applying the AAM formula.

Automatic Adjustment Formula

Consideration was given to re-instituting an AAM formula for annually setting the ROE for a benchmark utility between proceedings, which had been eliminated in the 2009 Decision. In addition, consideration was given to the status of AAMs in other jurisdictions and what optional AAMs might be considered. The Commission Panel has determined that it is appropriate to re-establish an AAM formula noting that it better meets the FRS than giving no consideration to the market changes over the period between ROE proceedings. The Panel has directed that a two variable model considering changes to utility bond spreads and the long-term Canada bond yield be

established to determine the benchmark ROE on an annual basis commencing in the 2014 calendar year. Implementation of the AAM will be subject to an actual Canada bond yield of 3.8 percent being met or exceeded. Therefore, the AAM formula will not be in effect as long as the long Canada bond yield is below 3.8 percent.

Cost of Capital – Small Utilities

Stage 1 of the GCOC proceeding considered the cost of capital for the benchmark utility, FEI. Stage 2 will assess the differences in short and long-term risk faced by regulated utilities in British Columbia other than FEI and their impact on the capital structure and ROE for these utilities. The Commission Panel has recommended that the utilities be separated into three groups, each of which will be handled separately. The Commission Panel has also made a number of determinations and findings with respect to the handling of the size factor as a business risk and deemed short and long-term debt interest rates.

1.0 INTRODUCTION

1.1 Background

The 2009 ROE Decision[1] (2009 Decision) was issued concurrently with Order G-158-09 on December 16, 2009. The Order set the return on equity for FEI, the benchmark utility in British Columbia, at 9.5 percent effective July 1, 2009, and the equity ratio at 40 percent effective January 1, 2010. Order G-158-09 also eliminated the AAM, which had been utilized to set the ROE for the benchmark utility annually. Since that Order, there have been no further adjustments to the ROE or capital structure of the benchmark utility.

This Decision for Stage 1 of the Generic Cost of Capital (GCOC) proceeding sets out:

- the new approved ROE and capital structure for FEI;
- the new automatic adjustment formula and the conditions under which it will be in effect; and
- the framework to review the cost of capital for small utilities.

Stating that changes have occurred in the financial markets since the 2009 Decision, the Commission, by Order G-20-12 dated February 28, 2012, initiated the GCOC proceeding pursuant to section 82 of the *Utilities Commission Act* (*UCA*) to review and determine, among other things, the following:

- the ROE and capital structure for a benchmark low-risk utility;
- the possible return to an AAM to set the ROE for the benchmark utility each year; and
- a deemed capital structure and deemed ROE for small utilities, particularly those utilities without short-term debt.

Order G-20-12 established that all public utilities would be considered applicants in the GCOC proceeding and included a preliminary scoping document, which set out a list of matters to be examined and determined within the proceeding. The Order further divided the list of utilities regulated by the BCUC into Affected Utilities and Other Utilities. The Affected Utilities have been so designated given their active participation in previous ROE proceedings or their anticipated interest

[1] In the Matter of Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc., Terasen Gas (Whistler) Inc. and Return on Equity and capital Structure Decision, December 16, 2009.

in the GCOC proceeding as investor-owned utilities. These utilities were expected to take a lead role in filing evidence for cost of capital matters that may impact them. The Other Utilities are so designated as they have not actively participated in previous ROE proceedings and they were not expected to file evidence in the GCOC proceeding.

On April 18, 2012, the Commission, by Order G-47-12, issued a final scoping document, which set out the purpose and scope of the proceeding. On April 19, 2012, the Commission issued a preliminary draft of the minimum filing requirements. Following submissions by Registered Interveners, the Commission issued Order G-72-12 on June 1, 2012, which set out the minimum filing requirements for those utilities expected to participate and a preliminary regulatory timetable. In an attachment to Appendix A to the Order, the Commission also placed on the record the terms of reference for a Survey of Cost of Capital Practices in Canada prepared by the Commission consultant, the Brattle Group (Brattle Report).

On October 11, 2012, following a procedural conference held on October 4, 2012, the Commission by Order G-148-12 established that in 2012, FEI in its pre-amalgamation state, will serve as the benchmark utility for the GCOC proceeding. The Order also established an oral public hearing to commence on December 12, 2012, to hear the cost of capital for the benchmark utility. In addition, it was determined that the proceeding will have two stages: Stage 1 establishing the ROE and capital structure for FEI the benchmark utility, and Stage 2, establishing a cost of capital for other utilities as compared to the benchmark utility.

1.2 Purpose and Scope of the Generic Cost of Capital Proceeding

The Commission determined the purpose and scope of the GCOC proceeding in Order G-47-12, with certain outstanding matters such as the appropriate utility, which would serve as the benchmark utility, determined by Order G-148-12 dated October 11, 2012. The purpose and scope of this proceeding are as follows:

PURPOSE OF THE PROCEEDING

The main purposes of the GCOC Proceeding are:

I. to establish a method to determine the appropriate cost of capital for a benchmark low-risk utility in British Columbia, commencing January 1, 2013, and to establish how the Benchmark return on equity (ROE) will be reviewed, and if required, adjusted on a regular basis;

II. to establish a generic methodology or process on how to establish each utility's cost of capital based on the cost of capital for a benchmark low-risk utility; and

III. to establish a framework for determining the appropriate cost of capital for other smaller utilities in the province.

SCOPE OF THE PROCEEDING

I. The appropriate cost of capital for a benchmark low-risk utility effective January 1, 2013. Cost of capital includes capital structure, return on common equity, and interest on debt.

II. Establishment of a Benchmark ROE based on a benchmark low-risk utility effective January 1, 2013 to December 31, 2013 for the initial transition year.

III. Whether re-establishment of an ROE automatic adjustment mechanism (AAM) is warranted. If a return to the use of a formulaic ROE AAM is accepted as a result of the GCOC Proceeding, it would be implemented January 1, 2014. If not, a future regulatory process will be set to review the ROE for a benchmark low-risk utility beyond December 31, 2013 on a regular basis.

IV. A generic methodology or process for each utility to determine its unique cost of capital in reference to the benchmark low-risk utility.

V. In certain circumstances, a methodology to establish a deemed capital structure and deemed cost of capital, particularly for those utilities without third-party debt. This would involve setting a methodology on how to calculate a deemed interest rate.

VI. In certain circumstances for those utilities that require a deemed interest rate, a methodology to establish a deemed interest rate automatic adjustment mechanism (Interest AAM). If warranted, the Interest AAM would be implemented for January 1, 2014. If not warranted, setting a future regulatory process on how the deemed interest for a benchmark low-risk utility would be adjusted in future years beyond December 31, 2013.

1.3 Regulatory Process

As noted previously, the Commission retained The Brattle Group to prepare a survey report on the Cost of Capital Practices in Canada. The Brattle Report, filed as Exhibit A2-3 on June 8, 2012, provides a description of the cost of capital estimation methods and the common approaches in implementing the results in Canadian jurisdictions. The Brattle Report was intended to provide context and background for the establishment of the cost of capital of a low-risk benchmark utility

in B.C. All parties were provided with the opportunity to file Information Requests (IRs) on the Report.

In accordance with Order G-72-12, the following utilities filed minimum filing requirements:

- FEI, FortisBC Inc. , FortisBC Energy (Vancouver Island) Inc. (FEVI), and FortisBC (Whistler) Inc. (FEW),[collectively (FBCU)];
- Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd. [collectively (PNG)]; and
- Corix Utilities (Corix).

The Industrial Customers Group of FortisBC Inc. (ICG) and the BC Utility Customers comprising the Association of Major Power Customers of BC (AMPC), the British Columbia Pensioners' and Seniors' Organization (BCPSO), and the Commercial Energy Consumers of BC (CEC) were active in the proceeding. Two rounds of IRs with respect to evidence filed by Affected Utilities and one round of IRs on evidence filed by Interveners took place.

The oral public hearing, including an *in camera* session on FBCU's confidential reports, took place over a period of seven days between December 12, 2012 and December 21, 2012. FBCU tendered five witness panels for cross-examination and Corix, BC Utility Customers, and the ICG each had one witness panel for cross-examination.

A list of procedural orders in the GCOC proceeding is included in Appendix A. A list of Appearances is included in Appendix B and Appendix C contains a list of witness panels that gave evidence. Appendix D contains the List of Exhibits. Appendix E contains a risk matrix used in a recent Commission decision with respect to a small utility that is Appendix B to Order C-1-13, Appendix F contains summary tables of ROE estimates by expert witnesses retained by the utilities and ratepayer groups, and. Appendix G is a list of acronyms.

1.4 Approach to Decision

The legal framework for determining a fair return for a regulated utility is called the "Fair Return Standard" and is discussed in Section 2.

There are a number of broader issues of importance, which were raised by this proceeding. These are contextual in nature and include the following:

- importance of past cost of capital decisions;
- consideration of decisions from other jurisdictions; and
- the relevance of the disparity between "allowed" and "actual" ROE.

These issues are discussed in Section 3 and provide the Commission Panel with a context to assist in reviewing and assessing the evidence.

Section 4 deals with an appropriate capital structure given FEI's level of risk with consideration of credit ratings and metrics and decisions in other jurisdictions. Section 5 considers the appropriate ROE for the benchmark utility with a review of some of the key issues and models employed by the expert witnesses. Section 6 examines potential AAM models and whether there is justification to return to a reliance on such a mechanism. Section 7 considers issues related to cost of capital for small utilities, and Section 8 examines the need for financial models presented in proceedings such as this to have a sound theoretical basis.

2.0 LEGISLATIVE FRAMEWORK – THE FAIR RETURN STANDARD

2.1 Legislative Requirement

The enabling legislation for the BCUC, the *UCA*, provides that a public utility must not make, demand or receive:

(a) an unjust, unreasonable, unduly discriminatory or unduly preferential rate for a service provided by it in British Columbia;

(b) a rate that otherwise contravenes this Act, the regulations, orders of the commission or any other law.

A rate is "unjust" or "unreasonable" if it is:

(a) more than a fair and reasonable charge for service of the nature and quality provided by the utility;

(b) insufficient to yield a fair and reasonable compensation for the service provided by the utility, or a fair and reasonable return on the appraised value of its property; or

(c) unjust and unreasonable for any other reason.[2]

The *UCA*, and other Canadian legislation delegating power to regulatory tribunals, follow what is known as the "Regulatory Compact." In general terms, the Regulatory Compact states that in exchange for an exclusive franchise to serve a defined area:

- a regulated utility must provide safe, reliable, non-discriminatory service to its ratepayers at cost-based rates as prescribed by the regulatory tribunal, and
- the regulatory tribunal must allow the regulated utility an opportunity to earn a fair return on its invested capital.

(Exhibit C4-9, p. 7; BCPSO Final Submission, p. 3)

The approach to determining a fair return on the cost of invested capital in a regulated utility has normally been referred to as the Fair Return Standard (FRS).

[2] *UCA* sections 59 (1) (a) (b), 59(5), 60 (1) (a) (b) (i)

2.2 Elements of a Fair Return Standard

The Supreme Court of Canada decision in *Northwestern Utilities Ltd*. v. *Edmonton (City),* [1929] S.C.R. 186, (*Northwestern Utilities*) at pages 192-193 describes the FRS as follows:

> "The duty of the Board was to fix fair and reasonable rates; rates which, under the circumstances, would be fair to the consumer on the one hand, and which, on the other hand, would secure to the company a fair return for the capital invested. By a fair return is meant that the company will be allowed as large a return on the capital invested in its enterprise, (which will be net to the company,) as it would receive if it were investing the same amount in other securities possessing an attractiveness, stability and certainty equal to that of the company's enterprise." (per Lamont J.)

The Brattle Report notes that the legal decisions, which provide the overarching principles of the FRS, do not prescribe how to determine comparability, how to estimate the cost of capital for the comparable companies, or how to apply those estimates when setting allowable rates. The cost of capital is the expected rate of return in capital markets on alternative investments of equivalent risk. The expected rate of return investors require is based on the risk-return alternatives available in competitive capital markets. In other words, the cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. (Exhibit A2-3, pp. 2-3)

On page 8 in the 2009 Decision, the Commission endorsed the National Energy Board's (NEB) articulation of the Fair Return Standard in NEB Decision RH-1-2008 where NEB stated:

> "The Fair Return Standard requires that a fair or reasonable overall return on capital should:
>
> - Be comparable to the return available from the application of the invested capital to other enterprises of like risk (comparable investment requirement);
> - Enable the financial integrity of the regulated enterprise to be maintained (financial integrity requirement); and
> - Permit incremental capital to be attracted to the enterprise on reasonable terms and conditions (capital attraction requirement)."

Ms. McShane, the expert witness for FBCU, submitted that the standards for a fair return arise from legal precedents and there are three requirements the utility must:

1. Earn a return on investment commensurate with that of comparable risk enterprises;
2. Maintain its financial integrity; and
3. Attract capital on reasonable terms.

According to Ms. McShane, the legal precedents make it clear that the three requirements are separate and distinct. The FRS is met only if all three requirements are satisfied. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 8)

Dr. Laurence Booth, the expert witness for the BC Utility Customers, submitted that the definition of a fair rate of return was confirmed in *BC Electric* [*Railway Co. Ltd. v. Public Utilities Commission of B.C. et al ([1960] S.C.R. 837)*] when Mr. Justice Lamont adopted the definition of a fair rate of return, put forward in *Northwestern Utilities*.

Dr. Booth submitted that the definition in the *Northwestern Utilities* is referred to as an opportunity cost, in that the fair return is what could be earned by investing in similar securities elsewhere. Only if the owners of a utility earn their opportunity cost will the returns accruing to them be fair, i.e., they will neither reward the owners with excessive profits, nor ratepayers by charging prices below cost. Dr. Booth further submitted that to any modern financial economist, Mr. Justice Lamont's definition of a fair rate of return as an opportunity cost means a risk adjusted discount rate or expected rate of return. (Exhibit C6-12, pp. 7, 8)

2.3 Application of the Fair Return Standard

The Commission Panel observes that the application of the FRS leaves room for disagreement, judgment and discretion. The methods relied upon by various regulators and practitioners therefore differ substantially. For example, while some regulators set rates by determining the weighted-average cost of debt and equity that the regulated company should be allowed to earn on its invested capital (as a whole), others determine separately the cost of equity and possibly the percentage of equity that should be allowed in the regulated company's capital structure. (Exhibit A2-3, p. 2)

The Panel also notes the words of the Alberta Utilities Commission (AUC) on this subject related to conflicting evidence and applying judgment:

> "....the determination of a fair return on equity for Alberta utilities requires the assessment of three criteria: return on comparable investments, ability to attract capital and maintenance of financial integrity. As noted by Mr. Justice Rothstein in the TransCanada Pipelines decision cited above, the determination of the rate of return on equity for a regulated utility is difficult given that the correct answer is not readily apparent. This determination requires an expert tribunal to apply its judgment in assessing often conflicting evidence and to consider the differing interests and perspectives on risk of debt and equity investors. This exercise is even more complex in Canada, and in Alberta in particular, given the limited number of stand-alone utilities issuing debt and the lack of any utilities that issue equity directly to investors."[3]

The Commission Panel further notes the words of the Federal Court of Appeal's ruling in *TransCanada Pipelines Ltd. v. National Energy Board, 2004 FCA 149* on just and reasonable tolls. It quotes the *Northwestern Utilities* and states:

> "Tolls which reflect a fair return on capital will be just and reasonable to both the Mainline and its users.

It further states:

> To put the matter another way, when the cost of service methodology is used to determine just and reasonable tolls, if the Board does not permit the Mainline to recover its costs because it has understated the Mainline's cost of equity capital, the Mainline will be unable to earn a fair return on equity. The tolls will therefore not be just and reasonable from the point of view of the Mainline's point of view. On the other hand, the tolls must also be just and reasonable from the point of view of the Mainline's customers and the ultimate consumers who rely on service from the Mainline. Therefore, customers and consumers have an interest in ensuring Mainline's costs are not overstated .... And, specific to this appeal, customers and consumers have an interest in ensuring that the Mainline's cost of equity is not overstated."
>
> (TransCanada Pipelines Ltd. v. National Energy Board, 2004 FCA 149, para. 33, 34)

[3] AUC 2009 Generic Cost of Capital Decision, November 12, 2009, p. 28

Submissions by Parties

None of the parties disagree with the Fair Return Standard as the applicable test. The Utilities and Interveners, however, disagree on how this test should be applied.

FBCU take the position that the overall rate of return allowed for FEI must be based on the utility's true cost of capital without compromising the legitimate cost of service to achieve lower rates in the short-run. FBCU submit that the combination of allowed ROE and capital structure should permit FEI to maintain credit ratings that are at a minimum in the "A" credit category in varying market conditions. This matter is further addressed in Section 4.5.

FBCU argue that a fair return is not synonymous with the lowest possible return. It pointed out that in the 2006 ROE Decision (2006 Decision),[4] the Commission had articulated that the "lowest possible" was not the appropriate test. Therefore, FBCU submit that the Commission should not rely on evidence on rate impacts and that the view of Dr. Safir, ICG's expert witness, that the outcome of a "fair return" should always favour the lower range is fundamentally inconsistent with the authorities on the FRS. (FBCU Final Submission, pp. 1, 7, 11-12)

The AMPC/CEC do not dispute the definition of the FRS based on the NEB Decision RH-1-2008 and endorsed by the Commission in the 2009 Decision. However, the AMPC/CEC disagree with FBCU's submission that the three requirements listed are the only factors to be considered when deciding what constitutes a fair return, with no consideration of the Commission's broader mandate to balance the interest of customers and regulated utilities. AMPC/CEC submit that when acting as the surrogate for competition, the Commission cannot and must not protect FEI from all business and financial risk by unnecessarily raising the ROE and common equity at the expense of customers; and the Commission must scrutinize whether the cushion FEI asks for is truly necessary to meet the FRS in light of its broader mandate to protect consumers. In Section 4.5 of this Decision, the Commission Panel discusses the application of the FRS and the role of credit metrics in the implementation of the FRS requirements.

[4] In the Matter of Terasen Gas Inc. and Terasen Gas (Vancouver Island) Inc. Application to Determine the Appropriate Return on Equity and Capital Structure and to Review and Revise the Automatic Adjustment Mechanism Decision and Order G-14-06, March 2, 2006.

According to AMPC/CEC, Dr. Booth's evidence shows that he recommended a fair return by applying the principle in the FRS that "only if the owners of a utility earn their opportunity cost will the returns accruing to them be fair." In addition, AMPC/CEC state that among other things, Dr. Booth checked his findings against numerous independent, reputable sources which confirmed that his estimates were reasonable. (AMPC/CEC Final Submission, pp. 5-7)

The BCPSO agrees with FBCU's characterization of the FRS and agrees that utilities are entitled to a competitive return as defined in the FRS' three tests regardless of the rate impact. However, BCPSO submits that it is not the same as to say that customer interests carry no weight in setting an appropriate deemed cost of capital as utility customers have an interest in ensuring that the utility's cost of capital is not overstated. BCPSO submit that a fair return is one that takes into account the right of utility customers to pay no more than a fair and reasonable charge for the service provided. Based on its logic, BCPSO submits that the evidence from Exhibit B1-42 which compares the rate impact of a 5 percent change in the equity ratio to a 50 and 100 basis point change in ROE is admissible; and furthermore, if the utility can be provided a competitive return with less rate impact, that option should be chosen. (BCPSO Final Submission, pp. 3-5)

ICG submits that the interests of customers should be paramount to those of the shareholders and reiterates Dr. Safir's testimony that where a range of competitive returns is available for evaluation, the outcome of a "fair return" should always favour the lower range presented. (ICG Final Submission, p. 3)

In Reply, FBCU submit that the Commission would err in accepting ICG's argument that regulation is simply to benefit customers. FBCU submitted that the Commission, in the 2009 Decision, had been explicit that it was not accounting for rate impacts in reaching its decision. (FBCU Reply, pp. 2-3)

Commission Determination

In previous decisions, the Commission concluded that the opportunity to earn a fair return must be provided to each regulated utility as a separate obligation from those service and financing requirements detailed in other sections of the *UCA*. For instance, on page 8 of its 2006 ROE Decision, the Commission said:

> "In coming to a conclusion of a fair return, the Commission does not consider the rate impacts of the revenue required to yield the fair return. Once the decision is made as to what is a fair return, the Commission has a duty to approve rates that will provide a reasonable opportunity to earn a fair return on invested capital."

The Commission Panel confirms that the approval of rates to meet the FRS is not optional for the Commission. In other words, the Commission has a duty to approve rates that will provide a reasonable opportunity to earn a fair return on invested capital, which is consistent with the previous ROE decisions and the Regulatory Compact. In determining the fair return, this Commission Panel examines the overall return, i.e., the ROE and the common equity component, allowed to the utility. This Decision reiterates the principle articulated in the 2006 ROE Decision and the 2009 Decision, and argued by FBCU on pages 7 to 9 in its Final Submission, that the Commission does not consider the rate impacts of the revenue required to yield the fair return. However, by seeking an optimal capital structure and the opportunity cost of capital we are serving the needs of the customer.

While this Commission Panel has not considered the rate impacts of the revenue required to yield the fair return *per se*, we are of the view that the capital structure of the utility should be set efficiently and, therefore, there is value in finding an optimal capital structure. Exhibit B1-42 provides comparative information on revenue requirements for FEI based on either a change in equity thickness or a change in ROE. The ICG submits that the Commission should reduce the ROE before reducing the capital structure of FEI. (ICG Final Submission, p. 4) In this regard, the Commission Panel finds the information on rate impacts as presented in Exhibit B1-42 useful. An optimal capital structure is discussed further in Section 4.4.

3.0 CONTEXTUAL ISSUES

This section considers important issues raised by this proceeding that are contextual in nature; they include:

- The significance of past cost of capital decisions;
- The relevance of US data and the significance of decisions from other jurisdictions; and
- The relevance of the disparity between "allowed" and "actual" ROE.

3.1 Past Cost of Capital Decisions

An important issue arising within the 2012 GCOC proceeding is whether a previous cost of capital decision is an appropriate reference point against which evidence in the current proceeding can be compared. Specifically, the questions facing the Commission Panel are: (1) whether a reference point is required, and (2) in the event it is, what reference point would be most appropriate and to what extent should it be relied upon in the Commission Panel's decision - making process. Within this proceeding, the primary comparative reference point has been the 2009 Decision, which has been relied on to illustrate changes in capital markets as well as changes in short and long-term risk since that time. Each of these referenced areas will be discussed in turn.

Submissions by Parties

3.1.1 Changes in Capital Markets

Throughout this proceeding, the FBCU have relied upon and underlined the Commission's statement that changes have occurred in capital markets since the 2009 Decision was issued. They have taken the position that capital markets are similar (albeit for different reasons) to what they were in the fall of 2009 when the previous cost of capital proceeding took place. The FBCU have relied very heavily on the 2009 Decision as a reference point for the current proceeding and have provided comparisons between what they believe exists today as opposed to conditions which existed at the time of the 2009 Decision. FBCU have relied upon the opinion evidence prepared by two of their expert witnesses, Ms. McShane and Mr. Engen, which showed that many of the key indicators of conditions within capital markets are similar and in some cases worse than the same indicators reflecting capital markets late in 2009. FBCU maintain that the experts along with market indicators

and Bank of Canada published information all suggest that equity capital markets in Canada are challenging and volatile and the market cost of equity has risen since 2009. In summary, FBCU maintain that current market conditions provide no basis for reducing FEI's overall return as argued by interveners. (FBCU Final Submission, pp. 1-2, 16-30)

ICG takes issue with FBCU on their choice of 2009 as an appropriate reference point and argue that a more appropriate reference point was the 2006 Decision. ICG submits that the 2009 Decision did not appropriately balance the interests of customers and shareholders and gave inappropriate weight to the interests of shareholders. Moreover, ICG submits that the 2009 Decision represented a significant departure from previous Commission cost of capital decisions. With respect to its Canadian peers, ICG points out that the weighted equity return component was materially lower (by 0.47) in 2005 through 2009 and materially higher (by 0.57) in the 2010 to 2012 period. ICG argues that the 2009 Decision should not be a point of reference for this decision given a steady decline in FEI's business risks since 2005. (ICG Final Submission, pp. 11-12)

BCPSO also takes issue with the use of the 2009 Decision as a reference point for this decision, expressing concern as to whether the capital market conditions comparator dates are consistent across the two proceedings. BCPSO submits that the current proceeding is forward looking with respect to capital conditions and snapshot-style evidence of past capital conditions is of limited value. In its view, the economic tests such as equity risk premium (ERP), comparable earnings (CE) and discounted cash flow (DCF) provide a better basis in assessing cost of capital stating that they "are more precise, forward looking, and can be made industry or company specific." The primary value of evidence relating to general market conditions lies in the trends it demonstrates. (BCPSO Final Submission, p. 6)

AMPC/CEC submit that regulators do not base a cost of capital decision on immediate circumstances only. They assert that the Commission will consider economic and financial conditions occurring since the last hearing and will also consider the outlook on a going forward basis. Referring to Mr. Engen's S&P/TSX Composite Index 10 Year Performance data, AMPC/CEC state that the difference now "is that the last few years have witnessed the market hold or increase ground it recovered, whereas in the lead up to the 2009 hearing, it had just suffered a dramatic crash." They further point out the FBCU argument that capital markets are similar to what they were in 2009 is in conflict

with their own witnesses' (Ms. McShane and Dr. Vander Weide) DCF calculations, which have declined considerably since the close of evidence in the last hearing. (AMPC/CEC Final Submission, pp. 28-29; Exhibit B-1-9-6, FBCU Evidence, p. 14, updated in Exhibit B-1-49)

In Reply to ICG, the FBCU state that the choice of 2009 as a point of comparison is because that proceeding is where the Commission most recently assessed FEI's business risk. To disregard this in favour of the 2006 Decision because ICG preferred the outcome in FBCU's view is indefensible. (FBCU Reply, p. 21)

Concerning the AMPC/CEC's submissions regarding the inconsistency in capital markets being similar to 2009 and FBCU's witnesses' DCF calculations, the FBCU state the following:

- Mr. Engen's evidence relates to the overall capital market and trends in the market cost of equity which indicate the market cost of equity is higher today.
- Ms. McShane's and Dr. Vander Weide's DCF calculations relate to a narrow segment of the overall market and deal specifically with FEI's cost of equity. (FBCU Reply, p. 5)

3.1.2 Changes in Long-Term Risk

While there has been considerable disagreement with respect to relying upon 2009 capital markets as a reference point for comparison, there has been little concern raised by the parties with respect to using the 2009 Decision as a reference for changes in long-term risk. Both the FBCU and interveners have relied heavily on what has changed since 2009 and in some cases referred back to the period prior to the 2006 Decision as a source of comparison.

Commission Discussion

The Commission Panel accepts that many of the indicators reflecting the current state of the capital markets are similar to what they were in 2009. This, however, does not mean that the conditions under which the 2009 Decision was made are the same as they are today. As noted in Mr. Engen's evidence, the current period is characterized by concerns for a sustained US economic recovery, fears of an economic slowdown related to weak economic data from the US and the European Union and the European sovereign debt crisis, among other things. These are not at all descriptive

of the period in latter 2009. (Exhibit B1-9-6, Appendix E, Engen Evidence, pp. 7-8) Moreover, as pointed out by AMPC/CEC, since that time markets have demonstrated a degree of stabilization in sharp contrast to the situation preceding the 2009 Decision which followed a dramatic crash. Therefore, while there are some similarities between the current period and late 2009, the Panel is of the view there are significant differences. By contrast, the markets, while maintaining volatility, have experienced a few years of comparative stability and the investor has been distanced from the financial conditions characterizing the period leading to the 2009 proceeding.

The Commission Panel is mindful that many of the key indicators of capital market conditions are similar to those of 2009 but does not consider them alone to be determinative in reaching a decision on the cost of equity. While considering changes in capital markets, pricing models some of which reflect the market outlook, are very important in reaching a determination on the appropriate rate of return in this proceeding.

The Commission Panel does accept that the period leading up to the 2009 Decision is a reasonable point of comparison with respect to changes in long-term risk as this is the most recent proceeding and notes that this has been used extensively by the parties. However, the Panel remains open to looking back further to the 2006 Decision where appropriate. In the view of the Panel, a determination on the degree of change in long-term risk is a much more discrete process. It is dependent upon an assessment of the level of risk, which exists in the current circumstances as compared to those which existed at a previous point in time. Therefore, we consider the periods prior to both the 2009 Decision and the 2006 Decision as appropriate reference points in assessing the level of long-term risk faced by FEI.

The Commission Panel does not accept ICG's argument that the 2009 Decision fails to appropriately balance the interests of customers and shareholders. In the view of the Panel, there is no value in re-examining the 2009 Decision nor is there evidence to support the need for doing so.

3.2 Consideration of Other Jurisdictions

Throughout the evidentiary portion of this proceeding there has been considerable reliance among the parties upon data and cost of capital decisions from both US and Canadian jurisdictions. The Commission Panel considers these separately as the issues related to each differ.

3.2.1 Relevance of US Data and Decisions

In the 2006 Decision, two issues related to reliance upon US data in cost of capital proceedings were dealt with by the Commission:

1) Opportunities exist for investors to commit capital on a global basis. The Commission Panel noted that there was considerable foreign exchange risk and was not convinced that the Federal Government's easing of foreign content in retirement portfolios was sufficient reason to raise the equity return of a utility.
2) The necessity of looking beyond Canadian data in measuring the risk premium. The Commission accepted the use of historical and forecast data for US utilities "when applied as a check to Canadian data; as a substitute for Canadian data when those data do not exist in significant quantity or quality; or as a supplement to Canadian data when Canadian data give unreliable results." (2006 Decision, p. 50)

In the 2009 Decision, the Commission accepted the use of historical and forecast data of US utilities as outlined in the 2006 Decision. In addition, the Commission supported the need for utilities to compete in a global marketplace and reiterated its acceptance of the use of historical and forecasting data. In the 2009 Decision, the Commission also noted the lack of relevant Canadian data and considered the potential for US gas utilities to act as a proxy in the determination of cost of capital and credit metrics. (2009 ROE Decision, pp. 15-16)

Submissions by Parties

In the current proceeding, the FBCU take the position that the Commission should find that US data remains useful and that US utilities can be appropriate comparators based on total investment risk. In support of this, they rely on the evidence of Ms. McShane and Dr. Vander Weide who make the following assertions:

- The operating, regulatory and business environments for US and Canadian regulated companies are generally similar.
- Capital markets in Canada and the US are significantly integrated and the cost of capital environment is similar.

In further support of their argument, the FBCU note that Dr. Safir acknowledged the integration of capital markets in his evidence and utilized US companies in his Capital Asset Pricing Model (CAPM) and DCF analysis. Further, the FBCU argue that Dr. Booth, in spite of his concern with the use of US data, conceded there was a high degree of integration between US and Canadian markets. (FBCU Final Submission, pp. 96-97)

AMPC/CEC's witness Dr. Booth raised two concerns with the use of US data:

- US financial markets exhibit greater risk than Canadian markets and have generated higher premia in the past.
- Regulatory implementation differs even though US and Canadian principles of regulation are the same.

  (Exhibit C6-12, Dr. Booth Evidence, Appendix B, p. 106)

AMPC/CEC submit that there is ample support for Dr. Booth's assertion that US markets are riskier than those in Canada. They point out his evidence demonstrates that over the period 1926-2011, US returns showed greater volatility than Canadian returns and the risk premium was higher in the US than the equivalent in Canada. They further submit that during Ms. McShane's cross-examination, she agreed that a typical US utility could be viewed as higher risk than a Canadian one and point out that her report aligns with Dr. Booth's as it presents a historical risk premium of 4.7-4.8 percent for Canada compared to 5.5-5.7 percent for the US. (AMPC Final Submission, p. 46) Concerning the difference between Canada and the US with respect to the implementation of regulatory principles, AMPC/CEC state that the Commission in the 2009 Decision was cognizant of the danger of relying on US comparables and cites the following statement of the Commission Panel in that decision:

> "The Commission Panel agrees with Dr. Booth that "significant risk adjustments" to US utility data are required in this instance to recognize the fact that TGI possesses a full array of deferral mechanisms which give it more certainty that it will, in the short term, earn its allowed return than the Value Line US natural gas LDC enjoy." [emphasis added by AMPC/CEC]

Additionally, AMPC/CEC point to Dr. Booth's finding that Canadian utilities have higher bond ratings in spite of poorer financial ratios, which in his view reflects the importance bond rating agencies place on the differing regulatory approaches in Canada and the US. In summary, AMPC/CEC submit that the Commission should continue to approach US data based results with caution, adjusting them downward to reflect differences in financial and regulatory contexts between the two countries. (AMPC/CEC Final Submission, pp. 46-47)

FBCU argue that the evidence does not support a downward adjustment to US results and state the following:

> "Since the financial crisis, long term interest rates have been similar in Canada and the US across a broad range of bond types, equity market volatility has been virtually identical, and market risk premium surveys show virtual identical values." (FBCU Reply, p. 28)

None of the parties have suggested that the Commission should put no weight on US data and decisions.

Commission Determination

The Commission Panel reaffirms the 2009 Decision determination on when to use historical and forecast data for US utilities. Canadian utilities need to be able to compete in a global marketplace and be allowed a return for them to do so. In addition, the Panel accepts that there continues to be limited Canadian data upon which to rely and considers that there may be times when natural gas companies operating within the US may prove to be a useful proxy in determining the cost of capital. **Accordingly, we have determined that it is appropriate to continue to accept the use of historical and forecast data for US utilities and securities as outlined in the 2006 Decision and again in the 2009 Decision.**

In making this determination the Commission Panel would like to be clear that while we accept there are similarities between the two jurisdictions, we do not accept that US data should be considered to be the same or necessarily be given equal weight as the data for Canadian utilities. Canadian investors considering US utility investments are subject to currency exchange risk that would not be the case with Canadian utility investments. Additionally, the US regulatory

environment while similar is not identical to that of Canada. The 2009 Decision's reference to the array of deferral mechanisms resulting in greater certainty for the Canadian utility is just one example of potential differences between the jurisdictions. Moreover, Ms. McShane has acknowledged under cross-examination that the universe of US utilities is focused on vertically integrated utilities and, to the extent that there is a smaller number of Canadian investor-owned, vertically integrated utilities, the typical US utility could be viewed as higher risk than the typical Canadian utility. (T3:466-467) Therefore, in the view of the Commission Panel, the use of US data must be considered on a case by case basis and weighed with consideration to the sample being relied upon and any jurisdictional differences which may exist.

3.2.2 Consideration from other Canadian Jurisdictions

Throughout this proceeding the parties have chosen to utilize information and related decisions from other Canadian jurisdictions as support for the position they have taken on an issue. The Commission Panel notes that decisions in all jurisdictions result from the judgment of evidence specific to a region or a particular utility that in each case is unique. To the extent that the ROE and equity thickness of a specific utility in another jurisdiction can be used as a comparator, we are open to considering it if it helps inform our decision. However, considerable reliance on decisions from other jurisdictions in our view would lead to circularity that would ensure that only the status quo is maintained -- perhaps at the risk of common sense. The Commission Panel acknowledges the importance of considering the methodologies, approaches and regulatory principles related to other jurisdictions' decisions. However, we do not accept that it is appropriate for results and values to be used for the purpose of calibration in B.C.

3.3 Relevance of Disparity between "Allowed" and "Actual ROE"

3.3.1 Outline of the Issue

As described in Section 2.1, when setting a rate under the subsection 60 of *UCA,* the Commission must have due regard for, among other things, whether the rate is insufficient to yield fair and reasonable compensation for the service provided by the utility, or a fair and reasonable return on the appraised value of its property. This standard does not mean, however, that a utility must be guaranteed its allowed return on equity. It simply means that a utility must be given an opportunity to earn this return. In any particular year, the actual ROE earned may be below or above the

allowed ROE. The rates are set based on a forecast revenue requirement for the year, which includes a provision for the allowed ROE, grossed up for income taxes. The utility's actual performance during the fiscal year will determine how close the actual ROE will be to the allowed ROE.

Short-run risks in general relate to a utility's ability to annually earn its allowed return on equity. The issue for the Panel, therefore, is to determine the relevance of the difference of realized and allowed ROE. From the investors' perspective, this risk relates to the relative stability of year-to-year variations in earnings or cash flows and the value of those cash flows. Therefore, the Panel first has to assess the relevance of the disparity between "allowed" and "actual" ROE in relation to the question of whether FEI faces any short-run risks. FEI has a track record of generally achieving, and often exceeding, the allowed ROE in any particular year. Does this strong track record imply FEI having "no material short-run risk, or the risk of return on capital" as claimed by Dr. Booth? (T8:1464)

FEI's track record was explored extensively in the proceeding as shown below:

- From 2002 to 2011, there was only one year when the actual ROE was below the allowed ROE, whether assessed on a pre or post earnings sharing mechanism basis. This year was 2010, when 9.42 percent was achieved as compared to the 9.50 percent allowed, resulting in a net income variance of $1.2 million. (Exhibit B1-20, BCUC 1.95.1)
- A similar trend is also apparent from 1994 to 2001. (Exhibit B1-10, BC Utility Customers 1.2.1; Exhibit C6-12, pp. 27-29)
- FBCU stated that the data set used by Dr. Booth is largely from years in which a Performance Based Rate (PBR) mechanism was in place for FEI. During the PBR period, O&M and capital were set through a formula, not based on forecast spending. The PBR formula approach was designed to result in savings to be shared with customers, primarily from the operational consolidation of three separate utilities. The Commission–approved framework expressly anticipated earnings that were above the allowed ROE. FBCU argue that when the periods under PBR are excluded, the variances between FEI's achieved return and allowed ROE from 1994 to 2011 were not that significant. (FBCU Final Submission, p. 40; Exhibit B1-20, BCUC 1.96.1.1)
- For the PBR period 2004 to 2009, after sharing, the average ROE over the period is .67 percent over the allowed ROE. (Exhibit B1-32, Rebuttal Evidence, p. 3)

Submissions by Parties

FBCU submit that the relative consistency of utility sector earnings in Canada tends to suggest lower short-term risk than for non-regulated companies, but "is not synonymous with an absence of short-term risk." (FBCU Final Submission, p. 39)

ICG submits that the Commission Panel should not accept that consistent over-earnings can be explained by PBR, and that consistent over-earning is attributable to how effectively FEI manages the regulatory risk, which it claims is its largest risk, not how effectively FEI operates the utility. ICG further argues that one should think of over-earnings during the PBR period as a regulatory benefit that can be enhanced to provide increased earnings that exceed the Fair Return Standard, and that "…the historic returns suggest that FBCU have come to expect returns that exceed a fair return." (ICG Final Submission, p. 16)

AMPC/CEC first observe that FEI has not experienced any significant risk as "the shareholder has not cumulatively lost any money whatsoever since 1994." AMPC/CEC submit that "year after year, FEI continues to face very little short-run risk, such that this pattern of consistent overearnings is clearly a long-term phenomenon." (AMPC/CEC Final Submission, p. 9)

In Reply, FBCU submit "the similarly long track record among Canadian utilities of achieving or exceeding their allowed ROE suggests that Canadian regulators have long recognized that it is reasonable for a well-managed utility to be able to achieve its allowed ROE on a consistent basis." (FBCU Reply, p. 10)

Commission Determination

The Panel notes that FBCU did not explain why, even after allowance for the sharing mechanism, the over earnings have continued. For instance, in 2011 the actual ROE was 10.15 percent as compared to the 9.50 percent allowed. Consequently, the Panel observes a noteworthy asymmetry between allowed and actual ROEs that is apparent in the frequent occurrence of annual overearnings in contrast to very few years of under earnings.

In the view of the Panel, the differences in actual and allowed ROE relate to revenue requirements and are influenced by management's ability first to forecast and then to control costs for each test period.

The Commission Panel concludes that debt and equity investors, who in their risk assessment consider both long and short-term cash flows as well as risk of financial disruption, will derive some comfort from the track record of FEI. However, there is no evidence to suggest they are likely to make a major distinction between short-term and long-term risk. Accordingly, the relevance of disparity between allowed and actual ROE of FEI is entrenched in the regulatory compact, revenue requirements proceedings, and management's proactive approach.

4.0 CAPITAL STRUCTURE

4.1 Definition of Risk

Dr. Booth has described the most basic definition of risk as "the probability of incurring harm, which in a financial sense means losing money." Ms. McShane agreed with this definition noting that it was consistent with her own testimony which defined risk as the probability that the utility's future returns (including the return on and of capital) will fall short of returns that investors expect and require. Mr. Dall'Antonia put a finer point on it as he described a loss as not earning a fair return or more specifically, a loss is anything that is less than the allowed ROE. (Exhibit B6-12, Dr. Booth Evidence, p. 26; Exhibit B1-15, AMPC 1.4.1; T2:123-124)

The Commission Panel takes no issue with the basic definition of risk as provided by Dr. Booth. However, for this Decision, the Commission Panel views risk as the probability that future cash flows will not be realized or will be variable resulting in a failure to meet investor expectations. In addition, the Panel recognizes the risk of potential financial disruption. We also accept the distinction outlined in both the 2006 Decision and the 2009 Decision where investment risk was described as comprising the sum of business risk, financial risk and regulatory risk.

Both Ms. McShane and Dr. Booth addressed business risk in terms of short-term and long-term risks, a distinction the Commission Panel considers appropriate. Each of these is discussed separately in Sections 4.2 and 4.3.

Dr. Booth has described short run utility risk as the risk of earning a return on capital and long run utility risk as the risk of earning a return of capital. (Exhibit C6-12, p. 25) Ms. McShane comments that both the capital structure and the ROE incorporate elements of long-term and short-term risks. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 39) The Commission Panel does not disagree with Ms. McShane but notes that long-term risk, which Ms. McShane outlines as being of primary importance to the utility investor, is primarily reflected in the equity structure determined for FEI considering the investors' ability to recover their invested capital. This is because if the underlying risk decreases, more debt can be issued; if it increases, the common equity ratio would increase resulting in less debt. Therefore, as pointed out in the 2009 Decision: "The assessment of risks has

a significant bearing on the application of the fair return standard and the determination of an appropriate common equity ratio for regulatory purposes."

4.2 FEI's Long-Term Risk

In the 2009 Decision, eight factors that influenced FEI's long-term risk were identified. They were:

1. Provincial Government climate and energy policies;
2. The effect of aboriginal rights issues;
3. The competitive position of natural gas relative to electricity;
4. Percentage of new construction being captured by Terasen Gas Inc. (TGI);
5. Natural gas vs. Electricity in high density housing;
6. The impact of Alternative Energy Sources on TGI;
7. Changes in demand related to fuel switching; and
8. Use of natural gas per customer account.

FBCU has stated that the same risk factors are at play in the current proceeding, although they have been expressed and organized somewhat differently. (FBCU Final Submission, pp. 47-48)
For the purposes of examining the long-term risk of FEI, items 4 and 5 related to the capture rate of new construction and the energy choice for high density housing are combined under the more general heading "Customer Growth." Items 7 and 8 related to use per customer and fuel switching related demand are also combined under the new "Market Demand and Throughput" heading. In addition, two new factors which received little or no coverage in the 2009 proceeding are addressed: "Supply Risk" and "Regulatory Risk."

4.2.1 Provincial Government Climate and Energy Policies

In the 2009 Decision, the provincial government climate and energy policies of the previous few years played a significant role. During the period leading up to the proceeding, the provincial government published the "BC 2007 Energy Plan," introduced numerous pieces of legislation (principally in the area of greenhouse gas emissions reduction) and in 2008 implemented the BC Carbon Tax. In the 2009 Decision, the Commission was in agreement with TGI's position that the climate change legislation had created a level of uncertainty which did not exist during the 2005

hearing and stated that the change in government policy "will quite probably cause potential customers not to opt for natural gas and persuade potential retrofitters to opt for electricity." (2009 Decision, pp. 36-38)

Submissions by Parties

The Commission Panel notes that there is considerable disagreement among the parties concerning the level of risk related to provincial government climate and energy policies. In the current proceeding, FBCU have ranked political risks in the number 2 risk category and submit that the risks associated with policy and legislation are equal to if not greater than in 2009. FBCU note that all of the legislation and policy relied upon by the Commission in the 2009 Decision remains in place and the introduction of the *2010 Clean Energy Act (CEA)* has had the following impacts:

- It has precluded natural gas utilities from using incentives to promote fuel switching (electricity to gas).
- It has required the Commission to account for enumerated energy objectives in the course of considering certain types of applications.

(FBCU Final Submission, pp. 53-56)

Both BCPSO and AMPC/CEC submit that conditions are far more favourable today and the resulting political risks are much lower today than TGI portrayed in 2009. In support of these submissions, they point to a number of factors:

- the lack of plans to increase the carbon tax;
- the introduction of the BC Natural Gas Strategy and its support of natural gas as a transportation fuel; and
- a collapse of the Western Climate Initiative and lack of progress on emissions-trading initiatives.

(BCPSO Final Submission, pp. 15-16; AMPC Final Submission, pp. 22-23)

Commission Determination

The Commission Panel finds that the risks related to provincial government climate and energy policy are less significant when compared to the period leading up to the 2009 Decision. At the time of the 2009 proceeding, there was considerable concern and uncertainty related to provincial

energy policies, how they would be shaped in the future and what impact this would have on Terasen's gas utilities. In addition, the Commission placed importance on the Nyboer Report as reflected in the following statement:

> "In addition, the Commission Panel considers that the Nyboer Report presents a scenario that did not exist in 2005 under which the three Terasen utilities might not earn a return of their capital. The scenario that now exists is described in a publication of a reputable consulting group which appears to have the attention of policymakers." (2009 Decision, p. 37)

The Commission Panel does not consider the current environment to be as threatening to FEI as it was perceived to be in the period leading to the 2009 Decision. As BCPSO points out, there are no plans to raise the carbon tax beyond the current $1.50 per GJ level and as AMPC/CEC reports, the Western Climate Initiative has collapsed and emission trading has become a dormant issue. These all reflect a less threatening current environment and with it, a lessening of risk associated with provincial government climate and energy policies.

4.2.2 Aboriginal Rights

In the 2009 Decision, the Commission Panel acknowledged that risks posed by First Nations did not exist previously and to the extent that they were currently perceived, represented an increase in risk over natural gas local distribution companies operating in other provinces. However, the Commission did not consider that risks posed by First Nations cast doubt over Terasen Gas Inc.'s "ability to earn a return on or of its capital." (2009 Decision, p. 37)

Submissions by Parties

FBCU acknowledge that aboriginal rights issues, which they rank in category 2, are much the same now as they were in 2009 and note that this issue was not addressed by the parties in IRs or at the hearing. (FBCU Final Submission, p. 49)

BCPSO argue the amount of aboriginal rights risk should be reduced relative to 2009, given the FBCU experience and understanding of aboriginal rights and title claims resulting from First Nation consultations tied into CPCN Applications. (BCPSO Final Submission, p. 17)

AMPC/CEC submit that this risk remains unchanged from 2009 where it was given no weight and this remains appropriate. (AMPC/CEC Final Submission, p. 24)

Commission Determination

The Commission Panel agrees with the FBCU and AMPC/CEC and find that there is no evidence to suggest that there has been a significant change to risk associated with aboriginal rights based on the evidentiary record of this proceeding. We also concur with the 2009 Decision that the risk associated with aboriginal rights has little impact on the FEI's ability to earn a return.

4.2.3 Competitive Position of Natural Gas Relative to Electricity

The competitive position of natural gas to electricity is an existing risk which bears scrutiny at each cost of capital proceeding. In the 2009 Decision, the Commission Panel took note of the interveners' position that the risk related to the competitive price of natural gas and electricity had diminished since 2005. However, the Panel considered that the competitive edge which existed was dependent on too many significant variables to be considered permanent. (2009 Decision, p. 36)

Submissions by Parties

The FBCU acknowledge that natural gas prices have fallen but submit that this occurred prior to the 2009 Decision and take no issue with the fact that the development of shale gas is a "game changer" or that there has been an increase in electricity prices. They do take issue with Dr. Booth's conclusion that long-term business risk has declined since 2009 and argue that his reliance on considerations related to cost-effectiveness paints an incomplete, distorted view of FEI's overall competitive position. FBCU make the following arguments in support of their position:

- Natural gas prices fell substantially prior to the 2009 hearing due to shale gas development and this was reflected in the evidentiary record leading to the 2009 Decision.
- Volatility in natural gas prices affect natural gas to electricity competitiveness and has increased due to the suspension of hedging instrument tools resulting from the 2011 Price

Risk Management Decision (PRMP Decision).[5] Looking ahead to 2017 there is a wide potential price range for natural gas based on the AECO Forward Curve. (see Figure 2 below)

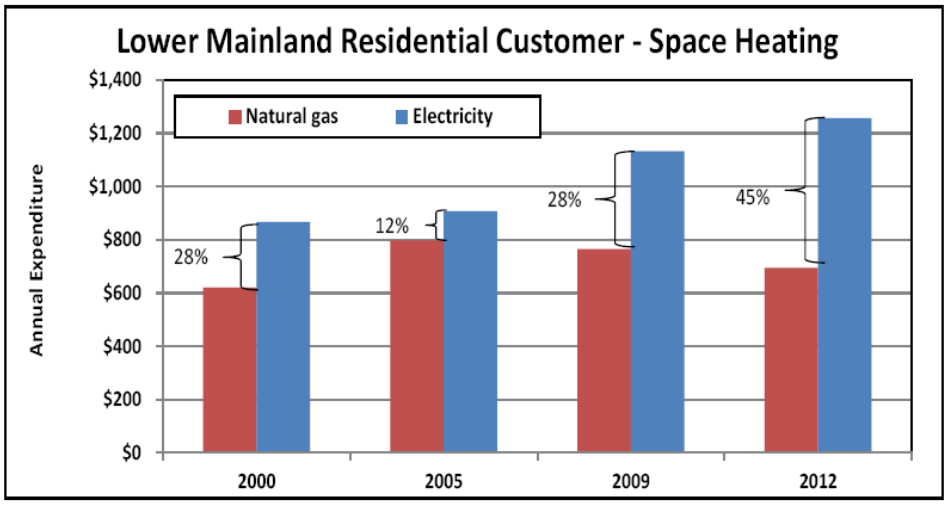
- The price of the natural gas commodity has decreased but the delivered cost of natural gas remains almost the same as 2009.
- Higher capital costs for natural gas heating materially diminish the operating cost advantage of natural gas over electricity.
- Non-price factors such as the desire to create a smaller carbon footprint have resulted in more customers being willing to adopt lower carbon and renewable energy sources.

(FBCU Final Submission, pp. 57-71)

ICG, relying on Figure 1 below, argues that there has been a significant improvement with respect to cost competitiveness between natural gas and electricity since both the 2005 and the 2009 proceedings.

Figure 1: Estimated Annual Expenditure

Figure 1: Estimated Annual Expenditure for FEI Lower Mainland Residential Customer – Natural Gas and Electricity for Space Heating

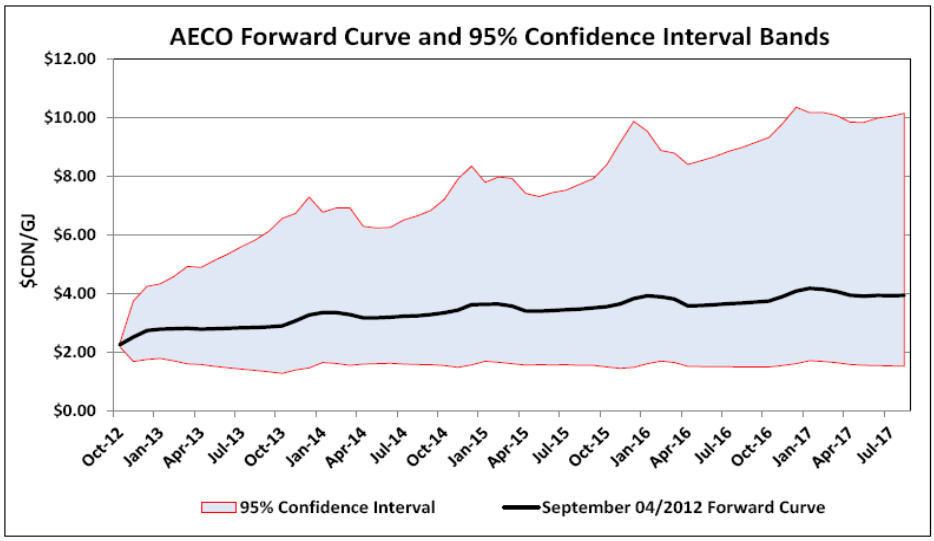


(Source: Exhibit B1-11, FBCU Response to BC Utility Customers, 1.4.2)

ICG contends that shale gas has been a game changer for natural gas prices, which has resulted in a "seismic" shift in the competitiveness of natural gas versus electricity. (ICG Final Submission, p. 11)

[5] Order G-163-11

Figure 2: AECO Forward Curve



(Source: Exhibit B1-20, BCUC 1.105.1)

BCPSO notes that there has been no change in FBCU's rating of capital cost and it is the same as in 2009. It argues there is no evidence that the effect of higher capital costs will offset any competitive gain made through lower commodity prices. Further, BCPSO submits that the AECO Forward Curve relied upon by FBCU demonstrates only an increasing level of price uncertainty over time, not volatility. BCPSO also takes issue with the FBCU claim that there is effectively no reduction in the customers overall bill. The important comparison is not natural gas against itself but against electricity, and this comparison is very favourable to FEI. (BCPSO Final Submission, pp. 9-10)

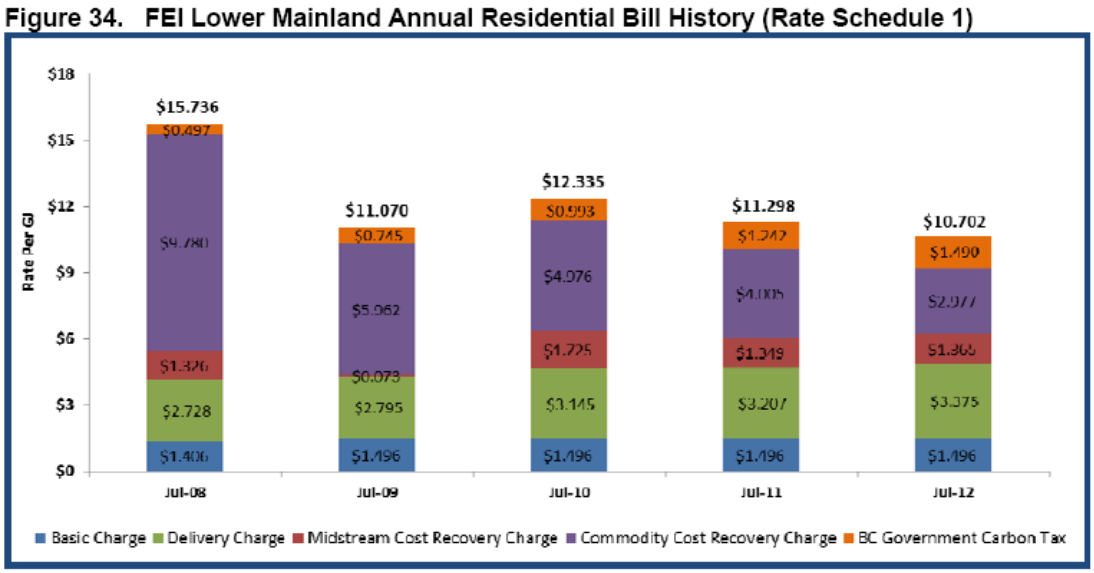
AMPC/CEC state that price is a key determinant of natural gas competitiveness and deserves the greatest weight when considering changes to FEI's business risk. In answer to FBCU's claim that the delivered cost of natural gas is similar to 2009, AMPC/CEC argue that prices are at or near a ten-year low and by FBCU's evidence (in Figure 3 below) are lower than 2009 and even more so when compared against 2005. (AMPC/CEC Final Submission, pp. 11-13)

AMPC/CEC assert that the volatility is manageable through options, including equal payment plans and deferral accounts which FEI currently uses. AMPC/CEC notes than in addition to these options, FEI is proactive in communicating the natural gas cost advantage relative to other sources.

AMPC/CEC also submit that a telling point with regard to competitiveness is how it compares to electricity. They assert that FBCU's response to AMPC/CEC 1.4.2 (Exhibit B1-15) outlines the savings of natural gas over electricity for space heating (and to a lesser extent water heating) and demonstrates a trend that continues to widen. In their view, this information demonstrates that FEI is the beneficiary of both a reduction in gas prices and rising BC Hydro rates. (AMPC/CEC Final Submission, pp. 11-16)

In Reply, FBCU argue that using November 2009 rather than July 2009 is a more appropriate point of comparison and represents a variance of less than 3 percent. They also point out that this difference has been insufficient to drive behavioral changes in new and existing customers. (FBCU Reply, p. 14)

Figure 3: Delivered Cost of Natural Gas



(Source: Revised Exhibit B1-9-6, Appendix H, p. 51, Figure 34)

Additionally, FBCU state that they have not suggested that there is an increase in price volatility, but rather they have fewer tools to deal with it. Overall, FBCU submit that commodity price volatility is a risk factor which remains undiminished since 2009. (FBCU Reply, pp. 14-15)

Commission Determination

The Commission Panel considers price, because of the importance placed on it by the consumer, to be a key determinant and deserves significant weight when considering changes to FEI's risk. **The Commission Panel finds that there has been some reduction in the level of risk associated with the competitive position of natural gas as compared to electricity.** It is difficult to reach any other conclusion given there has been a reduction in the total billing costs while over the same period the cost of electricity has risen regardless of the timeline one chooses for comparison. The evidence relied upon by the interveners in Figure 1, which details the growing variance between natural gas and electricity, is persuasive and it is unlikely that a price conscious customer would move away from natural gas in these circumstances. Looking ahead, and relying upon the information in Figure 2 above, the Panel notes that in spite of the range considered to fall under the 95 percent interval band, the September 4, 2012 AECO Forward Curve projects relatively stable natural gas commodity costs looking out to 2017. While hardly definitive, this does point to some level of stability over the next few years.

Notwithstanding these favourable conditions, the Commission Panel does place some weight on the lack of change in the purchasing behaviour of new and existing customers. In our view, some of this relates to the higher capital costs required to convert to or install natural gas service and the move to multi-family dwellings, which is discussed in Section 4.2.4.

FBCU state that price volatility is a risk factor that remains undiminished since 2009. Based on the evidentiary record we agree. However, we are not in agreement with the assertion that FEI have fewer tools to manage volatility. In the PRMP Decision, the Commission Panel offered a number of suggestions or options FEI may wish to consider. Included among these was offering the PRMP program to existing customers on a permission basis. There is no evidence before the Panel to indicate any action that FBCU has taken to bring alternatives forward.

4.2.4 Customer Growth

Submissions by Parties

FBCU note that a continuing trend has been its lower capture rate on new construction and reports a decline in the rate of net residential customer additions when 2011 is compared against 2007. In addition, the FBCU submits that new customer usage is roughly half what it used to be and therefore, the trend that existed in 2009 has not changed. FBCU states that this trend is closely associated with growth of multi-family dwellings in BC, a market where FEI has low penetration driven by unfavourable installation economics. This shift toward multi-family dwellings means that FEI's capture rate will further decline over time. (FBCU Final Submission, pp. 50-51; Exhibit B1-9, Appendix H, pp. 33-37)

AMPC/CEC point out that in spite of the challenges faced by FEI in growing customers, its total customer base continues to grow. The number of residential customers grew by 8 percent over the period 2005-2011 and the number of commercial customers grew by 5 percent over the same period while there was some decline in the number if not the consumption of industrial customers. (AMPC/CEC Final Submission, pp. 16; Exhibit B1-11, BCUC 1.4.4)

Commission Determination

The Commission Panel notes that the circumstances related to unfavourable installation economics and the shift toward multi-family dwellings existed at the time of the 2009 Decision. In spite of this, the total number of customers continues to grow if not the market share of potential new customers. **Therefore, the Commission Panel finds that there is no persuasive evidence to suggest there has been a shift in risk related to customer growth.**

4.2.5 Impact of Alternate Energy Services on FEI

Submissions by Parties

FBCU state that the "adoption of energy forms produced in combination with newer technologies represents a challenge to FEI's core business for providing natural gas for space and water heating." The recent number of energy projects approved serves to demonstrate the momentum behind

alternative energy which FBCU rate in the number 2 risk category. In FBCU's view, the growing consumer awareness of alternative energy and its green attributes and increasing cost effectiveness demonstrate the importance of this risk factor for FEI. (FBCU Final Submission, p. 52; Exhibit B1-9, Appendix H, p. 28)

AMPC/CEC argue that this represents double counting and there is no evidence to suggest that there is more risk posed by alternative energy to FEI than that which existed in 2009. Further, they argue that the new transportation technology will result in improved prospects as it allows natural gas to replace diesel in heavy trucking thereby increasing natural gas demand in the future. (AMPC/CEC Final Submission, p. 18)

Commission Determination

The Commission Panel notes that the impact of AES sources on FEI is not a new risk. However, we do acknowledge that in the three years since the 2009 proceeding, there has been greater momentum behind alternative energy forms and the adoption of new technology related to them. Therefore, the Panel is mindful that there is the potential for an increase in risk related to AES but, given that much of this risk has been accounted for in reference to FBCU's share of multi-family dwellings, it is difficult to quantify.

4.2.6 Market Demand and Throughput

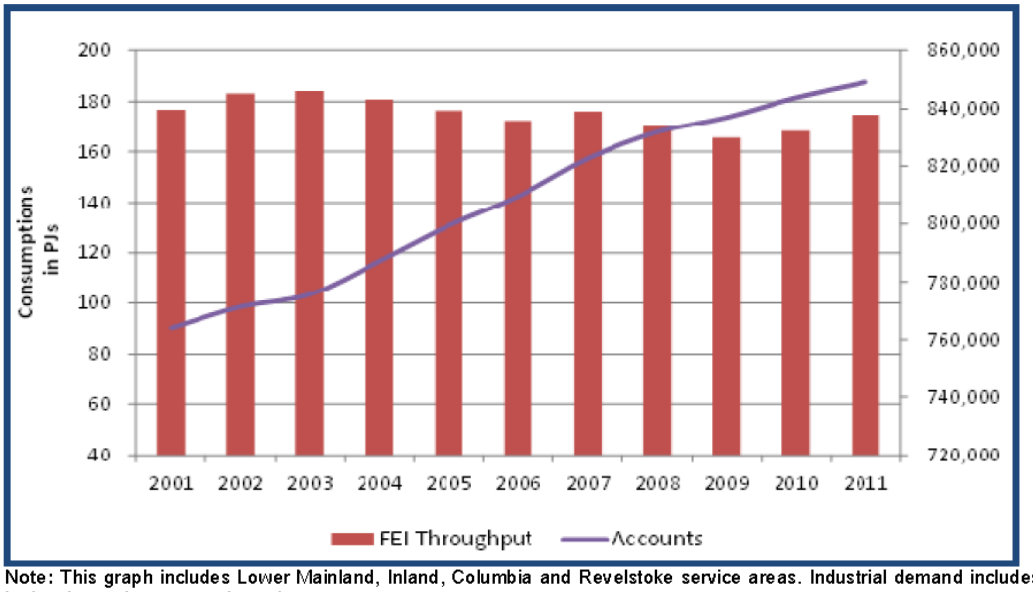
Submissions by Parties

The FBCU state that FEI's use per customer (UPC) for both new and existing customers has been declining; this trend, based on a Conservation Potential Review Study, is expected to continue until 2030. Contributing to this decline are a variety of factors including technological advances and energy efficiency improvements. In addition, the decline in UPC can, in part, be attributed to increased efficiency standards, better building envelopes and a move to smaller dwellings. Further, FBCU state that new construction research since the 2009 hearing shows that natural gas has been increasingly used as a secondary fuel source in new homes rather than the primary source. The FBCU state that there is no reason to believe the drivers behind these market trends will cease. (FBCU Final Submission, pp. 52-53; Exhibit B1-9-6, Appendix H, FBCU Evidence, pp. 32-35)

ICG states that Exhibit B1-41 shows that there has been no decline in system throughput since 2009. In addition, ICG asserts that there is an upward trend in industrial throughput, which is reflective of lower natural gas prices over the same period. Given this recent trend, ICG argues that the Commission should not accept the FBCU's 2013-2016 lower industrial throughput evidence and conclude that business risks are in fact lower than in 2009. (Exhibit B1-41, Undertaking No. 6, p. 3; ICG Final Submission, pp. 7-9)

BCPSO notes that the Commission acknowledged the risks related to throughput in its 2009 Decision and, as a result, they are not new. BCPSO, like AMPC/CEC, further submit that based on graphical information in Figure 4 below, the trend of declining throughput has reversed itself in 2009 and has increased each year since. (BCPSO Final Submission, pp. 13-14)

Figure 4: FEI's Total Throughput (Normalized Demand vs. Customer Accounts)



Note: This graph includes Lower Mainland, Inland, Columbia and Revelstoke service areas. Industrial demand includes both sales and transportation volumes.

(Source: Exhibit B1-9-6, Section H, p. 9)

AMPC/CEC submit that the evidence presented by FBCU shows that both commercial and industrial UPC has increased since 2009, while residential UPC has decreased only marginally.

AMPC/CEC further submit that as the Commission considers the issue of declining UPC, it should consider two points:

- The residential throughput would have to decrease by 83 percent in 2012 to drive its distribution margin to a level equal to BC Hydro Tier 2 Rates; and
- The negative trend related to the creation of energy efficiency is no different than that faced by BC Hydro.

AMPC/CEC argues that these energy trends are not new and there is only risk if they affect the utility's ability to earn a fair return which, in their view, is not supported by the evidence on the record. (AMPC/CEC Final Submission, pp. 16-18)

In Reply, FBCU submit that revenues related to increased throughput are largely unaffected due to the structure of industrial contracts that only generate additional revenue if consumption exceeds an agreed upon level. Therefore, the declines in residential and commercial UPC continue to have a disproportionate impact on FEI. FBCU also point out that AMPC/CEC's reliance on Tier 2 rates is inappropriate. In addition, they argue that the AMPC/CEC's position is based on the view that existing customers will not leave natural gas until there is no longer a price advantage. FBCU state that this assumption is unwarranted given recent research that people are less committed to natural gas, irrespective of price. (FBCU Reply, pp. 16-17)

Commission Determination

The Commission Panel finds that there is insufficient evidence to support a finding that there has been a shift in risk related to market demand and throughput.

The Commission Panel notes that the decline in UPC and overall throughput were issues raised in the 2009 proceeding. Based on the evidence in this proceeding, it is apparent that the overall throughput has increased since 2009 and UPC, while decreasing overall, has increased for both commercial and industrial customers. In the view of the Panel, these are all positive but not conclusive signs.

The Commission Panel places little weight on the FBCU submission that the increased throughput has not resulted in increased revenue due to the structure of industrial contracts. Notwithstanding our understanding that industrial contracts are subject to competitive negotiations, in our view, FBCU nonetheless has some control over the structure of and risks related to the contracts it negotiates.

The Commission Panel does not consider the research indicating existing customers are less committed to natural gas in spite of the price advantage to be persuasive. The Panel notes that much of the research referred to in this context was related to AES options, which have been considered as part of the growth of multi-family dwellings addressed in Section 4.2.4. (Exhibit B1-9-6, Appendix H, FBCU Evidence, pp. 32-35)

4.2.7 Supply Risk

Submissions by Parties

FBCU's position is that BC's shale deposits do not guarantee a reliable supply of natural gas at reasonable prices. Due to the higher cost of development relative to other areas and a lack of infrastructure for resource development and market connection, FBCU state that growth of production in northeastern BC has stopped and there is risk of current levels declining. This is in contrast to developments like the Marcellus Formation in the northeast part of the continent that is thriving. FBCU submit that this leads to the possibility of stranded resources or, at a minimum, higher market prices and an expansion of access infrastructure to encourage expansion of BC's shale gas resources.

FBCU also submit there is a lack of new development of infrastructure to move gas to FEI's service territory. They argue that the development of gas transmission infrastructure projects connecting BC sources with Alberta and Eastern markets, combined with the potential for LNG exports, could change the historical pricing relationship between BC supply and Alberta production leading to higher consumer prices in the future. (FBCU Final Submission, pp. 60-61)

AMPC/CEC describe the potential for stranded resources in northwestern BC as nonsensical. They submit that the impact of shale gas development on prices was not recognized, as it was not mentioned in the 2009 Decision. They also refer to the following statement of Ms. Des Brisay in the current proceeding:

> "What was not fully understood is how low the cost could be in terms of how we produced that resource, and that's really where we have seen the shifting of the curve has been as we have a better understanding of the economic feasibility of the development of shale gas reserves in different parts of North America." (T2:161)

Therefore, AMPC/CEC argues the existence of reserves may have been known in 2009, but the understanding of the economic feasibility of development has shifted since then. (AMPC/CEC Final Submission, p. 19)

AMPC/CEC submit that any weight the security of supply factor deserves pales when compared to the availability of supply. The Commission Panel notes they did not comment directly on the potential change to the historic pricing relationship between Alberta and BC. (AMPC/CEC Final Submission, pp. 18-20)

As noted previously, FBCU acknowledge that shale gas has been a "game changer" and that supply risk has declined. They did make the following points:

- There was knowledge of natural gas reserves prior to the 2009 proceeding.
- The price of natural gas must be higher (leading to higher rates) before supply will be extracted.
- FEI's ability to access cost effective supply could be challenged as there are competing markets for natural gas.

FBCU argue that it is the factors affecting demand for delivered natural gas, not energy supply considerations, that are the key supply risk for FEI. (FBCU Reply, pp. 19-20)

Commission Determination

The Commission Panel finds that there has been a decrease in the risk associated with the supply of gas but an increase in the risk associated with access to this gas at low prices. Balancing the two, there has been no material change in the level of risk related to energy supply.

The Commission Panel accepts the statement of Ms. Des Brisay as informative and a reasonably accurate reflection of where matters stood at the time leading up to the 2009 Decision. There is clearly no disagreement among the parties with respect to the existence of adequate supply of natural gas and FBCU have conceded that the actual supply risk has declined. Therefore, the issue is not whether natural gas will be available but whether sufficient natural gas will be available at the low commodity price levels that the consumer has come to expect. To this end, FBCU have laid out a number of facts and potential scenarios which they argue will have a significant impact on the supply of low cost natural gas. None of the interveners have challenged this information except AMPC/CEC who characterized the potential stranding of assets as "ludicrous."

In our view, the potential for some of FBCU's concerns to become a reality cannot be dismissed. The stability of the current environment remains uncertain, as does the magnitude of future development of the LNG business. Until this has been determined, the continuity of current low price levels for natural gas will be at some risk. However, the risk of supply to the extent that it existed, has abated and shifted to the risk associated with maintaining existing commodity price levels with no resulting increase in overall risk.

4.2.8 Regulatory Risk

Submissions by Parties

FBCU has ranked regulatory risk as their highest risk area with a number of factors in the "higher risk" category. In assigning this weighting, FBCU states that FEI is dependent on regulatory approvals that determine its revenue requirements, cost of service recovery and approval of investments. FBCU submit that the pace of change in the energy policy and environment has

increased at a time when the Commission's role in implementing and applying policy has expanded. This has contributed to increased uncertainty in the regulatory environment and added process as compared to 2009. (Exhibit B1-9-1, Section H, pp. 5-6)

BCPSO points out the FBCU witnesses have confirmed that the regulatory environment is predictable and stable and regulatory risk should not be viewed as its number one risk factor. (BCPSO Final Submission, pp. 14-15)

AMPC/CEC questions the FBCU ranking of regulatory risk as there is no compelling evidence to suggest that FEI faces greater regulatory uncertainty than it did in 2009. (AMPC/CEC Final Submission, pp. 10, 20)

In Reply, FBCU acknowledge that the relative stability and predictability of the BC regulatory framework reduces regulatory risk. However, they point out that the breadth of the Commission's influence on FEI's business is undeniable and individual decisions can have significant implications for FEI particularly in the short-term. While they identify "regulatory risk as being 'higher,' any change since 2009 was not material to FEI's overall risk." (FBCU Reply, p. 12)

Commission Determination

The Commission Panel finds that there has been no material change in the level of risk associated with regulatory risk.

The Commission Panel accepts that the BC regulatory framework has a significant influence on FEI's business and that individual decisions can have significant implications for FEI. However, we agree with the parties that argue there has not been a material change since the 2009 Decision.

4.3 FEI's Short-Term Risk

There are two issues that must be considered by the Commission Panel with respect to short-term risk. The first is whether there has been a change in short-term risk since the 2009 Decision. The second is how much of FEI's short-term risk has been mitigated and, as a result, how much of the remaining risk must be considered. In the view of the Commission Panel, this will be determinative

as to the level of weight to be placed upon the short-term risk in this proceeding. FBCU has expressed disagreement with the need to determine the level of short-term risk in reply to BCSPO submissions:

> "The Commission need not attempt to characterize or quantify FEI's short-term risk to determine a fair return for FEI. The question requiring a determination is the extent to which FEI's short-term risk has changed since 2009." (FBCU Reply, p. 9)

The Commission Panel disagrees. There are many measures of risk. The overall level of risk may not have changed substantially but one needs to consider the individual risk elements and their weighting. These may have changed and therefore, not considering them may be a mistake.

4.3.1 Change in Short-Term Risk

Submissions by Parties

The FBCU submit that short-term risk is essentially the same as in 2009. (FBCU Final Submission, p. 45)

Both FBCU and the interveners have focused their submissions on two areas in examining short-term risk:

- FEI's record of generally being able to earn its allowed ROE; and
- The amount of risk mitigation provided by deferral accounts.

Matters related to FEI's history of typically earning its ROE were dealt with in Section 3.3, where it was determined that actual earnings versus approved earnings history is more appropriately a matter for consideration in revenue requirements proceedings.

Concerning the use of deferral accounts, FBCU submit that "FEI's ability to manage short-term risk with deferral accounts is a function of the portion of the overall revenue requirement covered by deferrals, irrespective of the number of accounts providing that coverage." They also submit that there has been no material change in the collective scope of deferrals having an effect on earnings

volatility. In the view of FBCU, their evidence on deferral accounts shows that the percentage of revenue requirements covered by deferral accounts has decreased and has resulted in a credit to customers. (FBCU Final Submission, pp. 38-45)

AMPC/CEC acknowledge that some of the additions in deferral accounts since 2009 are a reflection of accounting changes, but submit that three new accounts (Compliance to Emission Regulation Account, Customer Service Variance Account and Depreciation Variance Account) are significant. They further submit that while the new accounts may not represent a monumental change, they are an indication of FEI's ability to obtain such accounts. Therefore, this risk factor is lower today than in 2009. (AMPC/CEC Final Submission, p. 22)

BCPSO agrees with the submissions of AMPC/CEC and submits that the addition of the three new accounts demonstrates the Commission's willingness to mitigate the impact of short-term uncertainties. It concludes that the new accounts indicate short-term risk is no greater and likely less. In sum, BCPSO submit that short-term business risk is lower than in 2009. (BCPSO Final Submission, pp. 8-9)

FBCU, in reply, assert that the submissions of AMPC/CEC are at odds with the evidence of their witness, Dr. Booth, "who admitted that FEI risk hadn't changed "in the slightest."" The Commission Panel notes that Dr. Booth (T8:1475) was referring to ROE and not overall risk. FBCU conclude that short-term risk when compared to risk faced by its peers in other jurisdictions, remains unchanged. (FBCU Reply, p. 9)

Commission Determination

The Commission Panel, after reviewing the evidence, finds that there has not been a material change to FEI's short-term risk since the 2009 Decision. However, to the extent that there have been additional deferral accounts added, there is a greater ability to mitigate short-term risk. The Commission Panel agrees with BCPSO that the Commission's approval of the new deferral accounts demonstrates a willingness on the part of the Commission to mitigate the impact of uncertainty. However, in the Panel's view it is not important how the deferral account came to be. It is the

effect. Therefore, the fact that the Depreciation Variance Account was ordered by the Commission, as noted by FBCU, in our view, is immaterial. More important is the fact that the deferral account now exists, as it reduces the risk associated with unforeseen variances in depreciation amounts.

4.3.2 Magnitude of Short-Term Risk

The second question to be considered by the Commission Panel with respect to short-term risk relates to the level of mitigation which has or could be applied against short-term risk. Much of the evidence related to this was focused on the use of deferral accounts which we explore below.

Revenue Related Deferral Accounts

The FBCU consider the overall risk for residential and commercial sales to be moderate and have assessed the risk of industrial sales to be high.

In 2011, residential and commercial sales accounted for 87.9 percent or $485.4 million of the total delivery margin revenue of $552.3 million. FBCU are protected for changes in use per customer for residential and commercial sales through the Rate Stabilization Adjustment Mechanism (RSAM). In assessing these risks as moderate, FBCU point out they are not protected for any differences in actual and forecast number of new customers in a given test period. The Commission Panel notes that impact of any variance in customer additions is likely to be minor, given the relatively small number of new customer additions as a function of the existing customer base. **Given the relatively heavy reliance on existing customers for most of the revenue and the existence of the RSAM, the Commission Panel finds the short-term risk related to residential and commercial sales to be low rather than moderate as suggested by FBCU.**

Industrial sales account for 12.1 percent or $66.8 million of the delivery margin revenue in 2011. FBCU assess the risk as high in this area because there are no deferral accounts utilized with this customer group. (Exhibit B1-20, BCUC 1.96.1)

In reviewing the submissions, the Commission Panel notes the following statement made by FBCU in reply to AMPC/CEC submissions: "Increased consumption by industrial customers only generates additional revenue if the consumption **exceeds a customer's fixed contract demand** (i.e., the 'take

or pay' volume)." [emphasis added] Notwithstanding the impact on revenue as addressed in this statement, it appears to the Panel that the lack of deferral accounts in the industrial category is because there is no need as this area is run on a contract basis with a reliance on "take or pay" contracts. (FBCU Reply, p. 16) It is therefore evident that potential risk is mitigated to a large extend by the existence of such contracts. **For these reasons, the Commission Panel finds that a "high" risk rating for industrial sales is inappropriate and a moderate to low rating is more appropriate to the level of risk.**

Expense Related Deferral Accounts

Table 1 of the FBCU response to BCUC IR 1.96.1.1 indicates that in 2011, 75.3 percent ($1,160.7 million) of the FEI revenue requirement or 31.0 percent ($171.1 million) of the Revenue Margin Delivery Requirement was covered by way of deferral accounts. Overall, the single biggest expense item was cost of gas, which at $989.6 million is 100 percent covered by deferral mechanisms.

FBCU's Operation and Maintenance (O&M) Expense totalled $184.6 million. Of this, approximately 9 percent encompassing Pension & OPEB Variance, Insurance Variance and BCUC Levies Variance Deferral is covered by deferral accounts. FBCU rates the overall risk of O&M Expense as high citing the small portion covered by deferral accounts in explanation.

The Commission Panel also notes that of the remaining revenue requirements categories, Property and Sundry Taxes ($50.2 million), Financing Costs ($108.5 million) and Depreciation and Amortization ($99.9 million) are at or near 100 percent deferral account protection levels. (Exhibit B1-24, BCUC 2.182.1; Exhibit B1-20, BCUC 1.96.1)

The most significant area not covered to a large degree by deferral accounts is O&M Expenses. O&M Expenses are also an area where there is a history of under spending approved O&M amounts. Under cross-examination, Mr. Dall'Antonia explained that risks at the start of each test year are the same and the success of managing within budgets can be attributed to management's experience and being sound managers. (T3:344) While the Commission Panel does not take issue with Mr. Dall'Antonia's comments, we are of the view that in addition to this, FEI has a broad range of options available to it to manage O&M budgets effectively. For example, many of the initiatives in an approved O&M plan can be postponed for short periods or in some cases not implemented

within the test period. This could include items such as routine maintenance, new staff additions, replacement of staff vacancies or delaying of new programs or initiatives. This may, in part, account for the fact that O&M expenditures were less than forecast in 8 of the last 9 years. (Exhibit B1-24, BCUC 2.182.1) Therefore, in the view of the Commission Panel, this is an area where FEI has a high degree of control. **Accordingly, the Commission Panel finds that a high risk rating for O&M expenses is not appropriate and a moderate to low rating is more reflective of the risk FEI faces.**

Another area with a high risk rating due to limited use of deferral accounts is Other Operating Revenue which encompasses things like late payment charges, NSF cheques, and connection charges. This item has been in the $20 to $25 million range over the last nine years, which is a relatively small part of revenue requirements. However, as outlined in Undertaking No. 8, there have been consistent negative variances (meaning revenues were less than approved) in the $2 million range for all but the most recent completed year. (Exhibit B1-24, BCUC 182.1; Exhibit B1-20, BCUC 1.96.1; T2:293-294; Exhibit B1-43)

The Commission Panel acknowledges that many of the Other Operating Revenue areas are less predictable and controllable in nature and most items are not covered by deferral accounts. Therefore, the Commission Panel finds that a high risk rating is appropriate.

Commission Determination

Given our findings with respect to revenue risks and risks in expense areas not covered by deferral accounts, the Commission Panel is not persuaded that on balance FEI faces significant short-term risks to its achieving its allowed ROE in a given test period. While including items that are less predictable or controllable, the Other Operating Revenue item generally shows a consistent pattern of under earning revenues. However, their impact on the total revenue requirements is relatively small. **Therefore, acknowledging that there has been little change in short-term risk since the 2009 Decision, the Commission Panel has determined that only minimal weight can be given short-term risk as an impediment to earning a fair return.**

4.4 Developing an Optimal Capital Structure

An important component of the Panel's task is to determine an allowed capital structure. This section is devoted to the discussion of the evidence presented that relates to the capital structure decision and presents the Commission Panel's findings. In this section, we set out the context within which this evidence has been considered.

4.4.1 Capital Structure and the Fair Return Standard

Background on the role of capital structure on the cost of capital is provided in the Brattle Report, which recognizes that "underlying asset risk in each company is typically divided between debt and equity holders – making them derivatives of the underlying asset return." In addition, the result of a specific capital structure is a particular Weighted Average Cost of Capital.

$$WACC = r_d(1 - T_C).\frac{D}{V} + r_E\frac{E}{V}$$

where: r_d = market cost of debt; r_E = market cost of equity; T_C = corporate income tax rate; D = market value of debt; E= market value of equity; and V = the market value of the firm (i.e., V= D+E).

(Exhibit A2-3, pp. 38-40)

This cost of capital reflects the equity risk and the debt risk, both of which in turn reflect both operating and financial risk, as well as the tax advantage of debt.

The integration of the capital structure decision with the ROE decision is recognized in the argument of AMPC/CEC:

> "Capital structure is important for two main reasons: (1) the cost of equity is higher to reflect the greater risk of investing in shares as opposed to bonds, and (2) the cost of debt (interest) is tax deductible, whereas the cost of equity (dividends) is paid out of after-tax income. Consequently, equity is substantially more expensive than debt. . . . FEI's customers have a right to expect that its capital structure will be efficient and the common equity component will reflect the real risks equity shareholders are exposed to." (AMPC/CEC Final Submission, p. 32)

Ms. McShane submits that the inter-dependence between capital structure and ROE is largely based on the FRS with its three requirements i) the ability to attract capital on reasonable terms, ii) maintenance of financial integrity; and iii) comparability of returns. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 34)

These considerations translate into a focus on credit metrics and the need to maintain a particular credit rating. The FBCU does, however, discuss at length the possible disruptions that might take place if FBCU experienced a rating downgrade. AMPC/CEC submit that FBCU's credit metrics are not weak and that a 35 percent common equity ratio (as compared to its existing 40 percent ratio) "is entirely consistent with the objective of maintaining FEI's existing credit rating." (Exhibit B1-9-6, McShane Evidence, Appendix F, pp. 35-37; FBCU Final Submission, pp. 12-15; AMPC/CEC Submission, pp. 32, 34-36)

4.4.2 Commission Panel Discussion

The Commission Panel accepts the view put forth by AMPC/CEC that the capital structure should be set efficiently. The Panel also notes that debt comes with advantages, primarily the deductibility of interest payments from taxes.

At the same time, the Commission Panel recognizes the argument made by FBCU that the excessive use of debt could disrupt the operations of the company by making it difficult to finance the ongoing operations.

The Commission Panel accepts, therefore, that there are both expected benefits and expected costs associated with the use of debt. The task faced by the Panel is to determine the 'optimal' capital structure, one that is efficient in reducing the total or WACC through the use of debt without creating potential financing disruptions that could offset these benefits to the point where the net benefit is reduced.

The discussion of the capital structure evidence and determination found in this section reflects the Panel's desire to find an efficient or optimal capital structure. In doing so it applies the following principles to guide its analysis:

1. While credit ratings are important indicators of the risk of disruption, a particular rating is not in and of itself the definition of an efficient capital structure. Possible ratings downgrades are important but must be considered in terms of the attendant costs and benefits.
2. The long-run risks discussed by all parties are important considerations in determining an optimal capital structure. They indicate operating uncertainties that can cause financial distress and the possible attendant disruption and distraction of management. Since the concern is with financial disruption, both diversifiable and non-diversifiable risks must be recognized in assessing the risk of financial disruption.
3. The stand-alone principle implies that the risk of disruption due to financial distress is assessed within the context of the risks to the benchmark utility. It is in this sense that the Panel agrees with FBCU's view that FEI is not a diversified investor. (FBCU Final Submission, pp. 130-131) As discussed in Section 5, however, this does not imply that the Panel accepts this view with regard to the ROE.

4.5 Credit Ratings and Metrics

An important issue for the Commission Panel is to determine how important it is for FEI, as the benchmark utility, to maintain an "A" category credit rating among credit agencies. Credit ratings are important indicators of potential financial disruption as discussed in Section 4.4. A lowering of credit agency ratings raises concerns about the cost of debt and access to the credit market at reasonable cost. Therefore, there are clearly advantages of maintaining an ROE and capital structure which will allow for existing credit agency ratings to be maintained. However, the Commission Panel must consider whether there is a point where maintenance of a particular credit rating may result in a capital structure or ROE that is suboptimal in the circumstances. In such instances, what importance should the Commission Panel place on the maintenance of a credit rating and at what additional cost?

Presently, FEI is rated by Moody's and DBRS, with Moody's providing the lower credit rating at A3, which is just one level above a Baa rating. DBRS provides a slightly higher A rating, which is comparable to a Moody's A2 rating. (Exhibit B1-58) The Moody's rating is considered to be more vulnerable to a downgrade due to weaker credit metrics, which, with further deterioration and a less predictable and supportive regulatory environment, could result in a drop to the Baa rating. (Exhibit B1-9-6, Appendix F, Ms. McShane Evidence, p. 59) This Baa rating could reduce the financial integrity of FEI by reducing its ability to maintain credit and access capital on as reasonable terms as an A3 rating.

The Commission determined in the 2009 Decision that Moody's rating should be the focus of attention because it was the lower in the group, and that the Moody's A3 rating should be maintained with a margin of cushion to ensure the financial integrity of FEI. (2009 Decision, p. 15)

None of the interveners took the position that FEI's 'A' rating should be jeopardized. AMPC/CEC submit that a reduction of the ROE to 7.5 percent at the existing 40 percent equity ratio would still leave FEI with strong credit metrics, including a cash flow coverage ratio of 2.67, and that a combined ROE reduction to 7.5 percent and lower equity ratio to 35 percent would leave FEI with a 2.35 ratio, which would still be above Moody's stated threshold of 2.3 to maintain the A3 rating. (AMPC/CEC Final Submission, pp. 35-36)

FBCU state that their current credit metrics are already weak for the existing rating and that the combined reduction in ROE and equity ratio as suggested by AMPC/CEC would not allow it to have a margin of comfort. (FBCU Final Submission, p. 15) FBCU also state that Moody's assessment of regulatory support had already weakened because of BC provincial energy policy. (T3:366) FBCU further state that under the Trust Indenture, Dr. Booth's recommendation would result in a coverage ratio of approximately 1.97. (FBCU Final Submission, p. 77)

Ms. McShane noted that the importance of 'A' category credit ratings arises from two factors: market access and cost. With respect to market access, Ms. McShane testified that regulated issuers can at times be closed out of the market if they have less than an 'A' category rating. Ms McShane further testified that "during the period June 2008 to January 2009, there was not a single issuer without at least one "A" credit rating who was able to issue long term debt on any terms in the Canadian market." With respect to cost, Ms. McShane states that in addition to market access issues, a rating downgrade would result in a cost increase to additional debt the company needs to raise. Further, it will also affect all of the utilities' outstanding debt as the increased cost of new debt will increase the required yield on existing debt and reduce the value of that debt. This higher cost of debt to the utility results in a higher cost of debt for ratepayers.
Ms. McShane further submits that institutional investors continue to have limits upon the amount of 'sub A' category debt they are able to hold or are restricted from holding Baa/BBB debt at all. This underscores the importance of 'A' credit ratings given the relatively small size of the Canadian market for Baa/BBB debt. (Exhibit B1-9-6, Appendix F, Ms. McShane Evidence, p. 35-37)

Mr. Engen submits that the 10 year bond yield spread for BBB/A rated utilities has been volatile and as of July 6, 2012, is at 38 basis points (bps). This is less than the 100 bps common during the 2008 financial crisis. According to Ms. McShane, over the past 15 years, the average spread between typical A and BBB rated utilities has been 75 bps. (Exhibit B1-9-6, Engen Evidence, Appendix E, p. 34; Exhibit B1-9-6, Appendix F, Ms. McShane Evidence, p. 36**)**

Commission Determination

The Commission Panel accepts that continued access to debt capital at an attractive price is an important element which benefits the shareholder and may benefit the customer. Based on the evidence of Ms. McShane and Mr. Engen, a drop to the equivalent of a BBB rating by both rating agencies would result in a borrowing rate difference which would be significant. That being said, the Panel is mindful that credit agencies like Moody's rely upon the embedded cost of debt rather than the marginal cost of debt when calculating a utility's credit metrics as argued by AMPC/CEC. (FBCU Reply, p. 22) Based on the testimony of Ms. McShane the approved cost of debt for 2013 (at 40 percent equity) is 6.8 percent. The Panel notes that current marginal rates are substantially below this level. Therefore, we conclude that the embedded cost of debt is likely to be reduced over time, even in the event of a credit downgrade.

The Commission Panel will continue to be guided by the Fair Return Standard with its three tests of financial integrity, capital attraction and comparable return in determining an appropriate capital structure and ROE. The Panel supports the maintenance of an "A" category credit rating but only to the extent that it can be maintained without going beyond what is required by the Fair Return Standard.

The Commission Panel finds that there is sufficient evidence to conclude that the maintenance of an "A" category credit rating is desirable, but not at all costs.

4.6 Other Jurisdictions

There is general agreement among the parties that the major natural gas utilities in Canada should serve as comparables for FEI for the purposes of assessing FEI's capital structure. This group which includes ATCO Gas, Union Gas, Enbridge Gas Distribution and Gaz Metro was used extensively throughout the proceeding as comparators. Dr. Booth also identified Nova Scotia Power Inc. as a reasonable comparator, being a province-wide integrated electric utility.

The equity thickness ratios of the comparator group of utilities are listed below in Figure 5. The equity ratios of the Canadian comparator group range from 36 percent to 39 percent in contrast to Dr. Booth's recommended equity ratio of 35 percent and FEI's current equity ratio of 40 percent:

Figure 5: Canadian Comparative Utility Equity Ratios

Company	Equity Ratio (%)
FEI	40.00
Dr. Booth on FEI	35.00
ATCO	39.00
Union Gas	36.00
Enbridge Gas Distribution	36.00
Gaz Métro *(*Quebec)*	38.50

(Source: FBCU Final Submission, p. 78)

While there is common agreement as to comparable gas utilities, there is considerable disagreement among the parties as to what these comparables suggest about FEI's required common equity ratio. (FBCU Final Submission, p. 78)

4.6.1 FEI Risk Level Relative to Alberta and Ontario Utilities

FBCU submit that the Commission should find that FEI faces higher long-term risk than natural gas distribution utilities in Alberta and Ontario for the following reasons:

- Alberta and Ontario marketplaces are more favourable from the perspective of supply and infrastructure for natural gas, overall marketplace liquidity, the number of storage facilities and pipeline companies that operate in the regions, and overall gas flows;
- Electricity costs in Alberta and Ontario are not heavily influenced by low embedded costs of "heritage hydroelectricity;"
- Eastern based utilities, by virtue of their proximity to the Marcellus Formation, have seen greater benefits from shale gas than FEI;
- The growing prevalence of multi-family dwellings in BC. The FBCU note that in a hearing before the Alberta Utilities Commission in 2011, Dr. Booth described this "condification" as a "significant competitive pressure;" and
- Government policy and legislation is a long-term risk factor for FEI. Among the provinces, BC is at the forefront of GHG reduction initiatives.

  (FBCU Final Submission, pp. 77-81)

FBCU point out that regardless of the analysis relied upon by Dr. Booth, his approach ended up recommending a 35 percent common equity ratio for all Canadian Utilities excepting Gaz Metro. (Exhibit C6-12, AMPC/CEC Evidence, Dr. Booth Evidence, p. 43) In this instance, FBCU had the following concerns with the analysis leading to his recommendation of 35 percent:

- Absent from the comparison was ATCO Gas which was the highest comparator at a 39 percent common equity ratio. FBCU notes that Dr. Booth puts ATCO Gas in the same risk category as FEI and perhaps a little riskier.
- There was no reference to Gaz Metro's deemed preferred shares in his portraying them as having a common equity ratio of 38.5 percent. This effectively understated Gaz Metro's effective deemed common equity ratio.

  (FBCU Final Submission, pp. 77-82)

AMPC/CEC submit that all of the comparators have common equity ratios that are below the current 40 percent common equity ratio of FEI. They also concede that at 38.5 percent, Gaz Metro is at the top of the range. However, they submit that Gaz Metro is in a far more difficult and risky climate than FEI, given FEI's advantage over electricity is 5 times as great as that of Gaz Metro. AMPC/CEC conclude that a common equity that is the same or greater than Gaz Metro's 38.5 percent would be unreasonable on comparative terms. (AMPC/CEC Final Submission, pp. 33-34)

FBCU submit that neither BCSPO nor AMPC/CEC made any attempt to reconcile the inconsistencies in the comparative analysis among Canadian utilities' capital structures. FBCU further submit that Dr. Booth's submission "that ATCO Gas risk was in the same risk bucket or slightly less risky than FEI" is significant because it suggests that the 40 percent common equity ratio for FEI is justified as ATCO has a 39 percent common equity ratio. (FBCU Reply, pp. 24-25)

Commission Determination

The Commission Panel has previously considered this matter in Section 3.2. The Panel has considered the common equity ratio decisions of other Canadian jurisdictions. **However, because each province is different in terms of its levels of regulatory protection and each utility has its own set of unique circumstances which are only minimally covered in the record of this proceeding, the Commission Panel has determined that only limited weight is to be given to the outcomes of proceedings in other Canadian jurisdictions.** Accordingly, evidence related to the equity ratios of other jurisdictions is used as a reference point only in determining whether FEI's is in an appropriate range.

4.7 Capital Structure – Commission Determination

The Commission Panel has determined that a common equity ratio of 38.5 percent is appropriate for FEI effective January 1, 2013.

The Commission Panel has examined the factors contributing to long-term risk in this proceeding and considered the submissions of each of the parties. The Panel has found that reductions are warranted in long-term risk associated with provincial government climate and energy policies as well as the competitive position of natural gas relative to electricity. Both of these risk areas were rated by the FBCU as category 2 risks. To offset these there is not a single area where the Panel has been persuaded the level of long-term risk has been demonstrated to have increased materially since 2009.

The Commission Panel notes that the 2009 Decision put considerable emphasis on the uncertainty created by climate change legislation that did not exist during the previous cost of capital proceeding. In addition, the 2009 Decision acknowledged the change in the competitive position of

natural gas versus electricity but concluded that there were too many variables at play for this to be considered permanent. The Panel's finding that there is lower long-term risk related to both of these factors since 2009 is indicative of a reduction in overall risk to FEI which needs to be reflected in the common equity ratio.

Consideration being given to both long and short-term risk, the Commission Panel determines that a reduction in the common equity ratio of 1.5 percent to 38.5 percent is appropriate.

Considering the discussion of optimal capital structure in Section 4.3, the Commission Panel notes that the reduction in common equity ratio to 38.5 percent is reflective of reduced long-term risk and yet balances this against potential disruption caused by a significant weakening of credit metrics.

With respect to credit ratings and metrics, the Commission Panel notes that considerable concern has been raised concerning FEI's credit metrics. In Section 4.4 we found the evidence supportive of maintaining an "A" category credit rating but not at all costs.

The Commission Panel notes that the 38.5 percent equity ratio awarded FBCU in this proceeding falls within the upper end of a range of comparative utilities in other Canadian jurisdictions and considers it to be reasonable on a comparative basis.

FEI is to file within 30 days of this Decision and the accompanying Order G-75-13 a document setting out how and when it will implement the change to its capital structure.

5.0 RETURN ON EQUITY

5.1 Key Issues

The Commission Panel is of the view that an important consideration in this proceeding is the determination of a return that provides investors with the opportunity cost of their investments. The Brattle Report recognizes and elaborates on this fundamental principle:

> "[The cost of capital is] Defined as *the expected rate of return in capital markets on alternative investments of equivalent risk,* it is the expected rate of return investors require based on the risk-return alternatives available in competitive capital markets. Stated differently, the cost of capital is a type of opportunity cost: . . ." (Exhibit A2-3, pp. 2-3)

However, even if one accepts the concept of the opportunity cost as a foundation of a Return on Equity determination, a remaining challenge is that risk and expected return of the relevant 'alternative investments of equivalent risk' are in the eyes of investors who have access to well functioning capital markets. These expectations are not directly observable to Panel members or to parties in this proceeding who provide evidence for the Panel to consider. Instead, estimates of investors' expectations are based on data that are interpreted through *models* of competitive capital markets. The Panel finds an observation offered in the Brattle Report to be instructive:

> "It is useful to recognize explicitly at the outset that models are imperfect. All are simplifications of reality and this is especially true of financial models. Simplification, however, is also what makes them useful. By filtering out various complexities, a model can illuminate the underlying relationships and structures that are otherwise obscured." (Exhibit A2-3, pp. 3, 5-6)

The evidence presented to the Panel was based on a large variety of specific models that fall into four broad classes: (i) DCF models; (ii) CAPM (iii) ERP models and (iv) CE models. Within these four classes are numerous specific implementations that vary in structure, assumptions, and the data from which they were estimated. For instance, there are multiple DCF models with multiple estimates of the appropriate opportunity cost of an equity investment in the Benchmark Utility FEI. The estimates of the investor's opportunity cost of equity, summarized in Appendix F to this Decision, range from 6.15 percent (Dr. Safir CAPM) to 11.50 percent (Dr. Vander Weide's FRP model.

The models and approaches used by the expert witnesses in this proceeding to estimate the ROE are summarized in Tables included in Appendix F of this Decision.

The key issue then in the determination of the appropriate ROE is assessing how much weight to give to each of these models and their estimates. In turn, the weight given to each estimate depends on a judgment of the validity of the conceptual base of the four broad model classes and a judgment of how reasonable the model inputs are. The Panel has based this judgment, as much as possible, on the objective of determining the opportunity cost of equity.

The Panel finds that the two most compelling frameworks for assessing the cost of equity are the DCF model and the CAPM. These models have well understood theoretical bases and explicitly recognize the opportunity cost of capital. Accordingly, these two models are given equal weight in determining the allowed ROE. As discussed in Sections 5.4 and 5.5, the ERP models (with the exception of Ms. McShane's CAPM based equity risk premium) and comparable earnings model are not based on compelling foundations. Furthermore, model inputs and estimates are largely *ad hoc* and assessments of the validity of these inputs and estimates are based on subjective evaluations with minimal logical guidance. Consequently, both the ERP and CE approaches are given no weight in the Panel's determination of the appropriate ROE for the benchmark utility.

5.2 The Capital Asset Pricing Model

The CAPM is based on consideration of individual investors making portfolio decisions in a well functioning capital market. As such, it is a model of the shareholders who own the shares of the firm. Of all the models used to present evidence to the Panel, we consider that the CAPM provides the underpinnings of investor choice in greatest detail.

The CAPM is based on portfolio theory, a theory that answers the question: If an investor wishes to achieve a particular rate of return and is able to invest in a large set of securities, what investment strategy will deliver the target expected return at lowest possible risk? (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 78) The somewhat surprising answer given by portfolio theory is that all investors will hold a combination of two mutual funds; one made up of all risky securities available, referred to as 'the market portfolio' and the second made up of risk free securities. In contrast to intuition, individual risk aversion will not determine which specific securities to invest in but will

determine how much of an investor's wealth will go in the market portfolio and how much will go into risk-free securities. A more risk-averse individual will hold less of their wealth in the market portfolio and more in treasury bills than a less risk-averse individual.

The result that investors will hold well diversified portfolios instead of individual stocks provides great guidance in elaborating on the seminal Supreme Court of Canada decision of *Northwestern Utilities* that the allowed return on capital is to be comparable to the return that would be earned on "... the same amount in other securities possessing an attractiveness, stability and certainty equal to that of the company's enterprise." (Exhibit A2-3, p. 2) The CAPM tells us that these 'other securities' are not other comparable firms but are instead comparable portfolios that combine the market and the risk free rate.

The Commission Panel notes that the reason investors are better off holding a mutual fund instead of picking individual stocks is diversification. Diversification builds on another bit of intuition: don't put all your eggs in one basket. As The Brattle Report states:

> "…when security returns are positively correlated (i.e., have a tendency to move in the same direction, to some degree), trade in capital markets allows investors to reduce their total risk exposure by holding portfolios, which serve to diversify the risk of the individual securities. Diversification permits investors to obtain lower variance for a given expected return or a higher expected return for a given level of variance, where variance of returns over time is a measure of risk." (Exhibit A2-3, pp. 6-7)

Since diversification is a driving force in investor's decisions, leading them to hold broadly diversified portfolios, when they consider the value of an individual stock they do not consider the total risk of the stock in isolation. They instead consider the amount of risk the stock will add to the risk of the mutual fund, recognizing the effect the stock has on the total diversification achieved. The amount of risk that remains after the benefits of diversification is referred to as non-diversifiable or systematic risk. The measure of the systematic risk is called beta. (Exhibit A2-3, pp. 6-7; Exhibit C4-9, p. 9; Exhibit B1-9-6, Appendix F, p. 88)

The CAPM builds on portfolio theory by providing a risk return relationship that recognizes beta as the risk measure. The theoretical foundation and the formulation of the CAPM is discussed in the evidence of Dr. Safir (Exhibit C4-9, pp. 8-11) and in the Brattle Report, which states:

> "The presence of a market underlies the "opportunity cost" interpretation of cost of capital – by investing in a security A, an investor foregoes (some) investment in an alternative, "comparable risk," investment B obtainable through the market." (Exhibit A2-3, p. 6)

The opportunity cost of an investment is based on the return on a risk free investment, which is the risk free rate. To this is added a 'risk premium'. In turn there are two parts to the risk premium. The first is the extra return that would be earned by holding the market portfolio on its own instead of the risk free security. The expected return on the market is denoted r_m and the risk premium over the risk free return, r_f, is denoted by (r_m - r_f). This is referred to as the 'the market price of risk' or the 'market risk premium'. The second component of the risk adjustment is beta which adjusts the market risk premium to account for the degree to which the individual stock contributes to the market risk; low beta stocks contribute less than average and earn less than the market rate, high beta stocks earn more.

The advantage of the CAPM is that it distils the complex interactions among risk averse investors trading with each other to a simple equation with three parts:

$$r_e = r_f + (r_m - r_f)\beta$$

where r_e is the opportunity cost of equity.

So, to estimate the investor's opportunity cost requires an estimate of the risk free return, the market risk premium and the beta. In spite of the CAPM's strong theoretical underpinnings, the estimation of these model inputs presents challenges as outlined in the Brattle Report (Exhibit A2-6, pp. 16-25) and in the evidence of Ms. McShane. (Exhibit B1-9-6, Appendix F, pp. 67-70) The challenges include the role to be played by the US data in the analysis.

The Panel recognizes the growing importance of US and indeed global securities in the portfolios of Canadian investors as pointed out in the evidence of Mr. Engen and of Ms. McShane. (Exhibit B1-9-6, Appendix E, pp. 11, 43-50; Appendix F, pp. A-14, A-15) The Panel also recognizes that none of the evidence was based on data related to global portfolios held by investors; for instance, market portfolios were defined as either the Canadian or US market separately and none of the evidence dealt with an integrated global portfolio. Furthermore, currency risk was not considered nor was the magnitude of foreign ownership of FEI. The evidence presented includes CAPM estimates on either US or Canadian data. In light of these concerns with respect to the lack of a complete global

perspective and the potential for risk (including currency risk), the Panel concludes that the more appropriate of these two perspectives is that of the Canadian based CAPM. Therefore, the Panel places greater weight on Canadian based CAPM estimates.

The Panel received a great deal of evidence on various estimates of the following three inputs.

(1) The Risk Free Rate, r_f

Evidence submitted to the Panel indicates that, at the time of filing, returns available to Canadian investors on long-term Government of Canada default free bonds were in the 2.6 to 3 percent range. (Exhibit B1-9-6, Appendix F, p. 77; Exhibit C6-12, pp. 53-71) Although this return was available to investors and therefore seems to meet the requirement of an opportunity cost, all of the experts submit that the appropriate opportunity cost is better measured by the *forecasted* yield on a long-term risk free instrument and that in some cases even this estimate should be adjusted.

Estimates of the risk free return available to investors, based on forecasted long-term Government of Canada Bond Yields, range from a low of 2.95 percent estimated by Dr. Vander Weide (Exhibit B1-9-6, Vander Weide Evidence Appendix G, p. 35) to a high of 4.0 percent by Ms. McShane and Dr. Safir. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 77; Exhibit C4-11, BCUC 1.4.1) Dr. Booth submitted that 3.0 percent was the forecasted yield on long-term Government of Canada Bonds but he considers forecast long Canada bond yields of 3.0 percent to be "well below any 'equilibrium' yield since they are only 1% above the forecast inflation rate and mean locking in a negative real yield for a typical taxable investor." (Exhibit C6-12, p. 60) Dr. Booth testified in cross-examination that:

> "…we do have foreign official flows of money coming into Canada because we are a triple A rate country and they are basically buying Canadian government bonds, pushing up prices, pushing down yields, and pushing them down to a value that I do not think reflects the proper trade-off between risk and return by "an ordinary private investor" making these decisions." (T8:1516)

Accordingly, Dr. Booth adds 0.8 percent to the 3 percent to recognize the alternative, and to arrive at his "Base adjusted LTC forecast" of 3.8 percent. (Exhibit C6-12, pp. 84-85, 93; Exhibit C6-15, BCUC 1.30.3)

In summary, the evidence presented seems consistent in stating that the current rates available on risk free government securities is between 2.6 percent and 3 percent. However, the Panel also agrees with the experts that current monetary policy is historically unusual and subsequently results in the possibility of a higher effective risk free rate. **Therefore, the Panel determines that the estimate of 3.8 percent for the risk free rate is reasonable, corresponds to Dr. Booth's estimate, and is within the relatively narrow range of estimates presented by all experts.**

(2) Market Risk Premium (r_m - r_f)

Estimates of the market risk premium range from 5 percent to 6 percent according to Dr. Booth (Exhibit C6-12, Appendix B, p. 16) to a high of 7.5 percent submitted by Ms. McShane. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 98) The basic estimation methodologies used by all experts were similar in that they were based on historical data on market returns and returns on risk free securities. They differ in some important details.

Ms. McShane bases her estimate on the average return on an investment in the market and shows, in Table 10, page 80 of her evidence that the average return on equities in Canada over the 1924-2011 period is 11.4 percent. From this number, Ms. McShane subtracts the *current* forecasted long-term Government of Canada Bond yield of 4 percent to arrive at her 7.5 percent estimate of the risk premium. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 87) The Commission Panel understands that it is typical to base the risk premium on the average historical difference between the return on the market and the risk free rate. It is our understanding that this approach is to deal with, among other things, the fact that historical market returns and historical bond yields reflect historical inflation while current returns reflect current inflationary expectations. This is an especially important consideration in the current environment where inflationary expectations are at a historically low level. (T3:483-485; T5:713-715)

To illustrate our concern with the approach used by Ms. McShane, the Commission Panel notes that there are times in the last 30 years where this approach would have yielded a very small or even negative risk premium. For instance, Schedule 2 of Ms. McShane's evidence reports that the yield on Long-term Canadian Government bonds in 1990 was 10.69 percent. If this was subtracted from the average market return it would have yielded an unreasonably low market premium. (Exhibit B1-9-6, McShane Evidence, Appendix F, Schedule 2, p. 1; T8:716-717)

Ms. McShane was asked if she could provide a single reference to a textbook or Journal article that advocated using her approach. Her response was that she 'probably could not' (T5:717-718). Accordingly, the Panel gives no weight to the risk premium estimate of 7.5 percent provided by Ms. McShane.

Dr. Booth provides evidence that the historical risk premium is between 5 percent and 6 percent. He adjusts this range for 'Operation Twist' to obtain a risk premium estimate of 5.8 percent to 6.8 percent with a midpoint of 6.3 percent. (Exhibit C6-12, p. 93) Operation Twist refers to monetary policy intended to influence returns at various maturities including long maturities.

Dr. Booth provides two tests of the robustness of his estimate. One robustness test is to compare his estimate of the market risk premium with expectations used by FEI in assessing its defined benefit pension liability. Dr. Booth takes the expectation of market return of 7 percent, provided by FEI's consultants, and converts this geometric return to an arithmetic return. From this, Dr. Booth infers that FEI has, for purposes of valuing its pension liability, accepted an expected market return of 9 percent. Based on this he concludes, on page 93 of his evidence, that "[a]s a result, FEI's data seems consistent with a market risk premium of about 6.2%." In their Final Submission, FBCU submit that the Panel should not rely on data used in assessing pension liabilities. FBCU assert that, since actuaries provided the data, they naturally reflect a conservative bias. FBCU cited its witness Ms. McShane, who stated that pension fund managers and actuaries "... have absolutely no incentive to be anything but very conservative because they have a lot on the line. A pension fund needs to be able to assure that it has funds available to pay its retirees." (FBCU Final Submission, p. 151)

The Panel does not accept the assertion that the actuarial expectations are conservatively biased and should be rejected. Actuaries are charged with fairly assessing pension plan liabilities. The Panel finds, therefore, that this robustness test is indeed helpful in assessing the risk premium.

In a second robustness test, Dr. Booth uses the DCF model to estimate an expected return on the entire market. The resulting estimate is 9.3 percent and Dr. Booth notes that this is very close to the expectation held by FEI's own actuaries. (Exhibit C6-12, Booth Evidence, p. 86) This is a forward looking estimate of the market return so that a forward looking risk free investment can be used to compute the risk premium. Since Dr. Booth concludes in his first robustness test that a 9 percent

market return implies a 6.2 percent risk premium, his estimates of 9.3 percent for the market suggests a market risk premium of about 6.5 percent.

FBCU argue that the DCF cannot be used to assess the market as a whole. (FBCU Reply, pp. 29-30) The Panel disagrees with this assertion. Although the model is typically illustrated and applied to a single company, the logic of investors setting prices based on expected cash flows applies equally to a mutual fund or portfolio of shares. The Panel, therefore, does not agree that this approach cannot be taken to estimate the expected return on the market. The Panel therefore finds the DCF based estimate of forward-looking market returns to be helpful as a check.

Other estimates of the risk premium were also in the range of 5.96 percent (Dr. Safir's Canadian estimate, Exhibit C4-9, p. 12, Table 1) to 6.6 percent. (Dr. Vander Weide's estimate, Exhibit B1-9-6, Appendix G, p. 38) **Given the preceding discussion, the Commission Panel accepts a market risk premium of 6.4 percent as it is within reasonable forecasts presented.**

(3) Betas

Evidence on the beta estimates is largely based on a standard approach of regressing returns from comparable firms on market returns. Since FEI does not have traded equity, estimates of beta must be based on comparable firms. In the evidence submitted, the set of comparable firms include Canadian firms as well as, in some cases, US-based firms.

Dr. Vander Weide submits a beta estimate of 0.92 based on the historical ratio of the average utility risk premium to the S&P risk premium. (Exhibit B1-9-6, Vander Weide Evidence, Appendix G, p. 42) Aside from the fact that this is a beta estimate for US Utilities (T6:1092), the method differs significantly from the more commonly accepted method(s) of calculating a beta estimate as set out in the Brattle Report (Exhibit A2-3, pp. 15-16), and as calculated by the other witnesses in the proceeding. Accordingly, the Panel places no weight on this beta estimate.

The other beta estimates submitted range from a low of .36 by Dr. Safir for his Canadian CAPM estimate (Exhibit C4-9, pp. 12, 15), to a high of 0.65-0.70 by Ms. McShane. (Exhibit B1-9-6, pp. 97-98) Dr. Booth provides an intermediate estimate of 0.45-0.55. (Exhibit C6-12, Appendix C, p. 14) All

estimates begin with a regression of returns of the comparator firm on market returns with the 'raw beta' being the slope coefficient of the regression.

The differences among estimates largely result from adjustments that are made to the raw betas. Empirical evidence indicates that the regression based beta estimates seem to understate the betas of low risk firms and overstate the betas of high risk firms. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 96; Appendix A to Ms. McShane's Evidence, pp. A-21-26; Exhibit B1-9-6, Appendix G, p. 41) Since, by construction, the beta of the market is one, the adjustments are intended to bring the estimated beta's closer to one. To accomplish this, Ms. McShane contends that it is appropriate to adjust utility betas towards the market average of 1.0. (Exhibit B-19-6, McShane Evidence, Appendix F, p. 96) Both Dr. Booth and Dr. Safir, on the other hand, contend that the adjustment should be to the utility average beta that is in the range of 0.5 - 0.6. (Exhibit C6-12, Booth Evidence, p. 71; Exhibit C4-9, Safir Evidence, p. 15)

None of the evidence presented revealed the actual bias in beta estimates; instead the experts assert a particular adjustment. In cross-examination Ms. McShane acknowledges that utility betas may indeed not trend towards one.

Mr. HOBBS: And because regulation protects companies, isn't it also true that you would not expect betas for utilities to ever trend towards 1?

Ms. McSHANE: To trend towards 1. I guess I don't disagree with that. I never said that they would. (T4:549)

Similarly, in cross-examination at T6:1073, Dr. Vander Weide says*:*

DR. VANDER WEIDE: Yes. And I readily recognize that betas for utilities don't adjust toward 1.0.

In their Reply, FBCU argued:

> "Ms. McShane's relative risk adjustment of 0.65-0.70 for a benchmark utility, based partly on adjusted betas, recognizes the past relationship between utility returns, both in Canada and the U.S., and the returns on the equity market as a whole. Over the longer-term, utility investors have achieved risk premiums that have been significantly higher than 45% to 55% of the risk premiums achieved on the equity market portfolio. That experience is consistent with the empirical evidence that lower (higher) beta stocks generally have achieved higher (lower)

> returns than the CAPM and beta would have predicted. It is not logical to conclude that, based on that experience, utility investors now only expect to achieve an equity risk premium that is 45% to 55% of the equity market risk premium (or Dr. Safir's lower 36%) simply because utility share price movements have not exhibited a high degree of correlation with price movements in the overall equity market." (FBCU Reply, p. 35)

An adjustment of beta to the market average of one seems inconsistent with the lower risk in the industry, while realized return seems to indicate a beta that exceeds the industry average. The Panel finds that none of the positions fully explain the beta value and therefore accepts an intermediate beta estimate of 0.6 representing the range of reasonable estimates presented.

5.2.1 Adjustments to the CAPM

A number of experts raised concerns about the validity of the simple 'single factor' CAPM. The term single factor refers to the reliance of the prediction of the model on only the market portfolio, the factor implied by the theory. Ms. Ahern introduced in evidence a summary article that shows how other factors such as firm market capitalization (size) and market-to-book ratios can provide added explanatory power to the single factor CAPM. (Exhibit B2-7, Evidence of Ms. Ahern, pp. 13-14; Exhibit B2-7, Attachment PMA-1, Exhibit PMA-9)

The CAPM is by far the most widely studied asset-pricing model and it is not surprising that more is known about its empirical performance than other asset pricing models. This evidence also implies that improved performance can be achieved by including these well-studied extensions of the model. The Panel notes, however, that none of the experts relied on the extensions as found in the literature findings in dealing with the shortcomings of the single factor CAPM. (Ms. McShane, T5:720-722); Dr. Vander Weide, T6:1102-1108; Dr. Safir, T7:1259-1262; Ms. Ahern, T7:1355-1357; Dr. Booth, T8:1658-1663) Instead, the evidence presented by different experts responded to the relatively poor empirical performance of the CAPM in a number of *ad hoc* ways.

Dr. Vander Weide's response to the weak empirical performance of the CAPM is to place no weight on CAPM estimates even though he provides estimates himself. In cross-examination, however, Dr. Vander Weide testified that he did not attempt any standard adjustments to the CAPM that might improve performance. For instance, he did not adjust for the importance of international markets to Canadians, he did not adjust for changes in capital structure and he did not study the ability of a

multi factor model to capture returns. (T6:1108-1111) As a result, the Panel does not accept Dr. Vander Weide's response to the relatively poor performance of the CAPM and continues to place weight on the model.

Ms. McShane and Dr. Booth both attempt to improve the performance of the CAPM by adding empirical analysis in order to augment the basic model. Dr. Booth is clearest in his objective when he states: "I regard this sort of adjustment as converting the CAPM into a conditional CAPM where the CAPM holds conditional upon the state of the financial markets." (Exhibit C6-12, p. 81) Dr. Booth testified that an academic literature exists that supports the analysis of a conditional risk premium and his credit spread adjustment is consistent with that literature. (T8:1659) Ms. McShane does not provide the same link to the academic literature and acknowledged, in cross-examination, that her work is along the lines of a multi factor CAPM. (T5:718-720)

The Commission Panel appreciates the efforts of the experts to recognize and deal with the shortcoming of the single factor CAPM. The evidence suggests there are two main thrusts to this effort: i) improving the estimate of the risk premium by conditioning on the current state of the capital markets; and ii) improving estimates of the risk return relationship by adding the factors to the single factor CAPM. Notwithstanding the efforts, the Commission Panel finds that we are not able to assess the validity of the extensions to the single factor CAPM that were presented as there is insufficient evidence involving the use of multi-factor models in this proceeding. The experts expressed reluctance to include other potential extensions to the CAPM that they thought were too complex. This is further addressed in Section 8.

In this regard, the Panel agrees more generally with the specific concern of ICG who argues that in Ms. McShane's CAPM based ERP, she "…makes an adjustment to the market risk premium of approximately 100-150 basis points because in her opinion market risk premium are in fact correlated with the risk free rate." ICG cites Dr. Safir as characterizing the adjustment as arbitrary and not in keeping with the CAPM model. ICG submits that before the Commission Panel accepts this adjustment there must be very strong evidence to support it. In the absence of such strong evidence, the CAPM specifications should not be changed. ICG goes on to say that: "The evidence regarding the correlation (inverse relationship) between the market risk premium and the risk free rate is in fact just that, it is a subjective judgement, with at best, very limited evidence in support of Ms. McShane's proposed departure from the CAPM model." (ICG Final Submission, p. 19)

In support of its argument that there is limited evidence in support of Ms. McShane's adjustment ICG submits that her evidence in support of a relationship between the market risk premium and the risk free rate is presented on a cumulative basis. It argues that when the same data is provided on a non-cumulative basis the US risk premiums do not follow income returns in the manner she suggests (Exhibit B1-53, Undertaking No. 14) and in some instances the data support the opposite conclusion to that observed by Ms. McShane.

Rather than relate the models presented in this hearing to the academic literature, as presented by Ms. Ahern for instance, the extensions seem to be somewhat *ad hoc* leading to the sort of concerns raised by ICG. There is no evidence, therefore that the models present were not the result of a "fishing expedition." That is, the Panel does not know if other adjustments or specifications would produce different results and we cannot assess whether other non-reported specifications should logically be ignored. In the absence of persuasive evidence that these are of value, the Panel is content to consider simple single factor models. At this time the Panel is not persuaded that the specific model extensions that are presented are valid and hence places no weight on them. However, the Panel recommends that in the future improvements in the model can also be brought into evidence, but the evidence should then include both the model extensions as well as a basis on which to judge the validity of the extensions.

5.2.2 CAPM Based Estimate of ROE

Summarizing the discussion above, the Commission Panel has applied the required judgment and accepts the CAPM estimate at 7.64 percent. This reflects a risk free rate of 3.8 percent, a risk premium of 6.4 percent, and a beta of 0.6.

5.3 Discounted Cash Flow Approach

The basis of the DCF approach is the principle that in a competitive market investors who purchase securities are essentially bidding for expected future cash flows that the security entitles them to. Competition implies that investors search for 'good deals', ones that offer the lowest price for a particular cash flow of a particular risk. The higher the price paid, the lower the expected return, so, in an attempt to improve their lot, investors search for securities that trade at a low price generating a high expected return. In their quest for high returns, they are willing to pay a price up to a level

that would make the purchase at least as good as the next best alternative, i.e. equal to their opportunity cost. Of course, in a competitive market, other investors are also looking for good deals and, as a result, competition ensures that observed prices generate returns equal to the opportunity cost.

The theory implies that if one can observe prices and expected cash flows one can infer the investor's opportunity cost. The DCF model applies this logic to equity investment in order to infer the opportunity cost of equity. It is assumed that cash flows to investors consist of dividends and that stock prices reflect investors' expected dividends and the opportunity cost of the investment. If we observe prices of equity and estimate all future dividends that the equity gives title to, then one can infer the opportunity cost of equity. (Exhibit A2-3, pp. 26-29; Exhibit B1-9-6, McShane Evidence, Appendix F, Appendix C, p. C-1)

An attractive feature of the DCF model is that it assumes, unlike the CAPM, that investors hold realistic investment horizons; both short and long-term investors estimate all dividends that the firm will provide over its lifetime. As with the CAPM, a significant disadvantage to the Commission is that for FEI none of the inputs, for example, price, dividends, or opportunity cost, are directly observable. The equity of the benchmark utility is held by Fortis Inc. and not actively traded. Therefore, future dividends are in the eye of the beholder as is the opportunity cost of capital. As a result, the opportunity cost estimate rests entirely on inferences that are commonly based on comparable firms. Not only should these firms be comparable, they should also have actively traded equity, and a source for estimating expected dividends.

Simplifying assumptions make the task of estimating dividends easier and the evidence submitted was all based on one of two simplifications or models. The 'Perpetual Constant Growth' model assumes that investors estimate the next dividend to be paid by the company and a single rate at which dividends will grow in perpetuity. The validity of the constant growth model is reduced when the estimated growth rate comes close to the opportunity cost (as this implies an extremely large stock price) and the model is invalid if the expected growth rate is greater than or equal to the opportunity cost of equity. The second model, 'the multi-stage growth' model, also requires an estimate of the next dividend to be paid but then allows investors to see multiple stages of constant growth; for example, the investor might expect growth of 4 percent for the next five years, 3 percent for the 5 years after that, followed by a constant perpetual growth rate of 2 percent starting

11 years hence. Although the long-term perpetual growth stage must meet the same growth restrictions as the constant growth model, the earlier stages are not restricted in this way. Therefore, multi stage growth models allow considerable more flexibility in dealing with growth forecasts. The Commission Panel has considered DCF-based ROE estimates presented by Ms. McShane, Dr. Vander Weide, and Dr. Safir.[6] Dr. Booth's DCF estimate for the market as a whole was used as a check on his CAPM estimate and is discussed with that estimate previously in Section 5.2.

1) Ms. McShane's estimates

Ms. McShane provides five different estimates with ROE estimates based on the DCF model. The estimates range from 8.6 percent to 11 percent. The estimates were variously based on 12 US Utilities or 5 Canadian utilities. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 113) FBCU submit that: "The application of both constant growth and three-stage models to the two samples supports a DCF cost of equity of approximately 9.1% to 9.8% (mid-point of approximately 9.4%)." (FBCU Final Submission, pp. 105-107) The FBCU also point out that Ms. McShane relied primarily on the consensus (mean) of analysts' earnings growth rate forecasts as the proxy for investors' long-term growth expectations, minimizing the need to superimpose on the analysis her own subjective view of growth expectations. (FBCU Final Submission, p. 106) Ms. McShane recognizes, however, that the forecast period for analysts' long-range earnings and dividend forecasts is typically three to five years over a business cycle (Exhibit B1-9-6, Appendix F, Appendix C, p. C-4), and that extending these forecasts into perpetuity in the constant growth model can overstate expected return. (T4:664-665)

2) Dr. Vander Weide's estimates

Dr. Vander Weide only presents evidence based on a constant growth DCF and only for a sample of US Firms. He relies on I/B/E/S Thomson Reuters Mean Growth forecasts to estimate dividend growth. Dr. Vander Weide's application of the DCF model to his comprehensive group of utilities produced a result of 10.3 percent, and to his smaller group of utilities, 10.0 percent, including 0.50 percent for flotation costs. (Exhibit B1-9-6, Vander Weide Evidence, Appendix G, pp. 27-31; Exhibits

[6] Dr. Booth employed a Constant Growth model but only to estimate the market wide expected return. This was used as a check on his CAPM estimate and so is not included in this discussion.

6 and 7 of his evidence) The FBCU submit that "…Dr. Vander Weide's DCF estimates are reasonable and should be given significant weight." (FBCU Final Submission, p. 108)

3) Dr. Safir's estimates

Dr. Safir uses a two stage DCF model to develop two estimates; one of 8.99 percent based on 5 Canadian firms and one of 8.86 percent based on a sample of 18 US utilities, before adding flotation costs amounting to 5 percent of the initial ROE estimates. (Exhibit C4-9, pp. 24-26, and Schedules 3 and 4)

Commission Panel Discussion

The Brattle Report observes: "The DCF approach is conceptually sound if its assumptions are met, but can run into difficulty in practice because those assumptions are so strong, and hence unlikely to correspond to reality." Elsewhere the report is more specific: "The major source of debate for the DCF model is determining the dividend growth rate, particularly for the long-term. There is generally no publicly available data on forecast growth rates for periods longer than 5 years." (Exhibit A2-3, p. 30)

The FBCU urges the Panel to give the DCF considerable weight, while the AMPC/CEC submits that "a DCF analysis can provide a helpful "check" on CAPM estimates, but the Commission should be cautious not to rely too heavily on it." (FBCU Final Submission, p. 89; AMPC/CEC Final Submission, p. 41)

The Commission Panel is of the view that, notwithstanding the concerns expressed about the approach, considerable weight should be given to the DCF but also accepts that caution should be used in assessing the growth estimates presented. A number of specific concerns arise with respect to the evidence presented:

a) **Reliance on analysts' short-term forecasts as the long run forecasts in constant growth formulas**:

This reliance appears in the single stage models presented by Ms. McShane and Dr. Vander Weide. For instance, Ms. McShane's estimate based on Canadian comparable firms assumes perpetual dividend growth of 7.5 percent. Since this is larger than her estimate for long run GDP growth of 4.3 percent, Ms. McShane seems to imply that FEI will grow to be an increasingly larger segment of the economy. This is inconsistent with the evidence presented in Appendix F of her testimony where she enumerates many reasons why consumers, both residential and commercial, will migrate from natural gas to other sources. Similarly, Dr. Vander Weide's estimates of the cost of capital use short-term analysts' forecasts to estimate the constant growth model. Similar to Ms. McShane, the resulting implication is that FEI will become a larger component of the economy over time, a conclusion that seems inconsistent with FEI's submissions regarding a shrinking market share and falling customer capture rates. (FBCU Final Submission, p. 53) We also note that Dr. Vander Weide included firms whose growth rate exceeded his estimate of the cost of equity in his comparable firms. As noted above, such a growth rate is inconsistent with the DCF constant growth model yet were included in his sample without adjustment. This calls into question the DCF estimates presented by Dr. Vander Weide.

The Panel finds that the use of analysts' forecasts is more consistent with the multi-stage models where the analyst forecasts can inform the early stage and longer term forecasts, such as of GDP growth, can inform later stages.

b) **Reliance on comparable firms operating in the US**:

The AMPC/CEC submits that the use of US based comparable firms renders DCF estimates of limited value. In their submission, AMPC/CEC cites Dr. Booth as follows:

> "[In the past] we had lots of pure play utilities in Canada, where you could do a DCF. In particular, all the local telephone companies were still regulated by the CRTC on a rate of return rate based method, and we had Island Telephone traded, Maritime Tel traded, NewTel traded, Bruncor Traded, Bell Canada traded, B.C. Tel traded. So we had a lot of traded rate of return regulated utilities that we could actually do DCF tests on. Unfortunately, they don't exist anymore." (T8:1493-1494)

While the Commission Panel concurs with the concern about comparability of US based firms, it also agrees with the argument of FBCU that, given the paucity of comparable Canadian firms, also recognized by Dr. Booth, augmenting Canadian data with US firms is appropriate. (FBCU Final Submission, p. 94) The Panel also recognizes the need for careful informed judgment in adjusting the US based estimates to reflect differences in the respective environments.

c) **Analysts' forecast bias**:

Given the heavy reliance on the forecasts of equity analysts, the AMPC/CEC submit that analyst bias may inflate DCF ROE estimates. (AMPC/CEC Final Submission, p. 59) FBCU argues that analysts' forecasts for utilities are not biased. (FBCU Final Submission, p. 111) The Brattle Report notes that studies have shown that analysts' forecasts are likely to be more accurate in utilities than in other sectors and bias is likely to be less in utilities than other sectors. (Exhibit A2-3, pp. 28-29)

The Panel finds that there is reason to be cautious of potential analyst bias in the utility sector. The expert testimony at this time does not, however, convince the Panel that an adjustment for analyst bias should be made. The Panel expects that future hearings will be informed of the latest research on bias in the analyst's reports on the utility sector.

Overall Assessment

The Commission Panel finds that the constant growth DCF models presented have growth assumptions that render the estimates questionable given the discussion above. Therefore, we place little weight on the submitted estimates that are based on the constant growth DCF. The estimates that the Panel found most helpful are Ms. McShane's multi-stage estimates in the range of 8.6 percent to 9.2 percent and Dr. Safir's estimates of 8.86 percent to 8.99 percent (two-stage). (Appendix F) Applying the appropriate judgment required, **the Commission Panel accepts an 8.9 percent DCF based estimate of the opportunity cost of equity.**

5.4 Equity Risk Premium Models

5.4.1 Introduction

FBCU's witnesses Ms. McShane and Dr. Vander Weide each provided results from various models, classified as equity risk premium models. Ms. McShane provided the results of three different 'types' of ERP models, comprising numerous estimates. Dr. Vander Weide used two types of ERP models, which he termed "Ex-Ante" and "Ex-Post" risk premium tests, and used two different samples for each of the two types of tests. None of the other witnesses relied on the ERP.

The Brattle Report summarizes the form and some of the issues concerning ERP models. According to the report, the ERP is frequently implemented using either a historical estimate of the risk premium or a forward-looking or expected risk premium. It notes that the historical risk premium is commonly estimated as the historical spread between equity and debt returns, so the primary choices for the analyst become which equity returns and debt instrument to use as well as the sample period over which the estimate of the spread (i.e., the risk premium) is to be based. The Brattle Report states that it is important that the analysis is consistent in its choice of a debt instrument to determine the cost of debt and that used to determine the risk premium. It also notes that the realized risk premium is highly dependent on the time period over which it is estimated, so that choice is also important. (Exhibit A2-3, p. 31)

The Brattle Report states that the forward-looking model requires that the analyst determine a proper measure of the cost of debt and how to estimate the expected risk premium. It says that because the yield to maturity of an investment grade bond serves as a proxy for the expected return, yield to maturity measures are natural candidates for the expected bond cost. However, determining the expected equity return is more difficult and requires the reliance on an estimation technique. It notes that it is common to rely on DCF models to determine the risk premium in the forward-looking version of the model. (Exhibit A2-3, pp. 31-32)

5.4.2 Discussion of the ERP Method and Results

The Brattle Report states that the risk premium model is a derivative of the CAPM so the comments that apply to the CAPM also apply to the Risk Premium Model, but that "…the Risk Premium Model

does not have the same level of theoretical support. The tie between theory and implementation is weakened because the interest rate in the Risk Premium Model is not necessarily equal to the risk-free rate and the risk premium is not explicitly based upon the product of the investment's beta and the MRP." (Exhibit A2-3, p. 33) Moreover, there is a concern that the historical risk premium approach to the ERP assumes that a historically realized risk premium is an appropriate measure for expected returns, but that over any given period, especially short periods, realized returns can differ substantially from expected returns. (Exhibit A2-3, p. 31)

A strength of the model identified in the Brattle Report is that the information on which the model relies is auditable. However, it notes that because inflation and other factors that are not directly related to the cost of equity capital may affect bond yields, the model will not necessarily produce like results for like conditions. It further states that the implementation of the model largely determines its ability to capture the systematic risk of companies, noting that, unless a forecasted return for relevant companies is used, the model will be unable to estimate reliably the cost of capital across different economic conditions. (Exhibit A2-3, pp. 34)

Commission Determination

The purpose of a rate of return model is to provide structure to the discussion of 'what a fair rate of return is.' Models used to assess this question provide structure and clarity and, in turn, a basis for the data to consider the appropriate interpretation to give it and the estimates.

The lack of a strong theoretical footing for ERP, as noted in the Brattle Report, may explain the large number of ERP estimates submitted to the Panel and the potentially intractable discussion of the merits of the models. There is simply little to help focus the analysis and as a result many models can be submitted as 'true' even though there is little on which to judge the validity of the submission.

The large number of estimates along with the absence of a compelling framework raises the following reservations about the estimates and indeed about the entire approach:

1. The models combine elements of the CAPM and the DCF with other ad hoc adjustments. Since evidence was presented on both the CAPM and DCF, it is not clear what is added by looking at these alternatives.

2. While it is not clear what is gained through these ERP models, it is clear that clarity is lost. In particular, the assumptions used in various estimates are difficult to evaluate. Ms. McShane, for instance, uses return estimates based on a sample of US firms with the 30-year Canada Bond rate in some estimates of the risk premium but in others uses 30-year A-rated utility/government bond yield spreads. (Exhibit B1-9-6, Appendix F, p. 99) Similar ad hoc assumptions are also found in Dr. Vander Weide's analysis. For instance, AMPC/CEC point to Exhibit C6-21 to demonstrate that if bond returns rather than bond yields were used in the analysis, the average Ex-Post risk premium for utilities would be approximately 4.47 percent or 2.3 percent less than Dr. Vander Wiede's estimate. Consequently, the AMPC/CEC argues that the Ex-Post estimates of Dr. Vander Weide must be ignored or if not ignored, then reduced by 2.3 percent. However, FBCU state that it is appropriate to use bond yields as the true risk-free rate. It is not clear, however, why the risk free rate is not estimated using a risk free return.

   Again, while judgment is always needed to evaluate estimates, without a theoretical base, there is no consistent way in which these differences of opinion can be assessed.

3. Since the model variations are ad-hoc they are subject to the concern that they may be subject to a "fishing' expedition" criticism. In contrast, while we can obtain various results from the CAPM or DCF models by changing parameters such as the risk premium in the CAPM or the growth rate in the DCF, the reasonableness of the selected parameter can be questioned.

Given these concerns along with the fact that there is ample evidence on both CAPM and DCF based estimates, the Panel places no weight on the ERP estimates submitted.

5.5 Comparable Earnings Approach

The Brattle Report states notes that the CE method is one of the traditional approaches to the cost of capital estimation, but that it does not have a financial economics foundation or strong theoretical basis. The report states that the legal decision, *Federal Power Commission et al v. Hope Natural Gas Co.,*[7] which stated that the return to the equity owner should be commensurate with returns on investment in other enterprises having corresponding risks, is often cited in the use of comparable earnings, but that neither the Canadian nor the US Supreme Courts has identified any specific methodology to determine a "fair return." (Exhibit A2-3, pp. 11, 36) The Commission Panel observes that much has been learned about financial economics since 1944. In particular, the notion of a comparable investment has been carefully cast in terms of investments in portfolios of

[7] 320 U.S. 591 (1944); 64 S. Ct. 281; 88 L.Ed. 333 (1944) U.S. Lexis 1204

comparable risk since portfolios are more efficient in achieving any expected return than is a single security.

The CE method requires the use of a sample of unregulated companies as comparators, since the use of regulated companies to estimate the comparable cost of capital would be circular. The Brattle Report notes that because the comparable companies are unregulated entities, it is necessary to adjust for any risk differences between the sample companies and the target company, and because the estimates from the model do not come from regulated companies or activities, the method does not recognize the regulatory context in which the cost of capital is being applied. (Exhibit A2-3, pp. 35, 38)

The Brattle Report states that a major issue with the comparable earnings method is whether realized book returns are a good proxy for the return that investors expect going forward and notes that it is a backward looking measure with no consideration of current market conditions. (Exhibit A2-3, pp. 36-37)

Ms. McShane submits that the fair return standard "…is only satisfied if the utility can attract capital on reasonable terms and conditions, its financial integrity can be maintained ***and*** the return allowed is comparable to the returns of enterprises of similar risk. The BCUC has recognized that the comparable return requirement is distinct from the capital attraction standard…." (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 8) [emphasis in the original] In her view, the comparable earnings test is an implementation of the comparable returns standard, as distinguished from the cost of attracting capital standard and it is critical that the regulator recognize the comparable returns standard when setting a fair return. (Exhibit B1-9-6, Mc Shane Evidence, Appendix F, p. 114)

Ms. McShane submits that the comparable earnings test, which measures returns in relation to book value, is the only test that can be directly applied to the equity component of an original cost rate base without an adjustment to correct for the discrepancy between book values and current market values.

Ms. McShane arrived at her comparable earnings estimates based on the earnings on book-value of 21 unregulated Canadian companies from 2004-2011. (Exhibit B1-9-6, Appendix F, pp. 113-116) She arrives at the following result: "To recognize the unregulated companies' higher risk, a

downward adjustment of 125 to 150 bps to their returns on equity was made, resulting in a comparable earnings result in the range of 11.0% to 12.0%." (Exhibit B1-9-6, Appendix F, p. 116)

To complete her comparable earnings estimate, she assesses the need for a market/book adjustment to the comparable earnings results. She submits that "[t]he similar to lower average market/book ratios of the Canadian sample of unregulated companies relative to both the Canadian and U.S. equity market composites indicate no evidence of market power. Thus there is no rationale for making an additional downward adjustment to the unregulated Canadian companies' returns on equity due to their market/book ratios." (Exhibit B1-9-6, pp. 116-17)

Dr. Booth submits that the average ROE increases when one starts adding low-risk firms to a comparable earnings sample and then progressively decreases as more risky firms are added, particularly after the lowest risk firms are added. He argues that: "…to get a high ROE from a sample of comparable earnings firms simply means coming up with "reasonable" screens to narrow down the sample and exclude those firms with significant losses. (Exhibit C6-12, p. 6)

He used book-value based estimates for Corporate Canada as a whole, using Statistics Canada reported earnings for the period 1987 to 2011 and the TSX composite for the same time period. He arrived at a CE estimate for the Canadian market of 9.3 percent, and says that "Like the overall stock market return this then needs to be lowered for the lower risk attached to regulated utilities." (Exhibit C6-12, Appendix E, pp. 3, 7, Schedule 2)

Dr. Booth submits that CE "…is totally unreliable unless a market to book adjustment is made which is rarely the case." (Exhibit C6-15, BCUC 1.39.0) He also submits that a "…market to book adjustment is needed since low risk firms usually have market power which is reflected in higher ROEs. It is incorrect to then allocate to a utility an ROE from a sample of firms that reflects market power when regulation is designed to remove this market power." (Exhibit C6-15, BCUC 1.67.1)

Dr. Booth also says that a problem with looking at past ROEs is that they are earned on historic accounting book equity that does not reflect what can be earned on investments today. (Exhibit C6-12, Appendix E, p. 5)

The AMPC/CEC argues that the Commission should place little or no weight on the comparable earnings test. (AMPC/CEC Final Submission, pp. 38, 60)

Dr. Safir used two market-value based estimates: one for the same Canadian sample of 21 companies used by Ms. McShane; the other based on a sample of 31 US companies in the consumer goods, industrial goods or service sectors using the same sample selection criteria as Ms. McShane used for her Canadian sample. (Exhibit C4-9, pp. 28-29)

Dr. Safir calculated his comparable earnings estimates "…using net income and market value of equity…." He submits that because his comparable earnings estimates were calculated using market-based values instead of book value, they more accurately capture the conditions in the current capital markets in which the benchmark firm would be competing for capital. He goes on to say that his method accounts for factors such as inflation, since both the net income and the stock prices will reflect the level of inflation occurring at the time these numbers were reported and that "[b]ook value-based calculations of comparable earnings will not account for inflation." (Exhibit C4-9, p. 30) Using his market-value based method of calculating CE Dr. Safir arrived at estimates of 6.85 percent for his Canadian sample and 5.81 percent for his US sample. He submits that the Canadian estimate should be given twice the weight of his US estimate and arrives at a weighted average estimate of 6.50 percent. (Exhibit C4-9, p. 33)

Dr. Vander Weide did not provide a CE estimate.

Commission Determination

The fundamental issue regarding the CE test is its lack of a basis in financial economics. The approach requires a sample of unregulated companies of similar risk, but creating a sample of unregulated companies that are, and can be shown to be, of similar risk is difficult without a theoretical basis such as the CAPM or the DCF. Dr. Booth has pointed out the issues that arise when even 'reasonable' screens are used to eliminate companies from the entire universe of companies to create a sample. Moreover, the CE method is retrospective, whereas the ROE to be established for the benchmark utility is prospective.

In her evidence, Ms. McShane submits that: "The economic principle guiding the fair return is the opportunity cost principle." She also submits that one of the requirements of the FRS is that the return allowed is comparable to the returns of enterprises of similar risk and that it is critical that the regulator recognize the comparable returns standard when setting a fair return. She also states that the CE test is an implementation of the comparable returns standard and is to be distinguished from the cost of attracting capital standard. (Exhibit B1-9-6, McShane Evidence, Appendix F, pp. 2, 8, 114)

During cross-examination a discussion on whether the comparable earnings test reflects an investor's opportunity cost concluded with the exchange below:

COMMISSIONER GIAMMARINO: But you would agree that in terms of an opportunity cost, it doesn't match up that closely to what we would consider the exact opportunity cost to the investor.

Ms. McSHANE: A: No, it is not an opportunity cost in the same sense that you were talking about. (T5:732-35)

The Commission Panel addressed the FRS in Section 2 and recognized that a fair or reasonable overall return on capital should be comparable to the return available from the application of the invested capital to other investments of like risk (comparable investment requirement). However, the Commission does not accept that this requirement means that it must use the comparable earnings method as a means of determining what return is required to meet the FRS. Modern finance theory has clearly established that comparable risk is assessed relative to a *portfolio* rather than a single stock. This is indeed the basis of the CAPM and other extensions of risk return modules. Searching for individual firms of comparable risk is consistent with this only if the comparison recognizes non-diversifiable risk as the relevant characteristic. This is exactly what is done when CAPM comparators are sought. But this is ignored when companies are considered comparable on dimensions other than systematic risk.

The preceding discussion highlights some of the serious problems the comparable earnings method contains as a means of determining the return required to meet the FRS. **Consequently, the Commission Panel places no weight on the comparable earnings results.**

5.6 Allowance for Financing Flexibility

Ms. McShane described financing flexibility allowance as intended to cover three distinct aspects: (1) flotation costs comprising financing and market pressure costs arising at the time of the sale of new equity; (2) a margin, or cushion, for unanticipated capital market conditions; and (3) a recognition of the "fairness" principle (Exhibit B1-9-6, McShane Evidence, Appendix F, p. F-1). Flotation costs and financing flexibility adjustments are typically applied to the market-based cost of equity estimates, i.e., the CAPM and the DCF models.

Ms. McShane provided an allowance of 50 basis points for each of her market based tests in order to maintain the market value at a small premium to the book value. In the alternative, should the Commission rely only on the market-based tests, Ms. McShane proposed an allowance for financing flexibility at 1.0 percent. (Exhibit B1-20, BCUC 75.2.1)

Dr. Vander Weide provided an allowance of 50 basis points for flotation and financing flexibility. (Exhibit B1-9-6, Vander Weide Evidence, Appendix G, p. 35)

Dr. Booth provided an allowance of 50 basis points, stating that the market opportunity cost should be adjusted upwards to include issuing costs or a financial flexibility adjustment to make sure that shares can always be sold to net out the original cost included in the rate base, which is all that earns the fair ROE. He also noted that most regulators in Canada have allowed 50 basis points for these new issue costs (Exhibit C6-12, p. 8).

Dr. Safir referred to a survey of flotation costs, which determined them to be approximately 4.5 percent of the recommended rate of return. Based on the 4.5 percent, Dr. Safir applied 5 percent of the rate of return, an equivalent of around 32 to 40 basis points for his CAPM models and 47 bps for his DCF model, to reflect the marginally higher costs that would be faced by Canadian issuers either crossing the border to utilize the US market or in issuing in the smaller Canadian capital market. (Exhibit C4-9, pp. 16-18)

Commission Determination

The Commission Panel accepts the allowance for financial flexibility of 50 bps added to the CAPM and DCF tests in determining the fair ROE. As indicated in Section 5.5, the two market-based tests, CAPM and DCF are given equal weight in the determination of the allowed ROE for the benchmark utility.

With reference to Ms. McShane's proposed additional 50 bps if the CE test is not accepted, the Commission Panel is of the view that each test to estimate the fair return is applied separately to provide a different perspective and each test's results are not contingent upon the results of other tests. Therefore, the Commission Panel does not accept the conditional 50 bps in Ms McShane's alternative proposal.

5.7 Fair Return on Equity – Commission Determination

The Panel finds that the DCF and CAPM should be given equal weight in determining the ROE. Moreover, the Panel finds that CE and other ERP models have insufficient merit to be accorded any weight in the determination of the fair ROE. Considering the CAPM based estimate of 7.64 percent and the DCF estimate of 8.9 percent, the Panel concludes that the ROE, before adjustment for financing flexibility, of 8.25 percent is an appropriate base as it falls in the midpoint range of the two estimates. When an allowance for financial flexibility of 0.5 percent is added, the resulting ROE is 8.75 percent, to be effective January 1, 2013, provided for by Order G-47-12 and confirmed in Order G-187-12. **The ROE will be effective until December 31, 2015, subject to variation commencing January 1, 2014, by the Automatic Adjustment Mechanism formula discussed and adopted in Section 6.**

FEI is to file within 30 days of this Decision and accompanying Order G-75-13 amended rate schedules in accordance with paragraphs 1 and 2 of Order G-75-13 as well as a proposal on the treatment of the refundable portion of the rates collected since January 1, 2013. FEI shall inform all affected customers of the final rates by way of customers notice.

6.0 AUTOMATIC ADJUSTMENT MECHANISM

6.1 Introduction

In 1994, the Commission determined that the Benchmark ROE was to be estimated annually by an Automatic Adjustment Mechanism (AAM).[8] This AAM was eliminated by Order G-158-09 issued concurrently with the 2009 Decision. In eliminating the AAM the Commission stated that: "... in its present configuration, the AAM will not provide an ROE for TGI for 2010 that meets the fair return standard." (2009 ROE Decision, p. 72)

One of the stated purposes of this proceeding was to review the possible return to an AAM for setting an ROE of the benchmark utility and examine potential AAM models. In this Section, the Commission determines that:

- Reinstituting an AAM formula for annually setting the ROE for a benchmark utility between proceedings is appropriate.
- A two-variable model AAM is to be instituted to set the benchmark ROE on an annual basis commencing in the 2014 calendar year for a period of two years.
- Implementation of the model will be subject to the actual long Canada bond yield meeting or exceeding 3.8 percent.
- The new formula will initially utilize the ROE of 8.75 percent as determined in Section 5.7.

6.2 Should the Commission Re-institute an AAM?

In considering re-instituting an AAM, the Commission Panel reviewed proposed AAMs to determine whether they would meet the Fair Return Standard or whether, as FBCU submit: "The Fair Return Standard is best met in intervening years until the next comprehensive cost of capital reviews by holding the ROE constant." (FBCU Final Submission, p. 153) In addition, the Panel examined the status of AAMs in other Canadian regulatory jurisdictions.

[8] In the Matter of Return on Common Equity – BC Gas Utility Ltd., Pacific Northern Gas Ltd., West Kootenay Power Ltd., -- Decision and Order G-35-94, June 10, 1994.

6.2.1 Status of AAMs in Other Canadian Jurisdictions

The Brattle Report surveyed the cost of capital practices in Canada including the formulas used to set the ROEs in Ontario and Quebec. (Exhibit A2-3, pp. 64, 72)

In the 2009 Decision, FBCU was directed to complete a study of AAM alternative formulas and report to the Commission. In compliance, FBCU filed the 2010 report, "A Review of Automatic Adjustment Mechanisms for Cost of Capital" prepared by Concentric Economic Advisers (Concentric). The 2010 Report provided an examination of the use of AAM formulas in other jurisdictions, contrasted these with alternatives and considered the merits of various approaches. While not recommending that a formula be adopted, Concentric identified attributes that should be considered if an AAM is adopted in the future. (Exhibit B1-9-6, Appendix I) In this proceeding, FBCU again engaged Concentric to provide an update of its analysis, which examined the use of ROE formulas in other jurisdictions. The update included the following observations with regard to Canadian jurisdictions:

- The Ontario Energy Board (OEB) continues to rely on its AAM which it modified in 2009. The modified formula is based on 50 percent of the change in forecast long-term Canada bond yields and 50 percent of the change in observed A-rated utility bond index over the 30-year Canada Bond yield.
- In Quebec the Régie de l'énergie (Régie) modified its previous formula in 2012 to incorporate 50 percent of the change in utility bond spreads in addition to the existing formula's 75 percent of change in government bond yields.
- In its December 2011 Decision, the AUC determined that the credit market remained volatile and therefore decided not to employ an AAM for 2012. The AUC indicated that it was not prepared to preclude a return to some form of formula-based AAM in future once the capital markets had stabilized.
- The Newfoundland and Labrador Board of Commissioners of Public Utilities, in June 2012, approved an 8.8 percent ROE (which was not set by formula) for Newfoundland Power stating that this was within a range of reasonable values. The Board did not disavow or abandon the formulaic approach for future rate proceedings.

Concentric has not changed its position on AAMs and stated that: "periodic rate hearings remain the only reliable method for the determination of utility ROE's." However, Concentric noted that Canadian regulators have recognized that a sole reliance on simple relationships to government bonds cannot be relied upon to estimate ROE. Concentric points out that both Ontario and Quebec have incorporated utility bond spreads in their formulas and notes that this mitigates one fatal

weakness of past AAMs. Concentric views the two variable methodology utilized by Ontario as an improvement with a remaining concern being the lack of a specific link to the cost of equity , other than that conveyed by bond yields. (Exhibit B1-9-6, Appendix I, Concentric Update Report, pp. 1-4, 11)

The Commission Panel notes that both the OEB and the Régie formulas are variations of the model proposed by Dr. Booth and are discussed further in Section 6.2.2 below.

It appears that there is some acceptance by utility regulators in Canada of an AAM formula based on a two-variable model that uses the long-term Canada bond rate as a proxy for a risk free rate and a change in utility bond spreads as a proxy for credit risk. There is, however, reluctance in some jurisdictions to institute an AAM given the volatility of Canadian capital markets in recent years.

6.2.2 Submissions by Parties

AMPC/CEC

AMPC/CEC submit that the Commission abandoned the AAM in 2009 because it did not provide a fair return citing the following passage from the 2009 Decision: "the recent flight to quality has driven down the yield on long-term Canada bond yields, while the cost of risk has been priced upwards." Therefore, AMPC/CEC submit that the question for the Commission is, "what formula will allow it to return to an AAM, while ensuring that the results are fair in light of the current financial conditions and the conditions FEI might encounter going forward." (AMPC/CEC Final Submission, p. 62)

AMPC/CEC support a return to an AAM based on its contribution to regulatory efficiency because an AAM reduces the frequency of periodic ROE reviews. They note that FBCU have suggested that 3-5 years is a reasonable gap between comprehensive ROE reviews. AMPC/CEC points out that if the Commission agrees with this, an AAM would likely allow the reviews to be closer to five years rather than three, resulting in considerable efficiency benefits. (AMPC/CEC Final Submission, pp. 62-63)

Dr. Booth states that "The key problem with 'old' ROE adjustment models was that they *only* linked the ROE to the forecast long Canada yield. As a result, during the financial crisis the ROE formula

indicated declining ROEs while at the same time the utility cost of debt was increasing. An enhanced ROE formula has to deal with this, which can be done by incorporating the credit market adjustment I have used in my direct ROE estimates." (Exhibit C6-12, pp. 97, 100)

Dr. Booth recommends "an ROE adjustment model where ROE adjusts by 75% of the forecast change in long Canada bond yields and 50% of the change in the credit spread. This would be subject to a minimum forecast long Canada bond yield of 3.80% … Similar models are in use by the Régie and OEB." (Exhibit C6-12, p. 3) Dr. Booth selects 3.80 percent as the "floor" stating that this "is the lowest rate consistent with a normal cyclical low." (Exhibit C6-12, pp. 97, 100)
AMPC/CEC argue that Dr. Booth's enhanced two variable ROE formula addresses the concern with the old ROE formula that during periods of financial crisis the allowed ROE and utility borrowing costs move in opposite directions. They argue that Dr. Booth's formula obviates FBCU's concern that the AAM won't work because of the current unusual business cycle. The proposed 3.8 percent floor acts like a fixed rate ROE until the long Canada bond yields return to normal, and it provides an adjustment mechanism for periods when conditions are more typical. (AMPC/CEC Final Submission, p. 64)

ICG

Dr. Safir believes that an AAM for a limited number of years is appropriate because "It is simply not economically efficient to revisit the entire ROE setting mechanism annually" and also states that "the AAM is administratively efficient, resulting in significant savings by avoiding costly, annual rate hearings." In Dr. Safir's view, AAMs that reference long-term bond rates, such as the one previously used by the BCUC, are good ways to account for near term influences that affect a fair ROE. (Exhibit C4-9, pp. 36-37)

ICG observes that during the interim years between periodic cost of capital proceedings an AAM formula is more likely to result in an ROE that meets the FRS than no formula. It submits that the Commission should establish an AAM similar to the one discontinued by the Commission in 2009 that referenced long-term bond rates with a three year effective period. It would differ from the previous Commission AAM in that it would use a five year average for the forecast long-term Canada bond yield. (Exhibit C4-9, pp. 36-38; ICG Final Submission, p. 32; T7:1187)

ICG concedes that a multiple factor model may be more likely to meet the FRS than a single factor model, but given that the single factor model has been tested over a long period, it has been recommended to the Commission. (ICG Final Submission, pp. 32-33)

BCPSO

BCPSO submits that an AAM is beneficial because it ensures that the benchmark utility will not operate for more than a brief period of time with a higher than required ROE and therefore supports reinstatement of an AAM. (BCPSO Final Submission, pp. 19-20)

FBCU

FBCU does not support the return to an AAM. FBCU's main concern with the AAM is that the basis upon which the annual ROE adjustments are being made may be suspect. They submit that an AAM relies on a formula with a limited number of inputs that could never capture the complex factors affecting ROE, and that an AAM likely relies on long Canada bond yields and corporate spreads, which are still affected by atypical market conditions. In addition, any formula relies on imperfect proxies. In their view, the application of the FRS requires a significant degree of analysis, market information, and judgment that evolve over time. Formula parameters are static and based on historic relationships and fundamental relationships may shift, leaving the formula out of touch with current market conditions. FBCU take the position that there is no formulaic way to assign a value or weighting to specific risk factors or utility/utility sector characteristics that would apply across multiple utilities and generate the appropriate cost of capital for each one. This is supported by Ms. McShane who submits that the Commission should continue to address the appropriate cost [of capital] on a case-by-case basis: "There is no 'one size fits all' cost that should be determined by means of an interest automatic adjustment mechanism." (FBCU Final Submission, p. 153-156; Exhibit B1-9-6, p. 33; Exhibit B1-9-6, McShane Evidence, Appendix F, p. 7)

FBCU prefer to have the allowed ROE and capital structure set through a traditional process and remain constant between the periodic (three to five year) formal reviews, subject to events occurring that bring the results out of alignment with the FRS, which could result in an unscheduled full review process. This is preferable to having updates made on a basis that the FBCU believe is suspect. (Exhibit B1-20, BCUC 2.113.1)

FBCU argue that there is no efficiency gain associated with implementing the AAM, if there are to be periodic reviews. FBCU further argue that the regulatory burden associated with periodic cost of capital reviews is the same as that associated with periodic reviews with annual formula-driven ROE changes in the interim. FBCU also argue the FRS is best met in the intervening years until the next comprehensive cost of capital reviews by holding the ROE constant. (FBCU Final Submission, pp. 153-156)

FBCU further submit that "The rationale for why the Commission discontinued the AAM remains valid today. Meeting the Fair Return Standard is not optional." FBCU state that "All of the experts agree that we are still experiencing unusually low interest rates, and the ability of any AAM to produce fair results is far from certain [when such conditions exist]." (FBCU Final Submission, p. 153)

With respect to the positions taken by Dr. Safir and Dr. Booth, FBCU make the following submissions:

1. FBCU submit that Dr. Safir is proposing to return to an AAM that has already been rejected by the Commission, with the only difference being the starting point for measurement of changes in the forecasted long Canada bond yields (i.e., the use of the five-year average forecast). They cite Ms. McShane's statement that there is an inverse relationship between long-term government bond yields and the utility risk premium. FBCU also argue that Dr. Safir's use of a five-year average forecast Canada bond yield as the base line in the formula is problematic because it suppresses ROEs despite increases in long Canada bond yields. FBCU submit that while this five year average is intended to compensate for present unusually low interest rates, it would be better to postpone consideration of a formula, rather than implement a "quick fix" that artificially suppresses the ROE. (FBCU Final Submission, pp. 159-160)

2. FBCU submit that the AAM proposed by Dr. Booth is biased downwards. FBCU notes that the current long Canada bond yield is well below the 3.8 percent that Dr. Booth employs as the floor, and points out that while he expects rates to increase, he does not expect the forecast to rise above the 3.8 percent for at least three years. FBCU submit that the combination of rock-bottom forecast yields and a slow rise in interest rates has two implications. First, rock-bottom interest rates means that further declines are not likely. Second, any increase in the forecast long Canada bond rate will not result in an increased ROE. In addition, FBCU submit that the cross-examination of Dr. Booth indicates that he expects credit spreads to fall while the long term Canada bond yield remains below 3.8

> percent, an expectation shared by Mr. Coyne. FBCU propose that the result of this will be a progressively lower benchmark ROE after 2013 if Dr. Booth's formula is employed. (FBCU Final Submission, pp. 160-161)

FBCU's position is that if the Commission requires an ROE AAM, it should seek to rectify the problems of the old formula. A new formula would address changes in the equity risk premium, and not solely changes in long Canada bond yields. Any adjustment factor would need to reflect sensitivity to change in bond yields to ROE. (Exhibit B1-9-6, pp. 27-29)

Corix

Corix submits that there is a continued flight to quality and a still increasing cost of risk, so an updated AAM is not appropriate at this time. (Exhibit B2-9, BCUC 1.2.1, p. 3)

6.3 Commission Determinations

6.3.1 Re-instituting an AAM

The Commission Panel does not take issue with FBCU's argument that an AAM formula with limited inputs cannot capture all of the complex factors affecting ROE and therefore, relies on imperfect proxies. However, at the same time, the Panel is of the opinion that the issue is whether the adoption of an AAM formula is better than the alternative, which is to do nothing as suggested by FBCU and Corix. In other words, while implementing an AAM formula may not be perfect, the question is whether it better satisfies the FRS than leaving the ROE static for a period of time or conducting frequent costly and time consuming ROE proceedings. The difficulty with leaving the ROE static over a three year or longer period is that financial markets continue to change and investors' needs continue to evolve. Therefore, in the view of the Commission Panel, implementing a mechanism to capture the impact of some of these changes is far superior to the alternative of doing nothing. Furthermore, as the AMPC/CEC submits, "if there are reasonable grounds to believe the mechanism is not producing fair results, the benchmark utility always has the option of asking for a review." (AMPC/CEC Final Submission, p. 64)

The Commission Panel does not disagree with FBCU's argument that the regulatory burden associated with periodic cost of capital reviews with or without an AAM is similar. However, we are

of the view that the likelihood of a requirement for more frequent ROE proceedings is reduced by having in place an AAM formula. Thus, the Panel is persuaded that the application of the AAM has the potential to contribute to regulatory efficiency.

Therefore, the Commission Panel determines that re-instituting an AAM formula for annually setting the ROE of the benchmark utility between ROE proceedings is appropriate. Additionally, the Commission Panel finds the FRS is adequately met because implementing an AAM formula better meets the standard than taking no consideration of changes in the market over a three year period as suggested by FBCU. The AAM formula to be adopted and the timing of its use is addressed in Section 6.3.2.

6.3.2 Optional AAMs to be Considered

The Commission Panel acknowledges that interest rates have been atypical in recent years and have remained at historical lows. The historical AAM used by the Commission prior to 2009 relied exclusively on a single variable formula based on the long-term Canada bond yields as a proxy for risk free rates. This model was less than fully effective for utilities because the flight to quality kept interest rates abnormally low while the risk had been priced upwards. It could not assure that the FRS could be met in extended times of low interest rates.

As noted previously, Dr. Booth proposed a two-variable model that incorporates the traditional concept of tying the benchmark utility's ROE to the "risk free" long-term Canada bond yield, and also incorporates a credit market adjustment to reflect the relationship of ROE and credit risk within the utility sector. His model also utilizes a "floor" long-term Canada bond rate of 3.8 percent as the risk free proxy until such time as long-term Canada bond yields return to a more common level.

Concentric submits that any new AAM formula should address changes in the utility risk premium and not be based solely on changes to the long Canada bond yields. While it does not recommend a formulaic approach, it does provide several potential formulaic methodologies that could be used in British Columbia (Exhibit B1-9-6, Appendix I, 2010 Report, pp. 39-45)

In summary, possible options for re-instituting an AAM include:

- The single variable model used by the Commission prior to 2009 that was based on long Canada bond yields;
- The variety of approaches offered by Concentric (Exhibit B1-9-6, Appendix I, p. 11);
- Dr. Booth's two-variable model or a variation incorporating the long Canada bond yield, a floor level of long Canada bond yield to address the atypical low interest rates, and a metric to address credit spreads.

The Commission Panel recognizes the shortcoming of the single variable model used by the Commission prior to 2009 in that it fails to satisfy the FRS when interest rates continue at abnormally low levels. Accordingly, this model will not be considered.

While Concentric has explored a number of alternative formulas that could be used in British Columbia, the Commission Panel notes that none of these have been recommended by Concentric nor have they provided evidence as to their use and effectiveness in other jurisdictions. In addition, none of the interveners has expressed support for any of these. Given this lack of support and the lack of evidence to support their efficacy and relevance to British Columbia, the Commission Panel does not endorse any of the possible alternative AAMs explored by Concentric.

During cross-examination, Commission counsel asked Mr. Coyne of Concentric what advice he would give the Commission in terms of adjustments if the Commission were adopt an AAM similar to that of the OEB and the Régie. Mr. Coyne testified that a coefficient of 0.5 was a more accurate reflection of the historic relationship to long-term Canada bonds than 0.75. (T5:827)

Dr. Booth testified that he recommended 75 bps but that he could live with 50 bps and he did not believe that there would be a big impact. (T8:1622)

The Commission Panel is persuaded that a two-variable model similar to that proposed by Dr. Booth and currently utilized in Ontario is appropriate for application to the benchmark utility within British Columbia. (Exhibit C6-15, BCUC 1.44.5 attachment)

By utilizing the 50 percent adjustment of the change in the long-term Canada bond yield as a proxy

for risk free rates, it recognizes the relationship between ROE and risk while moderating the level of change resulting from any volatility in the long-term Canada bond rate. In addition, by utilizing the 50 percent adjustment in the change in the utility bond spreads, it recognizes the relationship between credit risk and ROE in the utility sector and moderates volatility in utility bond spreads. And finally, by utilizing a 3.8 percent floor for the long Canada bond yield, it recognizes the atypical relationship between ROE and cost of risk in periods of unusually low interest rates. Further, the application of similar models within both Ontario and Quebec supports it usefulness and acceptance within other Canadian regulatory jurisdictions.

Given the advantages, the Commission Panel adopts a two variable model AAM to determine the benchmark ROE on an annual basis commencing in the 2014 calendar year. The AAM formula will operate until December 31, 2015. The implementation of the model is subject to conditions outlined in Section 6.3.3. The formula will initially utilize the 8.75 percent ROE as determined in Section 5.7 as the base ROE.

The formula to be used and the basic method to determine the changes in long Canada bond forecast and the changes in utility bond spread are provided as follows:

$$ROE_1 = \text{Base ROE (8.75\%)} + 0.50 \times (LCBF_t - \text{BaseLCBF}) + 0.50 \times (\text{UtilBondSpread}_t - \text{BaseUtilBondSpread})$$

Where:

$LCBF_t$ is the Long Canada Bond Forecast for the test year, with a floor of 3.8 percent. The Base LCBF is 3.8%.

UtilBondSpread_t is the average spread of 30 year A-rated Canadian Utility bond yields over 30 year Government of Canada bond yields and BaseUtilBondSpread will be determined.

6.3.3 Impact of a 3.8 percent Floor

FBCU has argued that the AAM proposed by Dr. Booth is biased downwards. The Commission Panel agrees that the potential for a downward bias does exist.

Dr. Booth has recommended that any change in the ROE be subject to a minimum forecast bond

yield of 3.8 percent as this is the lowest rate which is consistent with a normal cyclical low. The Commission Panel accepts this as reasonable since it is the risk free rate for the CAPM ROE as determined in Section 5.2.

With respect to the two-variable AAM formula, Dr. Booth has acknowledged that as long as the long-term Canada bond yields are below 3.8 percent, the only variable that can affect ROE is the corporate utility bond spreads. FBCU submit that if the credit spread drops or tightens before long Canada bond rates are above 3.8 percent, the ROE will drop further from whatever the starting point is under his formula. Further, Concentric states that "a troubling aspect of Dr. Booth's proposed formula is that it sets a minimum floor LTC yield of 3.8 %, which will be applied for purposes of measuring year over year changes in the formula, but does not specify an objective bond forecast to reference for the starting point." (Exhibit B1-32, Concentric Rebuttal Evidence, Concentric Response to Interveners, p.4) The Panel notes that all parties seem to agree that long-term Canada bond yields are well below what would be considered a cyclical low and have been influenced by monetary policy. Therefore, it is reasonable to assume that the likelihood of an increase in the yields of long Canada bond is much more likely than a decrease. If this were to occur with no corresponding change in utility bond rates, the result would be a decrease in the credit spread and, consequentially, the ROE. Given that a rise in the long Canada bonds yields may be driven by monetary policy and not a change in market conditions, and there is no evidence to suggest there would be a corresponding change in utility bond rates, the Commission Panel accepts that a potential for downward bias exists. **To deal with this the Commission Panel directs that any change in ROE resulting from the AAM formula be subject to an actual long Canada bond yield of 3.8 percent being met or exceeded. Accordingly, the AAM formula will not be operative as long as the long Canada bond yield is below 3.8 percent.**

The Commission Panel has considered Concentric's submission that Dr. Booth did not specify an objective bond forecast to reference as a starting point. We are of the view that the potential for downward bias will continue if attention is not paid to setting appropriate base rates for the formula. Therefore, the Commission will seek submissions from the parties with respect to determining appropriate base levels and developing an effective methodology for deriving the inputs to the formula.

The Commission Panel understands that the conditions placed upon the implementation of the AAM

formula may well result in the 8.75 percent ROE being in place for the term of this Decision ending December 31, 2015. However, in consideration of the FRS, the Panel is of the view that this is appropriate.

FEI is directed to file an application for the review of the common equity component and the ROE approved in Order G-75-13 by no later than November 30, 2015.

7.0 COST OF CAPITAL – SMALL UTILITIES

7.1 Introduction

When the Commission initiated the GCOC Proceeding, it identified the Affected Utilities, which included FEI and other FortisBC gas and electric utilities, PNG and Corix. These utilities were expected to take a lead role in filing evidence for cost of capital matters that may impact them. In addition, the Commission identified Other Utilities that "may wish to participate in the GCOC Proceeding." This list included among others:

- Big White Gas Utility Ltd. and Sun Peaks Utilities Co. Ltd.;
- Central Heat Distribution Ltd.;
- Dockside Green Energy LLP;
- Hemlock Valley Electrical Services Limited; and
- River District Energy Limited (River District).

The recent emergence of thermal energy services (TES) in British Columbia has resulted in the creation, over the last few years, of a number of new on-site thermal energy systems and district energy systems, which are subject to the Commission oversight. For instance, FortisBC Alternative Energy Service Inc. (FAES), an affiliate of FEI and a wholly-owned subsidiary of FortisBC Holdings Inc. (FHI), now owns and operates or is proposing to develop the following regulated TES projects:

- Delta School District Number 37;
- Tsawwassen Springs Development;
- PCI Marine Gateway;
- TELUS Garden Thermal Energy System; and
- Kelowna District Energy System.

Key purposes identified by the Commission Panel in its Final Scoping Document were to establish:

(i) a method to determine the appropriate cost of capital for a benchmark low-risk utility in BC and how the Benchmark ROE will be reviewed and/or adjusted;

(ii) a generic methodology or process for determining each Affected Utility's cost of capital in relation to the benchmark utility's cost of capital; and

(iii) a framework for determining the appropriate cost of capital for other smaller utilities in the province.

Related to this framework, the scope of the proceeding included the following key activities:

(i) establish a generic methodology or process for each utility to determine its unique cost of capital in reference to the benchmark low-risk utility;

(ii) in certain circumstances, develop a methodology to establish a deemed capital structure and deemed cost of debt, particularly for those small utilities without third-party debt, which would involve setting a methodology on how to calculate a deemed interest rate.

(Exhibit A-3, Appendix B to Order G-47-12)

The Commission Panel also requested submissions regarding Stage 1 and Stage 2 review. The FBCU submitted it would be most efficient to break the process down into three groups which would be handled separately: one for the FBCU, a second for the PNG and a third for micro utilities including Corix and FAES and others. (Exhibit B1-22, pp. 10-11) By Order G-148-12, the Commission Panel directed that a Stage 2 will be added to this GCOC proceeding with the schedule to be determined prior to the end of Stage 1. (Exhibit A-21)

Transition to Stage 2

The purpose of the Stage 2 proceeding is to assess the differences in short and long-term risk faced by the Affected and Other Utilities as compared to the benchmark utility FEI. Based on this assessment the Panel will then determine how the risk differentials will impact the capital structures and the allowed ROE for these utilities.

The Panel acknowledges the FBCU submission that it may be efficient, given the small size of thermal energy systems, to have a single process to address cost of capital issues for TES systems, irrespective of the provider. This would include FEI and FAES's Thermal Energy Services, and similar systems to be operated by developers or providers like Corix. (Exhibit B1-9, p. 34) The Panel also notes the previously mentioned FBCU suggestion about dividing the Stage 2 process into three groups.

In anticipation of Stage 2, this section addresses issues related to the framework for determining the cost of capital for the smaller utilities, including all new small TES utilities. The appropriate method to determine interest rates for deemed debt will also be addressed. In this Decision, the definitions of "small utilities" and "micro utilities" are used interchangeably.

7.2 Framework for Establishing an Appropriate Cost of Capital – Equity Risk Premium

7.2.1 Is Size a Risk Factor in ROE and Capital Structure Determination?

Ms. Ahern, the expert witness for Corix states "it is conventional wisdom, supported by actual returns over time, that smaller companies tend to be more risky, causing investors to expect greater returns as compensation for that risk." Ms. Ahern further explains that smaller companies, for instance, face more risk exposure to business cycles and economic conditions, both nationally and locally. Similarly, the loss of revenues from a few larger customers would have a greater effect on a small company than on a much larger company with a larger, more diverse customer base. Moreover, smaller companies are generally less diverse in their operations as well as experiencing less financial flexibility. (Exhibit B2-7, pp. 6-7)

Ms. McShane, the expert witness for FBCU states that in the assessment of investment risk, size has two dimensions that should be considered in determining a utilities common equity ratio and ROE:

1. A small utility does not have the opportunities to diversify its risks to the same extent as a larger utility. For example, assets are typically more concentrated in a limited geographic area, which limits operational flexibility.
2. Smaller utilities have fewer financing options, less institutional interest in acquiring their debt securities, issued debt would be relatively illiquid, and, if issued to third-parties would likely require stricter covenants than debt issued by large utilities.

Ms. McShane also points out that debt rating agencies often take size into account when rating companies and their debt issues. The impact of smaller size for rated utilities is frequently exhibited in lower debt ratings for these companies even in cases where their financial parameters are stronger than their larger peers. (Exhibit B1-9, Appendix F, p. 134)

PNG submits "there was little to no evidence submitted that suggested or countered that size was not a significant factor." While precedents and empirical studies exhibit a broad range of explicit company size adjustments (150-436 bps), which introduces a degree of subjectivity, PNG further submits that "Stage 1 evidence concerning size as an independent factor was relatively uncontested." (PNG Final Submission, p. 13)

7.2.2 Stand-Alone Principle

Both Ms. Ahern and Ms. McShane reaffirm the importance of the stand-alone principle, which is "a cornerstone of Canadian utility regulation with a history dating to at least 1978." (Exhibit B1-9, Appendix F, p. 10, B2-9, BCUC 1.4.7) Therefore, even if a small utility is owned by a larger parent company, there should be no impact on the determination of the small size utility ROE and capital structure. Each utility within the Commission's jurisdiction should be evaluated on a stand-alone basis.

Ms. Ahern further states there is ample academic evidence that investors demand greater returns to compensate for the lack of marketability and liquidity of the securities of smaller firms. She submits "it is the use of funds invested and not the source of those funds which gives rise to the risk of any investment." She refers to the text of Brealey and Myers, which notes "Each project should be evaluated at its own opportunity cost of capital; the true cost of capital depends on the use to which the capital is put." (Exhibit B2-7, p. 7)

7.2.3 Academic Evidence of the Size Effect in Literature

In her filed evidence, Ms. Ahern provides additional examples of the academic literature, where the risk effects of a company's size on the investor required return is addressed:

Eugene F. Brigham, *Fundamentals of Financial Management:*

> A number of researchers have observed that portfolios of small-firms have earned consistently higher average returns than those of large-firms stocks; this is called "small-firm effect." On the surface, it would seem to be advantageous to the small firms to provide average returns in a stock market that are higher than those of larger firms. In reality, it is bad news for the small firm; what the small-

> firm effect means is that the capital market demands higher returns on stocks of small firms than on otherwise similar stocks of large firms.
>
> (Exhibit B2-7, PMA-3, p. 4)

Giacchino and Lesser, *Principles of Utility Corporate Finance:*

> In general, smaller firms face greater financial risk than do large firms... Generally, firm size is measured in terms of total capitalization (i.e., the market value of a firm's equity). Empirical studies have typically found that small firms typically have higher returns over the long run than larger firms. (Exhibit B2-7, PMA-4, p. 3)

Fama and French, in *"The Capital Asset Pricing Model: Theory and Evidence,"* *Journal of Economic Perspectives*, note that size is a risk factor which must be reflected when estimating the ROE:

> ...the higher average returns on small stocks and high book-to-market stocks reflect unidentified state variables that produce undiversifiable risks (covariances) in returns not captured in the market returns and are priced separately from market betas. (Exhibit B2-7, PMA-5, p. 14)

Based upon this evidence, Fama and French proposed their three-factor model which includes a size variable in recognition of the effect of size on the rate of return on common equity.

Marc Reinganum, *"A Possible Explanation of the Small Firm Effect,"* *The Journal of Finance:*

> While the OLS estimates seem to understate the betas of small firms, the excess returns not explained by the misestimation could easily exceed twenty percent per year on average. Thus, one can conclude with confidence that the small firm effect is still a significant economic and empirical anomaly. (Exhibit B2-6, PMA-6, p. 9)

From her academic research, Ms. Ahern concludes that:

- The specific, unique risks of the investment (e.g. utility) must be reflected in the rate of return; and
- The size of an investment (e.g. size of the utility) is one of those unique risk factors for which investors must be compensated. (Exhibit B2-7, pp. 10-11)

7.2.4 Empirical Evidence for the Risk Effects of a Company's Size on the Investor's Required Rate of Return

Studies on small size and returns have quantified the impact of a firm's small size on the required return based on an analysis of the relationship between betas and historical returns for companies of different sizes. Ms. McShane and Ms. Ahern state the analyses indicate that small companies tend to exhibit higher betas than larger companies. Two empirical studies reviewed by Ms. Ahern are:

Morningstar/Ibbotson Size Premium Study (Firm Size and Return)
Ibbotson SBBI – 2012 Valuation Yearbook

This study constructs decile (10) portfolios of the companies contained in the NYSE, AMEX and NASDAQ. Ms. Ahern suggests that the study can be used to determine the approximate risk premium due to size for a specific utility over the benchmark utility return. This is done by comparing the size premium appropriate for the decile in which the benchmark utility would fall based on the estimated market capitalization with the size premium appropriate for the decile in which the specific utility would fall based on market capitalization.

	Decile	**Market Capitalization ($Millions)**	**Size Premium (%)**
Benchmark Utility	5	2,246 (average)	1.74
Micro-Cap	10	92	6.10
Size Premium			**4.36%**

(Exhibit B2-6, PMA-8, Table 7-1 and 7-5)

Duff & Phelps Size Study and Risk Study

The Size Study analyzes the relationship between equity returns and company size in a similar manner as the Morningstar Study. It could also be used to determine the magnitude of any necessary risk premium due to the size of a specific utility relative to the benchmark. In addition to presenting risk premia and size premia for 25 size-ranked portfolios using the traditional market

capitalization measure, this study also considers seven other measures of company size, including book value of equity, 5-year average net income, market value of invested capital, total assets, 5-year average EBITDA, sales and number of employees. (Exhibit B2-7, PMA-9, p. 30)

The Risk Study is an extension of the Size Study. The main difference is that while the Size Study analyzes the relationship between size and return, the Risk Study analyzes the relationship between fundamental risk measures (based on accounting data) and return. These are called "fundamental" measures of a company risk to distinguish these risk measures from a stock market-based measure of equity risk such as betas. (Exhibit B2-7, PMA-9, p. 65)

Corix provided a calculation of the size risk premium for micro utilities over the benchmark based on the Duff & Phelps Study. This resulted in a 3.89 percent risk premium as opposed to the 4.36 percent size premium based on the Morningstar Study. (Exhibit B2-8, Attachment to BCPSO 1.1)

7.2.5 Regulatory Support for Size Premium

Ms. Ahern provided only one example of a jurisdiction which has adopted the size premium concept. She cites the Florida Public Service Commission (FL PUC), which adds for small water utilities a bond yield differential, a 50 bps private placement premium and a 50 bps small utility risk premium to the ROE based upon the index of natural gas utilities. Regardless, Ms. Ahern recommends that the size risk of each utility be measured in accordance with the Morningstar/Ibbotson and the Duff & Phelps studies. Specifically, Ms. Ahern states "all of these risk premium spreads should then be averaged and through the exercise of informed expert judgement, a determination of the appropriate risk premium to be added to the benchmark utility return on equity to reflect the size risk of the utility/project relative to the benchmark utility." (Exhibit B2-9, BCUC 1.12.1; Exhibit B2-8, BCPSO 1.2.1)

In responses to IRs and during cross-examination, Ms. Ahern made it clear that she is not recommending any particular amount of a size premium to be adopted by the BCUC but is simply providing testimony for the purpose of establishing a framework. (T6:1128) Similarly, Ms. Ahern states the 4.36 percent risk premium shown in the example would only represent the upper limit of a size premium above the allowed benchmark ROE due to small size. Where in the 10th decile, Corix or any of its projects fall needs to be evaluated to determine the exact risk premium it would

propose. Corix stated it has not yet undertaken a comprehensive study of the appropriate size risk premium above the benchmark for each of its projects and indicated that such a study will be conducted in the next phase of the GCOC proceeding. (Exhibit B2-9, BCUC 1.13.2)

Ms. Ahern acknowledged that based on her experience the regulatory support for a specific size premium has been minimal and that ultimately any risk premium, whether it is linked to business risk in general or size specifically, is a matter of informed expert judgment. (T7:1278-1284) Further, Ms. Ahern could provide only seven cases out of over 200 regulatory proceedings where she has been involved that resulted in an allowed size adjustment. Yet, in a response to an undertaking, it appears that only two of those seven cases *specifically* reference "size" in the determination of the overall ROE and only one case granted a specific size premium. (Exhibit B2-14) Furthermore, the Panel notes that Ms. Ahern had recommended only modest size adjustments in the range of 25-50 bps in all those seven cases.

Ms. McShane concludes the empirical study findings indicate that small size is a factor that both debt and equity investors are concerned with, and which should be taken into account when evaluating ROEs and capital structures of individual utilities in British Columbia. (Exhibit B1-9, Appendix F, p. 136)

Commission Determination

Stand-Alone Principle

The Panel reaffirms the long history and importance of the stand-alone principle in Canadian utility regulation. The determinations on the benchmark ROE and capital structure in this Decision are based on this principle. Therefore, there is no reason to deviate from this principle even in the case of small utilities or projects whether or not they are part of a larger utility. These projects can represent either a "new" utility with a greenfield operation and no historical performance data or an existing facility being developed into a TES project. Each project needs to be considered individually and independently.

The Size Premium

The Panel has considered the evidence on record regarding the academic literature on the size effect as well as the empirical evidence for the risk effects of a company's size on the required rate of return. Noteworthy is the lack of regulatory support for the recognition of a small size risk premium. Finally, the Panel notes the requirement for on-going exercise of informed judgment by both the Commission and experts retained by the utilities, which was acknowledged by Ms. Ahern.

As a result, the Panel recognizes the academic literature and empirical studies seem to support the importance of size in explaining returns. At the same time, however, the evidence presented does not indicate how adjustment for size should be implemented.

Accordingly, the Panel determines that the small size factor should be further considered in the Stage 2 proceeding, but only as one of the many business and financial risks small utilities or projects are exposed to. Utilities are encouraged to use other methodologies or approaches to justify their risk differential in relation to the benchmark. The Panel has not been sufficiently persuaded to put any weight to the empirical studies reviewed to date.

The Panel notes that the Commission developed a risk matrix that has been used in various small TES utilities proceedings to evaluate overall risk of a given project. The "size" factor is one of the risk factors included in the matrix. **The Panel recommends that the small utilities use this risk matrix attached as Appendix B to Order C-1-13 of the TELUS Garden Decision[9] in the Stage 2 proceeding and for future projects to justify their case for the appropriate capital structure and risk premium over and above the benchmark ROE**. For convenience, the risk matrix is attached in Appendix E of this decision. Small utilities, other than TES, can modify this matrix to facilitate a similar comparison of their own short and long-term risks to those of FEI.

The Panel is cognizant of the on-going Phase 2 of the Alternative Energy Solutions (AES) Inquiry,[10] which involves development of a regulatory framework for dealing with small TES utilities. This evolving process will further influence the nature and content of future TES applications.

[9] Certificate of Public Convenience and Necessity Order C-1-13 and Reasons for Decision dated February 5, 2013, regarding FAES Telus Garden Thermal Energy Services

[10] In the Matter of FortisBC Energy Inc. Inquiry into the Offering of Products and Services in Alternative Solutions and Other New Initiatives

7.3 Guiding Principles for Setting Deemed Capital Structure and Deemed Debt

7.3.1 Determination of Deemed Capital Structure

The Commission deems an appropriate common equity ratio for the utility. The resultant debt ratio is simply the residual between 100 percent and the deemed equity ratio. However, the deemed component typically incorporates actual debt issues where rates can be objectively observed and determined. In some cases, the utility manages its actual financing to mirror the deemed debt/equity ratio.

Ms. McShane explains the actual debt issues may consist of issues that have been made directly into public markets; they may be private placement to third party institutions such as bank or insurance companies, or they may be non-arms length issues between a utility and affiliated company. In the latter case, there is a contract between the utility issuer (a legal entity) and the affiliated company, which specifies the terms and conditions of the loan, with rates that are based on market conditions. When the parent company issues debt, the subsidiary can enter into an arrangement with the parent for a specific portion of that debt issue, with the same terms as the third-party issue. Alternatively, the utility may enter into an arrangement with its parent for a debt issue that reflects the utility issuer's risk profile, funding requirements and market conditions at the time the issue is made, but is not tied to a specific third-party issue made by the parent. (Exhibit B-1-9-6, McShane Evidence, Appendix F, p. 121)

7.3.2 Criteria for Setting the Deemed Capital Structure

Ms. Ahern, the Corix expert, states that an appropriate deemed capital structure should:

- be reasonable relative to or consistent with the average capital structure of the particular utility industry;
- reflect the specific utility's unique risks, including its relative size;
- be consistent with bond rating agency metrics; and
- provide the opportunity for the utility to earn a reasonable and fair rate of return, given its unique risks, e.g., size etc.

(Exhibit B2-7, p. 19)

Ms. McShane provides general principles that should be observed when setting the ROE and common equity ratio for utilities, regardless of size:

- The combination of ROE and common equity ratio awarded to each utility in relation to the overall return adopted for the benchmark utility should reflect the level of that utility's business risk relative to that of the benchmark utility;
- The overall return awarded to each utility should be comparable, on a risk adjusted basis, to the overall return awarded to the benchmark utility;
- The capital structure, in conjunction with the ROE, should be adequate to permit the utility, on a stand-alone basis, to achieve investment grade debt ratings, with the caveat that some utilities many not actually have a credit rating; and
- There is a trade-off between equity ratio and ROE. For example, if a utility is not fully compensated for higher business risk than that of the benchmark utility through its common equity ratio, its ROE needs to be higher than the ROE granted to the benchmark utility. (Exhibit B1-9-6, p. 129)

7.3.3 When Is Deemed Debt Appropriate?

The FBCU state the deemed debt is appropriate for small utilities in cases where raising debt is inefficient. For example, a separate division or class of service within a larger regulated utility can contain a stand-alone project. Similarly, a regulated utility subsidiary/affiliate within a larger corporate organization can face circumstances where either:

(i) The high cost of debt issuance relative to the size of the issue makes the effective debt cost higher than it would be otherwise; or

(ii) The size of the utility precludes it from accessing appropriate debt terms.

The FBCU further state that the assessment as to whether deemed debt is appropriate and efficient should involve some judgment to ensure that the use of deemed debt is limited to circumstances where it is efficient to do so. Finally, FBCU state "it is reasonably clear that deemed debt would be appropriate for FEW (a separate legal entity), the Fort Nelson Division of FEI, and FAES." (FBCU Final Submission, p. 163; Exhibit B1-20, BCUC 1.140.1, 1.140.2)

7.3.4 Setting the Appropriate Deemed Debt Rate and Term

The FBCU state that deemed debt rates and duration should reflect the particular circumstances of each utility. Utilities for which a deemed cost of debt might be appropriate may have differing profiles; FEW, for instance, is not the same as one of FAES's TES projects or Corix's UniverCity project. The appropriate term of debt may also vary even among projects with a broadly similar risk profile. (FBCU Final Submission, p. 163; Exhibit B1-20, BCUC 1.140.2)

Ms. McShane submits as a general proposition that the term should reflect the long-term nature of the assets and offers the following additional considerations:

1. If the specific utility operations are backed by contractual arrangements, the length of the contract would be a relevant consideration in the determination of the term for the debt.
2. The higher the risk of the specific operation, the less their ability would be to obtain "real" debt on a long-term basis; i.e., on terms longer than 10 years. The term of the debt should reasonably reflect the limitations of what would reasonably be available to operations with a similar risk profile.
3. The appropriate term for the deemed debt also depends on the state of the capital markets.

Ms. McShane concludes that the individual utilities' circumstances may differ in terms of risk, the funding requirements and appropriate terms of debt. Accordingly, she recommends that the Commission continue to address the cost of deemed debt for each utility separately, on a case-by-case basis. In her view, there is no "one size fits all" cost mechanism. (Exhibit B1-9-6, pp. 123-124)

Commission Determination

Before addressing the issue of short-term and long-term debt in the deemed capital structure and the methodology for determining a deemed interest rate, the Commission Panel wishes to reaffirm certain principles for the Stage 2 GCOC proceeding framework.

(i) The general principles and criteria outlined by the Corix and FBCU experts for setting the capital structure for any utility in general and the deemed capital structure specifically for the small utilities are accepted as they are consistent with the principles adopted for setting the benchmark ROE;

(ii) Deemed debt is appropriate for small utilities in cases where raising debt is inefficient;

(iii) Deemed debt rates and duration should reflect the particular circumstances of each utility. Accordingly, the Commission should continue to address the cost of deemed debt for each utility separately on a case-by-case basis; and

(iv) Risk assessment of small utilities, especially the TES projects, must include consideration of rate setting mechanisms, deferral account treatment, length of term and the overall risk/reward equation.

Related to the issue of deemed capital structure and deemed debt are two key questions that the Stage 2 GCOC proceeding must address more comprehensively:

1. Can the combination of the deemed debt/equity ratio and the allowed ROE sufficiently compensate for the unique risks of a particular small utility or project?
2. How important is it to maintain consistency between the risk premium determination and assigning a deemed credit rating for a small utility without third party debt? For instance, would it be reasonable to allow no risk premium over FEI for a TES project while setting the debt rate based on a BBB bond rating?

7.4 Appropriate Portions of Short-Term and Long-Term Debt in the Deemed Capital Structure

In British Columbia, in some of the more recent TES Decisions, the Commission has considered deeming a portion of overall debt to short-term debt. To date no determination has been made to put this into effect. However, the Panel notes that the OEB has officially deemed a standard four percent proportion of short-term debt component for utilities under its jurisdiction for reasons that it outlined in its 2006 Decision:

(i) All utilities actually use some short-term debt;

(ii) Short-term debt is generally less expensive than long-term debt and provides greater financing flexibility; and

(iii) While actual short-term debt percentages may seem to be a more accurate approach, it is administratively challenging given the number of distributors regulated by the OEB.[11]

[11] OEB, Report of the Board on Cost of Capital and 2nd Generation incentive Regulation for Ontario's Electricity Distributors, December 20, 2006, pp. 9-10

In 2009, the OEB reaffirmed this practice for natural gas distributors as well. It also updated its methodology to estimate the deemed short-term debt rate. (Exhibit A2-21, Report of the Board on the Cost of Capital for Ontario Regulated Utilities, EB-2009-0084)

Ms. McShane states there is no single right answer to the question of what proportion of a deemed capital structure should be designated as short-term debt. She notes that annual fluctuations for individual utilities will reflect, among other things, the fact that utilities frequently use short-term debt as a bridge between long-term debt issues. Based on her filed evidence she further states that the average proportion of short-term debt to total capital for rated Canadian utilities has been approximately 1 percent to 2 percent. Her review of 2010 data for Ontario electricity distributors indicated that the average and median actual short-term debt ratios were at 2.9 percent and 0.4 percent respectively. (Exhibit B1-9-6, pp. 125-127)

Ms. Ahern states that conceptually the maturity of the debt capital should match the life of the assets being financed. But when the inclusion of short-term debt is optional, its inclusion should be based upon several criteria:

- If its use is sporadic and hence, volatile, it should not be included in the capital structure. However, if its use is consistent and especially at a significantly high level, it is likely financing rate base and possibly should be included;
- If its use is seasonal and self-liquidating, e.g., financing short-term inventories of natural gas in anticipation of heating season, it probably should not be included;
- If short-term debt is financing working capital, it should be included;
- If it is used as bridge financing until permanent financing can be put in place it should be included at the expected cost rates of that permanent financing; and
- If the short-term debt financing construction projects and if the Construction Work In Progress (CWIP) are included in rate base the short-term debt should be included. (Exhibit B2-7, pp. 23-24)

The FBCU provided information showing actual percentages of short-debt for FEI, FEI – Fort Nelson, FEVI, FEW, and FortisBC Inc. for the 2002-2012 period. While there has been significant fluctuation over the years, the average percentages for the period as a share of capital structure amounted to

5.28 percent, 8.58 percent, 10.77 percent, 13.10 percent and 5.27 percent for each respective utility. (Exhibit B1-24, BCUC 2.189.1, 2.189.2)

Commission Determination

The Commission Panel finds it as an accepted fact that all utilities use some short-term debt financing. The FBCU IR responses clearly support this. While there are varying reasons for its use, the evidence demonstrates that, on average, utilities always carry a small portion of short-term debt in their capital structure. The construction work in progress, due to its nature, is often financed by short-term debt.

Accordingly, the Commission Panel finds it reasonable and prudent to include a deemed component of short-term debt in the capital structure for all small utilities without third-party debt to reflect reality. To establish the percentage of short-term debt to be deemed, the Panel has considered testimony of Ms. McShane, FBCU IR responses and the OEB established practice in Ontario. **While acknowledging that there is no correct amount, the Panel concludes that a four percent component for deemed short-term debt provides a reasonable proxy as it is the midpoint of the range of actual short-term borrowing.**

7.5 Setting the Deemed Interest Rates

7.5.1 Deemed Interest Rate for Long-Term Debt

Parties acknowledge that there are at least three reasonable options for determining the deemed interest rate applicable to a small utility without third-party debt. These options are summarized below.

FBCU Option 1:

Step 1: Assign a credit rating on a stand-alone basis, and then obtain indicative quotes from investment dealers or banks based on the credit rating of a comparable proxy issuer. Using proxy companies that are engaged in the power sector or energy infrastructure can help to minimize subjectivity. The FBCU submit this approach is consistent with the stand-alone principle, and is how FEW has financed the debt component of its capital structure. (Exhibit B1-9, pp. 29-30; Exhibit

B1-20, BCUC 1.141.1, 1.141.5, 1.144.2) A reasonable deemed stand-alone rating for a small regulated utility appears to be in the range of BBB to BBB (low), with the deemed debt cost set on this basis. (Exhibit B1-9-6, McShane Evidence, Appendix F, p. 123; Exhibit B1-20, BCUC 1.147.1)

Step 2: Determine a Government of Canada (GoC) bond yield reflecting the proposed term of debt that could be either the 10-year or 30-year bond as the benchmark, or an interpolation of the two. The selected benchmark should reflect the long-term nature of utility assets, contractual terms and available debt terms. (Exhibit B1-9, p. 30)

Step 3: Determine the credit spread of a comparable corporate proxy issuer in similar industries or lines of business (e.g., regulated utility, power generation, energy infrastructure) at the same term to maturity as that selected as the benchmark GoC bond. (Exhibit B1-9, p. 30; Exhibit B1-24, BCUC 1.141.5.2; Exhibit B1-24, BCUC 2.188.2, 2188.3)

FBCU Option 2:

Ms. McShane identified an alternative approach to use the embedded cost of debt of the issuing entity as the deemed interest rate and allocate the deemed debt and interest rate based on an approved capital structure. Currently, FEI-Fort Nelson debt is deemed and the rate is the embedded cost of debt. (Exhibit B1-20, BCUC 1.141.1, 1.141.6) The FBCU submit that this is an administratively efficient way to allocate debt issued by a single regulated entity, allows the benefits of issuing all debt centrally to be shared, and provides a reasonable degree of assurance that the regulated entity raising the debt will be able to recover its actual incurred cost of debt. (Exhibit B1-20, BCUC 1.148.8)

Corix Option:

Corix supports FBCU's recommendation to apply one benchmark credit spread for small utilities to provide regulatory efficiency. To align with the proposed method, the benchmark credit spread would reflect the spread for BBB and BBB (low) rated debt relative to the underlying 10 year GoC bond yield and would reflect incremental risk of small utilities. Corix states that with the benchmark set for small projects, project stakeholders and interveners can then justify any variances from the benchmark depending on the risk exposure. (Exhibit B2-9, BCUC 1.26.3, 1.27.1, 1.46.5, 1.46.7, 1.46.11)

Commission Staff Option:

This option was raised in order to account for the scarcity of BBB-rated utilities in Canada that can be used as proxy, and for the possibility that utility ratings can be changed.

Step 1: Obtain the yield on an appropriate GoC bond as the benchmark.

Step 2: Assign a credit rating to the stand-alone utility/project based on an assessment of financial and business risk (e.g., BBB, other)

Step 3: Obtain the bond yield (credit) spread between GoC bond and a high grade utility (A or A low) and add it to the rate in Step 1.

Step 4 Add a premium, if required, to the credit spread in Step 3. This premium will be calculated as the credit spread between high grade utility bonds (A or A low) and utility bonds of the credit rating estimated in Step 2. The use of historical data (e.g., two most recent years) to have more data points could be considered. (Exhibit A2-43; Exhibit B1-20, BCUC 1.141.9; Exhibit B1-24, 2.188.6; Exhibit B2-9, BCUC 1.26.6)

The FBCU submits it is generally supportive of the Staff option but raised one concern. Ms. McShane cautioned that for any method involving the use of credit rating proxy companies, care should be taken to employ reasonable credit ratings. She re-emphasized that an appropriate credit for small utilities would be BBB to BBB (low), as the inherent risk of small size would preclude them from achieving higher ratings:. "As it is much more likely that the small utility would be BBB on a standalone basis, it makes sense to use a BBB yield as the benchmark to begin with rather than using A-rated proxies." (FBCU Final Submission, pp. 164-165; T5: 680-681)

Commission Determination

The evidence and Final Submissions suggest that setting the deemed interest rate is not a very controversial issue. However, each option reviewed has advantages and disadvantages. The Panel also notes that similar approaches have been adopted in number of recent TES Decisions. For example, BBB-rated proxies were used for the Delta School District Number 37 and Tsawwassen Springs projects.

The Commission Panel has already found that the cost of deemed long-term debt (rate and term) for each utility should be addressed separately on a case-by-case basis. Based on this the Panel recommends that on a go-forward basis the FBCU's Option 1 be used as a guideline for setting the deemed debt rate. The Panel is cognizant of the refinement proposed by Commission Staff to account for the scarcity of BBB-rated utilities in Canada that can be used as a proxy. Should this become a major issue in the future, the Commission can consider switching to use the Commission Staff Option as the guideline.

Because the deemed long-term debt by definition is set for a fixed term, the Panel finds that adjustments will not be necessary during the term of the loan. The only reason for a re-opener would be the situation where a small utility actually issues new debt. The impact of the rate change could be considered a subsequent revenue requirement review.

However, to allow some flexibility, the utilities will have an option to apply for a rate adjustment in accordance with the following reopener-criteria:

- **A measurable change in market conditions**
- **A measurable change in actual debt costs**

The Commission will consider each application for a rate adjustment on a case-by-case basis.

7.5.2 Deemed Interest Rate for Short-Term Debt

The FBCU state the basis for determining the deemed interest rate for short-term debt would be similar to that of long-term interest rate determination. It would be based on indicative credit spread quotes from investment dealers or banks using comparable proxy issuers plus a short-term benchmark yield. A common benchmark yield in Canada is the Canadian Dealer Offered Rate (CDOR). CDOR is the quoted benchmark that is used when a company issues short-term Bankers' Acceptances (BAs), which reflect the short-term benchmark rate plus the company's applicable credit spread. (Exhibit B1-9, p. 31) In response to IRs, the FBCU clarified that quotes from banks would be obtained based on indicated credit rating, not by individual proxy issuer. (Exhibit B-20, BCUC 1.44.2, 1.44.3)

Ms. McShane states that three-month BAs are also a common benchmark for establishing the cost of short-term debt for utilities. (Exhibit B1-9-6, McShane Evidence, Appendix F, pp. 127-128) In response to IRs the FBCU confirm that either the 3-month CDOR or 3-month BA rate is reasonable for setting the short-term rate. Regarding the indicative credit spread quotes, the FBCU state the following approach used by the OEB is reasonable: the OEB obtains up to six quotes from banks. If it obtains six quotes, it discards the highest and the lowest and uses the average of the remaining four. If less than four are obtained, it uses the average of all the quotes obtained. (Exhibit B1-20, BCUC 1.144.4) The FBCU submit that the OEB formulaic approach is an efficient and transparent way of estimating a deemed short-term debt rate. However, the FBCU stress that the OEB methodology is premised on a single debt rating, a short-term debt rating of R1-low, which generally corresponds to long-term credit ratings in the A category; i.e., higher than would be applicable to the small utilities. To overcome this problem, the FBCU suggest using a more reasonable short-term credit rating, one that would correspond to a BBB/BBB (low) on the long-term rating scale. (Exhibit B1-20, BCUC 1.144.5, 1.144.5.1)

Commission Determination

The Commission Panel recommends that small utilities use either the 3-month CDOR or 3-month BA rate as a basis and obtain 3-4 quotes to establish the credit spread for the purpose of setting the deemed short-term interest rate. Because it is highly unlikely that small utilities, especially the TES utilities/projects, will have frequent revenue requirement reviews, the Panel finds that there is no requirement for an annual adjustment mechanism. **The short-term rates are to be reset at the time of the revenue requirement review only.**

8.0 OTHER MATTERS

8.1 Reliance on Less Complex Financial Methodology

Expert witnesses in this proceeding expressed reluctance to use more complex models that could improve understanding and/or estimating the cost of equity. For instance, Ms. McShane states: "I think it's reasonable to try to capture these other factors. I know that it's been difficult to have regulators accept the Fama/French type models ..." (T5:721)

In response to a question from Commissioner Giammarino, Dr. Vander Weide expressed similar concerns:

> **COMMISSIONER GIAMMARINO:** "And [Fama/French] suggest that maybe the future is in an inter-tempo CAPM, that has multi factors. And that would allow for changes in the opportunities – the investments that are available to investors. Did you consider that as an alternative?" (T6:1103)
>
> **DR. VANDER WEIDE:** "That would certainly be an alternative, but from my years in testifying on the cost of capital, I have realized that there are two qualities that make a model present reasonable evidence. One is that it's -- you can estimate the inputs to the model reasonably well, and two, it has to be reasonably easy to understand. So that one can judge the model in the context where everyone doesn't have Ph.D.s in finance or economics. And once you get into dynamic capital asset pricing models, to me that's getting into a level that's too complicated for discussion in a public forum." (T6:1103)

Although Dr. Booth added a credit spread adjustment to his CAPM analysis, he also expressed a similar sentiment about adding further factors to his CAPM, as shown by the following exchange:

> **COMMISSIONER GIAMMARINO**: …there is sort of a well-established set of suspects. You've looked at one.
>
> **DR. BOOTH:** Correct.
>
> **COMMISSIONER GIAMMARINO:** So why not look at all?
>
> **DR. BOOTH:** Two reasons. First of all, with all due respect to the Commission, it's a question of getting things to the Commission in an understandable way through cross-examination. And KISS works. That a simple way of looking at these things, I think, makes sense. The only time,

> for example, I saw a company put forward the Fama French model was before the Gaz Métro. And the witness had a real tough time with the more complicated model. And the Régie was very reluctant to adopt a more complicated model.
>
> **COMMISSIONER GIAMMARINO:** Right.
>
> **DR. BOOTH:** So when you get down to conditioning, you're absolutely correct. You think about Chandrell and Ross, and you think about economic factors affecting security returns, you can go to more measures. Does the addition of more measures make the testimony more saleable to a Commission? And the answer to that is generally no. It may make it more saleable in an academic seminar but it's easier, I think, to pick on one thing that people can relate to – credit spreads – that was picked up in most of the hearings in 2009, which seems to make sense, and seems to be consistent with the academic literature, than to go through a more complicated model with term structure, yield parameters, dividend yields or other conditioning variables. So, I pick one, the credit spread. (T8:1658-59)

The Commission Panel accepts that evidence should meet some basic criteria. For example, expert witnesses must have confidence in their estimates; and the evidence must be understandable to the Panel, ideally for all parties involved. The Panel is, however, concerned that experts pay undue attention to prior assessments of the limits of what the Commission will understand and/or accept. While evidence put forward should be as helpful as possible to a Panel dealing with the difficult task of determining the appropriate rate of return and capital structure, it should reflect the expert's best judgment about the state-of–the-art methodology, which should in turn be presented in an understandable way.

It is the Commission Panel's opinion that the purpose of a cost of equity model is to provide structure to the discussion of 'what is a fair rate of return.' Models used to fulfill this purpose provide structure and clarity, and in turn provide a basis for determining the truth of any particular assessment. Models are abstractions and, by definition, imperfect representations. As a result, it is up to the Panel to decide how much confidence it should put in various models that have unrealistic assumptions and do not explain returns perfectly. The Panel must also understand where judgment needs to be applied to the output delivered by these models.

Specifically, in Section 5.2.1, the Panel identified some of the weaknesses related to the adjustments to the CAPM. In particular, the experts expressed reluctance to include additional potential extensions to the CAPM because they were perhaps "too complex" to the Panel. This in turn leaves

open what results other extensions could imply. Similarly, in the beginning of Section 5.2 the Panel identified the lack of global perspective in assessing the investor's portfolio. A more clear set of principles, including a definition of FEI's investors' portfolios (i.e., Global, North American, Canadian) would have been valuable. Accordingly, the Panel invites more comprehensive evidence on these topics in the future.

The Commission Panel believes that one of the roles of the expert is to guide the regulator in evaluating the trade-off between the complexities of the structures needed to evaluate arguments versus the reliability of the structures. This trade-off is at the heart of cost of capital hearings. As this trade-off evolves constantly, the testimony should evolve with it.

8.2 FEI - The Benchmark Utility

Based on the evidence related to long and short-term risk before the Commission Panel we are in agreement with describing FEI as the "benchmark utility" rather than a "low-risk benchmark utility." While the Panel has determined that the level of risk is somewhat less in a number of areas than those which existed at the time of the 2009 Decision, there has been little change in many areas. Therefore, we are of the view that describing FEI as low-risk would not be appropriate. Accordingly, for the purposes of Stage 2 of the GCOC, FEI will be referred to as the benchmark utility. **The common equity component and the approved ROE in this Decision will serve as the benchmark cost of capital for any other utility in British Columbia that uses the benchmark utility to set rates.**

The issue as to whether FEI is a pure-play gas distribution received little direct attention beyond the October 4, 2012 procedural conference. However, the Commission Panel has considered the issue in the context of the level of throughput related to alternative energy initiatives. It appears that FEI's forecasted throughput related to alternative energy initiatives is relatively small. Under cross-examination, FBCU witness, Mr. Stout with reference to natural gas transportation initiatives stated:

> "...we forecast two and a half to three petajoules in 2017. I think even if you go to some volume that's in the 10 to 15 petajoule range, it's still less than 10 percent of the throughput of the system, say 5 to 10 percent of the total throughput". (T3:317)

Based on Mr. Stout's testimony, the Commission Panel accepts that FEI at this point in time is primarily a pure-play gas distribution utility.

While Stage 1 of the GCOC proceeding has been mainly concerned with determining an appropriate cost of capital for the benchmark utility, Stage 2 will be primarily concerned with business risk assessment relative to the benchmark. More specifically, public utilities will be called upon to provide evidence as to how they differ from FEI with respect to business risk. The Commission Panel considers that it is feasible that a stand-alone public utility may face overall business risks that are either higher, lower or the same as the benchmark utility.

The primary factors that have influenced FEI's long-term risk have been identified and addressed in Section 4.2. In addition, we have further identified and made determinations upon FEI's short-term risk. In Stage 2 of the GCOC, the public utilities, where appropriate, will be required to describe how they differ from the benchmark utility on these and any other risk factor as it relates to them. In addition, in Section 7.2.5 the Commission Panel has described a risk matrix (included in Appendix E) as a tool for the small utilities (especially the TES utilities) to further assist in justifying their case for an appropriate capital structure and risk premium.

DATED at the City of Vancouver, in the Province of British Columbia, this 10th day of May 2013.

Original signed by:

_____

D.A. COTE
PANEL CHAIR/COMMISSIONER

Original signed by:

_____

R. GIAMMARINO
COMMISSIONER

Original signed by:

_____

M.R. HARLE
COMMISSIONER

Original signed by:

_____

L.A. O'HARA
COMMISSIONER

SIXTH FLOOR, 900 HOWE STREET, BOX 250
VANCOUVER, BC V6Z 2N3 CANADA
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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER G-75-13

TELEPHONE: (604) 660-4700
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FACSIMILE: (604) 660-1102

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

Generic Cost of Capital Proceeding

BEFORE: D.A. Cote, Commissioner/Panel Chair
M.R. Harle, Commissioner
L.A. O'Hara, Commissioner
R. Giammarino, Commissioner

May 10, 2013

O R D E R

WHEREAS:

A. By Order G-20-12 dated February 28, 2012, the British Columbia Utilities Commission (Commission) established a Generic Cost of Capital (GCOC) proceeding to review: (a) the setting of the appropriate cost of capital for a benchmark low-risk utility; (b) the possible return to a Return on Equity Automatic Adjustment Mechanism (ROE AAM) for setting an ROE for the benchmark low-risk utility; and (c) the establishment of a deemed capital structure and deemed cost of capital methodology, particularly for those utilities without third party debt;

B. Appendix C to Order G-20-12 divided public utilities into two categories for the purpose of the proceeding: "Affected Utilities" and "Other Utilities;"

C. FortisBC Energy Inc. (FEI), FortisBC Energy (Vancouver Island) Inc., FortisBC Energy (Whistler) Inc. and FortisBC Inc. (FortisBC)[collectively (FBCU)]; Corix Multi-Utility Services Inc. (Corix); and Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd. (PNG) registered as Affected Utilities. The British Columbia Hydro and Power Authority (BC Hydro) and the River District Energy (RDE) registered as Other Utilities;

D. Among the Interveners who registered for the proceeding, the Association of Major Consumers of BC (AMPC), British Columbia Pensioners' and Seniors' Organization (BCPSO), Commercial Energy Consumers (CEC) [collectively B.C. Utility Customers], and the Industrial Customers Group of FortisBC Inc. (ICG) actively participated;

E. By Order G-47-12 dated April 18, 2012, the Commission issued the Final Scoping Document for the proceeding. The Scoping Document sets out the purpose and the scope of the proceeding. Matters within the scope of the proceeding included, among others, the appropriate cost of capital and its effective date for a benchmark low-risk utility, the establishment of a benchmark ROE, the consideration of an automatic adjustment mechanism, and the deemed capital structure and deemed cost of capital for small utilities without third-party debt;

…/2

F. By Order G-50-12 dated April 19, 2012, the Commission, among other matters, set out the further procedural matters to be addressed in the proceeding and a Preliminary Minimum Filing Requirements (MFR) for Affected Utilities document. Parties were invited to make submissions on the Preliminary MFR for Affected Utilities by May 3, 2012, and on the allocation of Participant Assistance/Cost Awards (PACA), PACA eligibility, and/or the Draft Preliminary Regulatory Timetable by May 9, 2012;

G. By Order G-72-12 dated June 1, 2012, the Commission, among other matters, issued the Final Minimum Filing Requirements for Affected Utilities and the Preliminary Regulatory Timetable for the proceeding;

H. On June 8, 2012, the Commission released "A Survey of Cost of Capital Practices in Canada" prepared by The Brattle Group for the Commission (Brattle Report). Utilities and Interveners were provided with the opportunity to ask Information Requests on the Brattle Report;

I. By Order G-84-12 dated June 20, 2012, the Commission amended the Preliminary Regulatory Timetable, establishing, among other things, a Procedural Conference for October 2, 2012 and the commencement date for an oral hearing, if required, on December 12, 2012. The Procedural Conference was subsequently rescheduled to October 4, 2012;

J. At the Procedural Conference the Commission received, among others, submissions on the following items: (1) the appropriate benchmark utility for the determination of the generic cost of capital; (2) whether a Stage 2 for the purpose of determining an appropriate cost of capital for Affected and Other Utilities to immediately follow Stage 1 was desirable; (3) whether an oral phase was required and (4) the proposed timetable going forward;

K. By Order G-148-12 dated October 11, 2012, the Commission determined that : (1) FEI in its present pre-amalgamation state, would serve as the benchmark for the proceeding and whether FEI in 2012 is a pure play gas distribution utility would be determined following the hearing of further evidence; (2) a Stage 2 would be added to the proceeding with the schedule to be determined prior to the end of Stage 1; and (3) the review of the proceeding would continue by way of an oral hearing commencing on December 12, 2012;

L. By Order G-187-12 dated December 10, 2012, the Commission ordered that: (1) the current ROE and capital structure for FEI, the designated benchmark utility, and all regulated entities in B.C. that rely on the benchmark utility, except British Columbia Hydro and Power Authority, are to be maintained and made interim, effective January 1, 2013; and (2) any determinations of the premiums on the benchmark ROE and capital structure of regulated utilities that depend on the benchmark utility for rate setting will be made following the decision in Stage 2; M. The oral public hearing took place over a period of seven days between December 12, 2012 and December 21, 2012. A total of eight witness panels from FBCU and Interveners gave evidence;

N. FBCU, PNG, Corix, AMPC/CEC, ICG and BCPSO filed Final Submissions. FBCU filed a Reply Submission; and

O. The Commission has considered the evidence and the submissions of the Parties all as set forth in the Decision issued concurrently with this Order.

…/3

BRITISH COLUMBIA UTILITIES COMMISSION	
ORDER NUMBER	G-75-13

NOW THEREFORE, the Commission orders as follows:

1. The common equity component appropriate for the benchmark utility, FEI, effective January 1, 2013 is 38.5 percent.

2. A Return on Equity (ROE) for the benchmark utility, FEI, is established at 8.75 percent effective January 1, 2013.

3. An Automatic Adjustment Mechanism (AAM) formula for annually setting the ROE of the benchmark utility between ROE proceedings is adopted commencing January 1, 2014. The AAM formula will operate until December 31, 2015. The implementation of the model will be subject to conditions outlined in the Decision.

4. FEI is directed to file an application for the review of the common equity component and the ROE approved in Paragraphs 1 and 2 of this Order by no later than November 30, 2015.

5. The common equity component and the ROE approved in Paragraphs 1 and 2 of this Order will continue to serve as the Benchmark cost of capital for any other utility in British Columbia that uses a Benchmark Utility to set rates.

6. Within 30 days of the date of this Order, FEI is to file:

   (a) a document setting out how and when it will implement the change to its capital structure;

   (b) amended rate schedules in accordance with paragraphs 1 and 2 of this Order as well as a proposal on the treatment of the refundable portion of the rates collected since January 1, 2013.

7. Small utilities without third-party debt are to include a deemed component of short-term debt of 4 percent.

DATED at the City of Vancouver, in the Province of British Columbia, this 10th day of May 2013.

BY ORDER

Original signed by:

D.A. Cote
Commissioner/Panel Chair

APPENDIX A

LIST OF PROCEDURAL ORDERS

Exhibit Number	Commission Order (Date)	Determinations
A-1	G-20-12 (Feb 28, 2012)	• Stated purpose in establishing the GCOC proceeding • All regulated utilities determined to be applicants in this proceeding. Utilities are divided into "Affected Utilities" and "Other Utilities." • Issued initial regulatory timetable for registration of Utilities and Interveners and written submissions on the Preliminary Scoping Document
A-3	G-47-12 (April 18, 2012)	• Issued Final Scoping Document
A-5	G-50-12 (April 19, 2012)	• Issued preliminary Minimum Filing Requirements (MFR) • Issued preliminary regulatory timetable for written submissions on the MFR and the cost allocation of Participant Assistance/Cost Awards (PACA) and PACA eligibility
A-6	G-72-12 (June 1, 2012)	• Issued Final MFR • Determined the principles in the allocation of PACA costs and PACA cost eligibility • Considered expansion of the current proceeding by conducting the GCOC proceeding in two stages • Issued preliminary regulatory timetable for a Procedural Conference and Stage 1 of the GCOC proceeding. • Put on the record the terms of reference for the survey Report carried out by The Brattle Group
A-9	Order G-84-12 (June 20, 2012)	• Issued amended preliminary regulatory timetable

LIST OF PROCEDURAL ORDERS

Exhibit Number	Commission Order (Date)	Determinations
A-16 and A-17	Letter L-52-12 (September 13, 2012)	• Established the amended date and agenda for the Procedural Conference
A-22	G-148-12 (October 11, 2012)	• Determined that FEI in 2012 in its pre-amalgamation state, will serve as the benchmark utility for the GCOC proceeding • Determined that a Stage 2 will be added to the proceeding • Determined that review will take place by an oral hearing commencing on December 12, 2012
A-30	G-187-12 (December 10, 2012)	• Issued Interim Order establishing current ROE and capital structure for the benchmark utility and all regulated entities in B.C. that rely on the benchmark utility as interim, effective January 1, 2013

APPENDIX B

LIST OF APPEARANCES

G. Fulton, Q.C.	Commission Counsel
L. Bussoli	Commission Counsel
M. Ghikas	FortisBC Utilities
T. Ahmed	FortisBC Utilities
M. Cheesman	Corix Multi-Utility Services Inc. (Corix)
J. Kennedy	Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd.
R.B. Wallace, Q.C.	Association of Major Power Customers of B.C. (AMPC)
R. Hobbs	Industrial Customers Group of FortisBC Inc. (ICG)
L. Worth	British Columbia Pensioners' and Seniors' Organization (BCPSO)
E. Kung	British Columbia Pensioners' and Seniors' Organization (BCPSO)
T. Braithwaite	British Columbia Pensioners' and Seniors' Organization (BCPSO)
C. Weafer	Commercial Energy Consumers of British Columbia (CEC)
D. Craig	Commercial Energy Consumers of British Columbia (CEC)
J. Christian	British Columbia Hydro and Power Authority (BC Hydro)
B. Hobkirk	British Columbia Hydro and Power Authority (BC Hydro)
R. Hanson	River District Energy
J. Quail	Canadian Office and Professional employees' Union Local 378

E. Cheng Y. Domingo J. Tran B. Grant J. Fraser	Commission Staff
Allwest Reporting Ltd.	Court Reporters

APPENDIX C

LIST OF PANELS

FORTISBC INC., FORTISBC ENERGY INC., FORTISBC ENERGY (VANCOUVER ISLAND) INC., AND FORTISBC ENERGY (WHISTLER) INC.

PANEL 1 - COMPANY EVIDENCE

Roger A. Dall'Antonia	Vice President, Strategic Planning, Corporate Development and Regulatory Affairs (Panel Chair)
Douglas Stout	Vice President, Energy Solutions and External Relations
Cynthia Des Brisay	Vice President, Energy Supply and Resource Development
Michele Leeners	Vice President, Finance and CFO

PANEL 2 - EXPERT OPINION ON A BENCHMARK FAIR RETURN

Kathleen C. McShane, MBA, CFA	President Foster Associates, Inc.

PANEL 3 - EXPERT OPINION ON AUTOMATIC ADJUSTMENT MECHANISMS

James M. Coyne	Concentric Advisors

PANEL 4 - EXPERT OPINION ON CAPITAL MARKETS

Aaron M. Engen	Managing Director BMO Capital Markets (Energy Infrastructure Group)

PANEL 5 - EXPERT OPINION ON A BENCHMARK FAIR RETURN

James H. Vander Weide, PhD	Duke University

CORIX MULTI-UTILITY SERVICES INC. (CORIX)

Pauline M. Ahern, MBA	Principal AUS Consultants

APPENDIX C

LIST OF PANELS

THE INDUSTRIAL CUSTOMERS GROUP OF FORTISBC INC. (ICG)

Andrew Safir, PhD	President Recon Research Corporation

THE ASSOCIATION OF MAJOR POWER CUSTOMERS (AMPC), THE COMMERCIAL ENERGY CONSUMERS ASSOCIATION OF BRITISH COLUMBIA (CEC), THE BRITISH COLUMBIA PENSIONERS' AND SENIORS' ORGANIZATION (BCPSO), COLLECTIVELY THE BC UTILITY CUSTOMERS

Laurence D. Booth, DBA	University of Toronto

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

British Columbia Utilities Commission
Generic Cost of Capital Proceeding (GCOC) Stage 1

EXHIBIT LIST

Exhibit No.	Description
COMMISSION DOCUMENTS	
A-1	Letter Dated February 28, 2012 and Order G-20-12 – Establishing an initial Regulatory Timetable
A-2	Letter Dated April 17, 2012 – Response clarifying Union Gas's Intervener Status
A-3	Letter dated April 18, 2012 and Order G-47-2012 – Reasons for Decision and Final Scoping Document
A-4	Letter dated April 18, 2012 – Appointment of Panel
A-5	Letter dated April 19, 2012 - Order G-50-12 List of Further Procedural Matters
A-6	Letter dated June 1, 2012 - Order G-72-12 Issuing Preliminary Timetable, PACA costs, Final Minimum Filing Requirements for Affected Utilities
A-7	Letter dated June 6, 2012 - Request for Variance of Regulatory Timetable Order G-72-12
A-8	Letter dated June 8, 2012 – Commission Consultant's Survey Report
A-9	Letter dated June 20, 2012 – Order G-84-12 - Amended Preliminary Regulatory Timetable
A-10	Letter dated July 27, 2012 – Request for Comments on the Addition of a Panel Member
A-11	Letter dated August 22, 2012 – Appointment of Commissioner Mr. R. Giammarino
A-12	Letter dated August 31, 2012 – Information Request No. 1 to FortisBC Utilities
A-13	**CONFIDENTIAL** Letter dated August 31, 2012 – CONFIDENTIAL Information Request No. 1 to FortisBC Utilities
A-14	Letter dated August 31, 2012 – Information Request No. 1 to PNG

Exhibit No.	Description
A-15	Letter dated August 31, 2012 – Information Request No. 1 to Corix
A-16	Letter dated September 13, 2012 – L-52-12 Amending Regulatory Timetable
A-17	Letter dated September 27, 2012 – Agenda for Procedural Conference
A-18	Letter dated October 9, 2012 – Information Request No. 2 to FortisBC Utilities
A-19	**CONFIDENTIAL** Letter dated October 9, 2012 – CONFIDENTIAL Information Request No. 2 to FortisBC Utilities
A-20	Letter dated October 9, 2012 –Information Request No. 2 to Corix
A-21	Letter dated October 11, 2012 – Order G-148-12 and Reasons for Decision
A-22	Letter dated October 24, 2012 - Request to Access Confidential Material
A-23	Letter dated October 31, 2012 - Access to Confidential Material Response
A-24	Letter dated November 1, 2012 – Confidential Material Access to AMPC (Exhibit C6-11)
A-25	Letter dated November 16, 2012– Information Request No. 1 to ICG on Intervener Evidence
A-26	Letter dated November 16, 2012– Information Request No. 1 to AMPC on Intervener Evidence
A-27	Letter dated November 20, 2012 – Request for submissions
A-28	Letter dated December 3, 2012 – Oral Public Hearing Information
A-29	Letter dated December 5, 2012 – Opening Statements Clarification
A-30	Letter dated December 10, 2012 - Commission Order G-187-12 establishing the current ROE and capital structure
A-31	Letter dated February 14, 2013 – Commission Response to request for extension

Exhibit No.	Description
COMMISSION STAFF DOCUMENTS	
A2-1	Letter Dated February 28, 2012 - Commission Staff Filing British Columbia Utilities Commission letter dated November 28, 2011-Preliminary Notification of Initiation of Generic Cost of Capital Proceeding
A2-2	Letter Dated February 28, 2012 - Commission Staff Filing the Terasen Utilities (December 8, 2010) – Automatic Adjustment Mechanism Review
A2-3	Letter dated June 8, 2012 – Commission Staff Filing the Brattle Group Survey of Cost of Capital Practices in Canada
A2-4	Letter dated July 12, 2012 - Commission Staff Filing Response to AMPC Information Request to Commission Consultants
A2-5	Letter dated July 12, 2012 - Commission Staff Filing Response to FEU Information Request on the Consultants Survey Report
A2-6	Letter dated July 12, 2012 - Commission Staff Filing Response to Industrial Customer Group Information Request on the Consultants Survey Report
A2-7	Letter dated July 12, 2012 - Commission Staff Filing Response to BCOAPO Information Request to Consultants Report
A2-8	Letter dated July 12, 2012 - Commission Staff Filing Response to CEC Information Request to Consultants Report
A2-9	Letter dated July 13, 2012 – Commission Staff Filing BCUC Request for Proposal for a Survey of Canadian Cost of Capital Practice Report
A2-10	Letter dated August 31 2012 – Commission Staff Filing Behavior of the Firm under Regulatory Constraint by Harvey Averch and Leland L. Johnson
A2-11	Letter dated August 31 2012 – Commission Staff Filing Extract from Terasen 2005 and 209 ROE CAP Applications
A2-12	Letter dated August 31 2012 – Commission Staff Filing Extract from FEU 2012-13 Revenue Requirements Decision
A2-13	Letter dated August 31 2012 – Commission Staff Filing Extract from Bloomberg News (Report dated August 6, 2012)

Exhibit No.	Description
A2-14	Letter dated August 31 2012 – Commission Staff Filing Capital Structure - A Comparison
A2-15	Letter dated August 31 2012 – Commission Staff Filing Summaries of Reports and Notes from Recent Credit Rating Agencies and Investment Banks on FEI's Risk and Credit Metrics
A2-16	Letter dated August 31 2012 – Commission Staff Filing Extract from Washington Utilities and Transportation Commission Order 08 Decision
A2-17	Letter dated August 31 2012 – Commission Staff Filing Fitch Affirms National Fuel Gas' IDR at 'A'
A2-18	Letter dated August 31 2012 – Commission Staff Filing The City of Vancouver - District Energy Connectivity Standards Information for Developers
A2-19	Letter dated August 31 2012 – Commission Staff Filing City of Surrey – District Energy System By-law, 2012, No. 17667
A2-20	Letter dated August 31 2012 – Commission Staff Filing Extract from BCUC Information Request No. 2 to River District Energy Limited Partnership
A2-21	Letter dated August 31 2012 – Commission Staff Ontario Energy Board Report of the Board on the Cost of Capital for Ontario's Regulated Utilities December 11, 2009
A2-22	Letter dated August 31 2012 – Commission Staff Filing Ontario Energy Board Cost of Capital Parameter Updates for 2012 Cost of Service Applications for Rates Effective January 1, 2012
A2-23	Letter dated August 31 2012 – Commission Staff Filing Summary of Reports from Recent Credit Rating Agencies and Investment Banks on PNG's Risks and Credit Metrics
A2-24	Letter dated October 9, 2012 – Commission Staff Filing Bradshaw et al. - Playing Favorites
A2-25	Letter dated October 9, 2012 – Commission Staff Filing CTA-Risk-Free Rate Determination
A2-26	Letter dated October 9, 2012 – Commission Staff Filing Exhibit A2-26 OEB Cost of Capital Parameter, May 1 2012

Exhibit No.	Description
A2-27	Letter dated November 16, 2012 - Commission Staff Filing Cost of Capital by Sector_NYU_Value Line Database
A2-28	Letter dated November 16, 2012 - Commission Staff Filing Gau, Thompson 2012 Capitalization Rate Study
A2-29	Letter dated November 16, 2012 - Commission Staff Filing Schaeffler and Weber- The Cost of Equity of Network Operators
A2-30	Letter dated November 16, 2012 - Commission Staff Filing TD-Long-Term Returns October 2012
A2-31	Letter dated November 16, 2012 - Commission Staff Filing Ashton et al- Analysts' Optimism in Earnings Forecasts
A2-32	Letter dated November 16, 2012 - Commission Staff Filing Understanding Corporate Bond Spreads Using Credit Default Swaps
A2-33	Submitted at Oral Hearing December 12, 2012 – Commission Staff Filing FEU 2012-2013 Revenue Requirements G-44-12 Compliance Filing
A2-33-1	Submitted at Oral Hearing December 13, 2012 – Commission Staff Filing page 1 of letter dated may 1, 2012 to BCUC from FortisBC, with two pages attached
A2-34	Submitted at Oral Hearing December 13, 2012 – Commission Staff Filing Vancouver Sun Article Natural gas seen as green fuel
A2-35	Submitted at Oral Hearing December 13, 2012 – Commission Staff Filing Staff Witness Aid
A2-36	Submitted at Oral Hearing December 14, 2012 – Commission Staff Filing pages 7 to 10 from Standard & Poors Report
A2-37	Submitted at Oral Hearing December 14, 2012 – Commission Staff Filing Long-Term Economic Forecast, TD Economics, September 18, 2012
A2-38	Submitted at Oral Hearing December 14, 2012 – Commission Staff Filing Attachment 8.2(A), page 17 of 18, Results of Differences in Systematic Risk
A2-39	Submitted at Oral Hearing December 14, 2012 – Commission Staff Filing Extract from Order No. 09-176 from Public Utility Commission of Oregon

Exhibit No.	Description
A2-40	Submitted at Oral Hearing December 14, 2012 – Commission Staff Filing Rating Report, February 29, 2012 from DBRS
A2-41	Submitted at Oral Hearing December 14, 2012 – Commission Staff Filing Document Headed Moody's Investors Service, Credit Opinion: FortisBC Energy Inc.
A2-42	Submitted at Oral Hearing December 14, 2012 – Commission Staff Filing Five-Page Document, First Page Headed Returns on Average Common Stock Equity for Sample of U.S. Utilities
A2-43	Submitted at Oral Hearing December 17, 2012 – Commission Staff Filing Approaches to Estimating the Deemed Interest Rate for Long Term Debt
A2-44	Submitted at Oral Hearing December 17, 2012 – Commission Staff Filing Excerpt of FEI Kelowna DES CPCN Application
A2-45	Submitted at Oral Hearing December 17, 2012 – Document Headed Credit Rating and Equity Risk Premium
A2-46	Submitted at Oral Hearing December 18, 2012 – Commission Staff Filing Document Headed Weathering the Headwinds to Canada's Economic Growth 21 November 2012
A2-47	Submitted at Oral Hearing December 18, 2012 – Commission Staff Filing Document Headed Puget Sound Energy Inc.
A2-48	Submitted at Oral Hearing December 18, 2012 – Commission Staff Filing Document Headed Power & Utilities Research, the One-Two Punch: Growth Combined with Attractive Yield
A2-48-1	Submitted at Oral Hearing December 18, 2012 – Commission Staff Filing Extract from BMO Capital Markets, page 11, Headed Power & Utilities
A2-49	Submitted at Oral Hearing December 19, 2012 – Commission Staff Filing Extract from Ontario Energy Board, Report of Board, December 20, 2006
A2-50	Submitted at Oral Hearing December 19, 2012 – Commission Staff Filing Extract from Renewing Ontario's Electricity Distribution Sector: Putting the Consumer First
A2-51	Submitted at Oral Hearing December 19, 2012 – Commission Staff Filing Witness Aid Prepared by Commission Staff Entitled Informed Expert Judgment

Exhibit No.	Description
	AFFECTED UTILITIES DOCUMENTS
B1-1	**BC UTILITIES OF FORTIS INC. COMPRISED OF FORTISBC ENERGY INC., FORTISBC ENERGY VANCOUVER ISLAND INC., FORTISBC ENERGY WHISTLER INC. AND FORTISBC INC. (FBCU)** Letter Dated March 15, 2012 – Notice of Registration
B1-2	Letter Dated March 21, 2012 – FBCU Submission on the Preliminary Scoping Document
B1-3	Letter Dated May 3, 2012 – FBCU Submission on Minimum Filing Requirements
B1-4	Letter Dated May 9, 2012 – FBCU Submission regarding Order G-50-12 Appendix A
B1-5	Letter Dated June 5, 2012 – FBCU Submitting Request for Variance of Preliminary Regulatory Timetable
B1-6	Letter Dated June 5, 2012 – FBCU Reply Submissions regarding Request for Variance of Preliminary Regulatory Timetable
B1-7	Letter Dated June 22, 2012 – FBCU Submitting Information Request regarding the Commission Consultant Survey Report
B1-8	Letter Dated August 2, 2012 – FBCU Submitting comments regarding the addition of a panel member
B1-9	Letter Dated August 3, 2012 – FBCU Submitting Evidence
B1-9-1	Letter Dated August 3, 2012 – FBCU Submitting Evidence Appendix A – Sections 1 to 2
B1-9-2	Letter Dated August 3, 2012 – FBCU Submitting Evidence Appendix A – Section 3A – Debt Investment Analyst Reports for FEI
B1-9-3	Letter Dated August 3, 2012 – FBCU Submitting Evidence Appendix A – Section 3B – Equity Analyst Reports Beacon to Credit Suisse
B1-9-4	Letter Dated August 3, 2012 – FBCU Submitting Evidence Appendix A – Section 3B – Equity Analyst Reports Macquarie to UBS

Exhibit No.	Description
B1-9-5	Letter Dated August 3, 2012 – FBCU Submitting Evidence Appendix A – Sections 4 to 11
B1-9-6	Letter Dated August 3, 2012 – FBCU Submitting Evidence Appendices B to J
B1-9-7	**CONFIDENTIAL** Letter Dated August 3, 2012 – FBCU Submitting Evidence CONFIDENTIAL Appendices
B1-10	Letter Dated September 24, 2012 – FBCU Submitting Response to BCPSO IR No. 1
B1-11	Letter Dated September 24, 2012 – FBCU Response to BC Utility Customers IR1 – FBCU
B1-12	Letter Dated September 24, 2012 – FBCU Response to BC Utility Customers IR1 – A. Engen
B1-13	Letter Dated September 24, 2012 – FBCU Response to BC Utility Customers IR1 – Concentric
B1-14	Letter Dated September 24, 2012 – FBCU Response to BC Utility Customers IR1 – Dr. Vander Weide
B1-15	Letter Dated September 24, 2012 – FBCU Response to BC Utility Customers IR1 – K. McShane
B1-16	Letter Dated September 24, 2012 – FBCU Response to ICG IR No.1 – A. Engen
B1-17	Letter Dated September 24, 2012 – FBCU Response to ICG IR No.1 - Concentric
B1-18	Letter Dated September 24, 2012 – FBCU Response to ICG IR No.1 - Dr. Vander Weide
B1-19	Letter Dated September 24, 2012 – FBCU Response to ICG IR No.1 – K. McShane
B1-20	Letter Dated September 24, 2012 – FBCU Response to BCUC IR No.1
B1-20-1	**CONFIDENTIAL** Letter Dated September 24, 2012 – FBCU Confidential Response to BCUC IR No.1
B1-21	**CONFIDENTIAL** Letter Dated September 24, 2012 – FBCU Response to Confidential BCUC IR No.1

Exhibit No.	Description
B1-22	Submitted at Procedural Conference Letter Dated October 3, 2012 – FBCU Counsel's Oral Submissions
B1-23	Letter dated October 26, 2012 – FBCU Response to Confidentiality Request
B1-24	Letter dated October 29, 2012 – FBCU Response to BCUC IR No. 2
B1-25	**CONFIDENTIAL** Letter dated October 29, 2012 – FBCU Response to BCUC Confidential IR No. 2
B1-26	Letter dated October 29, 2012 – FBCU Response to BCPSO IR No. 2
B1-27	Letter dated November 2, 2012 – FBCU Comments regarding Confidential Material Access
B1-28	Letter dated November 16, 2012 – FBCU Submitting IR No. 1 to AMPC/BC Utility Customers on the Evidence of Dr. Booth
B1-29	Letter dated November 16, 2012 – FBCU Submitting IR No. 1 to ICG on the Evidence of Dr. Safir
B1-30	Letter Dated November 23, 2012 – FBCU Submission on Interim Rates Jan 1, 2013
B1-31	Letter Dated November 30, 2012 – FBCU Submitting Witness Panels and Direct Testimony
B1-32	Letter dated December 6, 2012 – FBCU Submitting Rebuttal Evidence
B1-33	Letter dated December 10, 2012 – FBCU Submitting Opening Statement
B1-34	Submitted at Oral Hearing December 12, 2012 – FBCU Written Opening Statement of Counsel
B1-35	Submitted at Oral Hearing December 12, 2012 – FBCU Revised: Exhibit B1-9-6, Appendix H, page 51, Figure 34
B1-36	Submitted at Oral Hearing December 12, 2012 – FBCU Undertaking No. 1
B1-37	Submitted at Oral Hearing December 12, 2012 – FBCU Undertaking No. 2
B1-38	Submitted at Oral Hearing December 13, 2012 – FBCU Undertaking No. 3

Exhibit No.	Description
B1-39	Submitted at Oral Hearing December 13, 2012 – FBCU Undertaking No. 4
B1-40	Submitted at Oral Hearing December 13, 2012 – FBCU Undertaking No. 5
B1-41	Submitted at Oral Hearing December 13, 2012 – FBCU Undertaking No. 6
B1-42	Submitted at Oral Hearing December 13, 2012 – FBCU Undertaking No. 7
B1-43	Submitted at Oral Hearing December 13, 2012 – FBCU Undertaking No. 8
B1-44	Submitted at Oral Hearing December 13, 2012 – FBCU Undertaking No. 9
B1-45	Submitted at Oral Hearing December 14, 2012 – FBCU Undertaking No. 10
B1-46	Submitted at Oral Hearing December 14, 2012 – FBCU Undertaking No. 11
B1-47	Submitted at Oral Hearing December 14, 2012 – FBCU Filing Testimony of Kathleen C. McShane Tab 2
B1-48	Submitted at Oral Hearing December 17, 2012 – FBCU Undertaking No. 12
B1-49	Submitted at Oral Hearing December 18, 2012 – FBCU Filing Testimony Figures Update
B1-49-1	Letter received January 3, 2013 – FBCU Filing Remaining Chart Updates
B1-50	Submitted at Oral Hearing December 19, 2012 – FBCU Filing 104 page Collection of Documents Used in Cross Examination of Dr. Booth
B1-51	Submitted at Oral Hearing December 21, 2012 – FBCU Filing Compendium of Extracts, First Page Entitled Fair Return for Terasen Gas Inc. (TGI) August 2009
B1-52	Letter received January 3, 2013 – FBCU Undertaking No. 13
B1-53	Letter received January 3, 2013 – FBCU Undertaking No. 14
B1-54	Letter received January 3, 2013 – FBCU Undertaking No. 15
B1-55	Letter received January 3, 2013 – FBCU Undertaking No. 16
B1-56	Letter received January 3, 2013 – FBCU Undertaking No. 17
B1-57	Letter received January 3, 2013 – FBCU Undertaking No. 18

Exhibit No.	Description
B1-58	Letter received January 3, 2013 – FBCU Undertaking No. 19
B1-59	Letter received January 3, 2013 – FBCU Undertaking No. 20
B1-60	Letter received January 29, 2013 – FBCU Undertaking No. 21
B1-61	Letter received January 29, 2013 – FBCU Undertaking No. 22
B1-62	Letter received January 29, 2013 – FBCU Undertaking No. 23
B1-63	Letter received January 29, 2013 – FBCU Undertaking No. 24
B1-64	Letter received January 29, 2013 – FBCU Undertaking No. 25
B1-65	Letter received January 29, 2013 – FBCU Undertaking No. 26
B1-66	Letter received January 29, 2013 – FBCU Undertaking No. 27
B1-67	Letter received January 29, 2013 – FBCU Undertaking No. 28
B1-68	Letter received January 29, 2013 – FBCU Undertaking No. 29
B2-1	**CORIX MULTI-UTILITY SERVICES INC. (CORIX)** Letter Dated March 14, 2012 – Notice of Registration
B2-2	Letter Dated March 21, 2012 – Corix Submission on the Preliminary Scoping Document
B2-3	Letter Dated May 3, 2012 – Corix Submission on Minimum Filing Requirements
B2-4	Letter Dated May 9, 2012 – Corix Submission regarding Order G-50-12 Appendix A
B2-5	Letter Dated June 8, 2012 – Corix Submission on FBCU Request for Variance
B2-6	Letter Dated August 3, 2012 – Corix Submitting Comments Regarding the Addition of a Panel Member
B2-7	Letter Dated August 3, 2012 – Corix Submitting Evidence
B2-8	Letter Dated September 24, 2012 – Corix Submitting Response to BCPSO IR No. 1
B2-9	Letter Dated September 24, 2012 – Corix Submitting Response to BCUC IR No. 1

Exhibit No.	Description
B2-10	Letter Dated October 18, 2012 – Corix Submitting Response to BCUC IR No. 2
B2-11	Letter Dated November 23, 2012 – Corix Submission regarding A-27
B2-12	Submitted at Oral Hearing December 18, 2012 – Corix Filing Opening Remarks of Counsel for Corix Multi-Utility Services Inc., December 12, 2012
B2-13	Submitted December 24, 2012 – Corix Filing Undertaking Document Titled Before the Florida Public Service Commission
B2-14	Submitted December 24, 2012 – Corix Filing Undertaking Document titled Comparison of Business Risk Adjustments in Cost of Capital Testimony Filed by Ms. Pauline M. Ahern
B2-15	Letter received January 3, 2013 - Corix Filing Response to Undertaking
B3-1	**PACIFIC NORTHERN GAS LTD. AND PACIFIC NORTHERN GAS N.E. LTD. (PNG)** Online Registration Dated March 16, 2012 – Notice of Registration
B3-2	Letter Dated March 21, 2012 – PNG Submission on the Preliminary Scoping Document
B3-3	Letter Dated May 3, 2012 – PNG Submission on Minimum Filing Requirements
B3-4	Letter Dated May 9, 2012 – PNG Submission Regarding Order G-50-12 Appendix A
B3-5	Letter Dated June 8, 2012 – PNG Submission Regarding Variance of the Regulatory Timetable
B3-6	Letter Dated August 3, 2012 – PNG Submitting Comments Regarding the Addition of a Panel Member
B3-7	Letter Dated August 3, 2012 – PNG Submitting Evidence
B3-8	Letter Dated September 24, 2012 – PNG Submitting Response to BCUC IR No. 1
B3-9	Letter Dated September 24, 2012 – PNG Submitting Response to BCPSO
B3-10	Letter Dated September 24, 2012 – PNG Submitting Response to AMPC, BCPSO and CEC
B3-11	Letter Dated November 23, 2012 – PNG Submission Regarding A-27

Exhibit No.	Description
B3-12	Letter Dated November 30, 2012 – PNG Submitting Comments regarding Witness Panels
	OTHER UTILITIES DOCUMENTS
B4-1	**BRITISH COLUMBIA HYDRO AND POWER AUTHORITY (BCH)** Letter Dated March 12, 2012 – Notice of Registration
B4-2	Letter Dated March 21, 2012 – BCH Submission on the Preliminary Scoping Document
B4-3	Letter Dated May 3, 2012 – BCH Submission on Minimum Filing Requirements
B4-4	Letter Dated May 9, 2012 – BCH Submission Regarding Order G-50-12 Appendix A
B4-5	Letter Dated June 8, 2012 – BCH Submission Regarding variance of the Regulatory Timetable
B4-6	Letter Dated August 3, 2012 – BCH Submitting Comments Regarding the Addition of a Panel Member
B4-7	Letter Dated November 23, 2012 - BCH Submission Regarding A-27
B4-8	Letter Dated November 30, 2012 – BCH Submitting Comments Regarding Witness Panels
B5-1	**RIVER DISTRICT ENERGY (RDE)** Letter Dated March 12, 2012 – Notice of Registration
	INTERVENER DOCUMENTS
C1-1	**UNION GAS LIMITED (UG)** Letter dated March 5, 2012 – Request for Intervener Status by Patrick McMahon
C2-1	**CANADIAN OFFICE AND PROFESSIONAL EMPLOYEES' UNION, LOCAL 378 (COPE 378)** Letter dated March 15, 2012 – Request for Intervener Status by James Quail
C2-1-1	Letter dated March 20, 2012 – COPE 378 Submitting Intervention Supplementary Comments
C2-2	Letter dated April 19, 2012 - COPE 378 Submitting Updating Consultant details
C2-3	Letter dated June 26, 2012 - COPE 378 Submitting Updating Consultant Information

Exhibit No.	Description
C3-1	**SENTINEL ENERGY MANAGEMENT (SEM)** Online Registration dated March 20, 2012 – Request for Intervener Status by Jim Langley
C4-1	**INDUSTRIAL CUSTOMERS GROUP (ICG)** Letter dated March 20, 2012 Via Email – Request for Intervener Status by Robert Hobbs and Brian Merwin
C4-2	Letter Dated March 21, 2012 – ICG Submission on the Preliminary Scoping Document
C4-3	Letter Dated May 3, 2012 – ICG Submission regarding the Preliminary Minimum Filing Requirements for Affected Utilities
C4-4	Letter Dated May 9, 2012 – ICG Submission Regarding Order G-50-12 Appendix A
C4-5	Letter Dated June 8, 2012 – ICG Submission regarding Variance of the Regulatory Timetable
C4-6	Letter Dated June 21, 2012 – ICG Submitting Information Request Regarding the Commission Consultant Survey Report
C4-7	Letter Dated August 31, 2012 – ICG Submitting Information Request No. 1
C4-8	Letter Dated October 24, 2012 - ICG Submitting Comments regarding Request for Confidential Information
C4-9	Letter dated November 5, 2012 – ICG Submitting Evidence
C4-10	Letter dated November 6, 2012 – ICG Submitting Confidential Undertakings
C4-11	Letter dated November 30, 2012 – ICG Submitting Responses to Information Request No. 1
C4-12	Letter dated November 30, 2012 – ICG Submission Regarding Exhibit A-27
C4-13	Submitted at Oral Hearing December 12, 2012 – ICG Opening Comments
C4-14	Submitted at Oral Hearing December 14, 2012 – ICG Filing Tab 2 Testimony of Kathleen C. McShane
C4-15	Submitted at Oral Hearing December 17, 2012 – ICG Filing Opening Statement of Dr. Andrew Safir

Exhibit No.	Description
C4-16	Letter dated January 14, 2013 – ICG Submitting Undertakings
C4-17	Letter dated January 25, 2013 – ICG Submitting Dr. Lawrence Booth Undertaking No. 2
C5-1	**BRITISH COLUMBIA PENSIONERS' AND SENIORS' ORGANIZATION (BCPSO ET AL)** (previously BC Old Age Pensioner' Organization *et. al*.) **VIA EMAIL -** Letter Dated March 20, 2012 – Request for Intervener Status by Leigha Worth, Tannis Braithwaite and Bill Harper
C5-2	Letter Dated March 21, 2012 – BCOAPO Submission on the Preliminary Scoping Document
C5-3	Letter Dated May 3, 2012 – BCOAPO Submission on Minimum Filing Requirements
C5-4	Letter Dated May 9, 2012 – BCOAPO Submission Regarding Order G-50-12 Appendix A
C5-5	Letter Dated June 8, 2012 – BCOAPO Submission Regarding Variance of the Regulatory Timetable
C5-6	Letter Dated June 22, 2012 – BCOAPO Submitting Information Request Regarding the Commission Consultant Survey Report
C5-7	Letter dated July 23, 2012 – BCOAPO Submitting Notice of Name Change to British Columbia Pensioners' and Seniors' Organization (BCPSO)
C5-8	Letter Dated August 3, 2012 – BCPSO Submitting Comments Regarding the Addition of a Panel Member
C5-9	Letter Dated August 31, 2012 – BCPSO Submitting Information Request No. 1 to Corix
C5-10	Letter Dated August 31, 2012 – BCPSO Submitting Information Request No. 1 to FBCU
C5-11	Letter Dated August 31, 2012 – BCPSO Submitting Information Request No. 1 to PNG
C5-12	Letter Dated October 9, 2012 - BCPSO Submitting Information Request No. 2 to FBCU

Exhibit No.	Description
C5-13	Letter Dated October 9, 2012 - BCPSO Submitting Contact Update
C5-14	Letter Dated November 30, 2012 - BCPSO Submission Regarding Exhibit A-27
C5-15	Submitted at Oral Hearing December 17, 2012 – BCPSO Filing Business Spectator Document
C6-1	**ASSOCIATION OF MAJOR POWER CUSTOMERS OF BC (AMPC)** Letter Dated March 20, 2012 – Request for Intervener Status by Richard Stout and Lloyd Guenther
C6-2	Letter Dated May 2, 2012 – AMPC Submitting Contact Update
C6-3	Letter Dated May 3, 2012 – AMPC Submission on Minimum Filing Requirements
C6-4	Letter Dated May 9, 2012 – AMPC Submission Regarding Order G-50-12 Appendix A
C6-5	Letter Dated June 8, 2012 – AMPC Submission Regarding Variance of the Regulatory Timetable
C6-6	Letter Dated June 22, 2012 – AMPC Submitting Information Request Regarding the Commission Consultant Survey Report
C6-7	Letter Dated August 3, 2012 – AMPC Submitting Comments Regarding the Addition of a Panel Member
C6-8	Letter Dated August 31, 2012 – Filing on behalf of BCUC Utility Customers AMPC/BCPSO/CEC Information Request No. 1 to FBCU
C6-9	Letter Dated August 31, 2012 – Filing on behalf of BCUC Utility Customers AMPC/BCPSO/CEC Information Request No. 1 to FBCU on Mr. Engen's Evidence
C6-9-1	Letter Dated September 23, 2012 – Filing on behalf of BCUC Utility Customers AMPC/BCPSO/CEC Corrected Information Request No. 1 to FBCU on Mr. Engen's Evidence
C6-10	Letter Dated October 22, 2012 - AMPC Filing a Request for Confidential Information
C6-11	Letter Dated October 31, 2012 - AMPC Submitting Comments regarding Access to Confidential Information
C6-12	Letter dated November 5, 2012 – AMPC Submitting Evidence

Exhibit No.	Description
C6-13	Letter dated November 5, 2012 – AMPC Submitting Confidential Undertakings
C6-14	Letter dated November 30, 2012 – AMPC Submission regarding Exhibit A-27
C6-15	Letter dated November 30, 2012 – AMPC Submitting Responses to Information Request No. 1 to BCUC
C6-16	Letter dated November 30, 2012 – AMPC Submitting Responses to Information Request No. 1 to FBCU
C6-17	Submitted at Oral Hearing December 12, 2012 – AMPC Filing BC Natural Gas Strategy Fueling BC's Economy for the Next Decade and Beyond
C6-18	Submitted at Oral Hearing December 14, 2012 – AMPC filing AUC 2011 GCOC IR Responses CAPP McShane ROE Attach 17d
C6-19	Submitted at Oral Hearing December 14, 2012 – AMPC filing AUC 2011 GCOC IR Responses CAPP McShane ROE Attach 21 i
C6-20	Submitted at Oral Hearing December 17, 2012 – AMPC filing Alberta Utilities Commission 2009 Generic Cost of Capital Proceeding Direct Testimony of James M. Coyne
C6-21	Submitted at Oral Hearing December 18, 2012 – AMPC Filing Witness Aid Prepared by BC Utilities Customers
C6-22	Submitted at Oral Hearing December 19, 2012 – AMPC filing Dr. Booth's Opening Statement
C6-23	Letter dated January 18, 2013 – AMPC Submitting Dr. Booth Undertaking No. 1
C6-24	Letter Dated February 14, 2013 – AMPC Submitting Extension Request
C7-1	**COMMERCIAL ENERGY CONSUMERS ASSOCIATION OF BRITISH COLUMBIA (CEC)** Letter Dated March 20, 2012 – Request for Intervener Status by Christopher Weafer
C7-2	Letter Dated May 9, 2012 – CEC Submission Regarding Order G-50-12 Appendix A
C7-3	Letter Dated June 8, 2012 – CEC Submission Regarding variance of the Regulatory Timetable

Exhibit No.	Description
C7-4	Letter dated June 25, 2012 – CEC Submitting Information Request Regarding the Commission Consultant Survey Report
C7-5	Letter Dated August 3, 2012 – CEC Submitting Comments Regarding the Addition of a Panel Member
C7-6	Letter dated November 9, 2012 – CEC Submitting Confidential Undertakings
INTERESTED PARTY DOCUMENTS	
D-1	**AT BUSINESS CONSULTING (ATB)** Online Registration dated May 9, 2012 – Request for Interested Party Status by Anastasios Tsalamandris

APPENDIX E

ORDER C-1-13
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	Risk Factor	FEI Natural Gas Class of Service (1)	FAES PCI Marine Gateway Project (2)	Telus Garden (3)	PCI Marine / Telus Garden Vs. FEI NG Class of Service (4)	FEI Delta School District (5)	Corix UniverCity (6)	Dockside Green Energy (7)	River District Energy (8)
	Capital structure (debt/equity ratio)	60/40 (actual)	60/40 (actual)	60/40 (actual; proposed)		60/40 (actual)	Deemed 60/40	Deemed 60/40	Deemed 60/40
	Equity Risk Premium	N/A	0 bps (approved)	50 bps (proposed)		50 bps (approved)	50 bps (approved)	100 bps (approved)	50 bps (approved)
1	Technology risk/system performance risk associated with chosen technologies	Natural Gas: proven technology	Geo-exchange loop field system and heat recovery with high efficiency natural gas boilers equipment	Recovered waste heat from TELUS Data Centre with peaking and redundant backup heat supplied by Centre Heat Distribution Ltd.: low risk	Slightly higher for PCI / TG than FEI NG	High efficiency condensing boilers: proven technology; Ground source heat pumps; less established technology	Natural gas boilers proven technology	Biomass Gasification innovative technology; Natural Gas boilers; proven technology (while DGE not yet on biomass, the Commission approved the technology)	Natural Gas: boiler: proven technology

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	Risk Factor	FEI Natural Gas Class of Service (1)	FAES PCI Marine Gateway Project (2)	Telus Garden (3)	PCI Marine / Telus Garden Vs. FEI NG Class of Service (4)	FEI Delta School District (5)	Corix UniverCity (6)	Dockside Green Energy (7)	River District Energy (8)
2	Fuel Risk cost and availability	Natural gas: Low-medium	Low risk: free energy from ground and heat recovery, but cost risk for electricity used to operate heat pumps and TES equipment, and for natural gas for supplementary heat and peaking	Data Centre that supplies waste heat is assumed to be available throughout the 20 year term of the analysis: low risk Data Centre ceases operation	Lower for PCI / TG than FEI NG	Natural gas and electricity: Low-medium; Heat from ground: low (some energy cost risk in electricity costs to operate GSHPs)	Natural gas fuelled energy centre: low medium Alternative renewable energy source: not approved yet and thus not relevant	Biomass: medium-high; natural gas; low-medium	Natural gas fuelled energy centre: low medium Alternative renewable energy source: not approved yet and thus not relevant
3	Customer Base (e.g., diversity, certainty, growing, declining)	Established and diverse customer base but very slow growth	Greenfield utility four types of customers	Not large customer base or significant diversity: low risk	Higher for PCI / TG than FEI NG (NG has much greater diversity)	Established customer: low risk	Greenfield utility: uncertainty related to timing of full build out	Greenfield utility: uncertainty related to timing of full build out	Greenfield utility: uncertainty related to timing of full build out
4	Default risk of customer	Minimal	Minimal	Minimal	Similar for PCI / TG as for FEI NG	Minimal as SD has budget constraints as well	Minimal	Minimal	Minimal

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	Risk Factor	FEI Natural Gas Class of Service (1)	FAES PCI Marine Gateway Project (2)	Telus Garden (3)	PCI Marine / Telus Garden Vs. FEI NG Class of Service (4)	FEI Delta School District (5)	Corix UniverCity (6)	Dockside Green Energy (7)	River District Energy (8)
5	Property development risk	Medium to high: there are competing energy options	Low risk: all customers bound by agreement	Majority of tenants committed but customers can still leave: low risk	Lower for PCI / TG than FEI NG	None, as not a new development	Low: phased approach to capital deployment	High: build first approach to capital deployment	Low: phased approach to capital deployment
6	Developer / customer connection risk	Medium to high: due to building stock changes and competitive energy sources	Low Risk: customers will connect on occupancy	Low Risk: customers will connect on occupancy	Lower for PCI / TG than FEI NG	Low, as one known customer with existing sites	Low: mandatory connection	Low: mandatory connection	Low: mandatory connection
7	Load Forecast Uncertainty	Minimal in the short term, as mature utility with deferral account; somewhat higher in the long term	Inherent uncertainty in load forecast	FAES proposes to take forecast risk on actual energy throughput versus forecast for 5 year period: Low-medium	Higher for PCI / TG than FEI NG	Low, as established energy load	Inherent uncertainty in load forecast	Inherent uncertainty in load forecast	Inherent uncertainty in load forecast

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	Risk Factor	FEI Natural Gas Class of Service (1)	FAES PCI Marine Gateway Project (2)	Telus Garden (3)	PCI Marine / Telus Garden Vs. FEI NG Class of Service (4)	FEI Delta School District (5)	Corix UniverCity (6)	Dockside Green Energy (7)	River District Energy (8)
8	Utility size	Large and mature utility	Project is carried out by a separate corporate entity, Small development specific utility.	Project is carried out by separate corporate entity, Small development specific utility.	Higher for PCI / TG than FEI NG	Project is carried out by separate corporate entity	Small development specific utility	Small development specific utility	Small development specific utility
9	Initial construction cost risk	Depends on the nature of the individual project	Depends on nature of the individual project	Depends on nature of the individual project	Similar for PCI / TG as for FEI NG	Depends on the nature of the individual project	Depends on the nature of the individual project	Depends on the nature of the individual project	Depends on the nature of the individual project
10	Future Construction cost risk	Depends on the nature of the individual project	Depends on nature of the individual project	Depends on nature of the individual project	Similar for PCI / TG as for FEI NG	Depends on the nature of the individual project	Depends on the nature of the individual project	Depends on the nature of the individual project	Depends on the nature of the individual project
11	Operating cost risk	Minimal as revenue requirement application to recover costs	Minimal as mechanism in place to recover costs	Low-medium risk: as deferral accounts do not cover all O&M variances between forecast and actual	Higher for TG, similar for PCI relative to FEI NG	Minimal as mechanism in place to recover costs	Minimal as a mechanism in place to recover costs	Minimal as a mechanism in place to recover costs	Minimal as a mechanism in place to recover costs

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	Risk Factor	FEI Natural Gas Class of Service (1)	FAES PCI Marine Gateway Project (2)	Telus Garden (3)	PCI Marine / Telus Garden Vs. FEI NG Class of Service (4)	FEI Delta School District (5)	Corix UniverCity (6)	Dockside Green Energy (7)	River District Energy (8)
12	Public Acceptance Risk	Medium as natural gas is an established and widely used technology but public perceives it as less than clean	Low as seen as green alternative	Low	Lower for PCI / TG than FEI NG	Low as seen as green alternative	Low as seen as a green alternative	Low as gasification technology part of approval process for the development and already selected at the time of the CPCN application	low as seen as a green alternative
13	Fixed/Variable rate design	15% fixed/85% variable	~~100% variable~~ Rate Design Not Approved	100% variable (volume rate)	Higher for TG, relative to FEI NG PCI Rate Design not Approved	100% variable	60% fixed/40% variable	50% fixed/50% variable	66% fixed / 34% variable

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	Risk Factor	FEI Natural Gas Class of Service (1)	FAES PCI Marine Gateway Project (2)	Telus Garden (3)	PCI Marine / Telus Garden Vs. FEI NG Class of Service (4)	FEI Delta School District (5)	Corix UniverCity (6)	Dockside Green Energy (7)	River District Energy (8)
14	Levelized approach to rates	No	~~Only in first three years then transition to cost of service~~ Rate Design not Approved	The rates charged for the first five years have been mutually agreed upon using a benchmark based on BC Hydro RIB Step 1 and Step 2	Slightly higher for TG, relative to FEI NG PCI Rate Design Not Approved	No, transitional market rate and deferral account	Yes	Yes	Yes
15	Financial risk	Low-medium: appropriate standalone financing structure for capital markets	Medium (similar to DSD)	Forecast risk and rates fixed for first five years (other than one-time adjustment for GCOC changes) impacts financial risk: medium risk justifies 50 bps on FEI utility benchmark	Higher for PCI / TG than FEI NG	Medium	Low-medium: subsidiary of parent utility	Low-medium: subsidiary of parent utility	Low-medium: subsidiary of parent utility

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	Risk Factor	FEI Natural Gas Class of Service (1)	FAES PCI Marine Gateway Project (2)	Telus Garden (3)	PCI Marine / Telus Garden Vs. FEI NG Class of Service (4)	FEI Delta School District (5)	Corix UniverCity (6)	Dockside Green Energy (7)	River District Energy (8)
16	Competitive challenges	Competitive with electricity and competition from alternative energy providers	Other TES providers and electricity	Other TES providers and electricity	Lower for PCI / TG than FEI NG	Other TES providers and electricity	Other utilities and electricity	Other utilities and electricity	Other utilities and electricity
17	Provincial climate change and energy policies	Encourage reduction of fossil fuels usage to reduce GHG emissions and lower energy use.	Favourable government policies	Favourable government policies	Lower for PCI / TG than FEI NG	Favorable govt. policies	Favourable govt. policies	Favourable govt. policies	Favourable govt. policies
18	Regulatory uncertainty	Low to medium: uncertainty exists for service offerings within the natural gas class of service.	Medium risk: New, uncertainty, scrutiny and not streamlined Rate Design Denied as Applied	Medium risk: New, uncertainty, scrutiny and not streamlined	Higher for PCI / TG than FEI NG	Medium risk: new, uncertainty, scrutiny and not streamlined	Medium risk: New, uncertainty, scrutiny, alternative energy centre not yet approved	Medium risk: New, uncertainty, scrutiny	Medium risk: New, uncertainty, scrutiny

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	Risk Factor	FEI Natural Gas Class of Service (1)	FAES PCI Marine Gateway Project (2)	Telus Garden (3)	PCI Marine / Telus Garden Vs. FEI NG Class of Service (4)	FEI Delta School District (5)	Corix UniverCity (6)	Dockside Green Energy (7)	River District Energy (8)
19	Business Development Risk	Minimal	Low – deferring business development costs increases risk of non-recovery. (PCI BCUC IR 1.41.1.) [Shareholder ultimately at risk for the TESDA]	FAES has agreed to purchase the TGTES from the Partnership upon commissioning for actual construction cost of $7.9 million up to a maximum of 30% above the $7.9 million estimate.	Higher for PCI / TG than FEI NG	Low: deferring business development costs increases risk of non-recovery. (PCI BCUC IR 1.41.1) (Shareholder ultimately at risk for the TESDA)	High as part of overhead cots	High as part of overhead cots	High as part of overhead cots

APPENDIX F

COST OF CAPITAL ESTIMATION MODELS AND KEY INPUTS

DISCOUNTED CASH FLOW MODELS

Analyst	Model Sub-type	Sample	Growth Estimate	ROE est. (%)	References
McShane	Constant Growth	12 US utilities	4.9% - Average of consensus earnings forecasts from Bloomberg, Reuters, ValueLIne and Zacks.	9.3	McShane Evid, Table 30, p. 113; App. C, and Schedule 19
	Constant Growth	5 Can utilities (incl. Fortis Inc.)	7.5% - Reuters L-T EPS forecasts	11.0	McShane Evid, Table 30, p. 113 and Schedule 22
	Sustainable Growth	12 US Utilities	4.4% - Avg of sustainable growth rates for US utilities derived from Value Line forecasts of ROEs, earnings retention rates and earnings growth from external financing.	8.7	McShane Evid, Table 30, p. 113 and Schedule 20
	Three Stage Model	5 Can utilities (incl. Fortis Inc.)	Stage 1 (yrs 1-5) - Reuters L-T EPS forecasts: 7.5% Stage 2 (yrs 6-10)- Avg of stages 1 and 3: 5.9% Stage 3 (yrs 11+)-GDP growth: 4.3%	8.6	McShane Evid, Table 30, p. 113 App. C and Schedule 23
	Three Stage Model	12 US utilities	Stage 1 (yrs 1-5) - Avg of all EPS forecasts: 4.9% Stage 2 (yrs 6-10) - Avg of stages 1 and 3: 4.9% Stage 3 (yrs 11+) - GDP growth: 4.9%	9.2	McShane Evid, Table 30, p. 113 and Schedule 21
	Mid-point of range	Canadian sample		9.8	McShane Evid. p. 113
	Mid-point of range	Both samples		9.4	McShane Evid. p. 113
			Bare bones Cost of Equity estimated at 9.4% and add Financing Flexibility Adjustment of 0.5%	9.9	

...**DCF MODELS**

Analyst	Model Sub-type	Sample	Growth Estimate	ROE est. (%)	References
Vander Weide	Quarterly DCF model	Comprehensive group of 32 US utilities	Range: 3.15% to 9.75% I/B/E/S Thomson Reuters mean growth forecasts	Range: 7.4-14.6 Avg: 9.8	VdW Evid, p. 28 – 30 and Exhibit 6
		Small group of 19 US utilities (subset of large group)	Range: 3.15% to 9.75% I/B/E/S Thomson Reuters mean growth forecasts	Range: 7.4-14.6 Avg: 9.5	VdW Evid, p. 28 – 30 and Exhibit 7
			Bare-bones cost of equity for the Comprehensive Model 9.8% plus Financing Flexibility	10.3	
			Bare-bones cost of equity for the Small Utilities Model 9.5% plus Financing Flexibility	10.0	
			Summary of results from DCF	10.15	
Booth		All of Canadian market	Growth rate range 4.7% - 6.1% based on multiplying corporate Canada ROEs since 1987 times retention rates.	9.3	Booth Evid., p. 94 & App D, p. 9-10
		US market – S&P 500	Growth rate range of 6.79% - 7.97% based on multiplying the average and median values respectively for S&P 500 ROEs since 1977 times the current dividend yield	Calculated range: 8.93-10.01. Adjusted range: 9.5-10.5	Booth Evid., App D, p. 10-13 (Note disc. of analyst forecasts at p. 14-17.)

...**DCF MODELS**

Analyst	Model Sub-type	Sample	Growth Estimate	ROE est. (%)	References
Safir	Two-stage model	Canadian Sample - 5 Can. utilities (incl. Fortis)	Stage 1 (analyst forecasts)- 7.49%; Stage 2 (GDP growth) – 4.49% Weighted average (33/67): 5.49%	8.99	Safir Evid, p. 24-26, and Schedule 3
	Two-stage model	US Sample – 18 US utilities	Stage 1 (analyst forecasts) - 5.50%; Stage 2 (GDP growth) – 4.57% Weighted average (33/67): 4.88%	8.86	Safir Evid,p. 24-26, and Schedule 4
			ROE Adjusted by Flotation Costs at 5% for Canadian sample	9.46	Safir Evid. p. 26
			ROE Adjusted by Flotation Costs at 5% for US sample	9.33	Safir Evid. p. 26

CAPITAL ASSET PRICING MODELS

Analyst	Model Sub-type	Risk Free Rate	Market Risk Premium	Beta Estimate	ROE est. (%)	References
McShane	See her Risk-Adjusted Equity Risk Premium Model					
Vander Weide	N/A – Vander Weide recommends placing no weight on CAPM results	2.95% forecast yield to maturity on L-C bonds	6.6% - Ibbotson SBBI estimate of risk premium on market portfolio – diff. between arithmetic mean return on S&P 500 vs. income return on 20-year Treasury bonds. (1937-2012)	0.73 – Average Value Line beta for his large proxy US utility group.	8.27 (including financial flexibility)	Vander Weide Evid, pp. 38-44; Exhibits 12 to 15
				0.92 – historical ratio of the average utility risk premium to the S&P risk premium	9.52 (including financial flexibility)	
Booth	Simple CAPM estimate	3.00% (Base adjusted LTC forecast)	Range: 5.0 – 6.0%	Range: 0.45-0.55	Range: 5.75-6.80, including 0.50 flotation cost allowance	Booth Evid, p. 74 & 75; App. B (MRP), p. 16, App. C (beta est), pp. 10-14
	Adjusted CAPM (Simple CAPM plus 0.40 for credit spread and 0.80 for Operation Twist.	3.80% (Base adjusted LTC forecast)	Same as above	Same as above	Range: 6.95 to 8.00 (2013) 7.00 -8.00 Including flotation cost allowance	Booth Evid, p. 85, 93-94 (adjustments); other values same as above.
				Point estimate for CAPM	7.5	Booth Evid. p. 95

…**CAPITAL ASSET PRICING MODELS**

Analyst	Model Sub-type	Risk Free Rate	Market Risk Premium	Beta Estimate	ROE est. (%)	References
Safir	Canadian CAPM	4.00%	5.96% (Total mkt. return minus the est annual long bond income return (both 1924-2010)	Adjusted beta: 0.36 (weighted 0.67 raw + 0.33 mkt tendency) Calculated raw beta (Sched 1): 0.25 Long-run mkt tendency beta (Schaeffler & Weber survey): 0.58	6.15	Safir Evid. p. 12-15 and Schedule 1
	US CAPM	4.50%	6.62% (Total mkt. return minus the est annual long bond income return (both 1926-2011)	Adjusted beta: 0.48 (weighted 0.67 raw + 0.33 market tendency) Calculated raw beta (Schedule 2): 0.43 Long-run market tendency beta (Schaeffler & Weber survey): 0.58	7.68	Safir Evid. p. 18 and Schedule 2
				Adjusted by flotation cost allowance of 0.32% for the Canadian ROE estimate	6.47	Safir Evid. p. 12
				Adjusted by flotation cost allowance of 0.40% for the US ROE estimate	8.08	Safir Evid. p. 18

EQUITY RISK PREMIUM MODELS

Analyst	Model Sub-type	Risk Free Rate	Market Risk Premium	Beta Estimate	ROE est. (%)	References
McShane	Risk-adjusted ERP (variant of CAPM)	4.0% (forecast 30 yr Long-Can bond yield)	7.25-7.5% (based on bond income returns < 8.0%; table 12, pp. 82, 98 of her evid)	0.65-0.70 adjusted (0.65 based on Bloomberg adjusted betas for 5 Can utilities or raw beta for TSX utilities index adjusted per Bloomberg (.67 raw+0.33; see McShane evid. p. 97. For upper end of range see table 21, p. 98)	Range: 8.9-9.1% Est. 9.0%	McShane Evidence, p. 98
	DCF Based ERP Models: 1998-2012 Q1 US Sample					
	Constant Growth – Single variable (L-C bond rate)	4.0% (forecast 30 yr L-C yield)	5.7% at 4.0% risk free rate (see table 22, p. 100)	N/A	9.7%	McShane evid. p. 99-101
	3-stage growth - single variable	4.0%	5.7 or 5.8% at 4.0 risk free rate (apparent inconsistency between tables 24 and 25)	N/A	9.7	McShane evid p. 99-105
	Constant Growth – two variable (L-C bonds and 30 year A-rated utility yield spreads)	4.0%	5.5%	N/A	9.5	McShane evid at pp. 102-105, esp. table 25.
(cont….)	3-stage growth – two variable	4.0%	5.6%	N/A	9.6	McShane evid at pp. 102-105, esp. table 25.

…**EQUITY RISK PREMIUM MODELS**

Analyst	Model Sub-type	Risk Free Rate	Market Risk Premium	Beta Estimate	ROE est. (%)	References
McShane (cont. from previous page)	*DCF Based ERP Models*: 1998-2012Q1 US Sample (continued from previous page)					
	Quarterly US utility ROE's as proxy for utility cost of equity – single variable	4.0%	6.2%		10.2 (McShane gives no weight)	McShane evid at pp. 102-105, esp. table 25
	Quarterly US utility ROE's– two variable	4.0%	6.1%		10.1 (no weight)	McShane evid at pp. 102-105, esp. table 25
	Constant Growth over A-rated bond	5.35% (4.0% L-C bond yield + 135 bp)	4.0		9.4	McShane evid at p. 105, table 26
	3-stage growth over A-rated bond	5.35% (as above)	4.2		9.6	McShane evid at p. 105, table 26
	Allowed ROEs over A-rated bond	5.35% (as above)	4.8		10.2 (no weight)	McShane evid at p. 105, table 26
(cont…)	Summary of results DCF based results	4.0%% (f'cast L-C bond yields) or 5.35% (A-rated utility bond yields	Range of regression results		9.4 – 9.7	McShane Evid. p. 106
			Bare bones Cost of Equity (mid-point)		9.6	

APPENDIX F

…**EQUITY RISK PREMIUM MODELS**

Analyst	Model Sub-type	Risk Free Rate	Equity Returns	Bond Inc. Returns	Utility Risk Premium	Change in Bond Yield/Ret	Change in Util Risk Pr.	Utility Equity Risk	ROE est. (%)	References
McShane (cont. from previous page)	Historic Utility ERP- Can utilities (1956-2011)	4.0%	12.1%	7.3%	4.8%	-3.3%	+1.6%	6.4%	10.5 (based on all 3 Historic Utility ERP tests)	McShane Evid. pp. 106-108
	Historic Utility ERP- US Gas Utilities (1947-2011)	4.0%	11.9%	5.9%	6.0%	-1.9%	+1.0%	7.0%		McShane Evid. pp. 106-108
	Historic Utility ERP- US Elec Utilities (1947-2011)	4.0%	11.0%	5.9%	5.1%	-1.9%	+1.0%	6.2%		McShane Evid. pp. 106-108
	Summary of All Risk Premium Tests	Risk-Adjusted Equity Market							9.0	McShane Evid p. 109, table 29
		DCF-based							9.6	
		Historic Utility							10.5	

Vander Weide			Stock Returns	Avg Bond Yields	Risk Premium	Expected bond yield		
(cont…)	Ex-Post Risk Premium	S&P/TSX Utilities: 1956-2011	11.99%	7.33%	4.7%	N/A	N/A	Vander Weide Evid, pp. 32-35, 44; and Exhiibits 8 & 9
		BMO Utilities: 1983-2011	16.01	7.24	8.8%	N/A	N/A	
		Average risk premium of the two samples			6.7%	2.95%	10.15 (rounded to 10.2% (incl. 0.5% flotation	

…**EQUITY RISK PREMIUM MODELS**

Analyst	Model sub-Type	Sample Group and Period	DCF Growth rate	Risk Prem.	Risk Free Rate	Roe est. (%)	References
Vander Weide (cont. from previous page)	Ex-Ante Risk Premium	Natural Gas group selected from S&P nat. gas companies	DCF growth rate and analysis by individual company from I/B/E/S forecast of earnings growth for each month. (Exhibits 10 & 11)	8.0%	2.95%	11.5 (incl flotation)	Vander Weide Evid. pp. 35-38 and App. 3, Exhibits 10, 11 and 24
		Moody's group of 24 Electric utilities.		7.5%	2.95%	11.0 (incl flotation)	
Booth	N/A						
Safir	N/A						

COMPARABLE EARNINGS TESTS

Analyst	Model sub-Type	Sample Group and Period	ROE est. (%)	References
McShane	Book-value based	21 Canadian unregulated companies: 2004-2011 (incl downward adjustments of 125 to 150 bps)	Range: 11.0-12.0 Est: 11.5	McShane Evid, pp. 113-117, 119 and App E.
Vander Weide	N/A		N/A	
Booth	Book-value based	Corporate Canada (Statistics Canada reported earnings): 1987-2011, and TSX composite for the same period	Market ret: 9.3	Booth Evid. p. 93 and App. E, Schedule 2
Safir	Market-value based	Canadian sample: same 21 Canadian Companies as used by McShane: 2004-2011	6.85	Safir Evid. pp. 28-35 and Schedules 5 and 6
	Market-value based	US Sample: 31 US companies in the consumer goods, industrial goods or service sectors using same selection critiera as McShane used for her Canadian sample: 2004-2011.	5.81	
	Weighted average giving Canadian results twice the weight of the US results		6.50	

SUMMARY OF ROE RECOMMENDATIONS

Analyst	Method	Model Sub-Type	'Bare-bones' Cost of Equity"	Financing Flexibility Adjustment	ROE est. (%)	References
McShane	DCF		9.4%	0.50%	9.9	McShane Evid. pp. 6 and 119
	Risk Premium	Risk-Adj Equity Mkt	9.0%	0.50%	9.5	
		DCF-based	9.6%	0.50%	10.1	
		Historic Utility	10.5%	0.50%	11.0	
	Comp. Earning		N/A	N/A	11.5	
VanderWeide	DCF		9.5%	0.5%	10.15	Vander Weide Evid. p. 44 and Exhibit 7
	CAPM	Calulates ROEs (incl. flotation allowance) of 8.27% and 9.52% but gives the CAPM results no weight			N/A	Vander Weide Evid. p. 44 and Exhibits 12 and 13
	Risk Premium	Ex-Post RP	9.65%	0.50%	10.15 (10.2)	Vander Weide Evid. pp. 35, 38 and 44, and Exhibits 8, 9, 10, 11 and 24
		Ex-Ante RP (average of Natural Gas and Elec. Samples	10.75%	0.50%	11.25	
Booth	Discounted Cash Flow	All of Canadian market	9.28% for the market as a whole		N/A	Booth Evid. p. 93-94 and App. D, pp. 9-10
		US market – S&P 500	9.5% - 10.5% for the US market		N/A	
	CAPM	Adjusted for credit spread and Operation Twist	6.95-7.50%	0.50%	7.50	Booth Evid. pp. 93-94
	Comp. Earning	Market Returns	9.3% for Corporate Canada (StatsCan)		N/A	Booth Evid, p. 93-94; App. E, pp. 2-7
Safir	DCF	Canadian Sample	8.99%	0.47%	9.46	Safir Evid, p. 26
		US Sample	8.86%	0.47%	9.33	
	CAPM	Canadian Sample	6.15%	0.32%	6.47	Safir Evid. p. 12
		US Sample	7.68%	0.40%	8.08	Safir Evid. p. 18
		Weighted average	N/A	N/A	7.01	Safir Evid, p. 19
	Comp Earning	Market value based results; wighted avg of Can and US results			6.50	Safir Evid. p. 33

APPENDIX G

LIST OF ACRONYMS

AAM	Automatic Adjustment Mechanism
AECO	Alberta's gas trading price
AES	Alternative Energy Services
AMPC	Association of Major Power Consumers
AUB	Alberta Utilities Commission
B	Beta
BA	Bankers' Acceptances
BCPSO	British Columbia Pensioners' and Seniors' Organization
BCUC	British Columbia Utilities Commission
BC Utility Customers	Collectively AMPC, BCPSO, CEC
bps	Basis points
CAPM	Capital Asset Pricing Model
CDOR	Canadian Dealer Offered Rate
CEC	Commercial Energy Consumers of B.C.
CEA	Clean Energy Act
Concentric	Concentric Economic Advisers
CPCN	Certificate of Public Convenience and Necessity
DCF	Discounted Cash Flow
ERP	Equity Risk Premium
FRS	Fair Return Standard
FBCU	FortisBC Utilities
Fl PUC	Florida Public Service Commission

LIST OF ACRONYMS

GCOC	Generic Cost of Capital
GJ	Gigajoule
ICG	Industrial Customers Group of FortisBC Inc.
LCBF	Long Canada Bond Forecast
NEB	National Energy Board
O&M	Operation and Maintenance
PBR	Performance Based Ratemaking
PNG	Pacific Northern Gas
PRMP	Price Risk Management Plan
OEB	Ontario Energy Board
ROE	Return on Equity
r_m	Expected return on the market
r_f	Risk free rate
$r_m - r_f$	Market risk premium
r_e	Opportunity cost of equity
Régie	Régie de l'Energie
TES	Thermal Energy Services
Terasen, TGI	Terasen Utilities, Terasen Gas Inc.
UCA	Utilities Commission Act
UPC	Use Per Customer

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BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER G-47-14

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IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

Generic Cost of Capital Proceeding
Stage 2

BEFORE: D.A. Cote, Commissioner/Panel Chair
L.A. O'Hara, Commissioner
C. van Wermeskerken, Commissioner

March 25, 2014

O R D E R

WHEREAS:

A. By Order G-20-12 dated February 28, 2012, the British Columbia Utilities Commission (Commission) established a Generic Cost of Capital (GCOC) proceeding to review: (a) the setting of the appropriate cost of capital for a benchmark low-risk utility; (b) the possible return to a Return on Equity Automatic Adjustment Mechanism (ROE AAM) for setting an ROE for the benchmark low-risk utility; and (c) the establishment of a deemed capital structure and deemed cost of capital methodology, particularly for those utilities without third-party debt. The Order also divided all participating public utilities regulated by the Commission into Affected Utilities and Other Utilities for the purpose of the GCOC proceeding;

B. By Order G-148-12 dated October 11, 2012, the Commission determined, among other matters, that: (a) the GCOC proceeding would proceed by way of an oral public hearing commencing December 12, 2012; (b) FortisBC Energy Inc. (FEI) in its pre-amalgamation state would serve as the benchmark utility; and (c) a Stage 2 would be added to the proceeding for the purpose of reviewing all other utilities against the benchmark;

C. A Procedural Conference for Stage 2 was held on April 25, 2013. The following utilities appeared and made submissions at the Procedural Conference: FortisBC Utilities (FBCU) comprising FortisBC Energy Inc. (FEI), FortisBC Energy (Vancouver Island) Inc. (FEVI), FortisBC Energy (Whistler) Inc. (FEW), and FortisBC Inc. (FBC); Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd. (collectively, PNG); FortisBC Alternative Energy Services Inc. (FAES); Corix Multi-Utility Services Inc. (Corix); River District Energy Limited Partnership (RDE); and Central Heat Distribution Limited (Central Heat);

D. The Industrial Customers Group of FBC (ICG) and the British Columbia Pensioners' and Seniors' Organization *et al.* (BCPSO) also appeared and made submissions at the Procedural Conference;

.../2

E. On May 10, 2013 the Commission issued Order G-75-13 and the accompanying Decision on Stage 1;

F. By Order G-77-13 dated May 13, 2013, the Commission determined that the Stage 2 review would take place by way of a written hearing for all applicant utilities, in accordance with the three Groupings of Utilities and the Regulatory Timetable that form Attachments 1 and 2 respectively to Appendix A of Order G-77-13. The Regulatory Timetable provided for the filing of evidence by the utilities, two rounds of Information Requests (IRs) on that evidence, the filing of Intervener evidence, and one round of Information Requests on that evidence. Order G-77-13 also deferred the decision on the review format for FBC until the Commission Panel had reviewed FBC's Stage 2 evidence;

G. The following utilities filed evidence: FEVI and FEW (jointly), Corix, RDE and Central Heat (jointly), FBC, PNG, and FAES. ICG filed Intervener Evidence;

H. By Order G-121-13 dated August 14, 2013, the Commission determined that the review of FBC would take place in a written hearing format in accordance with the Regulatory Timetable that forms Attachment 2 to Appendix A of Order G-77-13;

I. The following utilities filed Final Submissions: FEVI and FEW (jointly), Corix, RDE and Central Heat (jointly) FBC, PNG, and FAES ;

J. The following Interveners filed Final Submissions: ICG and BCPSO. BCPSO filed four separate Final Submissions: one for FortisBC; a second for FEVI and FEW; a third for PNG; and a fourth for the Group 3 Utilities;

K. FEVI and FEW (jointly), Corix, RDE and Central Heat (jointly) FBC, PNG, and FAES all filed Reply; and

L. The Commission has considered the evidence and the submissions of the Parties all as set forth in the Decision issued concurrently with this Order.

NOW THEREFORE the Commission orders as follows:

1. The common equity component of the capital structure and equity risk premium over the Benchmark for the following FBCU, effective January 1, 2013 are:

	Common Equity Component (%)	Equity Risk Premium (bps)
FEVI	41.5	50
FEW	41.5	75
FBC	40.0	40

.../3

2. The common equity component of the capital structure and equity risk premium over the Benchmark for the following PNG utilities, effective January 1, 2013 are:

	Common Equity Component (%)	Equity Risk Premium (bps)
PNG-West	46.5	75
PNG (N.E.) FSJ/DC	41.0	50
PNG (N.E.) TR	46.5	75

3. The common equity component for small TES utilities, effective January 1, 2013, is a minimum default capital structure consisting of 57.5 percent debt and 42.5 percent common equity. The minimum default risk premium over the Benchmark is 75 bps except for Dockside Green Energy Inc. where its existing 100 bps equity risk premium will not be reduced as a result of establishing the minimum default Equity Risk Premium. The minimum default capital structure and equity risk premium allowed for Central Heat is transitional until a decision on its next revenue requirement application.

	Common Equity Component (%)	Equity Risk Premium (bps)
Kelowna District Energy System	42.5	75
Dockside Green Energy Inc.	42.5	100
Univercity at Burnaby Mountain	42.5	75
Central Heat Distribution Limited	42.5	75
River District Energy Limited Partnership	42.5	75

4. FEVI, FEW, FBC and the PNG-West, PNG (N.E.)-FSJ/DC and PNG (N.E.)-TR are to each file, within 40 days of the date of this Order, a document setting out:

   a) How and when it will implement the change to its capital structure;

.../4

BRITISH COLUMBIA UTILITIES COMMISSION	
ORDER NUMBER	G-47-14

b) Amended rate schedules in accordance to the cost of equity for each utility as determined in the Decision issued concurrently with this Order; and

c) A proposal on the treatment of the difference between the interim rates being charged to customers and the permanent rates established by this Order.

5. Central Heat is directed to file, within 40 days of the date of this Order, a document setting out:

a) How and when it will implement the change to its capital structure; and

b) A permanent Steam Tariff Schedule of charges that reflects the changes to the cost of equity as determined in the Decision issued concurrently with this Order;

c) A proposal on the treatment of the difference between the interim rates being charged to customers and the permanent rates established by this Order.

6. The Kelowna District Energy System, Dockside Green Energy Inc. UniverCity and River District Energy Limited Partnership are each to file, within 40 days of the date of this Order, a document setting out:

a) Whether they would implement the minimum default capital structure and equity risk premium for rate setting, and if so, the time line; or

b) Whether they would let the existing contractual customer rates, if applicable, take their course, and if not, their proposed treatment of the difference between the current rates being charged to the customers and the allowed rates as determined by this Order.

7. Each utility is to comply with all other applicable directives in the Decision issued concurrently with this Order.

DATED at the City of Vancouver, in the Province of British Columbia, this 25th day of March 2014.

BY ORDER

Original signed by:

D.A. Cote
Commissioner/Panel Chair

Attachment

IN THE MATTER OF

BRITISH COLUMBIA UTILITIES COMMISSION

GENERIC COST OF CAPITAL PROCEEDING
(STAGE 2)

DECISION

March 25, 2014

Before:

D.A. Cote, Commissioner/Panel Chair
L.A. O'Hara, Commissioner
C. van Wermeskerken, Commissioner

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EXECUTIVE SUMMARY

This Stage 2 Decision addresses cost of capital awards for all utilities as compared to the established Benchmark, FortisBC Energy Inc. (FEI). Order G-75-13 issued on May 10, 2013, determined the Stage 1 Benchmark cost of capital. In that ruling, the British Columbia Utilities Commission established the common equity ratio and return on equity (ROE) for the Benchmark at 38.5 percent and 8.75 percent respectively. It also reinstated a reliance on an Automatic Adjustment Mechanism (AAM) formula for annual ROE adjustments subject to the long Canada bond yield of 3.8 percent being met or exceeded.

The Stage 2 proceeding was set to determine what individual circumstances apply to each utility in comparison to the Benchmark in setting the debt/equity ratio and allowed ROE. To do this, the Commission Panel is to compare each utility to the Benchmark and determine the level of difference in circumstances with particular attention to differences in risk. Stage 2 was categorized under three groups:

- **Group 1:** The FortisBC Utilities comprised of FortisBC (Vancouver Island) Inc. (FEVI), FortisBC Energy (Whistler) Inc. (FEW), and FortisBC Inc. (FBC);
- **Group 2:** Pacific Northern Gas Ltd. (PNG) companies comprised of PNG-West, PNG (N.E.) Fort St. John/Dawson Creek (FSJ/DC) and PNG (N.E.) Tumbler Ridge (TR); and
- **Group 3:** The Companies comprised of Corix Utilities Inc. (Corix), Central Heat Distribution Limited (Central Heat), and River District Energy Limited Partnership (RDE) as well as FortisBC Alternative Energy Services Inc. (FAES).

The Stage 2 proceeding was reviewed by way of written hearing and relied upon a number of determinations in the Stage 1 proceeding that had application. These included the use of Canadian vs. US data, the weight placed on decisions from other Canadian jurisdictions, the importance of credit ratings and related metrics, and reliance upon the stand-alone principle.

Contextual Issues

Prior to making determinations on the Stage 2 utility applications the Commission Panel addressed a number of contextual issues. Key among these are the following:

Basis for Comparing Against the Benchmark Utility

The Commission Panel determined that the primary reference point for the Stage 2 proceeding is FEI, the Benchmark as assessed in the period leading to the Stage 1 Decision. Additionally, the Panel finds that evidence related to previous cost of capital decisions will also be considered but only in those cases where the information contributes to a more complete evidentiary base.

Need for a Minimum Default Capital Structure and Risk Premium

The Commission Panel is persuaded that Thermal Energy Services (TES) projects "are more similar than different" and for regulatory efficiency a default structure is appropriate. A minimum default capital structure and equity risk premium is set for all TES Stream B projects with a capital cost in excess of a minimum threshold of $500,000 and below a maximum of $15,000,000.

Small Firm Effect- Applicability of Ms. Ahern's Evidence

There has been a great deal of empirical research into what has been termed the small firm effect. The Commission Panel is not persuaded that the Companies' expert Ms. Ahern's use of this empirical research has application to the Stage 2 proceeding. Therefore, the Panel gives no weight to Ms. Ahern's framework for determining the cost of capital for small utilities. However, small size factors will be considered among a range of business and financial risks that utilities face.

TES Projects –What is Being Regulated

It was determined that the timeline for the consideration of risk must begin when the project proponent is seeking equity funding and must encompass risks associated with efforts to secure agreements to initiate TES projects. A second phase of risk assessment begins when a project

comes on stream following a utility successfully competing for a project in the market. The Panel has determined that Stage 2 will consider all risks faced by a project investor over the business development, construction and operational phases.

The determinations related to these contextual issues have provided guidance to the Panel on how to consider the evidence in making individual Stage 2 utility cost of capital decisions.

Cost of Capital – Stage 2 Utilities

FortisBC (Vancouver Island) Inc. and FortisBC (Whistler) Inc.

The Commission Panel has determined that an equity ratio of 41.5 percent and an equity premium of 50 basis points (bps) for FEVI and an equity ratio of 41.5 percent and an equity premium of 75 bps for FEW is appropriate effective January 1, 2013.

As compared to the Benchmark, the Panel places significant weight on the small service areas and less diverse customer and economic bases for both FEVI and FEW. Minimal weight has been applied to supply and competition risks for both utilities but consideration has been given to the importance of maintaining current credit ratings for FEVI in determining an appropriate equity ratio. An additional 25 bps was awarded FEW in recognition of risks related to its small size.

By Order G-21-14 dated February 26, 2014, and accompanying Decision, the Commission approved the amalgamation of FEI, FEVI and FEW subject to confirmation that the Lieutenant Governor in Council has consented to the amalgamation and that it has been effected. Relying upon the Commission's recommendations in the Amalgamation Reconsideration Decision, the Commission Panel has determined that once amalgamation has been effected, the capital structure and ROE for the amalgamated utility will be the same as FEI, the Benchmark.

FortisBC Inc.

The Commission Panel has determined that an equity ratio of 40 percent and an equity risk premium of 40 bps are appropriate for FBC effective January 1, 2013.

The evidence supports the finding that FBC faces additional price competitiveness risk as compared to the Benchmark and there is some additional risk related to small size. However, the Commission Panel finds no substantial difference in supply risk in comparison to the Benchmark and in regard to operational risks, there was no basis on which to establish the potential impact of any differential in risk which may exist. Concerning the equity risk premium, the Panel is satisfied that maintenance of the current 40 bps premium is justified but is not persuaded that FBC has made a case for further differential as compared to the Benchmark.

PNG Utilities

Approved common equity ratios and equity risk premiums for PNG are as follows:

PNG-West:	Common equity ratio:	46.5 percent
	Equity risk premium:	75 bps
PNG (N.E.)-FSJ/DC:	Common equity ratio:	41.0 percent
	Equity risk premium:	50 bps
PNG (N.E.)-TR:	Common equity ratio:	46.5 percent
	Equity risk premium:	75 bps

The Commission Panel placed significant weight on PNG-West's issues with customer growth, market demand and throughput. PNG (N.E.)-TR was considered to have similar risks to those of PNG-West but the Panel placed greater weight on factors related to size as well as difficulties with supply than those of customer growth, demand and throughput. The evidence related to credit ratings and the desire to maintain a credit rating higher than non-investment grade for all PNG utilities also received some weight. The additional 25 bps equity risk premium for PNG-West and PNG (N.E.)-TR reflects the difference in short term risk between the PNG utilities as well as in comparison to the Benchmark.

In consideration of PNG's unique set of circumstances the Commission Panel has assessed the business risks which exist today and little weight was placed on the potential for change to these risks in the future. Given the potential for development of the Liquefied Natural Gas industry and other initiatives and their impact on PNG's business risk, the Panel has directed the PNG utilities to include an updated business risk assessment in all future revenue requirements applications.

TES Utilities

The Commission Panel has established a minimum default structure of 42.5 percent common equity and a default equity risk premium of 75 bps for all regulated TES projects. However, the project proponent retains the right to submit evidence in support of a higher risk premium than the default premium.

Specifically, the 42.5 percent equity ratio and 75 bps equity risk premium default structure was set for the FAES Kelowna District Energy System project and the Companies' projects inclusive of UniverCity at Burnaby Mountain and River District Energy Partnership. Dockside Green's equity ratio has been set at 42.5 percent and it equity risk premium at 100 bps based on its unique set of risks. Central Heat Distribution Limited was also awarded the 42.5 percent equity ratio and 75 bps equity risk premium, but only as transitional amounts. The Commission Panel directs Central Heat to file within next 12 months either a 2016 or multi-year revenue requirement application with the Commission reflecting a new business plan with a comprehensive justification for the equity thickness and equity risk premium.

1.0 INTRODUCTION

1.1 Background

The British Columbia Utilities Commission (Commission, BCUC) issued Order G-20-12 on February 28, 2012, to initiate the Generic Cost of Capital (GCOC) proceeding. The Order was issued pursuant to section 82 of the *Utilities Commission Act* (Act, UCA) to review and determine, among other things, the following:

- The Return On Equity (ROE) and capital structure for a benchmark low-risk utility;
- The possible return to an Automatic Adjustment Mechanism (AAM) to set the ROE for the benchmark utility each year; and
- A deemed capital structure and deemed ROE for small utilities, particularly those utilities without third party debt.

Order G-20-12 established that all public utilities would be considered applicants in the GCOC proceeding and included a preliminary scoping document, which set out a list of matters to be examined and determined within the proceeding. Order G-148-12 established that FortisBC Energy Inc. (FEI) in its pre-amalgamation state would serve as the benchmark utility (Benchmark) for the GCOC proceeding. It was determined that the proceeding would have two stages: Stage 1 to establish the ROE and capital structure for the Benchmark, followed by Stage 2 establishing a cost of capital for other utilities as compared to the Benchmark.

The intent of this approach as well as the relationship between the Stage 1 and Stage 2 proceedings are outlined in the following.

1.1.1 Purpose of the GCOC Proceeding

The GCOC proceeding was initiated specifically:

I. To establish a method to determine the appropriate cost of capital for a benchmark low-risk utility in British Columbia, commencing January 1, 2013, and to establish how the Benchmark Return on Equity (ROE) will be reviewed, and if required, adjusted on a regular basis;

II. To establish a generic methodology or process on how to establish each utility's cost of capital based on the cost of capital for a benchmark low-risk utility; and

III. To establish a framework for determining the appropriate cost of capital for other smaller utilities in the province.

(Stage 1 Decision, pp. 2-3)[1]

On May 10, 2013, the Commission rendered the Stage 1 Decision. Some of the key determinations made with reference to the Benchmark include the following:

I. A common equity ratio of 38.5 percent and a debt ratio of 61.5 percent is to be applied to the Benchmark. (Equity thickness as a percentage of total capital, debt/equity ratio of 61.5/38.5 also used interchangeably)

II. The return on equity of 8.75 percent inclusive of a 0.50 percent allowance for financial flexibility is appropriate for the Benchmark. This was effective January 1, 2013, and will remain until December 31, 2015, subject to annual adjustment as a result of applying an automatic adjustment mechanism (AAM) formula.

III. The AAM for determination of the benchmark ROE on an annual basis was established. Implementation of the AAM will be subject to an actual Canada bond yield of 3.8 percent being met or exceeded. Therefore, the AAM formula will not be in effect as long as the long Canada bond yield is below 3.8 percent.

[1] In the Matter of British Columbia Utilities Commission Generic Cost of Capital Proceeding (Stage 1) Decision, May 10, 2013 [hereinafter Stage 1 Decision].

In addition, the Commission determined that the small size factor should be further considered in the Stage 2 proceeding, but only as one of the many business and financial risks small utilities or projects are exposed to. The Commission was not sufficiently persuaded to put any weight to the empirical studies reviewed to date. Utilities were encouraged to use the Commission developed risk matrix as a tool. However, utilities were free to use other methodologies or approaches to justify their risk differential in relation to the Benchmark.

It is noteworthy, that at the outset it was not clear what the appropriate benchmark utility should be. For instance, the Commission raised a concern whether some of the new business initiatives being undertaken by FEI have already been recognized by the financial markets; and whether amalgamation will impact its risk profile. Ultimately, the Commission believed that one of the main reasons to establish a benchmark utility is to provide a stable point of reference against which other utilities can be measured and compared to over the longer term. To facilitate such comparison, the Commission was of the view that the benchmark utility should as closely as is reasonable represent a mature, stable "pure play" gas distribution utility. (Stage 1, Exhibit A-17) In summary, FEI now is the Benchmark, but is no longer described as a low-risk utility.

1.2 Stage 2 Proceeding

The main purpose of Stage 2 is to determine what individual circumstances apply to each utility compared to the Benchmark, in setting the overall return on investment (debt/equity ratio and allowed ROE). In doing so, the Commission Panel must compare each utility to the Benchmark and assess whether there are any differences in circumstances between the two, particularly with respect to risk. If there are differences, the Commission Panel must determine how these differences should be reflected in the debt/equity ratio and equity risk premium. If there are no significant differences, the equity/debt ratio and risk premium should be the same as those of the Benchmark. Accordingly, the Commission Panel must:

1. Assess the risks for each utility as compared to FEI, the Benchmark; and
2. Quantify the risk of each utility as compared to the Benchmark in:
   a. allowed equity thickness (equity component in capital structure); and
   b. allowed equity risk premium.

The process relevant to Stage 2 of these proceedings can be summarized as follows.

1.2.1 Key Participants

Utilities that filed evidence were:

- **Group 1:** The FortisBC Utilities (FBCU) comprised of FortisBC Energy Inc. (FEI),[2] FortisBC (Vancouver Island) Inc. (FEVI), FortisBC Energy (Whistler) Inc. (FEW), and FortisBC Inc. (FBC);
- **Group 2:** Pacific Northern Gas Ltd. (PNG) companies comprised of PNG-West, PNG (N.E.) Fort St. John/Dawson Creek (FSJ/DC) and PNG (N.E.) Tumbler Ridge (TR); and
- **Group 3:** The Companies comprised of Corix Utilities Inc. (Corix), Central Heat Distribution Limited (Central Heat), and River District Energy Limited Partnership (RDE) as well as FortisBC Alternative Energy Services Inc. (FAES).

The only Interveners were the British Columbia Pensioners' and Seniors' Organization et al. (BCPSO) and the Industrial Customers Group of FortisBC Inc. (ICG).

1.2.2 Regulatory Process

By Order G-77-13, the Commission confirmed that the Stage 1 record would form part of the Stage 2 record (Exhibit A-35). Stage 2 evidence was reviewed by way of a written hearing. A list of Procedural Orders is provided in Appendix A.

[2] FEI is not an applicant utility in Stage 2.

On December 10, 2012, Order G-187-12 established the currently allowed ROE and capital structure for the benchmark utility and all regulated entities in B.C. that rely on the benchmark utility to establish rates, except British Columbia Hydro and Power Authority (BC Hydro), as interim effective January 1, 2013. Any determinations on the premia for the regulated utilities over the Benchmark ROE and capital structure will be made in Stage 2.

1.3 Guidance from Stage 1 Determinations

Within the Stage 1 Decision there were a number of determinations made which have application in the Stage 2 proceeding. Among these are the following:

1.3.1 Use of Canadian vs. US Data

The Commission, in keeping with previous decisions, accepted that Canadian utilities need to be able to compete in a global marketplace and be allowed a return for them to do so. In addition, the Commission accepted that the amount of Canadian data upon which to rely continues to be limited. Therefore, it was recognized there may be times when natural gas companies operating within the US may prove to be a useful proxy in determining the cost of capital. Accordingly, it was determined that continuing to accept the use of historical and forecast data for US utilities and securities as outlined in the 2006 Decision[3] and again in the 2009 Decision[4] is appropriate.

1.3.2 Consideration of Other Canadian Jurisdictions

In Stage 1 many of the parties chose to utilize information and related decisions from other Canadian jurisdictions to support positions they had taken on an issue. The Commission Panel in its

[3] In the Matter of Terasen Gas Inc. and Terasen Gas (Vancouver Island) Inc. Application to Determine the Appropriate Return on Equity and Capital Structure and to Review and Revise the Automatic Adjustment Mechanism Decision, March 2, 2006 [hereinafter 2006 Decision].

[4] In the Matter of Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc., Terasen Gas (Whistler) Inc. and Return on Equity and Capital Structure Decision, December 16, 2009 [hereinafter 2009 Decision].

Stage 1 Decision noted that decisions in all jurisdictions result from the judgement of evidence specific to a region or a particular utility that in each case is unique and stated the following:

> "To the extent that the ROE and equity thickness of a specific utility in another jurisdiction can be used as a comparator, we are open to considering it if it helps inform our decision. However, considerable reliance on decisions from other jurisdictions in our view would lead to circularity that would ensure that only the status quo is maintained -- perhaps at the risk of common sense. The Commission Panel acknowledges the importance of considering the methodologies, approaches and regulatory principles related to other jurisdictions' decisions. However, we do not accept that it is appropriate for results and values to be used for the purpose of calibration in B.C."
>
> (Stage 1 Decision, p. 20)

1.3.3 Credit Ratings and Metrics

The Commission Panel acknowledged that ongoing access to debt capital at an attractive price is of benefit to the shareholder and possibly the customer. The Commission stated that it would continue to be guided by the Fair Return Standard with its three tests of financial integrity, capital attraction and comparable return in determining an appropriate capital structure and ROE. The Commission supports the maintenance of an "A" category credit rating but only to the extent that it can be maintained without going beyond what is required by the Fair Return Standard. The Commission found that maintenance of a credit rating (in the case of FEI, an "A" rating) is desirable but not at all costs. (Stage 1 Decision, p. 50)

1.3.4 Stand-Alone Principle

In its Stage 1 Decision, the Commission acknowledged the long history and importance of the stand-alone principle in Canadian utility regulation. The Panel found no reason to deviate from this principle even in the case of small utilities or projects whether or not they are part of a larger utility. This included either a "new" utility with a greenfield project and no historical performance data or an existing facility being developed into a thermal energy services (TES) project. As stated

in the Decision: "Each project needs to be considered individually and independently." (Stage 1 Decision, p. 100)

1.3.5 Use of the Commission Risk Matrix

The Stage 1 Decision made reference to the risk matrix developed by the Commission that has been used in various small TES utilities proceedings to evaluate overall risk of a given project. It was recommended that the small utilities use this risk matrix in the Stage 2 proceeding and for future projects to justify their case for the appropriate capital structure and risk premium over and above the Benchmark ROE. It was further recommended that small utilities, other than TES, could modify the matrix to facilitate comparisons of their individual short and long-term risks to those of FEI. (Stage 1 Decision, p. 101)

1.3.6 Principles for Stage 2 Framework

In addressing the issue of short-term and long-term debt in the deemed capital structure and the methodology for determining a deemed interest rate, the Commission reaffirmed certain principles for the Stage 2 GCOC proceeding framework.

(i) The general principles and criteria outlined by the Corix and FBCU experts for setting the capital structure for any utility in general and the deemed capital structure specifically for the small utilities are accepted as they are consistent with the principles adopted for setting the benchmark ROE;

(ii) Deemed debt is appropriate for small utilities in cases where raising debt is inefficient;

(iii) Deemed debt rates and duration should reflect the particular circumstances of each utility. Accordingly, the Commission should continue to address the cost of deemed debt for each utility separately on a case-by-case basis; and

(iv) Risk assessment of small utilities, especially the TES projects, must include consideration of rate setting mechanisms, deferral account treatment, length of term and the overall risk/reward equation.

(Stage 1 Decision, pp. 104-105)

The Commission also raised two questions to be addressed more comprehensively in Stage 2:

- Can the combination of the deemed debt/equity ratio and the allowed ROE sufficiently compensate for the unique risks of a particular small utility or project?
- How important is it to maintain consistency between the risk premium determination and assigning a deemed credit rating for a small utility without third party debt? For instance, would it be reasonable to allow no risk premium over FEI for a TES project while setting the debt rate based on a BBB bond rating?

(Stage 1 Decision, p. 105)

1.4 Approach to the Decision

Prior to discussing the attributes of the individual applications of the Stage 2 utilities, the Commission Panel has addressed a number of broader questions and issues related to this Decision in Section 2, Context and Issues. Determinations related to these contextual issues provides direct guidance to the Panel with respect to how it will consider the evidence.

Following a discussion of these issues the Commission Panel has reviewed the applications of the applicant utilities in Section 3.0. Finally, Section 4.0 addresses Other Matters resulting from the cost of capital determinations.

2.0 CONTEXTUAL ISSUES

2.1 Basis for Comparing against the Benchmark Utility

As noted in Section 1.1.1, one of the purposes of the GCOC proceeding was to create a methodology or process on how to establish each utility's cost of capital based on the cost of capital for the Benchmark. The Stage 1 proceeding established the cost of capital for the Benchmark. The Stage 1 Decision outlined that Stage 2 of this proceeding "will be primarily concerned with business risk assessment relative to the benchmark. More specifically, public utilities will be called upon to provide evidence as to how they differ from FEI with respect to business risk." Given that the Benchmark is no longer considered to be low risk, the Commission noted that business risks faced may be either higher, lower, or the same as FEI, the Benchmark.

In the Stage 1 Decision the issue arose as to the appropriate reference point from which to compare the level of change in FEI's long-term risk. The Commission, noting that the 2009 Decision was the most recent proceeding, accepted that the period leading up to it was a reasonable reference point although the 2006 Decision could be used where appropriate. Based on these reference points, the Commission made its Stage 1 determinations. (Stage 1 Decision, p. 16)

In this, the Stage 2 proceeding, the appropriate reference point has been raised again. Specifically, the question has arisen as to whether an appropriate reference point for this proceeding is the Benchmark as established in Stage 1 as advocated by some parties. In the alternative, some have held that the appropriate point of reference is the 2009 ROE proceeding as it was in Stage 1 or even some earlier point in time.

2.1.1 Positions of Utilities

FortisBC Energy (Vancouver Island) Inc. and FortisBC Energy (Whistler) Inc.

Based on their submissions, FEVI and FEW seem to have used a combined approach relying in some cases on a first principles approach or a comparison against the Benchmark as defined in the Stage 1 proceeding and in others, as compared against the FEI in prior decisions. In FEVI's and FEW's application in Stage 2, business risk relative to the Benchmark was assessed in two ways: the business risk relative to the current Benchmark and as changes in their risk profile since 2009. Their expert, Ms. McShane described the focus for this proceeding as "how FEVI's and FEW's current business risks compare to those of FEI and whether there has been any material change in the relative business risks of FEVI and FEW as compared to FEI since 2009." (Exhibit B1-71, Appendix B, Ms. McShane's Evidence, p. 7)

FortisBC Inc.

The approach taken by FBC relies primarily on the current Benchmark as a reference for comparison. It states in evidence that the last time the Commission performed a comprehensive review of FBC's common equity risk premium ratio and equity was during its 2005 revenue requirements application when the common equity ratio of 40 percent and risk premium of 40 basis points was reaffirmed.[5] (Exhibit B1-72, Evidence, p. 1) FBC's expert witness, Ms. McShane, described her focus or approach in this proceeding as providing "an overview of FBC's business risk, and where possible or relevant, a comparison with FEI, the benchmark utility, inasmuch as the Commission's focus in Stage 2 is a review of all other utilities against the benchmark utility." (Exhibit B1-72, Appendix B, Ms. McShane's Evidence, p. 11) In addition, Ms. McShane submits that a first principles approach is appropriate for FBC, and less so for FEVI and FEW because the Commission has not comprehensively evaluated FBC's business risks since 2005, more than eight years ago. (Exhibit B1-84, Rebuttal Evidence, pp. 1-2)

[5] In the Matter of FortisBC Inc., 2005 Revenue Requirement Application (RRA), 2005-2014 System Development Plan, 2005 Resource Plan, Decision, May 31, 2005 [hereinafter 2005 RRA Decision].

The evidence of ICG's expert witness, Dr. Safir, is that the differential risk between FBC and the Benchmark had narrowed thereby justifying a reduction in equity thickness and equity risk premium. FBC asserts that Dr. Safir's evidence is flawed. FBC submits that one of the fundamental problems with Dr. Safir's analysis is that it is based on the assumption that the pre-Stage 1 differential was the product of the Commission's assessment of FBC's business risk in relation to Terasen Gas Inc. (now FEI) in 2009. FBC stresses that the regulatory chronology shows that the business risk differential was last assessed in 2005 and the differential in common equity ratios between FBC and the Benchmark disappeared in 2009 because of the Commission's determinations with respect to Terasen Gas Inc. (TGI) alone. When it was last assessed as part of FBC's 2005 revenue requirement application (RRA), the Commission's 2005 RRA Decision approved a 40 percent common equity ratio that was 7 percent higher than the Benchmark's equity thickness at the time. FBC also submits that in the 2009 Decision relied upon by Dr. Safir, FBC was not an applicant nor did it submit evidence. FBC notes that Dr. Safir's "general approach would be reasonable if the Commission had considered FBC's relative business risk and allowed return in 2009, but it hadn't" (FBC Final Submission, pp. 39-41).

In Reply, FBC submits that a "first principles" assessment is appropriate given the passage of time since 2005 but nonetheless, it has provided evidence to permit the Commission to use 2005 as a point of reference (FBC Reply, p. 3).

Pacific Northern Gas Utilities

PNG, like FBC relies on FEI in its current state as the reference point for comparison. Ms. McShane, also an expert witness for PNG, submits that "In Stage 1 of this proceeding, I assessed the principal areas of business risk facing the benchmark utility, FEI, focusing on whether there had been any material changes since the 2009 ROE Decision. For purposes of Stage 2, as regards the PNG utilities, the focus is on how their current business risks compare to those of FEI." (Exhibit B3-14, Appendix B, p. 11)

The position taken by PNG is captured by the following: "comparing PNG as it stands today to its circumstances as of past PNG decisions effectively eliminates the 'generic' position of this proceeding in that it becomes solely an exercise of defining PNG's absolute risks rather than examining those risks relative to the Benchmark. PNG submits that this would represent a very different methodology from what was specified by the Commission and would have resulted in PNG presenting its evidence in a different manner." (PNG Final Submission, p. 2)

In response to BCPSO's Final Submission on PNG's changing risk over time, PNG submits that "the appropriate approach, as stated by the Commission in its Stage 1 Decision, is to conduct an assessment of the differences in the short and long-term risk faced by PNG as compared to the Benchmark." It submits that the risk assessment should be from first principles, based on the extensive evidence filed in the proceeding. (PNG Reply, p. 3)

Thermal Energy Services Utilities

This is the first instance where small TES utilities are reviewed for their common equity ratios and cost of equity before the Commission and, therefore, with the possible exception of Central Heat, the change in risk over a time period between the cost of capital proceedings is generally not applicable.

The Companies submit that the Commission should not consider itself bound by the past decisions on individual TES utility cost of capital issues where the issues have not been examined in depth (the Companies Reply, p. 2). The Companies submitted that setting the return on equity and capital structure for a "benchmark low-risk" utility in Stage 1 established a reference point against which other utilities could be compared (Exhibit B2-17, p. 3).

FAES provided evidence to compare: (a) the corporate position of FAES as a corporate entity relative to FEI, and (b) a comparison of the relative business risk of TES projects, once installed, to the benchmark utility (Exhibit B-6-2, p. 2).

2.1.2 Submissions by Interveners

British Columbia Pensioners' and Seniors' Organization et al.

BCPSO takes the position that the difference in prospective risk at the present time between FEI and the utility being assessed in Stage 2 is the only relevant consideration. Changes in risk between the present and previous periods were used to assess the Benchmark's business risk. In Stage 2 these are not relevant to providing an assessment of the level of risk applicable to an individual utility except to assist in the assessment of the difference in prospective risk between the utility and the Benchmark at the present time. (BCPSO Final Submission for FEVI and FEW, p. 1)
While maintaining this approach for FBC and PNG, BCPSO also submits that for FBC it may be necessary to rely more heavily on comparisons between 2005 and the present, and on comparisons with other integrated electrical utilities because of decreased similarity between FBC and FEI as the Benchmark. (BCPSO Final Submission for FBC, p. 2)

Industrial Customers Group of FortisBC Inc.

ICG is a customer in FBC's service area and its primary interest in this proceeding is with FBC.
ICG submits that the Commission Panel should not accept the submissions of FBC. Instead ICG has taken the position that the Panel should consider the 2009 Decision as an important point of reference with particular emphasis on the equity component. Its witness, Dr. Safir, states that since 2009 the relative risk between FBC and the Benchmark has decreased slightly and consequently FBC should be granted the same equity ratio as the Benchmark and a slightly reduced equity premium. He further states that "In the 2009 cost of capital proceeding for the Terasen/FortisBC gas utilities, the Commission confirmed that FEI/TGI would continue as the benchmark utility. The Commission left intact its previous ruling that FBC's equity ratio would remain at 40% and that the utility would continue to receive a risk premium to its ROE of 40 basis points. This was determined by the Commission to be a fair premium relative to the benchmark." (Exhibit C4-22, pp. 5, 14; ICG Final Submission, p. 6)

It thus appears that the basis for the position taken by ICG is its belief that the Commission, in the 2009 Decision, had fully considered the relative risk that existed between FBC and the Benchmark in making its determinations. This seems to be confirmed by the following ICG statement "it must be presumed that the Commission Panel that issued the 2009 Decision knew all the circumstances surrounding the capital structure of the utilities that might be affected by the decision. In particular, it must be presumed that the Commission Panel that issued the 2009 Decision considered the cost of capital of FBC established by Order G-193-08." (ICG Final Submission on FBC, p. 5)

Commission Determination

As noted earlier in this Section, the Stage 1 proceeding determined the cost of capital for the Benchmark. The Stage 2 proceeding is designed to have utilities other than FEI provide evidence comparing their business risks to those of the Benchmark for which a comprehensive cost of capital proceeding has only recently been concluded. It seems illogical that the Commission Panel would choose to minimize the importance of evidence in the most recently completed cost of capital proceeding and choose to put more weight on the results of a proceeding which was conducted four years previously and was based on evidence which is not part of this evidentiary record. Therefore, the Panel is in agreement with FEVI, FEW, FBC, PNG and BCPSO that setting the cost of capital for FEI also established a reference point from which to compare other utilities. **Accordingly, the Commission Panel has determined that the primary reference point for the Stage 2 proceeding will be FEI, the Benchmark as assessed in the period leading to the Stage 1 Decision.**

In determining that the current Benchmark will be the primary point of reference, the issue arises as to whether any weight should be given to reference points related to other previous decisions. In reviewing the evidence, the Commission Panel acknowledges that there are some instances where comparisons against previous decisions for the applicant utility may provide further background, clarity and a broader evidentiary base. In some cases the elimination of evidence

related to comparisons against previous decisions would leave some areas less than fully explored. **Therefore, the Commission Panel finds it appropriate to consider evidence related to previous cost of capital decisions but only in those cases where the information contributes to a more complete evidentiary base.**

ICG has made arguments with respect to FBC and whether it is appropriate to consider the 2009 Decision as a reference point. The Panel will address this issue further in Section 3.2 in assessing the cost of capital for FBC.

2.2 Common Equity Ratio and Cost of Equity Quantification Methodology

The Stage 1 proceeding included extensive evidence on cost of capital theory and suggested capital structures and ROE for the Benchmark. The FBCU (on behalf of FEI) put forward expert opinions from Ms. McShane, Mr. Engen, Dr. Vander Weide and Concentric Energy Advisors. Intervener evidence included expert opinions from Dr. Booth and Dr. Safir. That evidence was thoroughly tested in information requests and in cross-examination at the oral hearing. The Stage 1 Decision on the appropriate capital structure and cost of equity for the Benchmark utility included detailed analyses of the experts' opinions, including determinations on the various risk factors and how they had changed since the last cost of capital hearing in 2009. All parties agreed that the determination of appropriate capital structures and ROEs requires a high degree of judgement by the Commission since there is no consensus on the validity of the theoretical models or agreement on the input factors.

In considering the Stage 2 hearing format and content required to establish appropriate equity ratios and equity risk premiums for the remaining utilities in BC compared to that established for the Benchmark, the Commission held a procedural conference on April 25, 2013. The ensuing Order and Reasons for Decision included the following statement: "We agree with FBCU that Stage 2 is primarily concerned with business risk assessment which is tangible and does not require an oral examination." (Order G-77-13 with Reasons for Decision, p. 4) To put it another way, the

stated purpose of the Stage 2 proceeding is to assess the differences in short and long-term risk faced by utilities, as compared to the Benchmark.

In addition to providing evidence on the various business risks of each utility in reference to the Benchmark, the FBCU and PNG utilities also included expert evidence from Ms. McShane on the cost of equity and capital structure for those utilities. The evidence of Ms. McShane might be characterized as additional perspectives on the reasonableness of her conclusions. She includes a submission on the principles that should apply to establishing a fair capital structure and ROE, her assessment of business risk comparisons, the implications of the rating agencies opinions, beta differentials, size premiums, and allowed capital structures and ROEs of utilities she considers comparable. All of this information can be helpful in informing the Commission Panel of the relative risks of these utilities to the Benchmark.

At issue in this Section specifically are the additional perspectives Ms. McShane provided on capital structure theory and beta differential analysis and their implications on the cost of equity.

For the capital structure theory analysis, Ms. McShane referred to three theoretical approaches that could be used to quantify the range of impact of a change in financial risk, or the common equity ratio, on the cost of equity (Exhibit B1-71, Appendix B, p. 25; Exhibit B1-72, Appendix B, p. 25; GCOC Stage 1 Exhibit B1-9-6, Appendix F). These can be summarized as follows:

Approach 1 is based on the theory that the overall after-tax cost of capital and the pre-tax cost of capital do not change materially over a relatively broad range of capital structures. This approach effectively assumes that the benefit of the deductibility of interest expense for corporate income tax purposes, which would tend to lower the overall cost of capital, is offset by personal income taxes on interest.

Approach 2 is based on the theoretical model which assumes that the overall cost of capital declines as the debt ratio rises due to the income tax shield on interest expense. This approach

does not account for any of the factors that offset corporate income tax advantage of debt, and including the costs of bankruptcy/loss of financial flexibility, the impact of personal income taxes on the attractiveness of issuing debt, and the flow-through of the benefits of interest expense deductibility to ratepayers. Therefore, Ms. McShane states the results of applying the second approach will overestimate the impact of leverage on the overall cost of capital and understate the impact of increasing financial leverage on the cost of equity.

Approach 3 assumes for utility cost of capital purposes that the corporate income tax rate is zero. The underlying premise is that the benefits of the corporate tax deductibility of interest accrue to rate payers in regulated companies, not shareholders, as is the case with unregulated companies. As with the first approach, Ms. McShane states the overall cost of capital remains unchanged as the capital structure changes. However, since the cost of capital contains no income tax component, the impact on the cost of equity due to changing leverage is less than in the presence of corporate income tax and interest deductability.

Ms. McShane concludes that while it is impossible to state with precision whether, within a reasonable range of capital structures, raising the debt ratio decreases the overall cost of capital or leaves it unchanged, in all cases an increase in financial risk will be accompanied by an increase in the cost of capital.

Table 2.1 below shows the adjustments recommended by Ms. McShane to the cost of equity required under each of the three approaches to recognize the difference in financial risk between the proposed equity ratio for FEVI and the 48 percent equity ratio that represents the mid-point of the range of benchmarks.

Table 2.1

Equity Ratio		Basis Point Adjustment to ROE for Change in Common Equity Ratio Based on Approach:		
Mid-Point of Range of Benchmarks	FEVI Recommended	1: 26% tax rate	2: 26% tax rate	3: 0% tax rate
48%	43.5%	60	40	50

Source: Exhibit B1-71, Appendix B, p. 26

The estimated risk premium for FEW based on this approach is similar to that for FEVI. The estimated difference in the cost of equity between the recommended equity ratio of 45 percent and 50 percent equity ratio is approximately 55 basis points (Exhibit B1-71, Appendix B, p. 27).

Table 2.2 below shows the adjustments to cost of equity required under each of the three approaches for FBC to recognize the difference in financial risk between equity ratios of 40 percent and 45 percent.

Table 2.2

Equity Ratio		Basis Point Adjustment to ROE for Change in Common Equity Ratio Based on Approach:		
Equity Ratio for FEI Debt Ratings	FBC Recommended	1: 26% tax rate	2: 26% tax rate	3: 0% tax rate
45%	40%	70	50	60

Source: Exhibit B1-72, Appendix B, p. 27

In her beta differential analysis, Ms. McShane used likely beta differentials of the Benchmark and the utilities to estimate reasonable equity risk premiums. Ms. McShane described it as a potential approach. This approach allows Ms. McShane to recommend equity risk premiums by comparing the betas of utilities to the Benchmark beta of 0.60 used in the Stage 1 Decision. She summarized

her beta analysis and qualified it to recognize that betas can vary significantly and there is a range of views on how utility betas should be adjusted. (Exhibit B1-71, Appendix B, pp. 28-32, and similar evidence for other FortisBC and PNG utilities)

In her evidence, Ms. McShane selected a sample of US and Canadian electric and natural gas utilities to gauge the likely differentials in betas. The steps involved adjusting the raw betas to a market mean beta of 1.0, relevering the betas to isolate differences due solely to differences in business risk, and assigning the Benchmark utility as well as the Stage 2 utilities to proxy sample categories that are grouped by credit ratings.

The Commission did not receive alternative theoretical evidence from Intervener experts. One relevant information response is in response to BCUC informations requests (IRs) 1.29.1 and 1.29.2 (Exhibit B3-15) where Ms. McShane cannot assign a level of statistical confidence to her betas due to "an unavoidable degree of imprecision" and she acknowledges that betas can vary widely not only due to estimation methodology, but also due to both differences that are observed from period to period and to the manner in which betas are adjusted. This degree of variation is widely recognized, as is the need to apply expert judgement to inherently noisy data.

Commission Determination

The Commission Panel notes that there are insufficient data to support the conclusions made by Ms. McShane regarding her quantification methodology. However, the Panel will not reject this theoretical evidence and will use it as a check against the more direct evidence on business risk factors. The Panel notes that the appropriateness of Ms. McShane's assumptions, calculations and recommendations went largely untested in IRs. Furthermore, the Commission Panel did not receive alternative theoretical evidence from Intervener experts or suggestions on how they should be applied to the subject utilities. The evidence is of limited value because the assumptions are not altogether clear; and her findings indicate a large range of possible capital structures and equity risk premiums.

The Panel notes that Ms. McShane's beta analysis approach involved assumptions at every step: sampling of utilities, adjusting the raw betas, relevering the betas based on an assumed universe average equity ratio. These assumptions have no support and her use of adjustment methods, for example, adjusting raw betas to a market mean beta of 1.0, has been cautioned against in the Stage 1 Decision. (Stage 1 Decision, pp. 62-64) In her approach to relevering betas, there is little support put forward by any parties on the assumptions used. Therefore, while the Panel finds Ms. McShane's additional perspective to be an interesting approach to quantify the reasonableness of her conclusions, they are of limited value. The Panel gives little weight to the results and her conclusions.

The Commission addressed the topic of developing an optimal capital structure at length in the Stage 1 Decision. In doing so, it applied the following principles to guide its analysis:

- While credit ratings are important indicators of the risk of disruption, a particular rating is not in and of itself the definition of an efficient capital structure. Possible ratings downgrades are important but must be considered in terms of attendant costs and benefits.
- The long-run risks are important considerations in determining the optimal capital structure. They indicate operating uncertainties that can cause financial distress and the possible attendant disruption and distraction of management.
- The stand-alone principle implies that the risk of disruption due to financial distress is assessed within the context of the risks to the benchmark utility.

(Stage 1 Decision, pp. 46-50)

In this Decision, the Panel will put primary emphasis on the evaluation of comparative business risks of the Stage 2 utilities to the Benchmark, FEI. However, given that the Panel must exercise informed judgement in determining a fair ROE and capital structure we will acknowledge the value of Ms. McShane's quantification methodologies even though our emphasis will be on the relative business risk evaluation.

The Panel will continue to rely on the approach adopted by the Commission in the 2009 Decision and the Stage 1 Decision regarding the reflection of various business risks. Specifically, the Panel will endeavour to reflect long-term risks primarily in the common equity thickness while the shorter term risks will be reflected in the allowed return on equity. This approach reflects consideration of utility investors' ability to recover their invested capital. The Panel notes that if the underlying risk decreases, more debt can be issued; conversely, if it increases, the common equity ratio would have to increase resulting in less debt. Therefore, as pointed out in the 2009 Decision: "The assessment of risks has a significant bearing on the application of the fair return standard and the determination of an appropriate common equity ratio for regulatory purposes."

2.3 Impact of TES Framework Decision

2.3.1 Background

On December 27, 2012, the Commission issued its Report on the Inquiry into Alternative Energy Solutions (AES Report),[6] which among other things tasked Commission staff with conducting consultation with stakeholders on a scaled regulatory framework for thermal energy services (TES).

The scaled regulatory framework was to be developed in accordance with the Principles and Guidelines set out in Section 2 of the AES Report. Some of the key principles stipulated that the least amount of regulation to protect the ratepayer should be used, the benefits of regulation should outweigh the costs, and that TES utilities be encouraged to pursue market-based pricing mechanisms to increase efficiency, reduce costs and enhance performance as contemplated by section 60(1)(b) of the UCA. The Report further found that "economic regulation of Discrete Energy Systems is not warranted given the lack of natural monopoly characteristics and the lack of a need for consumer protection in light of the presence of a functioning competitive market place."

[6] In the Matter of FortisBC Energy Inc. Inquiry into the Offering of Products and Services in Alternative Energy Solutions and Other New Initiatives Report, December 27, 2012 [hereinafter AES Report].

After developing a "straw-man" document describing the proposed framework, starting in May 2013, the Commission staff held two consultation workshops with stakeholders and received two rounds of submissions on the proposed framework. On August 28, 2013, the Commission established a written hearing process for review of the proposed Regulatory Framework, which also included an exemption from regulation for certain Thermal Energy System Utilities (TES Framework).

On December 31, 2013, the Commission issued Order G-231-13A, which brings significant additional certainty to the regulation of TES utilities. The Commission Panel summarized its findings as follows.

1. The Panel approves the Stream A exemption proposed by staff subject to the following changes:

    - All projects below a "minimum threshold" should be exempt from Part 3, except for sections 42 and 43 of the UCA. This is referred to as the "Micro TES" exemption.
    - The Stream A regulatory model should apply to all on-site TES systems with a capital cost in excess of the "minimum threshold" and below a "maximum threshold."
    - The "maximum threshold" should be set initially to $15 million. Parties are invited to provide submissions regarding the quantum of the "minimum threshold."
    - The "maximum and minimum thresholds" should be subject to change as determined by the Commission following a hearing.
    - The Stream A regulatory model should include exemption from sections 45 and 61 of the UCA, in addition to the proposed exemption from sections 44.1, 59 and 60.
    - All other TES Systems are subject to the Stream B regulatory model, including CPCN requirements and rate approval.

2. The Panel approves the exemption, as proposed by staff, where the Strata Corporation is the Provider of TES.

3. The Panel will make determinations on the following further aspects of the TES framework in a subsequent decision:

    - Registration processes, forms, procedures and fees.
    - Capital Reserve Fund requirements for Stream A and Stream B TES Systems.
    - Reporting requirements for Stream A and Stream B TES Systems.

The TES Framework Decision will become effective upon approval of the Lieutenant Governor in Council. (Appendix A to G-231-13A, pp. 5-6)

2.3.2 Implication of the TES Framework to the GCOC Proceeding

The TES Framework Decision acknowledges that public utility regulation is only necessary when the competitive market is insufficient to protect the public interest, and has therefore approved the scaled down light-handed regulation for TES systems to encourage the growth of the TES market. In their submissions, FAES and the Companies expressed concern over the high regulatory risk of TES projects. Now that the Framework has been approved, subject to receipt of the Order in Council exemptions, there is more regulatory certainty and context, which lays the foundations for the subsequent equity risk premium and equity thickness determinations to follow in this Stage 2 Decision.

A further description of the Stream A and Stream B models follows:

Stream A Regulatory Model

This model will apply to all on-site TES Systems with a capital cost in excess of a "minimum threshold" of $500,000 and below the "maximum threshold" of $15 million as outlined in the Commission's Final Report on the Proposed Micro Thermal Energy System Exemption Limit and Stream B Extension Test of March 6, 2014. This model includes exemption from sections 44.1, 45,

and 59-61 of the UCA. By providing for complaint only regulation, Stream A enables TES providers and their customers to negotiate contract terms they find appropriate. There will be no initial Commission review of the contracts or rates for Stream A Systems. Accordingly, there will be no determination made as to the rates being just and reasonable, which in turn means that this Stage 2 Decision is not relevant for Stream A projects.

Furthermore, the 'regulatory compact,' which is related to the Commission's mandate to approve rates with utilities being granted a reasonable return on their investment, does not apply in Stream A. By using alternative rate setting mechanisms such as long term agreements or performance based rates, the utilities have an opportunity to earn higher than a regulated return for their TES projects.

For further clarity, the TES Framework Panel noted that "Stream A Systems will be exempt from rate regulation, and consequently regulate cost of service rates. ... There will be no approval of capital expenditures through the issuance of a CPCN, no notion of a regulated return on the equity deployed in the TES and no rate base on which to base that return." (Appendix A to G-231-13A, p. 30)

Accordingly, the Stage 2 proceeding is not applicable to Stream A type TES projects.

Stream B Regulatory Model

All other TES systems are subject to the Stream B regulatory model, including Certificate of Public Convenience and Necessity (CPCN) requirements and rate approval. It should be noted, however, that even for Stream B Systems, alternatives to cost-of-service based rates may turn out to be more appropriate rate setting mechanisms. Examples of other forms of rate setting include cost recovery basis, avoided costs, business-as-usual competitive rate, with inclusion of a profit margin or a percentage management fee, provision for a take-or-pay clause etc. To emphasize the focus on other mechanisms, the TES Framework Decision also stipulates that should a Stream B TES System

proponent propose a regulated cost-of-service rate setting mechanism, it must provide justification in its rate application as to why other rate setting mechanisms are not feasible or desirable.
In summary, the TES Framework Decision remains true to the spirit of the AES Report. This means that in the projects to come forward, the cost-of-service rate setting methodology should be viewed as the method of last resort. It follows that the Panel in this Decision will only determine equity risk premiums and equity thickness for Stream B TES projects that have or will be approved with the regulated return/traditional cost-of-service rate setting mechanism.

2.4 Need for a Minimum Default Capital Structure and Risk Premium

Given the growing number of TES projects and the potential for significant growth in the number of regulatory proceedings, both FAES and the Companies are in support of the Commission setting a minimum default cost of capital for TES projects. The case made for this approach is based on consideration of both the defining features of TES projects and the regulatory efficiency. FAES and the Companies made submissions in support of a default structure and have provided their respective positions as to an appropriate capital structure and the equity risk premium. This section addresses the need for a default equity thickness and risk premium in principle, whereas the quantum requested is discussed in Section 3.4.

FAES states that the defining features of TES projects – small size and lack of diversity – permit the Commission to establish a minimum default common equity ratio and risk premium for all non-exempt TES projects, subject to FAES bringing forward evidence establishing a risk profile higher than the risk reflected in the default standard. FAES considers the minimum default to be recognition that typically TES projects as a group will have more similarities than differences and can be expected to have a similar ROE and capital structure. FAES further states this approach is reasonable and efficient as it recognizes the overriding similarities and avoids the necessity of re-litigating ROE and capital structure for each TES project. (Exhibit B6-2, p. 1; Exhibit B6-3-1, BCUC-FAES 1.2.2; Exhibit B6-5, BCUC-FAES 2.32.1; FAES Final Submission, p. 15)

The Companies state that the regulatory burden of setting capital structure and return on investment for TES projects is disproportionate to the relative size of the utility if the traditional regulatory approach is followed. Furthermore, the Companies state that the risk of regulatory burden frustrating the TES market can be mitigated by lowering the regulatory barrier to facilitate small utility participation and growth in the TES market. The Companies provided evidence which suggests a set of default financial parameters for small utilities that, they state, is "fair and is directionally closer to the actual market conditions." In addition, in the Stage 1 proceeding, Corix already suggested that the Commission adopt a generic approach to setting a deemed capital structure, ROE and debt rates. (Exhibit B2-17, pp. 4-5; the Companies Final Submission, pp. 1, 3-4)

As discussed in Section 2.3.1, the Commission issued Order G-231-13A and Reasons for Decision on December 31, 2013, and found that the public interest is served in certain circumstances by providing exemptions from certain provisions of the UCA. In accordance with this, the Commission has sought approval from the Lieutenant Governor in Council (LGIC) for such exemptions. The effect of these exemptions when approved will be to greatly reduce those instances where regulation is a requirement for TES projects. The requirement for regulation would be restricted to District Energy TES systems and on-site TES systems not otherwise excluded from the public utility definition. Where regulation is required, approvals would be through a streamlined CPCN and Rate Application process.[7]

Commission Determination

Given the proposed exemptions, the question is whether a need for a minimum default structure remains. The exemptions before the LGIC have greatly reduced the number of projects which must be regulated and only those where the public interest is at risk are required to be regulated. Where regulation is required, more light handed streamlined processes will reduce the regulatory burden and facilitate the approval process.

[7] TES Framework proceeding, Exhibit A-4, Appendix A, pp. 8-9.

The Commission Panel notes that the TES business is small and in its early stages and will continue to grow and evolve over time. Looking ahead, there will likely be many new issues as yet unknown that will need to be addressed. Because of this, it might be premature and difficult to establish a reasonable minimum default structure for TES projects that could be relied upon by the Commission on a go-forward basis. Nonetheless, the Panel finds that the Commission raised some expectations in Order G-47-12 by stating that one of the purposes of the GCOC is "to establish a framework for determining the appropriate cost of capital for other smaller utilities in the province." The Panel also agrees with the submissions of the Companies that the regulatory burden should not be disproportionate to the relative size of the utility.

In summary, after having reviewed the evidence on risks faced by TES projects and their proponents, the Panel is persuaded by FAES and the Companies' submission that TES projects as a group "are more similar than different" and that regulatory efficiency calls for a default structure at this point in time. **Accordingly, the Commission Panel, in Section 3.4, sets a minimum default capital structure and equity risk premium for Stream B TES projects.** Should a Stream B TES project possess risk characteristics that overall are higher than those implicit in the default TES, the project proponent can bring forward the related evidence and make its case. While it is unlikely that any project proponent would bring to the Commission an application to lower the cost of capital, a potential customer of a low risk Stream B TES project can always have recourse by bringing a complaint to the Commission to raise this issue.

2.5 Small Firm Effect – Applicability of Ms. Ahern's Evidence

In the Stage 1 Decision, consideration was given to the impact of firm size on the determination of an appropriate ROE and capital structure. In the Stage 1 proceeding, Ms. Ahern, the expert for Corix Utilities, submitted evidence in support of the establishment of a framework for determining the cost of capital for small utilities. Ms. Ahern asserted "it is conventional wisdom, supported by actual returns over time that smaller utilities tend to be more risky, causing investors to expect greater terms as compensation for that risk." Ms. Ahern also stated that smaller companies are

less diverse and face higher risk to business cycles and economic conditions. In addition, the loss of a few customers has more impact on a smaller firm than a larger firm with a more diverse customer base. (Exhibit B2-7, pp. 6-7)

In the Stage 1 proceeding, Ms. Ahern relied upon evidence of two empirical studies which in her view have direct application to utility cost of capital proceedings; the Morningstar/Ibbotson Size Premium (SBBI) (Ibbotson SBBI-2012 Valuation Yearbook) and the Duff &Phelps (D&P) Size Study and Risk Study. She states that the Morningstar/Ibbotson study can be used as a means to determine the size risk premium for a given utility over the benchmark utility. This is done by "comparing the size premium appropriate for the decile in which the benchmark utility would fall based upon estimated market capitalization with the size premium appropriate for the decile in which the specific utility would fall based on market capitalization." The D&P study analyses the relationship between equity returns and company size in a similar manner and can also be used to determine size risk premium of a specific utility against the benchmark. D&P's Risk Study is described as an extension of the Size Study in that it analyses the relationship between fundamental risk measures based on accounting data and return. Based on the studies, Ms. Ahern has concluded that specific, unique risks of a utility investment must be reflected in the rate of return; and the size of an investment (or a utility) is one of those unique risk factors for which investors need to be compensated. Under cross-examination in Stage 1, Ms. Ahern acknowledged that regulatory support for these data in regulatory proceedings has been minimal. (Exhibit B2-7, Ms. Ahern's Evidence, pp. 10-11, 15-16; Exhibit B2-7, PMA-9, pp. 30, 65; T7:1278-1284)

In the Stage 1 Decision, this evidence was considered. While noting the lack of regulatory support for a small size risk premium, the Commission also commented on the need for an on-going exercise of informed judgement by both the Commission and experts retained by the utilities. The Commission acknowledged that the academic literature and empirical studies seem to support the importance of size in explaining returns but noted that the evidence did not indicate how adjustment for size should be implemented. The Commission was not sufficiently persuaded to put any weight on the empirical studies and determined that the small size factor should be further

considered in the Stage 2 proceeding, but only as one of the many business and financial risks small utilities or projects are exposed to.

In Stage 2 Ms. Ahern has provided her estimates of specific risk adjustments based on size for Corix, Central Heat and RDE relying upon updated versions of the SBBI and D&P studies which were used in Stage 1. Based on the same methodology used in Stage 1, Ms. Ahern estimated the appropriate range of size-related premiums to be the following:

Table 2.3

	D&P Company-Specific Interpolated Premium	D&P Company-Specific Portfolio-Specific Premium
DGELLP:		
Range of D&P Size Premiums	5.69% - 9.73%	2.60% - 5.32%
SBBI Size Premium		5.19%
UniverCity:		
Range of D&P Size Premiums	6.45% - 10.05%	2.60% - 5.32%
SBBI Size Premium		5.19%
Central Heat Distribution Limited:		
Range of D&P Size Premiums	4.19% - 7.74%	2.41% - 5.32%
SBBI Size Premium		5.19%
River District Energy Limited Partnership:		
Range of D&P Size Premiums	5.88% - 9.01%	2.60% - 5.32%
SBBI Size Premium		5.19%

Source: Derived from Exhibit B2-20, p. 2

Both the SBBI and D&P studies rely upon major US stock exchange companies for their portfolio of companies (Exhibit B2-17-1, PMA 1, p. 2; PMA 2, p. 13).

In calculating the D&P range of size premiums and the SBBI size premium for the utilities of the Companies, Ms. Ahern appears to have applied a similar approach as the studies she has relied upon. Her approach places the benchmark utility in a decile that is made up of the sample of US electric and gas utilities used by Ms. McShane in Stage 1. In using Ms. McShane's sample she states: "The size premiums specific to DGELLP must be subtracted from those relative to Ms. McShane's proxy group, because the benchmark is based upon the proxy group." It therefore appears that Ms. Ahern's calculations result from a comparison of a sample of US electric and gas utilities, which serves as proxy for the benchmark. The information in PMA 3-6 seems to confirm this. (Exhibit B2-17-1, pp. 4-7)

Ms. McShane, the expert for FAES, has taken a similar position to that of Ms. Ahern as to the small firm effect. She relies on a number of studies to support her position. One such study states:

> "A number of researchers have observed that portfolios of small firms' stocks have earned consistently higher average returns than those of large firms' stocks; this is called the "small-firm effect. On the surface, it would seem to be advantageous to the small firm to provide average returns in the stock market that are higher than those of large firms. In reality, however, this is bad news - what the small-firm effect means is that the capital market demands higher returns on stocks of small firms than on the stocks of otherwise similar large firms. Therefore, the basic cost of equity capital is higher for small firms."
>
> (Exhibit B6-2, FAES Evidence, Appendix B, McShane's Evidence, pp. 15-16)

However, Ms. McShane differs from Ms. Ahern in that her estimates take into consideration the differences in environments in which publicly traded firms operate and that regulated companies are afforded greater protection than unregulated companies. Ms. McShane notes that once FAES has competed for a project and it's constructed, it is afforded protection not available to the unregulated firms that would comprise the majority of the firms in the Ibbotson analysis. Ms. McShane concludes that size premia applied to very small TES utilities, while relevant, are smaller than those that could be applied to companies operating in fully competitive markets. In support of this conclusion, she submits that the Ibbotson studies demonstrated that small utilities

(i.e., publicly traded gas, electric and sanitary) have achieved returns that are approximately 1.5 and 3.0 percentage points higher on a compound and arithmetic average basis respectively, than those of large utilities. (Exhibit B6-2, FAES Evidence, Appendix B, Ms. McShane's Evidence, pp. 17-18; Exhibit B6-3-1, BCUC-FAES 1.29.2 (Ms. McShane) further clarified this aspect of her evidence in the response to Exhibit B6-3-1, BCUC-FAES 1.30.2 (Ms. McShane))

BCPSO expresses concern with some of Ms. Ahern's assumptions regarding the calculation of risk premium ranges. BCPSO points out that FEI, rather than the average of Ms. McShane's sample of US electric and gas utilities, is the appropriate gauge from which to calculate differences in return. Had this been used, BCPSO submits that the low end of the range for the D&P risk premium would have been substantially lower. (BCPSO Final Submission, pp. 4, 7)

Commission Determination

The Commission Panel acknowledges that there has been a great deal of empirical research into what has been termed the small firm effect. Among these, the SBBI and D&P studies have explored the development of models designed to relate firm size factors with the determination of an appropriate risk premium for a given company as compared to others of different size. Both of these studies relied upon the results of a large group of US companies encompassing most of the major US stock exchange companies. There is no evidence to suggest that Canadian companies have been included in these studies.

The question the Commission Panel must address is whether Ms. Ahern's application of this research in establishing a framework for determining the cost of capital for small utilities has application in this proceeding and if it does, what weight should be placed upon it. After consideration of the evidence put forward by the Companies, the Commission Panel is not persuaded that the empirical studies as used by Ms. Ahern has application in the Stage 2 proceeding. Our reasons for this follow.

Individual Categories of Business vs. the Universe of US Stock Exchange Companies

The approach taken by Ms. Ahern implies that with respect to size, all businesses are the same and the results of the larger sample of US stock exchange companies are reflective of those in each of the business categories making up that larger sample. Thus, an investor considering a small firm in the high tech industry would assess the same level of risk and have the same return expectations as an investor considering a small utility. Put more simply this could be interpreted to mean that high tech stock purchase risks are comparable to utility stock purchase risks.

Ms. Ahern has presented no evidence to support the position she has taken regarding the validity of applying the results of the empirical studies for the broader US stock exchange companies to the Canadian or US utility industry. The Commission Panel is of the view that business environments differ among categories of business as do investor assessment of risks and expectations of returns. Ms. McShane makes this point as she submits that the estimates she has prepared take into account environmental differences in which relevant firms operate. As noted, Ms. McShane points out that there is a significant difference between the protections offered regulated companies, which leads to her conclusion that the size premia applicable to very small TES utilities are smaller than those which would be applied to those companies in a fully competitive market. The Commission Panel agrees with Ms. McShane as the regulatory compact and the fair return standard are just two examples of the protection afforded regulated companies. In addition, the Panel has noted that Ms. McShane has reported results of an earlier Ibbotson study which demonstrated that returns for a group of small utilities varied by approximately 1.5 percent on a compound basis. This further casts doubt on the validity of Ms. Ahern's conclusions.

Reliance Upon a Sample of US Gas and Electric Utilities

As stated previously, Ms. Ahern relies upon a sample of US gas and electric utilities (used by Ms. McShane in Stage 1 as a basis for her calculations). The Commission Panel has two concerns with Ms. Ahern's choice of comparator. First, Ms. Ahern has made no effort to justify the use of this

sample as being representative of the Canadian market and her calculations have in no way been adjusted to account for this omission. As stated in the Stage 1 Decision and in Section 2.3 of this Decision, "US data needs to be considered on a case by case basis and weighed with consideration to the sample being relied upon and any jurisdictional differences which may exist." Second, the sample she has relied upon serves as a proxy for the Benchmark. No evidence has been presented to justify the use of a proxy of US companies rather than FEI, which is the Benchmark. This point was raised by BCPSO who submits that the appropriate approach "would have been to calculate the differences in return as between a utility comparable in size to FEI versus the size of the various TES utilities." BCPSO further submits, based on the Companies response to BCPSO IR 1.3, that the "resulting range of results is somewhat lower for both SBBI and D&P studies across virtually all size metrics." (BCPSO Final Submission, p. 7) The Panel notes that the Companies did not respond to this in reply.

While the SBBI and D&P studies in support of the small firm effect are not at issue in this proceeding, Ms. Ahern's use and their application of the studies are very much at issue. For all the foregoing reasons, the Commission Panel finds that no weight should be given to Ms. Ahern's framework for determining the cost of capital for small utilities. Despite giving no weight to Ms. Ahern's framework, we still consider that the business world has generally accepted that there is greater risk in being small. Therefore, small size as a factor will still be considered in our Stage 2 utility cost of capital determinations but as one of a number of related factors. Factors such as diversity of customer and economic base, concentration of assets and differences in service areas all of which may be related to small size will be considered among a range of business and financial risks utilities are exposed to.

2.6 TES Projects – What is Being Regulated?

To provide further clarity for the discussion and determinations to follow, this section will define at the outset what is being regulated in the case of TES projects.

Utility, Person, Project or System

The Commission, in its communications regarding the Stage 2 proceeding, identified the Group 3 utilities as micro utilities engaged in thermal energy services (Exhibit A-33). FAES states it develops and operates TES projects (Exhibit B6-2, p. 1). The Companies state they provide thermal energy services throughout the province and that in most cases the Companies' projects are regulated as "public utilities" under the UCA. In the case of Corix, however, some of its projects are not regulated under the UCA (Exhibit B2-17). The TES Framework Decision also addressed the confusion related to references of a person, utility, project or a system. This confusion arises because the UCA defines a public utility as a person providing, in this case, certain thermal energy related services. The Framework Panel noted that the proposed exemptions were based on the characteristics of a particular TES system (project) and not the person providing those services.

The Commission Panel acknowledges the Corix description of owning both regulated and unregulated projects. However, it is unclear as to the current status of FAES in this regard. In any case, the Commission Panel in this Decision considers Corix and FAES as corporate entities that contain numerous TES projects under their umbrellas. For the purposes of this Decision, the Panel will make determinations related to individual TES projects, defined as public utilities under the UCA.

What Entity Faces the Financial Risk?

The Commission Panel notes that among the applicants in the Group 3 utilities, there does not appear to be a common agreement as to the entity being regulated or how risk will be assessed in determining an appropriate cost of capital for utilities within this group. More specifically, this relates to whether the risks associated with an entity financing individual TES projects should be considered in determining a cost of capital for one of its utility projects. Therefore, the question becomes whether the Commission is assessing the cost of capital for the operator of the TES utility project or the project itself. Furthermore, a crucial determination at the outset involves deciding

whether the Stream B utility in consideration should be compensated for the business developmentrisks during the early stages before the project comes to fruition.

FAES appears to have taken the position that the cost of capital to be determined is for the operator of the utility rather than the project utility itself. This is evident in the following:

- From the perspective of FAES as the entity financing individual TES projects, the company faces similar competitive pressures to FEI from other energy sources. Unlike FEI, which is a natural gas monopoly within its defined service territory, FAES also competes with other TES entities to construct TES projects. A small entity competing in a highly competitive energy market, by definition, faces higher risk.
- Once constructed, each TES project operates as a very small utility. Although there are differences among TES projects, the defining characteristics of all TES projects are that they are exponentially smaller and less diverse than FEI, are greenfield operations, and by their very nature face financing challenges. (Exhibit B6-2, FAES Evidence, p. 1)

FAES states that the additional risk to FAES in competing with other TES providers to construct and operate a project is one that is not material for FEI which is large, established and has a well-defined service territory. FAES points out that it is only once it has successfully competed for the market, thus winning a greenfield utility, that a more direct comparison with the benchmark utility is possible. (Exhibit B6-2, FAES Evidence, Appendix A, p. 1)

Corix states that Corix Utilities is financed through a combination of debt and equity with debt financing being provided through Corix' consolidated credit facilities. Corix is a private, investor-owned company, which provides propane, gas, water and electricity utility deliveries to various communities within BC. The Companies state small utilities often operate in a competitive environment where customers have many energy choices, including their service provider should they choose TES. The TES market is an emerging market that provides service to customers on a small scale using many different applications of both existing and new technologies. Furthermore, the Companies state that due to the local nature and smaller size of TES energy projects, the TES market has much lower economic barriers to entry than the natural gas distribution market, and is best served when competition is encouraged. In addition to competing on the basis of price or

quality of service, TES projects also compete on the basis of environmental qualities of their service. In summary, the Companies state the competitive efforts including innovative technologies entail a very different risk profile than that of a conventional utility business characterized by a natural monopoly with a large, captive customer base. "As a result, the return that investors expect to receive on an investment in small utilities is higher than an investment in the benchmark utility." (Exhibit B2-17, pp. 3-4, 13-15)

River District Energy's development and net operations are 100 percent funded by its parent, Wesgroup Properties Limited Partnership (Wesgroup).

The Companies state that customers who make the decision to consider an alternative to traditional heating options typically issue a request for proposals, which generally result in several bids from competing TES service suppliers. (Exhibit B2-17, p. 29)

Commission Determination

In the Stage 1 Decision, the Commission viewed the overall risk as the probability that future cash flows will not be realized or will be variable resulting in a failure to meet investor expectations. In addition, the Panel recognized the risk of potential financial disruption and accepted the distinction outlined in the 2006 and 2009 Decisions where investment risk was described as comprising the sum of business risk, financial risk, and regulatory risk. (Stage 1 Decision, p. 24)

The Stage 2 Panel also accepts the above description of risk and further reaffirms the principles of the Stage 1 proceeding that should be respected when establishing the cost of capital in general, and the capital structure and equity risk premium for TES projects, specifically:

- The stand-alone principle;
- Fair Return Standard;
- Compatibility of capital structure and overall return with business risks;

- Ability to attract capital on reasonable terms and conditions;
- Maintenance of financial integrity; and
- Comparability of returns with similar enterprises.

These principles were also articulated by FAES' expert, Ms. McShane. (Exhibit B6-2, Appendix B, pp. 3-4)

To find answers to the questions that have been posed, the Commission Panel must consider who is the investor in these TES projects. In practical terms, the investors in the existing projects have been identified and include entities such as Corix, FAES and Wesgroup. Consistent with this analogy, the investor in FEI is its parent, Fortis Inc. However, the Fair Return Standard, which arises from legal precedents, requires that a utility must (i) earn a return on investment commensurate with that of comparable risk enterprises; (ii) maintain its financial integrity; and (iii) attract capital on reasonable terms. Consistent with this standard and the stand-alone principle, the entire focus of the Stage 1 proceeding was on FEI and its investors' perception of FEI risk profile even though one can invest in FEI only via Fortis Inc. shares. The fact that FEI issues debt and, therefore is the subject of credit rating reports, is an actual test of the reasonableness of its capital structure.

In the case of TES projects, due to their small size, even the debt component is deemed as the TES projects are too small to issue actual debt. Regardless, as described above, this Decision must consider the risks faced by current and future investors in thermal energy services. Therefore, the timeline for this consideration must begin at the stage when a project proponent is seeking equity funding, by way of seed money from an angel investor, private equity funds, a property developer, an existing utility, etc. This in turn involves assessing first any risks associated with efforts to secure agreements to initiate TES projects. The second phase of risk assessment begins once an individual project, as a stand-alone entity, becomes a utility after successfully competing in the market for the project. **Accordingly, the Stage 2 Decision considers all risks faced by a Stream B TES project investor, which include the business development, construction and operation phases.**

2.7 Use of the Risk Matrix

To evaluate the overall risk of a given TES project, the Commission has developed a risk matrix for use in small TES utility proceedings. In Stage 1, the Commission recommended that small TES utilities use this risk matrix in Stage 2 as an aid in justifying a risk premium and capital structure in comparison with the benchmark utility. The Commission also encouraged other small utilities to modify the matrix to facilitate a similar comparison. (Stage 1 Decision, p. 101)

A number of utilities took issue with the recommendation of the Commission to utilize the risk matrix.

The Companies submit that the Commission's risk matrix with 19 risk factor comparisons is not an effective tool to assess small utility profiles. They recommend that the process should be more simplified with appropriate weight given to utility size, the factor they consider to be the most important determinant of small utility risk. The Companies point out their concerns as follows and suggest a modified approach for each:

- The current list of 19 risk factors overlaps yet each factor appears to receive equal weighting. They suggest that a reduction in the number of risk factors will result in a more focused and accurately weighted risk profile.
- Because regulation provides a surrogate for competitive market pressures, the Commission should rely on objective data that quantifies the market indicators. In doing so the Commission should evaluate utility risk and financial risk separately.
- To date, the Commission has placed a de facto limit of 100 basis points (bps) that ignores the risk profile differences between most small utilities and the benchmark. The Companies propose the Commission expand the spread beyond 100 bps.

(the Companies Final Submission, pp. 4-5)

FAES notes its experience in previous proceedings where the Commission has relied upon a 20-factor risk matrix and has expressed concerns about this approach in both past and in the

current proceeding. While acknowledging that there is value to using a risk matrix as a tool to summarize utility characteristics in terms of risk factors, FAES raises the following concerns:

- If the matrix is interpreted as a checklist, dominant factors like size and diversity could be given equal weight to other less dominant factors on the list.
- The 20 point risk matrix implies a degree of precision in a projects cost of capital that is not warranted.

In summary, FAES submits that the risk matrix approach has provided little value in setting out its evidence and should not be a requirement in future proceedings. In the event the Commission continues to use the risk matrix, FAES recommends that the Commission should acknowledge that it does not imply weightings for any particular factor or that differences among TES projects do not translate into differences in cost of capital. (FAES Final Submission, pp. 11-12; Exhibit B6-5, BCUC 2.39.1)

BCPSO takes a more holistic view of the risk matrix and submits it is a framework that all utilities can use in distinguishing their risk in comparison to the benchmark. In its view "It should be open to utilities to identify those areas in which their risk differs from that of the benchmark utility." Therefore, risks that are not spoken to or identified can be considered to have no difference in risk to that of the benchmark. BCPSO argues that as long as it can be justified on a rational basis, and eases the process of assessment and presentation, it should be open to utilities to determine their own groups of risks. Accordingly, BCPSO takes no issue with the Companies approach to simplifying the risk matrix but leave it open for other utilities to group the risk factors differently if they so choose. (BCPSO Final Submission, pp. 2-3)

Commission Determination

There does not appear to be any disagreement among the parties with respect to the purpose of the risk matrix although there does appear to be a level of anxiety regarding its application. In the view of the Commission Panel much of the problem is related the parties' understanding of how the risk matrix will be used and how results are to be interpreted. There appears to be much concern regarding the weighting of each factor and whether appropriate weight will be applied to what some utilities consider to be the key factors of size and diversity. This seems to place the risk matrix in the context of being viewed as a formulaic approach to cost of capital, which yields a specific result. As outlined previously, FAES raised this concern in its submissions by pointing out that the degree of precision implied by the Commission risk matrix with respect to TES projects' cost of capital is not warranted. BCPSO, on the other hand, seems to consider the risk matrix as a tool providing a level of guidance to the utility that also allows complete flexibility as to how it is to be used.

The Commission Panel considers the risk matrix to be a useful tool to assist utilities in capturing the scope of risks that a utility may face. In our view it does not address specifically the level of importance accorded a particular risk or whether it is appropriate in a given circumstance to combine certain risk factors. Therefore, the Panel recommends that in future proceedings it is appropriate to continue to use the risk matrix for the purposes of identifying and describing risks or categories of risks. However, for purposes of clarity, the Panel provides the following guidelines regarding its use:

- Utilities are free to use some or all of the risk factors and are free to group them as they deem appropriate.
- The Commission has no predetermined weighting for any of the risk factors. However, utilities are free to weight factors or groups of factors and base their submissions on those weightings.
- Any weight to be placed on a specific risk factor or group of factors will, at the discretion of the Commission Panel, be determined on a case-by-case basis in each proceeding.

- The risk matrix is not to be considered a formulaic approach with a specific outcome.
- Any comparisons among utilities will be made to aid in maintaining inter utility consistency. Such comparisons will be used as a check only with the primary source of comparison being the Benchmark.

In continuing to support the use of the risk matrix, the Commission Panel would like to be clear that it is viewed as a tool only. In making cost of capital decisions, the Commission will continue to rely on exercising its judgement based on all of the evidence before it. In the course of its deliberations, if a Commission Panel is persuaded that a risk premium in excess of 100 bps is warranted to meet the fair return standard, it is not bound by any limitations or a de facto limit.

3.0 COST OF CAPITAL – STAGE 2 UTILITIES

Commission Order G-77-13 issued on May 13, 2013, set out the review of Stage 2 of the GCOC proceeding with all the utilities in Stage 2 separated, for practical reasons, into three groups:

Group 1: FBCU: FEVI, FEW and FBC.
Group 2: PNG Utilities.
Group 3: Corix, FAES and other small TES utilities.

In the following sections, the short and long-term business risks of each utility is examined relative to FEI, the Benchmark with some consideration of past decisions as outlined in Section 2.1. Based on this, the Commission Panel has determined the allowed ROE and deemed capital structure for each utility. Where appropriate, the determinations on contextual issues from Section 2.0 has been relied upon to provide guidance to the cost of capital determination process.

3.1 Group 1 Utilities - Gas

FortisBC (Vancouver Island) Inc. and FortisBC (Whistler) Inc.

Introduction

FEVI and FEW filed evidence in a joint document that outlines the current assessment of their respective business risks relative to the Benchmark utility (Exhibit B1-71, Evidence of FEVI and FEW, pp. 1-12).

In the 2009 Decision, the risk premiums for FEVI (formerly known as Terasen Gas (Vancouver Island) Inc.) and FEW (formerly known as Terasen Gas (Whistler) Inc.) were set at 50 bps above the Benchmark FEI. The allowed equity thickness for both entities was 40 percent.

In the current proceeding a 43.5 percent common equity with an ROE risk premium of 50 bps is proposed for FEVI, a 45 percent common equity with an ROE risk premium of 75 bps is proposed for FEW. The currently allowed levels, those applied for as well as the Intervener proposal, are summarized below for ease of comparison.

Table 3.1
Summary of Capital Structure and Equity Risk Premiums (ERP)

	Current		**Requested by FEVI/FEW**		**Proposed by Intervener (BCPSO)**	
	Equity Thickness (%)	ERP (bps)	Equity Thickness (%)	ERP (bps)	Equity Thickness (%)	ERP (bps)
FEVI	40	50	43.5	50	40-42	50
FEW	40	50	45	75	40-42	50
Benchmark	38.5	0	n.a.	n.a.	n.a.	n.a.

In support of their respective positions, FEVI and FEW assert that they have higher risk than the Benchmark in the following areas:

- Smaller Service Area and Less Diverse Customer and Economic Base;
- Less Competitive;
- Greater Supply Risk.

FEVI and FEW note that historically, the Commission has consistently determined that FEVI and FEW risks are higher than those of the Benchmark. The two utilities further assert that their evidence and that of Ms. McShane is that FEVI and FEW continue to face higher business risk. This is further corroborated in the case of FEVI by its lower credit ratings. (FEVI and FEW Final Submission, pp. 4-5)

Ms. McShane recommends deemed equity ratios for FEVI and FEW of 43.5 percent and 45 percent, respectively. Her conclusions are based on the following:

- Both FEVI and FEW face higher business risk than FEI and FEW faces risks higher than FEVI. This is supported by both Moody's and DBRS debt ratings and related opinions which support the conclusion that the FEVI higher business risk points to a ratio higher than 40 percent.
- Moody's June 2013 Credit Opinion on FEVI indicates an equity thickness of over 40 percent is needed to maintain credit metrics.
- There has historically been a 5 percentage point difference in equity ratios of FEVI and FEW compared to FEI.
- Differences between allowed common equity ratios of small and large Canadian utilities indicates a 45 percent ratio for both utilities.
- US gas utilities are appropriate benchmarks and point to equity ratios in the 50 to 52 percent range for FEVI and FEW.

In addition, Ms. McShane recommends a 50 bps equity risk premium for FEVI and 75 bps equity risk premium for FEW. She bases this on the following:

- With no material change in the relative risk between the utilities, a 50 bps premium is equal to the most recently approved risk premium over FEI and remains reasonable.
- At recommended common equity ratios there is a need for equity risk premiums relative to FEI's ROE to recognize higher business risks for FEVI and FEW. Premiums of 50 bps are indicated at recommended equity ratios.
- Differences in the Commission's attributed beta to FEI in Stage 1 and betas of higher risk utilities support risk premiums of 50 bps for FEVI and 75 bps for FEW.
- Available data on size premia for small utilities like FEVI and FEW indicate that proposed premiums are conservative

(Exhibit B1-71, Appendix B, Ms. McShane's Evidence, pp. 1-3)

BCPSO states that it agrees that both FEVI and FEW face greater business risk than FEI.

Accordingly, BCPSO submits that it supports an equity thickness in the range of 40 percent to

42 percent for FEVI and FEW with a ROE premium in the range of 50 basis points. In reaching this conclusion, BCPSO submits that this will produce credit metrics to allow FEVI to avoid a ratings downgrade.

As noted in Section 2.1, the Commission Panel has determined that the primary point of comparison will be against the Benchmark. Comparisons against prior Decisions will be considered secondarily. In addition, the Panel notes that Order G-21-14 and the accompanying Reasons for Decision issued on February 26, 2014, for the FortisBC Energy Utilities Application for Reconsideration and Variance of Order G-26-13 concerning Common Rates, Amalgamation and Rate Design is a consideration. This will be addressed in Section 4.2.

Risk Assessment

3.1.1 Smaller Service Area and Less Diverse Customer and Economic Base

FEVI and FEW Positions

FEVI and FEW state that they are significantly smaller natural gas distribution utilities than the Benchmark in terms of service area, customers, rate base and revenues. FEVI is approximately 1/8 the size of FEI at 100,000 customers and serves far fewer communities than the Benchmark, while FEW is considerably smaller with only 3,000 customers and is confined to a single community. FEVI and FEW assert that the concentration of assets within a small service area makes it more difficult for them to diversify risk relative to FEI (Exhibit B1-71, Appendix A, Evidence of FEVI and FEW, pp. 3-8). While having a smaller rate base than FEI, the rate of asset growth is higher. The FEVI average annual growth of rate base of FEVI is 13.5 percent from 2009 to 2012, and the FEW average annual growth in rate base is 9.8 percent. This compares to a much smaller growth of rate base for FEI at 3 percent over the same period. (Exhibit B1-79, BCUC 2.29.1)

In terms of customer profile, FEVI and FEW submit that they have less diverse economic and customer bases than the Benchmark. The less diverse customer base, and the concentration of customers in particular industry segments, make FEVI and FEW subject to greater throughput and revenue risks in response to events that affect specific customers and industries. FEVI submits that its throughput is largely dependent on industrial customers, mainly the Vancouver Island Gas Joint Venture (VIGJV) in the pulp and paper industry and the BC Hydro – Island Generation. These two customers account for 61 percent of FEVI's total demand and 16 percent of its total delivery margin. FEVI submits that there is risk associated with both of these customers. BC Hydro can terminate its service agreement on 24 months' notice as early as November 2015 and a recent change in use has led to a 20 percent reduction in firm demand charges. Further, the VIGJV contract expires in 2017 and there is uncertainty around requirements beyond that date.

FEW states that the majority of its delivery margin is derived from the commercial sector and is largely focused on tourism, which is cyclical and dependent upon discretionary income. This, they note, was recognized in the FEW 2009 Decision where the Commission stated that FEW "lacks the diversity of service area and customer base enjoyed by the benchmark low risk utility."[8] FEW asserts that investors, in making longer term decisions, must consider the risk of customer failure when the cycle hits a low point. FEVI and FEW state that with respect to the cost of capital, the important thing to consider is the forward looking risks associated with a service area. (Exhibit B1-71, Evidence of FEVI and FEW, Appendix A, pp. 3, 7-10; FEVI and FEW Final Submission, pp. 7-11; Exhibit B1-76, BCUC 1.8.1, 1.9.1)

FEVI and FEW contend that their smaller service area and smaller utility size means they are riskier than the Benchmark. Their expert, Ms. McShane, seems to agree with this and states that having physical assets concentrated in a limited geographic area contributes to a higher business risk profile. (FEVI and FEW Final Submission, p. 5) FEVI and FEW submit they have a much higher rate

[8] In the Matter of Terasen Gas (Whistler) Inc. and an Application for 2009 Revenue Requirements and for a Return on Equity and Capital Structure Decision, April 7, 2009 RRA Decision [hereinafter TGW 2009 RRA Decision].

base per customer than FEI, and are reliant on a smaller number of customers to generate revenue. (FEVI and FEW Final Submission, pp. 6-9; Exhibit B1-71, Appendix B, p. 8)

BCPSO Position

BCPSO considers compact utilities to have significant advantages and rejects the idea that it necessarily follows that operating in a small service area results in greater risk. BCPSO argues small utilities require less infrastructure to serve the same load, resulting in a lower rate base and cost of service relative to their more widely dispersed counterparts (BCPSO Final Submission for FEVI and FEW, p. 2).

BCPSO acknowledges that FEVI and FEW have a smaller customer base and rate base per customer than FEI. However, it asserts this is a forward looking exercise and one advantage held by FEVI and FEW is their higher customer growth rates (BCPSO Final Submission for FEVI and FEW, p. 2).

BCPSO submits that there seems to be improvement with respect to FEVI's industrial customer base. The VIGJV has increased its demand to 12 TJ/day effective November 1, 2012 from 8 TJ/day since August 2008. While acknowledging that a downturn in the pulp and paper industry could come any day, the trend is toward improving conditions. Further, BCPSO does not see the BC Hydro - Island Generation as a high risk customer pointing out that its Island Generation contract is renewed to 2022 and FEVI has acknowledged that there has been no indication that BC Hydro intends to terminate its transportation agreement. In addition, BCPSO asserts that FEVI is in a good position to increase its industrial customer base with the proposed Pacific Energy Corporation (PEC) export facility and note that it appears increasingly likely the facility will be built (BCPSO Final Submission for FEVI and FEW, p. 3).

FEVI and FEW Reply

FEVI and FEW question BCPSO's assertion regarding infrastructure requirements to serve the same load and argue that it costs FEVI and FEW more to deliver each gigajoule (GJ) of throughput (hence the higher delivery rates than FEI). A higher rate base per customer means that to recover their invested capital, FEVI and FEW must be more reliant on each customer and competitive risk related to high delivery rates is increased (FEVI and FEW Reply, p. 3).

FEVI and FEW submit that while BCPSO's calculation of growth rate is correct, the absolute number of FEVI and FEW customers is very small and the calculated growth percentages are still low. They note that there is little to distinguish among the growth rates of FEI, FEVI and FEW (FEVI and FEW Reply, p. 4).

Concerning the long-term risk arising from having customers in highly cyclical industries, FEVI and FEW assert that long term risk is not related to an industry's position in the economic cycle. FEVI and FEW further argue that while BCPSO seems to acknowledge that the future is more important than the present from an investment perspective, it departs from this in its assessment of risk associated with VIGJV and BC Hydro – Island Generation. They point out that the VIGJV's current demand is related to the pulp and paper industry today and the long-term risk is more related to long-term requirements and mill closures (FEVI and FEW Reply, p. 5).

FEVI considers the PEC project to be uncertain and argues it is inappropriate for the Commission to place any material weight on the project during its business risk assessment. FEVI submits that the PEC project, should it proceed, is properly a consideration for the next cost of capital proceeding (FEVI and FEW Reply, pp. 6-7).

Commission Determination

The Commission Panel considers the risks related to the smaller service areas and a less diverse customer and economic base to be important determinants. **The Commission Panel finds that both FEVI and FEW face additional business risk, which are deserving of significant weight when compared to FEI with respect to their service area size and its diversity.**

The Panel acknowledges that there is additional business risk associated with FEVI and FEW having fewer options available to diversify their risk in what are relatively small service areas when compared to FEI. The growth rate of rate base as compared to FEI and the higher rate base per customer and its impact on rates are also considerations contributing to higher risk. BCPSO submits that this is offset by FEVI's and FEW's higher customer growth rate in comparison with FEI. The Panel notes that the difference in growth rates between the utilities is small and places minimal weight on it given the lack of materiality.

A significant factor related to rate base growth rates is the fact that they were largely driven by FEVI's Mt. Hayes project and the FEW's pipeline which was completed in 2009. These, while significant, were "one off" projects which are not necessarily representative of what will occur in the future.

The less diverse customer base and concentration in limited industry segments is also a consideration as evidenced by FEVI's reliance on two major customers, VIGJV and BC Hydro, for 61 percent of their total demand. Likewise, FEW is dependent on tourism for 70 percent of its total demand and 68 percent of its margin (Exhibit B1-71, Appendix A, p. 11). While the Panel acknowledges the cyclical nature of both of these market areas, we are not persuaded that a case has been made that either utility faces undue stress in the future. With respect to BC Hydro and VIGJV (which has increased its consumption in recent years), FEVI has presented no evidence as to what either of these customers intends to do in the future noting only that they have options when contracts expire. With respect to FEW the Panel takes a similar view. While the Panel accepts

these are risks that must be considered, we are not persuaded as to the probability of these events occurring. Consideration of the potential PEC project can be viewed through the same lens. While there is a possibility that the PEC project may proceed, as noted by BCPSO, there is no firm evidence as to the probability or the materiality.

FEW and FEVI assert that investors must consider the risk of customer failure during a low cycle. The Panel notes that given the recent difficult economic period, it would not be unreasonable for investors to take guidance from the recent past in determining the level of cyclical risk they may face with an investment in the Whistler area.

3.1.2 Competition Risk

FEVI and FEW Positions

FEVI and FEW submit that their burner tip rates are higher than the Benchmark. More importantly, their new space and water heating burner tip rates are higher as compared to Tier 2 electric equivalent rates when upfront capital costs are taken into account. FEVI and FEW submit that along with FEI they must compete against BC Hydro "postage stamp" electricity rates. However, they argue that they continue to face much higher effective per gigajoule natural gas delivery rates than the Benchmark. In their view, the differences between the Benchmark and FEVI and FEW in this regard are significant. While FEI enjoys a favourable advantage against the cost of electricity, FEVI and FEW customers face higher energy costs than customers with electric heat. FEW and FEVI argue that this differential makes it challenging for builders and developers to make a case for choosing gas equipment over electricity. (Exhibit B1-71, Appendix A, Evidence of FEVI and FEW, pp. 16-17; FEVI and FEW Final Submission, pp. 11-12)

In addition, FEVI submits that the impact of the loss of royalty revenues has been significant. Because of this, its rates are currently insufficient to recover costs. Consequently, FEVI anticipates a further increase in rates once the amounts remaining in the Revenue Surplus Deferral Account

(RSDA) are depleted. FEVI also points out that loss of the royalty revenues has further competitive impact in that they formerly acted as a hedge on volatility which is no longer there.

In consideration of this evidence, FEVI and FEW submit that the Commission should find that they face greater price risk than FEI. (Exhibit B1-71, Evidence of FEVI and FEW, Appendix A, p. 3; FEVI and FEW Final Submission, pp. 13-14)

BCPSO Position

BCPSO does not disagree with the assertion that FEVI and FEW delivery rates are higher than those of FEI or that natural gas is less price competitive relative to electricity than is the case in FEI's service area. However, BCPSO disagrees with the assertion that FEVI and FEW are facing higher energy costs than customers with electric heat. BCPSO submits that the majority of customers with electric space and water heat take Tier 2 energy, which is therefore, a better comparator than Tier 1 energy. In addition, BCPSO asserts that the information in the response to BCUC IR 2.30.2 "appears to indicate that gas is cost competitive with tier 1 electricity when total bill charges are factored in" (BCPSO Final Submission for FEVI and FEW, pp. 4-5).

BCPSO also notes the significant increases in BC Hydro rates announced by the Minister of Energy in November 2013, and asserts there is no indication that rates for natural gas will rise as quickly. They further submit that FEVI's projection for rates following the depletion of the RSDA sometime after 2020, as outlined in response to BCUC IRs 1.11.3 and 2.34.2 [sic], indicate the impact on rates will be far less than that announced for BC Hydro. They state that "...even under the most pessimistic forecast, BC Hydro rate increases will come sooner and will be a greater percentage increase than any rate increases anticipated by FEVI." (BCPSO Final Submission for FEVI and FEW, p. 5)

BCPSO also submits that the withdrawal of royalty revenue is not a legitimate issue "affecting shareholders or the ability of FEVI to raise capital when the RSDA balance will not be depleted for a decade." (BCPSO Final Submission for FEVI and FEW, p. 5)

With respect to FEW, BCPSO notes that the 2009 conversion to natural gas made FEW much more cost competitive relative to BC Hydro than was previously the case. (BCPSO Final Submission for FEVI and FEW, p. 5)

FEVI and FEW Reply

FEVI and FEW submit that BCPSO takes no issue with respect to FEVI and FEW delivery rates being higher than FEI thereby making them less competitive relative to electricity. FEVI and FEW assert that "[T]he relevant evidence for the Commission's Stage 2 assessment of competitive risk is that FEVI/FEW's service is less competitive vis a vis electricity than the benchmark utility, a fact which BCPSO concedes."

FEVI takes issue with BCPSO downplaying the loss of royalty revenues as an additional risk. It submits that this was recognized by the Commission as a risk not faced by the benchmark utility in the 2009 Decision. FEVI submits that the depletion of the RSDA is well within the time horizon of long term investors (FEVI and FEW Reply, p. 8).

Concerning the competitiveness of FEW, the utility relies on the Terasen Gas (Whistler) Inc. 2009 RRA Decision which states the following: "supply risk may be reduced following conversion, its business risk will have increased by virtue of the fact that its rate base will have doubled as a result of the conversion while its customer base remained largely unchanged." FEW submits that the Commission should not double count the effects of conversion (FEVI and FEW Reply, p. 9).

Commission Determination

There seems to be agreement among FEVI and FEW and BCPSO as to delivery rates being higher in FEVI and FEW service areas than in that of FEI and that vis-à-vis electricity, FEI holds a cost advantage over FEVI and FEW. The Commission Panel also acknowledges these facts. However the question we must consider is what level of weight is appropriate to place on these differences.

FEVI and FEW submit their burner tip rates, in addition to being higher than FEI, is also higher as compared to BC Hydro Tier 2 equivalent rates when upfront capital costs are taken into account. They argue that because of this, builders and developers have difficulty making a case for gas equipment over electricity. The higher cost related to installing natural gas space and water heating as opposed to electric heat was raised in Stage 1 and has been a subject in previous cost of capital proceedings and applies equally to all gas utilities. Notwithstanding this, the Panel notes that in most cases, a builder must consider installation costs as they relate to the construction costs and they must weigh the cost of options against customer requirements. Therefore, the cost of energy is separate and combining the capitalized cost with the energy cost clouds the issue and is inappropriate. Eliminating capitalized costs from the cost of natural gas results in both FEW and FEVI rates being substantially lower vis-à-vis electricity Tier 2 rates. The question then becomes one of magnitude and the Commission Panel considers that while FEI holds an advantage in differential, the costs of energy in FEVI and FEW are still favourable.

FEVI submits that the impact of the loss of royalty revenues has been significant pointing out that rate increases will result following exhaustion of the RSDA sometime in 2022. FEVI states that "based on the change in the commodity price, all else equal, the RSDA is forecast to be fully depleted by 2022." (Exhibit B1-79, BCUC 2.34.3) The Commission Panel considers a timeframe spanning 8 or 9 years to be considerable even from the point of view of a forward looking investor. Moreover, the Panel notes that as BCPSO argues, the projected increases are relatively modest following depletion of the RSDA and, as announced by the Minister of Energy, the cost of electricity will be rising in the near term. Add to this the fact that amalgamation of the three utilities has

been reconsidered in a concurrent proceeding and the proposal concerning the risk that FEVI and FEW's market will be less competitive in the future against electricity becomes difficult to accept.

The Commission Panel finds that FEVI and FEW face some additional risk due to differences in rates vis-à-vis electricity compared to FEI. The Panel also finds that natural gas rates are likely to continue to maintain a competitive advantage over electricity and therefore places minimal weight on this factor.

3.1.3 Supply Interruption Risk

FEVI and FEW Positions

FEVI and FEW face natural gas supply issues similar to that of FEI since the three utilities all source their gas requirements in the same market. FEVI and FEW rely upon FEI's coastal transmission system to obtain natural gas and thus have similar infrastructure constraints to transport natural gas to the Lower Mainland. However, FEVI and FEW are downstream of the FEI coastal transmission system. For its supply, FEVI is dependent on a single high pressure pipeline system that includes marine crossings, traverses rugged terrain and interconnects with the coastal transmission system. FEW is served by a single pipeline lateral that interconnects at Squamish with FEVI's system. A disruption on this pipeline lateral would disrupt service to FEW's entire customer base. (Exhibit B1-71, Appendix A, FEVI and FEW Evidence, pp. 3-4)

FEVI and FEW argue that the Commission should find they have greater supply risk based on the following:

- Being downstream of FEI increases risk.
- FEI's load centres are throughout its service territory with various means to access supply while FEVI and FEW load centres are at the end of a radial pipeline.
- The pipelines on which they rely cross challenging terrain.

- Although total failure of the twinned submarine crossings on FEVI's is a small probability, there is additional risk associated with the challenge of making repairs to maintain uninterrupted service.
- FEW lacks any on-system storage to deal with emergencies.

BCPSO Position

BCPSO submits that FEVI and FEW have slightly higher supply risks than FEI. However, it does not agree that this is a significant business risk factor affecting the smaller utilities' cost of capital. In support of its position, BCPSO submits the following:

- It is unlikely that both of FEVI's submarine crossings will be disabled at the same time.
- While two LNG tankers cannot fully backstop a complete FEW supply failure, a second LNG tanker was added to the fleet in November 2010 mitigating the damage if a supply failure were to occur.
- The Mt. Hayes LNG facility came online in April 2011, which reduced the supply risk of both FEVI and FEW.

(BCPSO Final Submission for FEVI and FEW, p. 6)

FEVI and FEW Reply

In response to BCUC IR 2.36.1, FEVI and FEW submit that the mitigation activities are only available for the management of short-term supply interruptions, and not capable of relieving long-term supply interruption. FEVI and FEW submit the answer to BCPSO's argument is twofold. First, FEI's LNG tankers are insufficient to replace a pipeline and meet FEW's demand, even on a short-term basis. Second, the role of Mt. Hayes in helping to manage supply interruptions should not be considered a new development as it was already known in 2009 when the Commission last determined FEVI's and FEW's cost of capital (FEVI and FEW Reply, p. 9).

Commission Determination

The Commission Panel finds that there are additional supply interruption risks faced by FEVI and FEW when compared to the Benchmark but they are marginal. Therefore, the Panel places minimal weight on this factor.

The Commission Panel agrees with BCPSO with respect to the likelihood of both of FEVI's submarine crossings being disabled concurrently. We acknowledge that there is a remote possibility but the probability is very low. The Panel acknowledges that both FEVI and FEW load centres are at the end of a radial line which results in some increased risk and FEW's lack of on-system storage. However, FEVI and FEW did not provide evidence to establish the level of probability related to such an occurrence or examples of where these types of issues proved to be a problem in other jurisdictions.

The Panel does not disagree that the role of Mt. Hayes in the management of supply interruption was known when FEVI's last cost of capital was determined. However, we note that the backstopping capability of Mt. Hayes has reduced FEVI's absolute risk. A similar capability does not exist for FEW.

Other Considerations

3.1.4 Credit Rating Outlooks of FortisBC Energy (Vancouver Island) Inc.

FEVI Position

FEVI has relied upon debt ratings and related opinions by both Moody's Investor Services (Moody's) and Dominion Bond Rating Services (DBRS) to support their conclusion that FEVI is of higher stand-alone business risk than FEI and that FEVI's higher business risk points to an equity ratio higher than the existing 40 percent (FEW is not rated). The current Moody's rating for FEVI is A3. However, FEVI notes that Moody's issued a press release in June of 2013, indicating that it had

changed the outlook for all FortisBC utilities from "stable" to "negative." FEVI states that "Moody's cited the "severely weak" financial metrics at current rating levels and the recent Stage 1 Decision that further weakened the credit metrics of the utilities." This was followed by the June 26 Credit Opinion for FEVI, FEI and FBC. In it Moody's considers FEVI's high cost of service and small size and recent developments regarding the phase-out of royalty revenues and the denied amalgamation application as factors underscoring a need for additional regulatory support in maintaining credit metrics. Moody's states later in its report that "the degree of BCUC regulatory support may not be of sufficient strength to support FEVI's A3 unsecured rating..." Based on this FEVI submits that the potential for a credit rating downgrade is of immediate concern and should be a consideration for the Commission in determining the appropriate capital structure and risk premium. With respect to DBRS, FEVI reports that its rating for FEVI is already two notches lower than the FEI rating, supporting the position that FEVI is of higher overall risk than FEI. (Exhibit B1-71, pp. 10-11; FEVI and FEW Final Submission, p. 19; Exhibit B1-71, Appendix B, Ms. McShane's Evidence, p. 22; Exhibit B1-71, Appendix D, Moody's Credit Opinion: FortisBC (Vancouver Island) Inc.)

BCPSO Position

BCPSO submits that while it is preferable for FEVI to avoid a ratings downgrade, it does not support going beyond what is required by the fair return standard to ensure this result. BCPSO observes that Moody's appears to have assumed that FEVI's ROE will be stepped down in accordance with FEI. In addition, it submits that this is also true of DBRS. The DBRS Credit Opinion of June 11, 2013, seems to support this. DBRS further commented that while the current cost of capital is under review for FEVI, it does not expect the decision to have a material effect on the company's earnings and cash flow. (BCPSO Final Submission for FEVI and FEW, p. 8)

FEVI Reply

FEVI argues that BCPSO's conclusion is based on the erroneous assumption that if it's recommended equity ratio (40-42 percent) produced credit metrics similar to 2012 metrics, a

downgrade would not occur. FEVI states that this ignores the fact that its rating, based on 2012 metrics, was Baa1 as shown in Moody's June 2013 Credit Opinion. (FEVI and FEW Reply, p. 10)

Commission Determination

The Commission Panel has considered the evidence submitted by the parties. **The Panel finds it appropriate that it continue to be guided by its Stage 1 finding as discussed in Section 1.3 of this Decision and considers the maintenance of current credit ratings to be desirable but only to the extent that doing so does not go beyond what is required by the Fair Return Standard.**

3.1.5 Commission Cost of Capital Determination

The Commission Panel determines that an equity ratio of 41.5 percent and an equity risk premium of 50 bps for FEVI and an equity ratio of 41.5 percent and an equity risk premium of 75 bps for FEW is appropriate effective January 1, 2013.

Both FEVI and FEW acknowledge that many of the risks they face are the same as those faced by FEI and the level of business risk to the three utilities on many of the identified risk factors is not materially different (FEVI and FEW Final Submissions, pp. 4-5). The key area where FEVI and FEW identified business risk differs from that of the Benchmark is on the following factors:

- The size of service area;
- The less diverse customer and economic bases;
- Challenges with energy price competitiveness; and
- Risks related to supply security.

The Commission Panel has considered the evidence and submissions related to each of these risk areas in conducting its risk assessment. The small service areas and the less diverse customer and economic bases for both FEVI and FEW pose additional business risk deserving of significant weight

when compared against the Benchmark. In addition, there is some additional business risk related to competition with electricity when rates were compared with the Benchmark. However, both FEVI and FEW had lower rates when compared with BC Hydro Tier 2 rates. Given this competitive advantage and no evidence of a future change in circumstance, the Commission Panel places minimal weight on risks associated with competition. A final consideration is the risk of supply interruption. It is acknowledged that there are additional supply risks faced by FEVI and FEW when compared to the Benchmark but these are marginal and again the Panel has awarded them only minimal weight.

The Commission Panel has considered the evidence of Ms. McShane along with the evidence related to credit ratings.

There is no way to predict how rating companies will react to this Decision. However, the Commission Panel acknowledges the importance of maintaining current credit ratings and has given this factor some weight in reaching our overall cost of capital determination.

With respect to Ms. McShane's evidence, the Commission Panel is in agreement that FEVI and FEW face a higher level of business risk than the Benchmark. This is the basis for awarding the higher equity ratio of 41.5 percent for both utilities. With respect to equity risk premiums, the Commission Panel has awarded FEVI and FEW risk premiums of 50 bps and 75 bps, respectively. Historically, both FEVI and FEW have had a 50 bps equity risk premium compared to the Benchmark. Given the higher level of business risk, Ms. McShane's expert opinion in support of the premiums, and the support from BCPSO, the Commission Panel is not persuaded there is any justification to reduce these premiums.

Further consideration was given to the fact that FEW faces overall somewhat higher business risk than FEVI and to FEW's small size in comparison to both FEVI and the Benchmark as key factors in awarding the additional 25 bps risk premium for FEW. The higher risk premium is also justified by the identical equity ratios granted to both FEVI and FEW.

3.2 Group 1 Utilities – Electric

FortisBC Inc.

Introduction

FBC is a fully integrated electric utility and is the owner and operator of hydroelectric generating plants, high voltage transmission lines and a distribution asset network in the southern interior of BC. FBC's service area is comprised of 1,400 km of transmission lines and 5,369 km of distribution lines serving directly or indirectly over 160,000 customers. (Exhibit B1-72, Appendix A, p. 5)

The most recent full review of FBC's capital structure and equity risk premium was undertaken as part of the 2005 FBC RRA proceeding. At that time, the common equity ratio of 40 percent and equity risk premium of 40 bps from previous decisions were reaffirmed. In the 2009 Decision, the Commission Panel responded positively to FBC's request for "an order of the Commission maintaining the current regulatory framework in British Columbia whereby TGI's ROE is established as the Benchmark ROE for utilities in British Columbia, including FBC, as previously ordered by the Commission in Order G-14-06" by noting that there was no evidence suggesting that its use was not in the public interest.[9] FortisBC was an intervener in that proceeding.

As indicated in Table 3.2, FBC proposes a 40 percent common equity ratio with an ROE risk premium of between 50 and 75 bps. The table also shows the currently allowed amounts and those proposed by Interveners.

[9] 2009 Decision pp. 79-80.

Table 3.2
Summary of Capital Structure and Equity Risk Premiums (ERP)

	Current		**Requested by FBC**		**Proposed by Interveners**	
	Equity Thickness (%)	ERP (bps)	Equity Thickness (%)	ERP (bps)	Equity Thickness (%)	ERP (bps)
FBC	40	40	40	50 - 75	40 (BCPSO) 38.5 (ICG)	40 (BCPSO) 30 (ICG)
Benchmark	38.5	0	n.a.	n.a.	n.a.	n.a.

FBC, in support of its proposal, states that its risks are higher than that of the Benchmark in the following areas:

- Smaller Size, More Concentrated Assets and Less Diverse Customer and Economic Base;
- Energy Price Competitiveness;
- Supply Risk;
- Operating Risk; and
- Financial Risk Related to its Credit Profile.

FBC and FEI operate in substantially the same financial, regulatory, policy, operating and business environment. Therefore, FBC states it can be directly compared without revisiting the determinations made in respect of the Benchmark. (Exhibit B1-72, p. 2; Appendix A, pp. 1-2)

Ms. McShane, FBC's expert witness, states that FBC's common equity ratio "...should, in conjunction with the returns allowed on various sources of capital, provide the basis for strong investment grade credit ratings." She recommends that a 40 percent common equity ratio is reasonable and bases this on a number of factors including the following:

- FBC faces higher business risk than the Benchmark.
- FBC's existing 40 percent common equity ratio is at the lower end of the range based on her assessment of FBC's relative position on the Canadian electric utilities business spectrum.
- At the current ratio FBC has only been able to attain split credit ratings; one that is in the Baa/BBB category and one in the A category.
- Recent and expected credit metrics are not materially stronger in the context of the minimums cited by Moody's as a potential trigger for a downgrade.
- Any reduction in the equity ratio which has been stable since 1996 may be regarded by Moody's as reduced support for FBC's regulatory framework resulting in a relatively high risk of a downgrade.

In addition, Ms. McShane has recommended a 50-75 bps equity risk premium for FBC based on the following:

- FBC's lower debt ratings indicate that at the recommended 40 percent common equity ratio an equity risk premium over the Benchmark of no less than 50 bps is reasonable.
- Differentials between the Benchmark beta attributed by the Commission and those of utilities with similar total risk to that of FBC indicate that an equity risk premium of 50-75 bps is reasonable.
- The size differential between FBC and the Benchmark indicate an equity premium for FBC of 50-75 bps is conservative.

(Exhibit B1-72, Appendix B, pp. 1-3)

BCPSO states, "it is reasonable to conclude the FBC's overall business risk is greater than FEI's." However, BCPSO is of the view that FBC may have overstated the degree of risk differential in its comparisons against the Benchmark. BCPSO concludes that the BCUC should approve a maximum common equity ratio of 40 percent and an equity risk premium of 40 bps over the Benchmark. (BCPSO Final Submission, pp. 7, 11)

ICG has relied on past decisions in reaching its conclusions on the appropriate cost of capital for FBC. ICG submits that the 38.5 percent equity ratio for the Benchmark should be the same for FBC and the equity premium should be reduced to 30 bps.

In Section 2.1, the Commission Panel discussed ICG's use of 2009 as a reference point. The Panel notes that ICG has based their approach on its assumption as to the intent of the Commission in the 2009 Decision. Given the importance of this distinction, the Panel will address this matter prior to examining the positions of the parties with respect to the various risks faced by FBC.

As noted in Section 2.1, ICG takes the position that an appropriate reference point for comparison of FBC with the Benchmark is the 2009 Decision rather than the Stage 1 Decision. This is based on its view that the Commission Panel in the 2009 Decision had made its decision on the Benchmark with full consideration of the relative risks that existed between FBC and TGI. Thus, in effect, the Commission, in establishing a 40 percent equity ratio for the Benchmark had done so with the intent that a similar equity ratio should apply to FBC as should a 40 bps equity premium.

Commission Determination

The Commission Panel rejects the submission of ICG that the Commission, in the 2009 Decision, had considered the relative risks that existed for FBC as compared to the Benchmark. The 2009 Decision was established in response to an application collectively from TGI, TGVI and TGW concerning their cost of capital. Accordingly, there was a robust evidentiary record concerning TGI in that proceeding. This was not the case for FBC as it was not an applicant nor did it file evidence in the proceeding.

The Panel notes that ICG has submitted no evidence in support of its position to suggest that the Commission, in the 2009 proceeding had considered whether, on a comparative basis, the risks faced by FEI and FBC were the same or to what extent they may have differed. Therefore, the

Commission Panel accepts the approach taken by FBC in this proceeding, which relies upon the Benchmark as defined in Stage 1 as the primary reference point.

Risk Assessment

3.2.1 Smaller Size with More Concentrated Assets and Less Diverse Customer and Economic Base

FBC Position

FBC submits that its smaller size, higher rate base per customer and higher concentration of assets results in increased risk relative to the Benchmark. In addition, FBC considers that its less diverse customer and economic base in comparison to FEI are two further factors leading to an elevated level of risk.

FBC further submits that it serves a much smaller service area, with less than one-third the number of communities and, on a proportional basis, is far more rural than the Benchmark. In addition, rural economies are less diverse and as a utility, FBC is more dependent on fewer industries than is FEI and this lack of geographic diversity contributes to its business risk. FBC also contends that because its assets are concentrated in a limited geographic area, negative events can have a greater impact on earnings and viability and there is greater potential for an event that affects most or all of its service territory. According to FBC, because its rate base per customer is significantly higher than that of the Benchmark, customer losses resulting from localized events has a larger impact on average on its ability to recover its invested capital.

FBC has a smaller customer base than FEI with an approximate total of 163,000 direct and indirect customers although the customer profile is similar in that the majority are in the residential sector. The difference in customer profile is greatest in the wholesale sector, which accounts for 22 percent of the utility load representing $32 million in revenue. The loss of this customer base would result in an increase of 5 percent for the remaining customers. A further consideration is the

portion of industrial load attributable to a low number of customers. If the largest 10 industrial customers chose to discontinue taking service, it would result in the loss of $14 million and a 2 percent rate increase for the remaining customers.

FBC states that as a general principle, the impact of a downturn or failure of an industry is more likely to have a material impact on a utility's customer base when it is dominated by a small number of industries. Eight out of 10 of its largest customers are in the forestry industry and account for well above 50 percent of total industrial load and revenue. FBC asserts that the forestry industry is sensitive to many factors including the strength of the Canadian dollar, the strength of the US and Pacific Rim economies and other more local factors such as strikes or trade disputes. In addition to the impact on the industry itself, such factors resulting in a longer-term downturn or decline also have secondary effects on the local economy reliant on those employed in those industries. FBC reports that the forestry industry is currently struggling due to slow domestic and US demand for Canadian lumber products and issues related to the mountain pine beetle infestation, and it expects this to continue. Since 2005, forest industry trends have contributed to the significant drop in demand from the industrial customer group. (Exhibit B1-72, Appendix A, pp. 5-11; Exhibit B1-72, Appendix B, p.11; FBC Final Submission, pp. 8-14)

BCPSO Position

With respect to size, BCPSO observes that while FBC is smaller in size than FEI on major parameters, there is no evidence to suggest that the relative risk has changed since 2005. It also notes that FBC, unlike the Benchmark, is not suffering from declining use per customer (UPC) as its load since 2005, has been relatively flat. Further, while FBC states that a significant portion of its load is related to a small number of customers, BCPSO notes it has not indicated how this has changed since 2005.

In addition, BCPSO makes the following assertions:

- The evidence suggests that customer concentration risk relative to wholesale customers has gone down since 2005 while that associated with industrial customers remains unchanged.
- For residential customers, there has been steady growth in UPC since 2001 in contrast to the gas utilities where it has declined.
- Implementation of the "advanced metering program should improve reliability and reduce costs, both of which will assist FBC in retaining customers."

(BCPSO Final Submission for FBC, pp. 3-4)

ICG Position

ICG states that FBC "argues that wholesale and industrial sales risk has not changed since 2009." ICG asserts that there was significant change to FBC's customer composition as a result of the City of Kelowna purchase and, as a result of the transaction, its customer base has grown and there are increased economies of scale. ICG notes that Ms. McShane's evidence did not address this transaction but its expert witness, Dr. Safir, observes that there are now many individual customers from what was a single large wholesale customer. The result of this change has been to reduce the expected variability in revenues due to the unlikelihood that all new customers would leave FBC simultaneously.

FBC Reply

FBC submits that there appears to be no challenge from Interveners as to it being a smaller utility and because of this, it has increased risk relative to the Benchmark. Regarding BCPSO's submissions with respect to UPC as compared to FEI and its relatively flat load, FBC points out that neither of these points represents change in FBC's business risk compared to the Benchmark.

FBC does take issue with ICG's submission regarding the City of Kelowna and asserts that while there is a directional impact on customer diversity, there has been no material change in business risk. In support of this, FBC points to the evidence of Ms. McShane who makes, among others, the following points:

- In terms of load served the transaction was neutral.
- From a size perspective it was immaterial and the effect was similar to incurring a couple of larger capital expenditures.
- Even with the transaction, FBC's rate base per customer is higher than in 2009 and since then has outpaced FEI's growth on a per customer basis by 2:1.

(Exhibit B1-73, BCUC 1.10.9; Exhibit B1-81, BCUC 2.34.1; FBC Reply, p. 8)

Regarding BCPSO's comments about the improvement in forestry in recent years, FBC disagrees and submits that investors making long-term investments look beyond current circumstances.

Commission Determination

While FBC is smaller than the Benchmark, it is nonetheless a sizable entity with many customers. In the Commission Panel's view, the more relevant factor is business risk associated with FBC's reliance on a relatively small wholesale and industrial customer base and its overall reliance upon the forestry industry. We acknowledge the cyclical nature of the forestry industry and its sensitivity to many external factors both internationally and local. However, we also note that this is not a unique circumstance as many industries face similar issues. Rather, what separates FBC from the Benchmark is its heavy reliance on one industry. This lack of wholesale and industrial diversity is a factor the Panel considers to be relevant and worthy of some weight. On the other hand, the Panel notes that FBC did not refute the BCPSO submission as to the improvement in the forestry industry in recent years. Instead it chose to comment upon the longer view taken by investors. The Panel notes that the recent results appear to at least be moving in the right direction and should not be dismissed.

The Commission Panel also considers the City of Kelowna electric distribution system purchase to be directionally positive in reducing business risk. As pointed out by Dr. Safir, it seems to eliminate the possibility of losing all of the customers that may have occurred previously. We recognize that that the transaction was not exceedingly large and neutral in terms of load but it does reduce risk of customer loss that potential long-term investors may be concerned with.

Taking all of these factors into consideration, the Commission Panel finds that FBC does face more risk than the Benchmark with respect to size related issues such as concentrated assets, and the lack of diversity in both its customer and economic base and the Panel places some weight on this difference.

3.2.2 Energy Price Competitiveness

FBC Position

FBC submits that one of the primary factors contributing to FBC's elevated business risk relative to the Benchmark is competitive risk. It cites the importance placed on this by the Commission in the Stage 1 Decision: "The Commission Panel considers price, because of the importance placed on it by the consumer, to be a key determinant and deserves significant weight when considering changes to FEI's risk." FBC considers that the evidence demonstrates that its business risk related to energy prices is higher than the Benchmark. (FBC Final Submission, pp. 6-7, 14; Stage 1 Decision p. 32)

FBC states that low natural gas prices and rising FBC electricity rates make it more difficult for it to compete on the basis of price across all customer classes.

For residential and commercial heating load, FBC competes with natural gas, alternative technologies and, in some cases, BC Hydro. The primary competition is natural gas. Approximately one-third of its residential sales are for space and water heating, making competition for heating load an important determinant of its overall business risk. Natural gas commodity costs are

currently low, resulting in lower operating costs and competitive advantage. At the same time FBC's rates for residential customers are significantly higher than BC Hydro's residential rates. This rate differential becomes a factor in underdeveloped regions within FBC's service area that are adjacent to BC Hydro's service area. Where this exists, customers have an option as to which electricity provider they choose. FBC must also compete along with the Benchmark with alternative energy technologies such as source heat pumps and other forms like solar and wind are gaining viability as technology improves and costs decrease. Over the longer term FBC expects technical change to increasingly create competitive alternatives. (Exhibit B1-72, pp. 15-19; FBC Final Submission, pp. 14-15)

FBC states that wholesale and industrial customers have options that would allow them to discontinue their contract for service with reasonable notice. These include self-generation, purchasing electricity on the open market or taking service from BC Hydro through its Open Access Transmission Tariff (OATT). Further, in addition to two industrial customers with generation, others have explored generation opportunities in recent years.

Looking ahead, FBC notes that it will continue to face upward rate pressure due to the necessity of investing in infrastructure. In the utility's Application for Approval of a Multi-Year Performance Based Ratemaking Plan for 2014 through 2018, annual capital costs of $60-$70 million per year are forecasted. FBC states that the required capital for sustainment projects along with expenditures for infrastructure upgrades will result in it spending more on capital as a proportion of rate base than the Benchmark. (Exhibit B1-72, pp. 15-19; FBC Final Submission, pp.14-17)

<u>BCPSO Position</u>

BCPSO states that FBC is not suffering from declining UPC as the evidence indicates there has been steady growth since 2001. This compares favourably to the declining use by customer experienced by gas utilities. In addition, FBC enjoys a new home heating capture rate of 57 percent since 2006.

BCPSO submits that there is no evidence that any wholesale customer has indicated it will leave FBC in favour of an alternative energy source. Further, the responses to BCUC IR 1.9.2 and BCPSO 1.3.3 indicate that FBC is not aware of any FBC customers planning to purchase electricity on the open market. Therefore, while this may represent a theoretical risk, it is not imminent and so far customers have not elected to purchase from BC Hydro at lower rates.

BCPSO also submits that BC Hydro rates are under considerable upward pressure and the announced 16 percent increase over two years will impact FBC rates by 2 percent. BCPSO argues that FBC appears to be minimizing the impact that rising BC Hydro prices will have on its competitiveness with that utility and focusing on the impact of these increases on FBC prices only. In addition, it points out that existence of open access and options for customer choice were risks that were flagged in 2005. While these risks exist, BCPSO argues they are overstated as they have existed since 2005 and have yet to materialize. (BCPSO Final Submission for FBC, pp. 4-5)

ICG Position

Dr. Safir states that to some extent he agrees that FBC has greater business risk than FEI due to competition from alternative forms of energy noting the effect that shale gas has had on the price of natural gas. Dr. Safir states that the offset for this is the development of the LNG market which will increase the demand for the commodity and limit the extent to which prices will decline. (Exhibit C4-22, p. 21)

ICG did take issue with Ms. McShane's submission attributing the improved position of natural gas versus electricity as the reason the Commission concluded that FEI's common equity ratio should be reduced. ICG argues that the competitive position of natural gas versus electricity alone cannot be considered a reason for increasing either the equity component or ROE of FBC from the benchmark equity component and ROE. (ICG Final Submission, p. 11)

ICG also addresses the risk identified by FBC concerning its wholesale and industrial customers choosing alternative forms of supply. ICG notes one of FBC's largest customers, Zellstoff Celgar (Celgar), has expended considerable effort and resources dealing with what are described as unresolved issues. In its view, this expenditure of effort should leave no doubt that electric utility service rates remain attractive to industrial customers. (ICG Final Submission, pp. 11-12)

FBC Reply

FBC submits that the key fact for assessing competitive risk in the residential sector is that FBC rates are facing considerable upward pressure at a time when natural gas rates at the burner tip are relatively low.

FBC addresses BCPSO's reliance on a retrospective approach and states that business risk can only be assessed prospectively. FBC also takes issue with BCPSO's characterization that the risk of Industrial customers leaving is not imminent pointing out that the Commission has always given the greatest weight to longer term business risks. With respect to BCPSO's comments regarding competitiveness with BC Hydro, FBC submits that its primary competition in the Residential and Commercial markets is from competing energy forms such as natural gas and alternative energy, as opposed to direct competition with BC Hydro. (FBC Reply Submission, pp. 9-11)

In consideration of ICG's comments regarding the potential for Celgar to leave the system, FBC submits that "[g]iven that energy costs are a significant operating cost for industrial customers, one can reasonably expect industrial customers to consider all options available to them to reduce costs." FBC also submit that ICG is at pains in its submissions to downplay the significance of lower natural gas prices and speculates this is attributable to lower gas prices improving FEI's competitive position compared to electricity utilities.

Commission Determination

The Commission Panel finds that the evidence supports FBC facing additional risk due to competitive pricing factors when compared with the Benchmark. The primary reason for this is the fact that relative to the price of electricity, natural gas is less expensive, which is important in that the service areas of FBC and FEI overlap to a large degree (Exhibit B1-72, Appendix A, p. 19). The Panel notes that this was not contested by any of the parties.

The Commission Panel notes the evidence of Dr. Safir who points out that the demand and hence the price of natural gas may be affected by the development of the LNG business. While this may indeed be the case, there is no evidence to support the view that natural gas prices will increase in the future or will be directly affected by development of the LNG business.

The Commission Panel acknowledges that there are wholesale and industrial customers that have options available to them allowing them to discontinue their service. The question is whether it is probable that such an event will occur. As noted by BCPSO, there were no recent examples where this has occurred or where it is expected to occur. The Panel accepts that the risk continues to exist but is not persuaded that there is a probability of such customer loss occurring. The Panel notes ICG's comments on behalf of a major customer and FBC's response that if there is the potential for savings that industrial customers will consider all options. The Commission Panel agrees with FBC but notes that it cuts both ways. The fact that Celgar has remained a customer indicates that Celgar has not determined it is in its best interest to pursue other options. **Hence, the Commission Panel places minimal weight on this risk.**

3.2.3 Energy Supply Risk

FBC Position

FBC submits that with respect to energy supply it faces greater risk overall compared to FEI. It describes energy supply risk as being made up of two elements:

- The business risk associated with relative long-term availability of natural gas for FEI verses electricity for FBC.
- The business risk related to supply interruption and replacement costs.

FBC submits that in general the circumstances regarding the availability of supply are similar for FBC and FEI. Supply risk for FBC has been mitigated to a degree by long-term capacity agreements but this is offset by price risk concerns with future rate increases related to the BC Hydro Power Purchase Agreement (PPA) and open market pricing. FBC describes its supply risk related to availability as 'fairly low.'

FBC currently generates 45 percent of its energy and 30 percent of its capacity from hydro generating plants it owns. In addition, it has long-term agreements for energy supply with BC Hydro and Brilliant Power Corp. and a long-term capacity agreement for power from the Waneta Expansion (WAX) project expected to go into service in 2015. Collectively, these projects are sufficient to cover capacity requirements for the next 10 years. Like FEI, FBC faces supply interruption risk associated with transmission systems that it either owns or to which it connects. However, there is increased risk for FBC relative to FEI due to the potential for failure of one of its generating plants each of which must be on line if it is to obtain its entitlements under the Canal Plant Agreement. If equipment failure occurs the utility faces a potentially higher cost of purchasing replacement power on the open market. FBC submits that this has occurred three times in recent years. It also notes that in addition to these replacement costs, it is exposed to potential penalties, additional Mandatory Reliability Standards compliance costs or litigation costs resulting from the potential for claims by its customers. Because of this, FBC considers its supply risk to be higher than the Benchmark. (Exhibit B1-72, pp. 19-20; FBC Final Submission, pp. 18-22)

FBC takes issue with Dr. Safir's evidence with respect to vertical integration and his view that it lowers business risk. FBC states that the evidence related to supply interruption risk and the

potential impacts of this fully answer Dr. Safir's arguments on vertical integration. In addition, on this subject, FBC submits the following:

- Vertical integration increases business risk. FBC relies upon Ms. McShane's evidence that there is a common view among the rating agencies that integrated utilities are more risky than distribution utilities.
- Dr. Safir has misinterpreted the studies he cites and misapplies the results as finding that a vertically integrated business is less risky and that "the sum of its individual parts in a portfolio of investments is fundamentally different from a finding that a vertically integrated electric utility is less risky than a natural gas LDC like FEI."

(FBC Final Submission, pp. 22-24)

BCPSO Position

BCPSO submits that FBC's final submissions requesting the Commission to find that the utility's energy supply risk is higher than FEI is quite different than its earlier evidence, which concluded that both utilities had similar energy supply risk profiles. BCPSO states that the reason for this is that FBC's evidence speaks to the higher number of energy supply contracts compared to the Benchmark. These contracts mitigate some of the risk, lead to a lower energy price risk than FEI and when considered, the supply risk for the two utilities is similar.

Worthy of note is FBC's answer to BCUC IR 1.16.8 which cites Moody's statement that "FBC's hydrology risk is substantially mitigated by the Canal Plant Agreement." BCPSO states that FBC believes this statement would apply equally to the WAX capacity available and considers that this agreement has improved its business risk related to its ability to meet its capacity requirements. (BCPSO Final Submission for FBC, p. 6)

ICG Position

ICG submits that the WAX Capacity Exchange (WAX CAPA) and the BC Hydro PPA are two significant supply risk changes since 2009. ICG state that "the record on WAX CAPA is clear: the WAX CAPA reduces supply side risks for FBC, provides the shareholder with a higher than regulated return, and transfers the risk of surplus sales from the new facility to customers." ICG asserts that given this "FBC proposes to deny customers the benefit of the lower cost of capital attributable to the WAX CAPA." ICG submits that the Commission Panel should give weight to the views of customers by reducing the cost of capital thereby providing customers with some relief.

ICG acknowledges that at the time of final submission the BC Hydro PPA was before the Commission and observes the following; there is a new PPA that both parties have agreed to, it provides certainty for all stakeholders, and in 2009 there was uncertainty considering the renewal of this agreement. As this represents 34 percent of power purchase expenses, ICG submits that this is a most significant variable and will reduce the supply risk of FBC as compared to 2009.

ICG urges the Commission to reject FBC's evidence that power supply risk has not changed materially since the 2005 RRA. (ICG Final Submission, pp. 12-13)

ICG denies that Dr. Safir said, as suggested by FBC and Ms. McShane, that FBC warrants a smaller risk premium because it is vertically integrated. Further, ICG disagrees with FBC's argument that because the FBC vertical integration involves ownership of generation assets, which individually tend to be more risky than electricity transmission and distribution, that FBC is therefore more risky than FEI with regards to supply. To ICG "[t]he process of vertical integration is akin to compiling a portfolio" and having a diversified portfolio is less risky than owning a single entity. The point being made by Dr. Safir was that an integrated utility is not necessarily a higher risk than one that is not integrated.

ICG also submits that the assumption that FEI's supply risk is lower than FBC's because FEI receives its supply through the market is economically untrue. It asserts that FBC's analysis ignores that FEI's supply risk profile is influenced by risks of pipeline failures because FEI receives most of its supply from outside pipelines. (ICG Final Submission, pp. 17-18)

FBC Reply

FBC considers certain parts of the ICG submissions regarding WAX CAPA to be beyond the scope of this proceeding as the task in Stage 2 is to assess FBC's business risk. FBC notes that while the ICG may not be in favour of the WAX CAPA, the Commission has already determined it to be in the public interest and in doing so accounted for the greater rate impacts in the early years. In its view, the ICG argument requesting denial of a return that reflects the appropriate level of FBC's business risks is not in keeping with the fair return standard.

FBC does not disagree with the fact that the BC Hydro PPA renewal and the Wax CAPA have reduced its supply risk in terms of supply availability but assert that this was already low. The key issue for FBC is the risk associated with supply interruption and the resulting price or reliability consequences. In the view of FBC, ICG failed to address the following evidence referenced in final submissions:

- The fact that it is an electric utility in and of itself affects interruption risk as compared to the Benchmark.
- There remains price risk uncertainty due to future rate increases related to the BC Hydro PPA and prices on the open market affecting rates.
- Supply interruption risk is higher than FEI resulting from having owned and contracted generation within its service area.

FBC also notes that while both utilities have risks associated with getting the commodity to where it can be used, FBC's transmission is above ground and more exposed than that of FEI. Further, in

the event of interruption, FBC's ability to serve load is effected, as it has no access to storage. (FBC Reply, pp. 14-15)

Concerning vertical integration, FBC submits that according to the Capital Asset Pricing Model (CAPM) "since risk can be reduced by diversification, investors should not expect to be compensated for unsystematic risks or company-specific risks that they can diversify away by investing in a portfolio of assets." Therefore, an investor's expected return on an asset within a portfolio is a reflection of whether the investor is able to diversify and represents the assets marginal contribution to the portfolio's systematic risk. Based on this, FBC notes that if a higher systematic risk entity is added to the portfolio the risk of the portfolio will increase. Therefore, in the case of FBC, the portfolio is riskier when higher risk generation assets are added to lower risk transmission and distribution. (FBC Reply, p. 15)

Commission Determination

With respect to availability of supply, FBC has acknowledged there is little difference compared to the Benchmark and describes availability risk as 'fairly low.' Neither ICG nor BCPSO took issue with this characterization nor does the Commission Panel. The remaining issues are concerned with whether there is a risk differential between an integrated generation, transmission and distribution utility such as FBC and one like FEI that is transmission and distribution only.

With respect to vertical integration, the Commission Panel accepts FBC's submission that adding a higher systematic risk entity to a portfolio will raise the risk of that portfolio. However, the question remains as to whether the generation assets add risk to FBC and if they do, whether this risk is higher or lower than that of the Benchmark. FBC has made the case that business risk has increased due to the risk that one of its generating plants will fail resulting in the need to purchase power immediately on the open market at potentially higher prices. The Commission Panel accepts that there may be instances where such an event may occur and would result in a higher supply cost risk. However, in considering whether this potential risk might also exist for FEI, the Panel

notes that a similar position was taken by FBCU in the Stage 1 proceeding with respect to risks associated with the BC shale deposits not guaranteeing a reliable supply of natural gas at reasonable prices. The Commission in Stage 1 accepted FBCU's position that the current environment is uncertain and stated that "[u]ntil this has been determined, the continuity of current low price levels for natural gas will be at some risk." It therefore appears that both FBC and FEI face risks that have the potential to drive higher commodity prices.

Accordingly, the Commission Panel finds that the risks faced by FBC with respect to supply do not differ significantly from those faced by the Benchmark. In the view of the Panel both utilities have similar access to the respective commodities and both face potential challenges which could impact commodity pricing.

3.2.4 Operating Risk

FBC Position

FBC takes the position that as a vertically integrated electric utility, it faces greater operational challenges and risks as compared to the Benchmark. These include risks related to the integrity of its older generation, transmission and distribution assets, the presence of polychlorinated biphenyls (PCBs) in transformers and substations, the risks associated with an above-ground infrastructure and the radial configuration of the system.

FBC's four hydroelectric generating plants represent 17 percent of its rate base and the majority of its generation assets are over 80 and some are over 100 years old. FBC points out that it is maintaining these assets and, in spite of refurbishing 11 of its 15 generation plants, it remains exposed to risks related to events that cause failure. FBC submits that the advanced age of some of these generation assets in relation to their end-of-life expectations results in the risk of increased deterioration. FBC also states that its distribution and transmission assets are on average older than FEI's noting that a higher portion of FEI's assets have been installed in the past 30 years. As stated previously, FBC also has predominately above-ground assets that are exposed to extreme

weather and the potential for outside interference and conductor theft to compromise asset integrity.

Another risk relates to PCBs. Significant portions of FBC's station assets and pole top transformers have PCBs and by government regulation, must be removed by 2025. In the meantime, a release of significant PCBs gives rise to the possibility of penalties including fines.

FBC also contends that because it has a radial configuration of its system, it faces higher risk than the Benchmark. Because of this, the implications of operational failure are more far-reaching and often result in a corresponding outage to customers where no alternative transmission paths are available. Additionally, because the system is radial such transmission can be widespread and lengthy. By contrast, an interruption of FEI's transmission network does not necessarily result in a corresponding outage to customers. (Exhibit B1-72, Appendix A, pp. 22-27)

BCPSO Position

BCPSO states that the identified risks related to generation are being well managed and note that 11 of 15 generating units have been refurbished and plans are underway for the remaining four units. Citing the answer to BCPSO IR 1.2.2, BCPSO points out that hydroelectric generation tends to be less risky than fossil fuel generation and it believes that FBC has lower risk because of the Canal Plant Agreement.

BCPSO notes FBC's submission that on average its assets are older but it adds that there is nothing in the record to suggest this was not the case in 2005. While not addressing FBC's operational submissions directly, BCPSO point out that it is also worth noting that electricity is at lower risk from provincial GHG emissions policy and bears less risk due to the universal need for electricity and the cost of moving away from electrical space and hot water heating to natural gas. (BCPSO Final Submission for FBC, pp. 6-7)

ICG Position

ICG made no submissions specific to FBC's operating risks.

FBC Reply

FBC states that the submissions of BCPSO miss the mark. With respect to the age of the FBC assets, the appropriate response was not whether FBC or the Benchmark properly managed the risks but whether the risks faced by FBC are greater than those faced by the Benchmark. With respect to comments related to the percentage of FBC's rate base being in generation and the risks of hydroelectricity versus fossil fuel generation, the relevant comparator is with FEI. No such comparison was made.

Commission Determination

The Commission Panel accepts that there is clearly a difference in some of the operational risks that are faced by FBC as opposed to those faced by the Benchmark.

- FBC has generation assets while FEI has none.
- FBC's assets are older than those of FEI and faces challenges related to PCBs that do not exist for FEI.
- FBC with its radial configuration has fewer options in the event of a problem leading to system outages than does FEI.

What is less clear is how these identified risks relate to the risk of losing business or discouraging a potential investor. In other words what are the implications of having these risks?

In the Stage 1 Decision, the Commission defined risk "as the probability that future cash flows will not be realized or will be variable resulting in a failure to meet investor expectations." (Stage 1 Decision, p. 24)

In its evidence, FBC raised these risk issues yet did not clearly connect them to the probability of them occurring or their impact on future cash flows. Therefore, it is difficult to assign any weight to operational risk as a factor in determining FBC's cost of capital.

Accordingly, the Commission Panel finds that although there are differences in operational risk between FBC and the Benchmark there is no basis upon which to establish the potential impact of these differences. Accordingly, the Commission Panel gives these operational risks limited weight.

Other Considerations

3.2.5 Credit Ratings

FBC Position

FBC states that its rating agencies, Moody's and DBRS have raised concerns with the potential impact of the GCOC proceeding on its credit ratings. FBC is concerned that reducing its equity thickness or its allowed ROE increases the risk of a ratings downgrade. This would increase the Company's cost of debt and restrict its access to financing. It asserts that the requested cost of capital requirements is, in part, justified in response to the possible downgrades.

As noted in Section 3.1.4, Moody's changed the outlook for all FBCU utilities from "stable" to "negative." With respect to FBC, Moody's on June 26, 2013, issued a credit opinion on FBC at Baa1 (negative). Moody's commented that the weak financial metrics may get worse following the recent Stage 1 Decision. FBC submits that Moody's summary table from its Credit Opinion shows that FBC is borderline investment/non-investment grade on Financial Strength and its indicated rating from the methodology grid is one notch (Baa2) lower than its actual rating. FBC states that

"Moody's June 2013 Credit Opinion concludes that a downgrade could occur if FBC's CFO pre-WC metric remains around 10 %, or Moody's concludes that the Commission has become less supportive."

FBC submits that DBRS, the higher of the two credit agencies with respect to ratings, in its March 25, 2013 opinion was clear that FBC's credit profile could be weakened by any material change in ROE or deemed equity from the GCOC proceedings that may negatively affect cash flow or earnings. This opinion was issued prior to the Stage 1 Decision. Given that this decision will impact FBC's earnings and cash flow, FBC concludes that a DBRS downgrade is not out of the question. (Exhibit B1-72, pp. 7-8; FBC Final Submission, pp. 54-56)

On a related matter, FBC submits that it's "ability to issue long-term debt is restricted by an "Earnings Coverage Test" covenant that exists pursuant to the trust agreements for certain of its outstanding debentures." A decrease in allowed ROE or equity thickness combined with rising interest rates and low taxes could impact FBC's liquidity arrangements negatively. (FBC Final Submission, pp. 57-58)

BCPSO Position

BCPSO submits that FBC only considered the implications of implementing a capital structure similar to that of the Benchmark based on past performance. FBC's response to BCPSO IR 1.18.1 indicates that if it were granted a 40 percent equity thickness and a 40 bps risk premium again based on past performance, it would be sufficient to maintain the current credit ratings. BCPSO also submits that based on the response to BCUC IR 2.29.2, there will be virtually no improvement in average results if the equity premium were to be raised to 70 bps.

ICG Position

Dr. Safir asserts the evidence indicates that FBC would still be able to raise capital on reasonable terms because a downgrade to a BBB(high) rating would still allow FBC to maintain its financial integrity. To support this assertion, Dr. Safir relies upon two long-term bonds, one issued by FEI and one by FBC during the 2006 to 2010 period where FEI had a lower credit rating.
Dr. Safir notes that the market price for FBC was only marginally lower than for the higher rated FEI. (Exhibit C4-22, p. 27; ICG Final Submission, p. 21)

Concerning the Earnings Coverage Test covenant, ICG states that the interest coverage was 2.64 in 2012 and a review of various SEDER filings for FBC through 2013 indicate earnings coverage ratios varied from 2.47 to 2.53. ICG notes that the trust deed agreement restriction was 2.0 for FEI. (ICG Final Submission, p. 23)

FBC Reply

FBC disagrees with ICG's conclusion that the costs of a lower credit rating can reasonably be expected to be in the order of 10 basis points. In FBC's view to examine bond yield spread differentials over more normal market conditions and extrapolate this to mean that the impact of a downgrade will be small is not meaningful. During difficult economic periods there is a flight to quality as evidenced by the 90 bps between the two utilities in January 2009. FBC asserts that it did not attempt to raise debt during the worst of the recent financial crisis and notes that access to capital is of equal importance during adverse market conditions. Further, FBC notes that ICG did not address Ms. McShane's evidence raised in the Final Submission that during the period from June 2008 to January 2009 there was no issuer (without at least one "A" rating) of long term debt on any terms in the Canadian market.

FBC characterizes ICG's comparison of FBC's actual historic coverage ratios to a Trust Indenture Minimum as simplistic and states it does not take FBC's debt financing requirements into account.

It therefore provides limited insight into the constraints on its ability to issue long term debt in the event ICG's recommendations were adopted.

Commission Determination

The Commission Panel has considered the evidence submitted by the parties. In Section 3.1.4, the Panel determined it appropriate that it continues to be guided by its Stage 1 finding as discussed in Section 1.3.2 of this Decision. The maintenance of current credit ratings is desirable but only to the extent that doing so does not go beyond what is required in the Fair Return Standard. We have no reason to vary this.

3.2.6 Short Term Risks and Deferral Accounts

ICG Position

ICG notes that FBC has consistently achieved ROE amounts in excess of those approved and assert that because of the use of deferral accounts, business risks are by and large borne by the customer. ICG submits that in FBC's last revenue requirements decision[10] the Commission approved the establishment of the Power Purchase Expense Deferral Account. This captured any risk with regards to future power purchase costs. In addition, since 2009, the Revenue Deferral Account has been in place and together these two deferral accounts manage utility risks by transferring what were formerly FBC risks to customers. In ICG's view, the fact that these risks are now borne by the customer results in the narrowing of differential risk with the Benchmark and justifies a lower risk premium. (ICG Final Submission, pp. 17-18)

[10] 2012-2013 Revenue Requirements Application and Review of Integrated Systems Plan Decision, August 15, 2012, p. 116).

FBC Position

FBC states that ICG overplays the significance of the deferral accounts as well as the ROE track record and makes the following comments:

- Achieving its ROE is not a distinguishing factor because FEI's record is similar.
- The introduction of the deferral accounts were predated by its ROE performance and deferral accounts do not address underlying business risk.
- It would be inconsistent for the Commission to give significant weight to FBC's increase deferral account coverage as no significant weight was given to FEI's lack of change in short-term risk in the Stage 1 Decision.
- The percentage of FBC's revenue requirement currently covered by deferral accounts is lower than in 2005.

Commission Determination

The Commission Panel agrees with FBC with respect to FBC's performance on ROE being similar to that of the Benchmark in that both have consistently earned higher than allowed amounts. The Panel also notes that in Stage 1 it was determined that actual earnings versus approved earnings history is a matter for revenue requirements and should have no bearing on the cost of capital. However, in the view of the Commission Panel, this determination cannot be interpreted to mean that the use of deferral accounts does not impact a utility's ability to earn or exceed its approved ROE.

FBC, relying upon evidence in BCUC IR 2.46.2, takes the position that the amounts covered by deferral accounts are reduced from amounts covered in 2005. The Commission Panel notes that the comparative point of 2005 was a Performance Based Ratemaking (PBR) period and there is no evidence on the record of this proceeding that assists in determining how this may have affected any comparison between the two time periods. Further, this comparison is for FBC over time and does not address any differences which may exist between FBC and the Benchmark.

FBC has requested an increase in its risk premium from the 40 bps that has been in place for a number of years. In the view of the Commission Panel, the addition of deferral accounts can serve to mitigate short-term risk. It would not be reasonable to take the position that the addition of these deferral accounts has significantly reduced the level of short-term risk relative to the Benchmark. However, it would be equally unreasonable to ignore the effect of significant deferral account additions on FBC's short-term risk. Therefore, given the addition of these new deferral accounts and their impact on the reduction of risk, the Commission Panel considers the 10 to 35 bps additional risk premium requested by FBC to be more difficult to justify.

3.2.7 Commission Cost of Capital Determination

The Commission Panel has determined that an equity ratio of 40 percent and an equity risk premium of 40 bps for FBC is appropriate effective January 1, 2013.

While acknowledging that there are areas where its business risks are similar to the Benchmark, FBC outlined a number of key areas of risk that, in its view, differed from FEI. These included smaller size, more concentrated assets and less diverse customer and economic bases, energy price competitiveness, supply risk, operating risk and financial risk related to its credit profile. The Commission Panel has reviewed the evidence from the parties related to each of these areas in reaching its overall risk assessment. The evidence supports the findings that FBC faces additional price competitiveness risk as compared to the Benchmark and in addition there is some additional risk related to small size. The Panel finds no substantial difference in supply risk as compared to the Benchmark, and, regarding operating risks, we found there was no basis on which to establish the potential impact of any differential in risk. In addition, the Commission Panel has considered the observations of BCPSO that electricity is at lower risk from provincial GHG emissions policy as well as the difficulty and costs associated with moving from electrical space and hot water heating in favour of natural gas (BCPSO Final Submission, p. 7). The matters were raised in Stage 1 and soften the impact of some of the factors raised by FBC in support of the level of differential in business risk between it and the Benchmark.

The Commission Panel has considered the evidence concerning credit ratings and Historic Trust Indenture Minimum and noted the desirability of maintaining current credit ratings but only to the extent that it does not go beyond what is required by the fair return standard. Concern for credit weightings has been given consideration and some weight in reaching our overall cost of capital decision for FBC.

The Commission Panel agrees with Ms. McShane's overall assessment that FBC faces a higher level of business risk than the Benchmark. This higher level of risk is the basis for our support of the recommendation of maintaining the equity ratio at its present level of 40 percent. With respect to the equity risk premium, the Commission Panel is not persuaded that FBC has made a case for a further differential in short term risk as compared to the Benchmark. Further, the Panel has considered Ms. McShane's evidence concerning FBC's debt ratings, the size differential between FBC and the Benchmark and the differences in the beta of the Benchmark as compared to other utilities of similar overall risk and finds that the current 40 bps risk premium is not significantly out of the range which would be considered reasonable. Moreover, the Panel notes that FBC's answer to BCUC IR 2.29.2 suggests that increasing the risk premium to 70 bps will have little impact on credit metrics. Finally, the Panel has considered the impact of BC Energy Policy, which favours electricity, and the fact that this along with the high cost of conversion from electricity to gas all serve to soften some of the long and short term risk faced by FBC. **Therefore, the Commission Panel finds that maintaining a 40 bps equity risk premium is both reasonable and appropriate.**

3.3 PNG Utilities

Introduction

The PNG utilities are made up of PNG-West, PNG (N.E.) Fort St. John/Dawson Creek (FSJ/DC) and PNG (N.E.) Tumbler Ridge (TR). PNG-West, the largest utility, encompasses the transmission and distribution system in the west-central portion of northern British Columbia from Summit Lake, BC to the west coast of the province. PNG (N.E.)-FSJ/DC Division includes the distribution system in

the FSJ and DC service areas in northeastern BC. PNG (N.E.)-TR Division, the smallest utility, is made up of the distribution system and gas processing plant in the Tumbler Ridge service area in northeastern BC.

As presented in Table 3.3, PNG is proposing the following equity ratios and equity risk premiums for the three utilities:

- PNG-West's common equity ratio to be increased from 45 percent to 50 percent and that PNG-West's equity risk premium be increased from 65 to 100 bps above the Benchmark.
- PNG (N.E.) FSJ/DC's common equity ratio to be increased from 40 percent to 45 percent and that its equity risk premium be increased from 40 bps to 75 bps.
- PNG (N.E.) TR's common equity ratio to be increased from 40 percent to 50 percent and that its equity risk premium be increased from 65 bps to 100 bps.

Table 3.3
Summary of Capital Structure and Equity Risk Premiums (ERP)

	Current		**Requested by PNG**		**Alternative Proposals by Intervener (BCPSO)**	
	Equity Thickness (%)	ERP (bps)	Equity Thickness (%)	ERP (bps)	Equity Thickness (%)	ERP (bps)
PNG-West	45	65	50	100	(A) 43.5 (B) 45	(A) 65 (B) 140
PNG (N.E.) FSJ/DC	40	40	45	75	(A) 38.5 (B) 40	(A) 40 (B) 115
PNG (N.E.) TR	40	65	50	100	(A) 38.5 (B) 40	(A) 65 (B) 140
Benchmark	38.5	0	n.a.	n.a.	n.a.	n.a.

PNG submits that it has been and remains the riskiest utility in Canada. PNG states that its proposed capital structure ratios are based on a number of factors including:

- Its best judgement of what is required to maintain PNG's financial integrity given its business risks.
- The evidence of its expert, Ms. McShane.
- It reflects the higher equity ratio PNG has maintained to retain an investment grade rating.

PNG submits that it has relied upon Ms. McShane's analysis to determine its appropriate equity risk premium. (PNG Final Submission, p. 35; Exhibit B3-14, pp. 29, 41)

Ms. McShane's recommended common equity ratios for PNG-West, PNG (N.E.)-FSJ/DC, and PNG-TR of 50, 45 and 50 percent respectively. Her recommendations are based on the following:

- The PNG utilities face higher business risk than the Benchmark.
- PNG will be able to maintain and possibly improve its investment grade debt rating. DBRS requires PNG maintain a debt/capital ratio of approximately 50 percent to maintain its investment grade rating.
- If deemed capital structures do not equate to the amounts required for an investment grade rating, PNG will be unable to earn its ROE.
- The recommended ratios will reasonably reflect the relative business risks for the utilities and is close to the DBRS required equity ratio.

In addition, Ms. McShane has recommended an equity risk premium for PNG-West and PNG (N.E.)-TR of 100 bps and a 75 bps premium for PNG (N.E.)-FSJ/DC. She has based this on the following:

- They are consistent with the DBRS conclusion that PNG's allowed ROE is low relative to its business risk.
- The beta analysis conducted by Ms. McShane supports the risk premiums.
- Data on size premiums indicate that recommended risk premiums are conservative.

(Exhibit B3-14, Ms. McShane's Opinion, pp. 2-3)

BCPSO acknowledges that PNG faces greater business risks than the Benchmark but notes that this has been reflected in the PNG utilities current equity ratios and risk premiums. BCPSO further states that in comparison to 2009, riskiness relative to the Benchmark has remained largely unchanged. This being considered, BCPSO takes the position that the equity ratio for PNG-West, PNG (N.E.)-FSJ/DC, and PNG (N.E.)-TR should be 43.5, 38.5 and 38.5 respectively and the equity risk premium should be 65, 40 and 65 bps respectively. (PNG Final Submission, p. 9)

Risks Assessment

PNG presents its evidence as a consolidated entity where risks affect all of the individual regulated utility divisions, on an equal basis, except in circumstances where there are significant differences between the utilities. (Exhibit B3-14, p. 4) To compare its overall business risk to the Benchmark, PNG has assessed seven risk categories providing an impact and probability assessment and a probability weighted ranking. These are summarized in Tables 3.4, 3.5 and 3.6 which follow.

PNG-West Division serves customers in 11 municipalities close to its transmission lines, which traverses B.C. from the Westcoast Energy system mainline interconnection near Summit Lake to Prince Rupert. The total population of the service area is under 100,000. (Exhibit B3-14, Ms. McShane's Opinion, p. 11)

Table 3.4 PNG-West Risk Ranking

Table 2 - PNG West Probability Weighted Impact

PNG West Risk Ranking by Probability Weighted Impact

Risk Category	Impact (1)	Probability (2)	Prob. Weighted Ranking (3)
Other (operating and size)	4 - High	5 - Very High	1
Demand and Throughput	4 - High	3 - Moderate	2
Competitive Position	3 - Moderate	4 - High	3
Regulatory	5 - Very High	2 - Low	4
Customer Growth	3 - Moderate	3 - Moderate	5
Aboriginal Rights	3 - Moderate	2 - Low	6
Supply Risks	3 - Moderate	2 - Low	7

(1) Impact defined as the potential magnitude of a significant adverse impact on PNG's returns
(2) Relative probability of a significant adverse occurrence
(3) Based on result of both Impact and Probability scores

Source: Exhibit B3-17, BCUC 2.3.1

The highest weighted risks identified for PNG-West are operating and size, demand and throughput, competitive position and regulatory.

PNG(N.E.) FSJ/DC is a small town utility in the heart of the natural gas producing region of B.C. with extensions to nearby hamlets. This division has been a very stable small utility for decades and offers the lowest residential delivered rate for natural gas ($7.64/GJ) in the Province. (Exhibit B3-14, p. 6)

Table 3.5 – PNG (N.E.)-FSJ/DC Risk Ranking

Table 4 – FSJ/DC Probability Weighted Impact

FSJ/DC Risk Ranking by Probability Weighted Impact

Risk Category	Impact (1)	Probability (2)	Prob. Weighted Ranking (3)
Other (operating and size)	4 - High	5 - Very High	1
Demand and Throughput	4 - High	3 - Moderate	2
Regulatory	5 - Very High	2 - Low	3
Customer Growth	3 - Moderate	3 - Moderate	4
Competitive Position	3 - Moderate	2 - Low	5
Aboriginal Rights	2 - Low	2 - Low	6
Supply Risks	2 - Low	2 - Low	7

(1) Impact defined as the potential magnitude of a significant adverse impact on PNG's returns
(2) Relative probability of a significant adverse occurrence
(3) Based on result of both Impact and Probability scores

Source: Exhibit B3-17, BCUC 2.3.2

PNG (N.E.)-FSJ/DC highest weighted risks are operating and size, demand and throughput, customer growth and regulatory.

Tumbler Ridge is a very small town that was settled in the 1980's as a service town to the NE coal development and included an underground gas grid utility. As the coal industry went into decline and closure, TR faced a bleak future since it is located in such a remote area. Some oil and gas development has supported the remaining community. Although TR is able to source its gas supply locally, most of the gas production in the area is very sour and is not processed until it is delivered to a processing plant outside of the area before delivery to its customer base of just over 1,200 and its sole industrial customer Canadian Natural Resources Limited (CNRL). PNG (N.E.)-TR purchases its gas from some less sour wells owned by CNRL but there is concern that those wells are becoming depleted. These factors, along with an aging gas processing plant that cannot be economically replaced, add to the risks and strains faced by PNG. (Exhibit B3-14, p. 26)

Table 3.6 – PNG (N.E.)-TR Risk Ranking

Table 6 – Tumbler Ridge Probability Weighted Impact

Tumbler Ridge Risk Ranking by Probability Weighted Impact

Risk Category	Impact (1)	Probability (2)	Prob. Weighted Ranking (3)
Other (operating and size)	5 - Very High	5 - Very High	1
Demand and Throughput	4 - High	4 - High	2
Supply Risks	4 - High	3 - Moderate	3
Customer Growth	3 - Moderate	4 - High	4
Regulatory	5 - Very High	2 - Low	5
Competitive Position	3 - Moderate	3 - Moderate	6
Aboriginal Rights	2 - Low	2 - Low	7

(1) Impact defined as the potential magnitude of a significant adverse impact on PNG's returns
(2) Relative probability of a significant adverse occurrence
(3) Based on result of both Impact and Probability scores

Source: Exhibit B3-17, BCUC 2.3.2

PNG (N.E.)-TR's highest weighted risks are operating and size, demand and throughput, supply and customer growth and regulatory.

Some of the categories utilized by PNG in its submissions have been combined in the discussion as follows.

3.3.1 Operating, Size and Supply Risks

PNG presented its size measurement factors and data comparisons with the Benchmark based on absolute as well as on a per customer basis (Exhibit B3-15, BCUC 1.20.1). The consolidated PNG rate base is 6.4 percent of the benchmark comprising PNG-West at 4.7 percent and the consolidated PNG (N.E.) at 1.7 percent.

PNG-West

PNG describes PNG-West size and operating risk as higher than the Benchmark. PNG describes PNG-West as about one-twentieth the size of the Benchmark and in comparison to FEI it "operates in a northern, mountainous and generally harsher environment, where the company's assets are subject to significant weather, geographic and geologic factors." These factors can be a cause of significant operating volatility and are reflected in increased costs of operating and maintaining a safe, reliable and efficient pipeline. PNG points out that both operating and capital cost are borne by fewer customers resulting in greater significance attached to customer losses relative to the Benchmark. Further, as noted by Ms. McShane, "the impact of smaller size for rated utilities is frequently exhibited in lower debt ratings despite financial parameters that are stronger than their larger peers" (Exhibit B3-14, p. 26; Exhibit B3-14, Ms. McShane's Opinion, p. 13; PNG Final Submission, pp. 5-6).

PNG, in assessing PNG-West's gas supply risk rates it slightly higher than the Benchmark due to having only one access point for all its gas supply. By contrast, the Benchmark has the Southern Crossing pipeline as an alternative supply source. PNG also cites its generally harsh operating environment as a factor noting that there is a greater potential for an event and access and repair can be more difficult (Exhibit B3-14, p. 26, Ms. McShane's Opinion, p. 17; PNG Final Submission, p. 18).

PNG (N.E.) Fort St. John/Dawson Creek

PNG describes the FSJ/DC Division as having higher risk than the Benchmark with respect to operating and size risk. PNG asserts that the FSJ/DC Division at approximately one-fiftieth the size is multiple orders of magnitude smaller than the Benchmark. Further, because of the smaller size, the impact of adverse events can create greater disruption and, due to its non-diversified customer base, it has fewer resources to deal with such occurrences. In addition, the small size of the communities within the service area limits FSJ/DC's access to services and trades and it is forced to

compete for relatively scant resources with the gas industry. PNG states that this is much different than the situation faced by the Benchmark and that these factors increase the cost of operating and maintaining a safe, reliable and efficient utility system. (Exhibit B3-15, BCUC 1.20.1; PNG Final Submission, pp. 20-21)

PNG describes the FSJ/DC Division supply risks to be slightly higher than the Benchmark. FSJ/DC is located in the heart of the production region and PNG notes that if curtailment of long term development of the area were to occur, the lack of access to gas would severely affect its competitive advantage (PNG Final Submission, p. 25).

PNG (N.E.) Tumbler Ridge

PNG states that the TR Division faces much higher operating and size risks than the Benchmark. The TR Division operates in a northern mountainous area characterized by a harsher environment and its assets are subject to significant weather, geographic and geologic factors. TR is a small remote community, with a customer base of just over 1,200, a size similar to some of the "micro-utilities" (i.e., small TES utilities). The small size means the TR division, like the FSJ/DC Division has limited access to services and faces the risk of competing for relatively scarce resources with the oil and gas industry. This is a situation that is much different than the Benchmark (PNG Final Submission, pp. 27-28).

PNG rates the TR risk related to supply to be much higher than the Benchmark. The area is served by gas supply from nearby CNRL wells and processed by PNG's gas plants before usage by customers. Of concern to PNG is the TR division's reliance on these wells, which are depleting, and the increasingly sour content of the gas. In addition, CNRL's own usage effectively limits gas supply availability to the TR Division's other customers and there are no alternative economically accessible pipeline quality gas sources available. As a means of partially mitigating this risk, in July 2013, PNG (N.E.) applied to the Commission for a Certificate of Public Convenience and Necessity (CPCN) to acquire, construct, own and operate a compressed natural gas virtual pipeline between

the communities of Dawson Creek and Tumbler Ridge. (Exhibit B3-14, pp. 25-26; Exhibit B3-15, BCUC 13.3-13.4)

PNG believes that even if the virtual pipeline is put in place, the greater level of operational complexity will continue to result in greater supply risk than the Benchmark (PNG Final Submission, p. 30).

BCPSO Position

BCPSO does not dispute that PNG's experiences higher operating and size specific risks as compared with the Benchmark. However, in BCPSO's submission, those risks have not changed since 2009. Similarly, the size differential between the two has not changed and BCPSO points out that the growth in PNG (N.E.) likely exceeds that of FEI (BCPSO Final Submission for PNG utilities, pp. 4-5).

With respect to supply risk, BCPSO views PNG's being the same or lower than it was relative to FEI in 2009. BCPSO considers that PNG's relative proximity to much of the shale supply in BC "is not only driving growth, particularly in the NE division, but ensures that the supply is accessible, whether production growth continues or not." (BCPSO Final Submission for PNG utilities, p. 9)

PNG Reply

PNG submit that with respect to what it refers to as Other Risks (operating and size risks) BCPSO's arguments are either unsubstantiated or based on a comparison of PNG's position in 2013 relative to 2009 with no reference to current position of PNG to the Benchmark. Therefore it is not relevant.

Commission Determination

The Commission Panel finds that all of the PNG utilities face additional business risk deserving of some weight when compared to FEI with respect to operating, size and supply risks.

The Commission Panel accepts that PNG's small size and operating environment creates challenges and limits its ability to diversify its risks when compared with the Benchmark. In addition, the Panel accepts that the extremely harsh environment where the PNG utilities operate is also more challenging than that of the Benchmark. This is especially true of PNG (N.E.)-TR, the smallest and most isolated of the communities. However, as argued by BCPSO, the Panel notes that these are not new risks and they have not changed markedly in recent years.

With respect to supply risk there is no disagreement from the Panel regarding the challenges that PNG (N.E.)-TR currently faces with respect to the quantity and quality of available gas. Among the PNG utilities PNG (N.E.)-TR faces the most serious challenges with regard to supply risk. However, we must consider that PNG has taken steps to develop a means to mitigate this risk through its application for a virtual pipeline. The eventual approval of the application may not remove all of the additional risk but the TR Division will have options.

With regard to PNG-West and PNG (N.E.) FSJ/DC supply risk, the Panel is not persuaded that it differs substantially from that of the Benchmark.

3.3.2 Customer Growth, Market Demand and Throughput Risk

PNG-West

PNG states that the evidence indicates that it has much higher risk with regards to customer growth than the Benchmark. PNG-West has experienced negative customer growth for nine consecutive years covering the 2003 to 2012 period. In total, this amounts to close to a 10 percent

decline in overall accounts over this period. PNG asserts that this is very different from the experience of the Benchmark, which has experienced steady growth in the number of customer accounts. PNG considers that if proposed LNG projects do not move ahead in a timely manner, it is doubtful that population growth will occur in its service area. (Exhibit B3-14, p. 11; Exhibit B1-9-6, Section H, p. 9; PNG Final Submission, pp. 15-16)

PNG-West submits that it faces much higher risk than the Benchmark with respect to market demand and throughput. PNG-West's total system throughput has declined by 87 percent over the 2003-2012 timeframe. A significant part of this is related to the loss of a major customer, Methanex. Notwithstanding this loss, a 42 percent decline continued over the 2006-2012 timeframe following the loss of Methanex. In PNG's view, this demonstrates the level of volatility that it faces and the detrimental impact of the loss of a single large customer. PNG provides a further example of this susceptibility, where in 2010 it lost the West Fraser Kitimat linerboard mill as a customer. Over the past ten years, PNG-West has experienced year-over-year declines of greater than 10 percent on at least four occasions, which is extremely atypical for the traditionally stable gas distribution industry. PNG submits that the Benchmark had not experienced these types of declines during the 2001-2011 time-period and had not faced a 10 percent decline in annual throughput in its entire history. (Exhibit B3-14, p. 14; PNG Final Submission p. 7)

Regarding business outlook, PNG has updated its evidence on a potential large industrial customer in the Burns Lake area. The customer informed PNG that it has recently reprioritized its capital spending plans and is not going forward with its proposed natural gas conversion project although it may revisit its decision in mid-2014. PNG submits that if the customer were to move forward with the project, "a contract would likely not be signed until the third quarter of 2014 with service not expected until 2015 at the earliest." (Exhibit B3-16-1, revised BCUC 10.2)

With reference to new LNG contracts, PNG remains optimistic regarding various initiatives but notes that none of the potential customers has made a final investment decision. In addition, PNG has updated its evidence with the information that Douglas Channel Energy Partners (DCEP), which

has contracted to take up to 80 mmcf/day of PNG-West's existing transportation capacity (representing approximately 70 percent of PNG-West's total capacity), is now in CCAA proceedings. While PNG submits that it is hopeful that DCEP will be able to successfully restructure its affairs, there is no assurance that such a restructuring will take place. (PNG Final Submission, p. 7; Exhibit B3-16-1, revised BCUC 1.10.2)

PNG submits that the potential Burns Lake customer and DCEP are indicative of the various risks PNG-West faces on an on-going basis. (PNG Final Submission, pp. 8-9)

PNG (N.E.) – FSJ/DC

PNG's view is that PNG (N.E.)-FSJ/DC faces a slightly higher level of risk than the Benchmark with respect to customer growth. FSJ/DC has had a more positive growth trend than PNG-West. This is primarily due to the population impact within the Fort St. John and Dawson Creek service areas resulting from the economic activity associated with the natural gas extraction industry (Exhibit B3-14, p. 11).

PNG submits that in contrast to the Benchmark, the growth experienced by FSJ/DC is primarily reliant on a single cyclical industry and is due to an increase in gas exploration in its service area. In its view, an extended downturn in the oil and gas industry could reduce the level of growth and subject FSJ/DC to significant future customer losses. PNG further points out that because it is relatively small, a small number of new households can potentially distort its overall growth figures. PNG is hopeful that LNG growth will eventually occur but there has yet to be any final investment decisions with respect to LNG projects. (Exhibit B3-15, BCUC 9.1; PNG Final Submission, p. 23)

PNG submits that the market demand and throughput risk faced by FSJ/DC is higher than the Benchmark. PNG attributes the lack of customer diversification, small service area, and single industry focus within the FSJ/DC customer base in its description of the division's more negative

and more volatile throughput trend compared to the Benchmark. At the same time, PNG concedes that FSJ/DC has not exhibited the same magnitude of declines in throughput as PNG-West. PNG describes FSJ/DC Division as more reliant on its residential and small commercial base and more exposed to the risk of continuously declining UPC levels, which has been far greater than the Benchmark. Specifically, FSJ/DC's 2000-2013 normalized residential UPC has declined by approximately 26 percent in comparison to a 10 percent decline in the Benchmark's UPC over a similar period. FSJ/DC's small commercial UPC results are similar in that a 24 percent decline over this same period are in contrast to an actual increase in the Benchmark's commercial UPC. (Exhibit B3-14, pp. 16-17; PNG Final Submission, p. 22)

FSJ/DC's total system throughput was 4,916 TJ in 2009 compared to 4,398 TJ in 2012, representing a net decline of 10.5 percent. PNG submits that the market prospects for FSJ/DC have not improved, particularly when compared to the Benchmark (PNG Final Submission p. 21).

PNG (N.E.)-TR

PNG describes the level of customer growth of PNG-TR to be similar to that of the Benchmark but it faces higher risk. PNG submits that while the overall number of customers has increased, the average is less than 1 percent per year, and because of the exceptionally small base, the absolute increase in customers has been minor. Further, PNG asserts that its reliance on a single cyclical industry is in contrast to the Benchmark, which is large and well diversified (PNG Final Submission, p. 31).

PNG is of the view that the risks related to demand and throughput are higher than those of the Benchmark. PNG describes its TR division as a small size utility with reliance on a single large industrial customer, CNRL, representing over 80 percent of its throughput volume and approximately 25 percent of its margin. As a result, a change in the demand level of this one customer will effectively lead to a change in total throughput levels. (Exhibit B3-14, pp. 19- 20)

PNG submits that it is actively seeking methods to not only reduce the level of supply risk but also potentially stimulate additional demand via a CNG or "virtual pipeline" strategy. This should also help to alleviate a portion of the Tumbler Ridge Division's reliance upon CNRL (PNG Final Submission, p. 29).

BCPSO Position

BCPSO agrees that PNG-West has experienced challenges in customer growth and notes that this is not a new trend. In its view, the relative risk to PNG-West is the same or better than it was in 2009. BCPSO consider the growth of FSJ/DC to be similar to that of the Benchmark citing the oil and gas boom as the cause (BCPSO Final Submission, p. 8).

While it does not dispute the decline of 87 percent from 2003-2012, BCPSO disagrees with the timeframe PNG put forward in its evidence when describing the market demand and throughput risk. In the view of BCPSO, the 2003-2012 timeframe is not an appropriate comparator when determining PNG's relative decline compared to FEI. It submits that the loss of Methanex in 2005 accounts for the majority of that decline and has been accounted for in the 2009 Decision (BCPSO Final Submission, p. 5).

BCPSO submits that "FSJ/DC has not experienced near the magnitude of decline as PNG-West, and indeed saw an increase of 3.6% in 2012." Furthermore, it takes the position that the decline in throughput is offset by the improved outlook both in the PNG NE territory and the potential improved outlook for PNG due to potential LNG projects. While BCPSO accepts there is a degree of uncertainty remaining, PNG's position relative to FEI is the same or better in 2013 than it was in 2009 and that should be reflected in determining the overall business risk (BCPSO Final Submission for PNG utilities, p. 5).

PNG Reply

PNG states that BCPSO's arguments concerning demand and throughput risks are not supported by evidence and are compared against 2009 with no reference to the current position of PNG relative to the Benchmark (PNG Reply, p. 5).

Commission Determination

The Commission Panel finds that PNG-West faces significantly more risk than the Benchmark with respect to customer growth, market demand and throughput risk and these factors are deserving of weight. While PNG (N.E.)-FSJ/DC and PNG (N.E.)-TR face risks that are greater than the Benchmark on these factors, they are less than those faced by PNG-West. The Commission Panel awards only limited weight to PNG (N.E.)-FSJ/DC and PNG (N.E.)-TR and moderate weight to PNG-West.

The Commission Panel accepts that PNG-West has and continues to have significant challenges with customer growth and its impact on demand and throughput. The Panel acknowledges that this situation is not new and has existed for some time. However, to deny the fact that the challenges faced by PNG-West are significant would not be reasonable and justifies the moderate weight given relative to the Benchmark. The Panel also acknowledges that there is great potential in the LNG market, which could significantly change the situation for PNG-West. However, there are no firm contracts in place for new customers and some LNG initiatives with potential are less certain. Therefore, while placing some weight on the potential for future development, the Commission Panel remains cautious about the future.

The challenges faced by PNG (N.E.)-TR while different than those of PNG-West are still significant. While enjoying some growth in recent years, the small customer base and reliance on one industry are risks that have not dissipated. The heavy reliance on CNRL as its largest customer and the potential for demand shifts creates business risk. It is too early to determine the impact of the

virtual pipeline strategy on attracting potential customers but the Panel considers this a positive development. The Panel acknowledges the conditional CPCN granted by Order G-4-14 on March 5, 2014.

The Commission Panel notes that PNG (N.E.)-FSJ/DC has experienced a more positive growth trend due to increasing economic activity related to the natural gas industry and has not experienced the magnitude of declines in throughput as has PNG-West. In addition, the future does hold some potential for further growth if LNG projects become a reality. However, this is tempered by the fact that the FSJ/DC Division is reliant on one industry that is cyclical and there remains the risk of a downturn with significant impact.

3.3.3 Competitive Position of Natural Gas

PNG-West

PNG states that the evidence indicates that PNG-West has much higher risk with regards to its competitive position than the Benchmark. PNG-West differs substantially from the Benchmark with regards to competitiveness of gas versus electricity for space heating because of the much smaller differential in rate advantage over electricity. This leads to less ability to offset higher initial capital costs for natural gas in comparison with electricity. In addition, due to PNG's smaller customer base and relatively large service area, PNG's delivery rates have historically been, and are expected to remain, substantially higher than those of the Benchmark. (Exhibit B3-14, p. 5)

Ms. McShane states that the differential in delivery rates between PNG-West and FEI "...means that irrespective of the change in natural gas prices or electricity prices, it will continue to face significantly higher price competitive risks than the Benchmark utility" (Exhibit B3-14, Ms. McShane's Opinion, p. 14).

PNG states that PNG-West's customers have seen a significant decline in the commodity cost of gas over the past several years. However, the delivered charge to residential customers is nearly twice that of FEI ($16.04/GJ vs $8.80/ GJ). In addition, noting that PNG-West's delivered cost of gas is now approximately 30 percent below that of electricity, PNG considers that a return to 2008 level gas prices would effectively result in the disappearance of any operating cost advantage. (PNG Final Submission pp. 9-11)

PNG (N.E.)-FSJ/DC

PNG submits that FSJ/DC Division face competitive risk equal to the Benchmark. FSJ/DC Division is located within BC gas exploration and production sector. The presence of local (low-cost) gas, combined with virtually no transmission requirements, has allowed FSJ/DC's customers to enjoy competitive rates versus electricity for an extended period of time. The residential rate for FSJ/DC is $7.64/GJ compared to $8.80 for FEI. PNG submits that despite the competitive advantage, it has not led to significant customer growth; moreover, more efficient appliances and insulation/home construction have resulted in lower UPC which has declined by 25 percent. (Exhibit B3-14, pp. 6, 8)

PNG (N.E.)-TR

PNG takes the position that PNG (N.E.)-TR faces slightly higher risk than the Benchmark. PNG states that this division has a higher cost of delivery than FEI which is primarily a result of the very limited size of the TR utility and service area. In addition, all fixed costs that are associated with the safe, reliable and efficient delivery of gas are spread over a very small number of customers. The total delivered price of gas for the TR Division is slightly higher than that of the Benchmark ($9.51/GJ vs. $8.80/GJ). (Exhibit B3-14, pp. 6, 9)

PNG submits that the TR Division's slightly weaker competitive position relative to the Benchmark could deteriorate with any significant changes in CNRL volumes.

BCPSO Position

With reference to PNG-West's concern that a change in natural gas prices may nullify the price advantage over electricity, BCPSO submits that the likelihood of such a sizeable increase in the cost of gas in the next four years is low. Furthermore, BCPSO notes that the cost advantage has been increased for PNG-West when compared to FEI since 2009. (BCPSO Final Submission for PNG, p. 6) While BCPSO does make specific submissions with respect to FSJ/DC's competitive position, it states that PNG (N.E.) Divisions enjoy a similar cost advantage as PNG-West and that the relative competitive position for PNG compared to FEI is better today than it was in 2009. (BCPSO Final Submission, p. 6)

PNG Reply

PNG argues that PNG-West's competitive position has improved because of an increase in electricity prices and the operating cost advantage of PNG-West is significantly lower, more volatile and historically shorter than that of the Benchmark (PNG Reply, p. 5).

Commission Determination

The Commission Panel finds that all of the PNG utilities face some additional risk due to differentials in electricity rates when compared to the Benchmark. However, the Panel also finds there is insufficient evidence to support the view that electricity as compared to natural gas rates is more attractive.

The Commission Panel takes no issue with the assertion that the natural gas cost advantage relative to electricity is less for PNG than the Benchmark. The question is how much weight should be placed on these differences.

The Panel considers the primary competitor for PNG to be electricity. There appears to be no argument that both PNG utilities and the Benchmark are competitive with electricity prices. Therefore, any variance which exists between the prices charged by the PNG utilities and the Benchmark are less important since they are not competitors.

The Commission Panel acknowledges that the Benchmark's more favourable price differential between natural gas and electricity rates is an advantage in the event of rising natural gas prices. That being said, there is no evidence to suggest that this is likely to occur in the near future. **Therefore, while the Commission Panel finds that there is additional competitive risk relative to the Benchmark we place minimal weight on it.**

3.3.4 Regulatory Risk

PNG

All three divisions of PNG face similar regulatory risk and the following discussion combines all three PNG utilities.

PNG takes the position that it faces a higher level of risk relating to the regulatory framework than does the Benchmark. PNG has highlighted the following areas:

- Inconsistent treatment versus the Benchmark regarding pension assets.
- Inefficient treatment of the retirement compensation arrangement.
- Disallowance of some revenue requirement expenses.
- Regulatory burden regarding information requests for routine operating matters.

PNG claims that it faces higher regulatory risk than the Benchmark due to handling differences between the regulatory decisions for the FEI and PNG. PNG states that on multiple occasions, it received different treatment, which results in higher regulatory risk. In addition, PNG states that its

"significantly different experience with respect to earning its allowed rate of return relative to that of the Benchmark is the prime evidence of this higher regulatory risk." (PNG Final Submission, pp. 12-14; Exhibit B3-14, p. 25)

BCPSO Position

BCPSO argues that the Commission has been extremely supportive of PNG especially during the difficult periods in which it lost major industrial customers and risked entering the death spiral. BCPSO made the following submissions:

- The Retirement Compensation Arrangement (RCA) that was put into place demonstrates one of the ways in which the Commission supported PNG during its difficult years.
- As set out in response to BCPSO IR 1.8.1, Figure 19, depicting PNG's actual against its allowed ROE, is based on PNG-West's actual equity, not deemed equity. This would depress the ROE when actual returns exceed the approved ROE.
- The 2011 actual ROE in Figure 19 was depressed due to the cost of the sale to AltaGas where the buyer agreed to a $54.2M premium (60% of the $94.9M NBV). This suggests that AltaGas, as an investor, viewed PNG's ROE as acceptable.
- The response to BCUC IR 1.9.1.1 suggests that FSJ/DC was close to the benchmark, but still under-earned the allowed ROE in 7 of the last 11 years. BCPSO notes that this does not alone indicate that the allowed ROE is too small. It could indicate that cost control has not been as robust as it could have been. BCPSO further submits that rates are set to allow a fair opportunity to earn the approved ROE.
- PNG's rates have been set by Negotiated Settlement Agreement since 2003 for all years but 2004, 2006, 2007, 2012 and 2013. BCPSO interprets this to mean that PNG agreed those rates were a reasonable balance which enabled the utilities to earn a fair return.

(BCPSO Final Submission for PNG utilities, pp. 6-8)

PNG Reply

PNG argues that it does not regard the RCA as supportive, but as disadvantageous and serves as an example of PNG facing different treatment than the Benchmark resulting in higher regulatory risk. PNG acknowledges that BCPSO is correct with respect to Figure 19 being based on actual and not deemed equity and, when actual equity exceeds deemed equity, it will have a depressing effect on ROE. PNG points out that BCPSO's submission ignores PNG's desire to maintain an investment grade rating equity ratio exceeding deemed levels (PNG Reply, p. 6).

Commission Determination

PNG has raised a number of concerns that it believes collectively justifies that it has higher regulatory risk than the Benchmark. To support this PNG has listed a number of decisions where it believes it received regulatory treatment that differed from FEI. Additionally, PNG believes there have been proceedings where the degree of scrutiny through information requests is unnecessary for what it considers to be routine operating matters. These have resulted in unnecessary cost burden and, in some instances, the Commission has disallowed some expenses that are typically allowed in other corporate organizations (Exhibit B3-14, pp. 24-25).

With regard to PNG's perceived treatment by the Commission respecting regulatory process, the Commission Panel reminds PNG that in ensuring a panel can consider all relevant evidence it is appropriate for IRs, including those prepared by Commission staff to test the evidence. Given that PNG agrees that being referred to as the riskiest utility in Canada remains an apt description, it is appropriate for the Commission to scrutinize PNG's applications and be thorough with its information gathering process.

The Commission Panel notes that there is no evidence to support PNG's assertion that it receives different treatment in its revenue requirements applications. It is not unusual for the Commission

to disallow certain costs it deems unnecessary or require treatments which are unique to an individual utility.

The Commission Panel has considered BCPSO's statements with respect to PNG's ROE and earnings history and resultant ROE performance. The Panel notes that PNG's rates have been set by negotiated settlement in 2009, 2010, and 2011. We agree with BCPSO that it would be reasonable to conclude that PNG by its agreement considered rates to be "a reasonable balance which enabled the utilities to earn a fair return."

The Commission Panel has considered the DBRS Ratings Report for PNG of March 12, 2012, that has been filed in this proceeding. In the report, DBRS stated the following with respect to regulation: "Though DBRS continues to view the regulatory environment as supportive, the review could have an impact on PNG's future earnings and cash flow." The "review" referred to by DBRS is the Generic Cost of Capital proceeding. The Commission Panel also notes that the most recent DBRS Ratings Report of August 1, 2013, raised no concerns with respect to regulatory oversight. It therefore appears that DBRS does not view the regulatory environment as problematic. (Exhibit B3-7, p. 1 of 2, Tab 2; Exhibit B3-15, BCUC 1.23.1 Attachment)

Taking all of these factors into consideration the Commission Panel finds that there is no evidence to support PNG's assertion that it faces higher regulatory risk than the Benchmark. Accordingly, the Panel places no weight on this factor.

3.3.5 Aboriginal Rights

PNG-West, FSJ/DC and TR Divisions

The PNG-West system spans much of the province on an east to west basis and traverses many areas that are currently within existing Aboriginal territories or within disputed Aboriginal areas.

Furthermore, a large portion of PNG-West's assets are in the transmission business, which is significantly different than the primarily distribution function of the Benchmark (Exhibit B3-14, pp. 4-5).

PNG points to the 17 different First Nations with land claims in its region and the "non-treaty" status of many of those First Nations to conclude that it faces higher risk relative to the Benchmark (PNG Final Submission, pp. 16-17).

PNG believes that the FSJ/DC and TR Divisions face similar issues with respect to Aboriginal Rights and PNG (N.E.)'s risks related to Aboriginal Rights lie between those of the Benchmark and PNG-West. According to PNG, the risk stems from the fact that First Nations represent a larger percentage of communities and customers within the service area of PNG N.E. the Benchmark. This exposes the Utilities to greater relative uncertainty. (Exhibit B3-14, p. 5 of 41; PNG Final Submission, p. 24)

BCPSO Position

BCPSO notes that PNG has been fairly successful in maintaining good relations with First Nations in their territories, despite their smaller workforce when compared to FEI. As set out in BCUC IR 1.3.4, the Commission has never denied any costs related to First Nations issues. In this regard, BCPSO submits that PNG and FEI are not dissimilar. (BCPSO Final Submission for PNG utilities, p. 8)

Commission Determination

The Commission Panel finds there is no persuasive evidence that PNG is more at risk with respect to aboriginal rights than the Benchmark. The Panel acknowledges that PNG does face some level of risk with respect to aboriginal rights but is not persuaded it is materially different than FEI.

Specifically, PNG has provided no evidence to indicate any uncertainty in First Nations rights and titles have affected or are likely to affect PNG's ability to earn its return in the future as compared to the Benchmark.

3.3.6 Capital Structure and Equity Risk Premium Considerations

Credit Ratings

PNG-West, PNG (N.E.)-FSJ/DC, PNG (N.E.)-TR

PNG currently has a BBB(low) rating by DBRS on its existing third party debt which is considered investment grade. This rating is four notches below the Benchmark. In spite of this, PNG exhibits superior credit metrics and explains that the primary reason for this is that it has historically maintained a higher equity level in its capital structure than what has been approved. PNG has done this based on its assessment of the required level of equity to maintain the financial integrity of the utilities. In addition, PNG based this decision on what DBRS considers to be the minimum level of equity for maintenance of its BBB(low) credit rating.

PNG states that DBRS in its August 1, 2012 credit rating noted that to maintain investment grade ratings PNG must maintain a credit profile that is stronger than its peers and its debt-to-capital ratio is expected to remain at approximately 50 percent over the medium term. Based on its current rating, PNG states that it has a significantly higher debt cost than the Benchmark and much more limited access to capital. PNG also states that a downgrade by DBRS would have, among others, the following impacts on PNG and its customers:

- Significantly higher borrowing costs.
- Higher costs for existing debt facilities.
- Reduced access to markets.

- Stricter financial covenants.
- Higher counterparty requirements.

PNG submit that the negative impacts related to a downgrade are greater than the impact to customers of approving a higher level of common equity. Ms. McShane agrees stating that while the BBB rated companies face higher costs, reduced market access and more stringent covenants attached to debt issues relative to those in the A category, the implications of a non-investment grade category rating is significantly more serious. (Exhibit B3-14, pp. 33-34; Exhibit B3-14, Ms. McShane's Opinion, pp. 21-22)

PNG points out that "[t]he lack of a BB rated utility in Canada, or even additional BBB-rated utilities in Canada is instructive in and of itself." In addition, in the US, which has a larger universe of gas utilities than Canada, a BBB- or lower rating is the exception. In spite of this, PNG notes that historically, its level of common equity is significantly lower than those utilities rated much higher than PNG.

BCPSO Position

BCPSO submits "that DBRS view is that PNG is "stable" not "negative" is premised on the existing CERs and RoE." While undefined, the Panel takes CER to refer to equity thickness. (BCPSO Final Submission for PNG utilities, p. 9)

Commission Determination

The Commission Panel has considered the evidence submitted by the parties. The Panel in Sections 3.1.4 and 3.2.5 determined it appropriate that it continue to be guided by its Stage 1 finding as discussed in Section 1.3 of this Decision. The maintenance of current credit ratings is desirable but only to the extent that doing so does not go beyond what is required in the Fair Return Standard.

We have no reason to vary this. However, it is acknowledged that PNG does face a unique set of circumstances and a further credit rating downgrade will have impacts. The Commission Panel considers this in its overall cost of capital determination.

3.3.7 Commission Cost of Capital Determination

The Commission Panel has determined that the following common equity ratios and equity risk premiums are appropriate for the PNG utilities:

PNG West:	**Common equity ratio:**	**46.5 percent**
	Equity risk premium:	**75 bps**
PNG (N.E.)-FSJ/DC:	**Common equity ratio:**	**41 percent**
	Equity risk premium:	**50 bps**
PNG (N.E.)-TR:	**Common equity ratio:**	**46.5 percent**
	Equity risk premium:	**75 bps**

The Commission Panel has considered the business risks faced by the three PNG Utilities and in its judgement considers these common equity ratios and risk premiums to be appropriate for each utility. PNG-West has significant issues with customer growth, market demand and throughput and the Commission Panel has weighted these accordingly. In addition, the Panel has considered the operating risk and factors related to its relatively small size in reaching our determination. PNG (N.E.)-TR has similar risks to those of PNG-West. However, the Panel has considered that factors related to size and difficulties with supply to be key determinants with less emphasis on customer growth, demand and throughput. PNG (N.E.)-FSJ/DC is less susceptible to some of the business risks and is closest to the Benchmark in terms of levels of business risk. All of the PNG utilities face some competitive risk relative to the Benchmark.

In reaching our common equity thickness determinations, the Commission Panel has considered the evidence related to credit ratings and has placed some weight on the desire to maintain a

rating category higher than non-investment grade. This has been only to the extent that it does not go beyond what is required by the Fair Return Standard.

The Commission Panel has awarded an increase in equity premium over the Benchmark to all of the PNG utilities. PNG-West and PNG (N.E.)-TR have been awarded equity risk premiums of 75 bps, which are slightly higher than that of PNG (N.E.)-FSJ/DC at 50 bps. In the judgement of the Commission Panel, the variance among the PNG utilities reflects the difference in short term risk between the utilities as well as in comparison to the Benchmark. In addition, the Panel has considered the PNG utilities' debt ratings as affected by credit metrics and factors related to size and their impact on short term risk.

The Commission Panel acknowledges that the PNG utilities face a unique set of circumstances with respect to the level of business risk. The determinations that have been made in this proceeding are based on the Panel's assessment of the business risks which exist today and little weight has been placed on the potential for change to these risks in the near future. If, for example, the various LNG initiatives currently contemplated become a reality, the amount of business risk will shift accordingly. The same could be said about potential developments in the mining industry. In the view of the Panel, it is important to ensure that PNG's business risk assessment remains contemporary and its cost of capital aligned with it. **Accordingly, the Commission Panel directs the PNG utilities to include an updated business risk assessment in all future revenue requirements applications.**

3.4 TES Utilities

Introduction

In the Stage 1 Decision, the Commission acknowledged the FBCU submission that it may be efficient, given the small size of thermal energy systems, to have a simple process to address cost of capital issues for TES systems, irrespective of the provider (Stage 1 Decision, p. 94). Corix

Utilities Inc., Central Heat Distribution Limited and River District Energy Limited Partnership (the Companies) filed evidence jointly in Stage 2. FAES filed evidence for its TES projects: Delta School District, Tsawwassen Springs, PCI Marine Gateway, Telus Garden and Kelowna DES.

The TES Regulatory Framework Decision issued on December 31, 2013, and Order G-231-13A determined that District Energy System type projects, i.e., a system designed for intended future expansion to connect to future unknown customers and sites where the demand is uncertain and the capital costs to construct are in excess of $15 million are Stream B utilities. Stream B utilities must follow the regulatory requirements in the TES Regulatory Framework. Stream A TES utilities include on-site Discrete Energy Systems up to a capital cost of $15 million. The Commission no longer determines the deemed return on equity, capital structures and cost of debt for each Stream A utility from the outset once the exemption has been approved by the Lieutenant Governor in Council. (Exhibit B6-5, BCUC 31.1; Exhibit B2-18, BCUC 1.1)

FEI confirmed that the regulatory streams of FAES utilities are as follows:

- Delta School District – Exempt
- Tsawwassen Springs – Stream A
- PCI Marine Gateway – Stream A
- Kelowna DES – Stream B

(Exhibit B6-5, BCUC 2.40.1)[11]

On February 20, 2014, the Commission invited FAES to make submissions by February 27, 2014, with respect to the Commission Panel rendering a decision on the capital structure and equity risk premium only for Stream B utilities. FAES confirmed acceptance of this approach. (Exhibit B6-6)

[11] By letter dated February 27, 2014, in response to the Commission's invitation to make submissions whether there is a need for the Commission Panel to make determinations for FAES' Exempt and Stream A utilities, FAES updated its response to BCUC IR 2.40.1 regarding Delta School District, which will fall under Stream A.

In accordance to the TES Regulatory Framework, the Stream B utilities that require a deemed capital structure and a risk premium above the Benchmark ROE are:

- FAES Kelowna DES;
- Dockside Green Energy;
- Corix UniverCity;
- Central Heat;
- River District Energy.

The relevant conclusions from the Contextual Issues discussions are as follows:

- As a result of the TES Regulatory Framework, the determinations from this Stage 2 proceeding will only apply to the utilities identified above as Stream B utilities. (Section 2.3.2)
- With respect to regulating Stream B utilities, the Commission Panel will set a minimum default capital structure and equity risk premium minimum for Stream B TES projects (utilities, systems). (Section 2.4)
- As determined, no weight should be given to Ms. Ahern's framework for determining the cost of capital for small utilities. Regardless, the Panel will continue to consider the small size factor as one among a range of business and financial risks TES utilities are exposed to. (Section 2.5)
- For the purposes of this Decision the Panel will make determinations related to TES projects and will consider all risks faced by a TES project investor, which include the business development, construction and operation phases. (Section 2.6)
- A risk matrix is a useful tool for the purposes of identifying and describing risks or categories of risks. (Section 2.7)

Table 3.7 below summarizes the current and requested standard default capital structure and ERP.

Table 3.7

Summary of Capital Structure and Equity Risk Premiums (ERP)

	Current		**Requested by TES Utilities**		**Proposed by Intervener (BCPSO)**	
	Equity Thickness (%)	ERP (bps)	Equity Thickness (%)	ERP (bps)	Equity Thickness (%)	ERP (bps)
FAES	n.a.	n.a.	**45**	**75**	n.a.	n.a.
Delta School District	40	50	FAES minimum default		FAES recommendation be given significantly more weight	75 bps as proposed by FAES be the maximum
Tsawwassen springs	40	50	FAES minimum default			
PCI Marine	40	0	FAES minimum default			
Telus Garden	40	0	FAES minimum default			
Kelowna DES	40	50	FAES minimum default			
The Companies	n.a.	n.a.	**60**	**250**		
Central Heat	36.31	50	The Companies minimum default			
Dockside Green	40	100	The Companies minimum default			
UniverCity	40	50	The Companies minimum default			
River District	40	50	The Companies minimum default			
Benchmark	38.5	0	n.a.	n.a.	n.a.	n.a.

3.4.1 Minimum Default Capital Structure and Equity Risk Premium

Summary of Submissions by Parties

The Companies request that the Commission take the following steps:

- Set the default debt/equity ratio at 40 percent debt/60 percent equity;
- Set the default equity risk premium relative to the Benchmark at a minimum of 250 bps;
- Set the default debt component of the capital structure to track a benchmark credit spread that reflects a BBB or BBB(low) rate debt relative to the 10 year Government of Canada bond yield;
- Any TES utility would be free to present a case for different financial parameters.

(the Companies Final Submission, pp. 1-2)

The Companies also stated that a utility could choose to accept a lower return as it saw fit to compete fairly in the TES market, so long as that conduct complies with the UCA. Further, the Companies submit the fact that FAES is willing to accept a lower equity ratio and lower ROE does not diminish the validity or value of the approach that their expert has proposed. (Exhibit B2-18, BCUC 1.4.8; the Companies Final Submission, p. 6)

FAES submits that, in light of the overriding similarities among TES utilities, the Commission should approve a default common equity ratio and equity risk premium of 45 percent and 75 bps respectively. Furthermore, FAES submits that a TES utility would retain the right to tender evidence in support of a higher equity risk premium than the default risk premium. (Exhibit B2-6, Appendix B, pp. 1-2, FAES Final Submission, p. 22)

BCPSO submits that small TES utilities should be allowed a slightly higher common equity ratio than the Benchmark. BCPSO also agrees with both FAES and the Companies that small TES utilities should be permitted a default risk premium relative to the Benchmark. (BCPSO Final Submission, pp. 5-6)

The Commission Panel Approach

As the Commission Panel already has reviewed the testimony put forward by the Companies' expert, Ms. Ahern, and found that no weight should be given to her framework, this section focuses on the principles outlined by Ms. McShane, the expert for FAES. Nevertheless, the risk descriptions below do not necessarily contradict the views put forward by the Companies. For ease of presentation, this section follows that adopted by Ms. McShane. Earlier in Section 2.2, the Panel reviewed Ms. McShane's quantification methodologies for establishing an optimal common equity ratio and ROE.

3.4.1.1 Business Risk of TES Projects

Ms. McShane states that although each TES project regulated by the Commission will have its own unique characteristics, TES projects share attributes which result in higher business risk for each project and for the BC thermal energy utility sector as a whole relative to the Benchmark. The higher business risk of TES projects relative to the Benchmark utility reflects the combination of:

1. Their greenfield characteristics, including the lack of an established customer base;
2. Reliance on non-traditional rate structures to make the projects competitive and provide an opportunity to recover the related investment;
3. Small size of individual TES projects, e.g., fewer customers to recover the costs of the assets constructed and operated to serve them;
4. Reliance on more complex systems to provide thermal energy service;
5. Competition to provide thermal energy services from conventional sources of energy;
6. Competition to provide thermal energy services from other TES providers;
7. The relatively high upfront capital costs that must be recovered only from thermal energy customers; and
8. Higher counterparty risk due to reliance on one or a limited number of counterparties for revenue.

Ms. McShane concludes that the higher business risk of TES projects relative to the Benchmark results in a higher cost of capital, which needs to be reflected in a higher overall allowed return. (Exhibit B6-2, Appendix B, p. 6)

3.4.1.2 Common Equity Ratios for TES Projects

Ms. McShane acknowledges that the determination of a reasonable equity ratio for TES projects, which appropriately reflects their higher business risk and smaller size, is largely a qualitative exercise and involves informed judgement. She also points out that because BC is the only province where TES projects are regulated, there are no directly comparable companies to serve as a benchmark, except for the recent BCUC decisions.

As a first step, Ms. McShane considers the fact that the small size of the TES projects, on a stand-alone basis, would preclude them from obtaining arms-length third party financing in similar proportions of debt and equity as the Benchmark. Consequently, she states that an equity ratio of 40 percent for projects of this type is too low to reasonably recognize the higher risks, small size and limited access to debt capital. She draws this conclusion despite the fact that over the last few years the Commission has adopted a 40 percent equity ratio for seven TES projects.

As the second step, Ms. McShane reviews the capital structures adopted for small electric and natural gas distribution utilities in Canada and provides the following Table 3.8.

Table 3.8

Capital Structures for Small Canadian Electric and Natural Gas Utilities

Utility	Regulator	Date of Decision	Allowed Common Equity Ratio	Equity Risk Premium Relative to Benchmark	Rate Base (SM)	Customers (000s)
AltaGas Utilities	AUC	Dec-11	43.0%	0%	$175	74
Enbridge Gas NB	NB EUB	Nov-10	45.0%	2.75%	$273	12
FEVI	BCUC	Dec-09	40.0%	0.50%	$779	101
FEW	BCUC	Dec-09	40.0%	0.50%	$42	3
FortisOntario	OEB	Dec-09	40.0%	0%	$200	64
Gazifère	Régie	Nov-10	40.0%	0.25%-0.50%	$78	39
Heritage Gas	NSUARB	Nov-11	45.0%	2.0% [1/]	$198	4
Maritime Electric	IRAC	Dec-12	43.5%	0.58% [2/]	$311	76
Natural Resource Gas	OEB	Jun-10	40.0%	0%	$13	7
Northland - (NWT)	NWTPUB	Nov-11	44.0%	0.30% [3/]	$15	3
Northland - (YK)	NWTPUB	Aug-11	43.5%	0.30% [3/]	$41	8
PNG (N.E.) - FSJ/DC	BCUC	May-10	40.0%	0.40%	$49	18
PNG (N.E.) -TR	BCUC	May-10	40.0%	0.65%	$2	1
PNG-West	BCUC	May-10	45.0%	0.65%	$128	20
Yukon Electrical	YUB	Feb-09	40.0%	0.46%	$34	17

Source: Exhibit B6-2, Appendix B, p. 8

After providing a number of caveats, Ms. McShane concludes that it is reasonable to rely on the upper end of the range for establishing the common equity ratio for each project: i.e., a common equity ratio of 45 percent. To support this, she specifically discusses the credit ratings for FEVI and PNG. Thus, her recommendation for "FAES as a whole, given the small size of the projects individually and in the aggregate, it is unlikely that either any individual TES project or FAES would be able to achieve a debt rating higher than BBB."

Ms. Ahern, expert for the Companies, states that it is her opinion as well as common sense that small companies, such as TES utilities, generally need to maintain a less financially leveraged capital structure than larger companies such as FEI. This is to provide a cushion against the effects of extraordinary events which will affect a smaller firm to a greater extent than a larger firm. (Exhibit B2-17-1, pp. 12-13)

3.4.1.3 Equity Risk Premium for TES Project

Ms. McShane highlights the difficulties inherent in setting equity risk premiums for TES projects. For instance, it is not possible to select samples of publicly-traded utilities that are of directly comparable risk to the regulated TES project. Moreover, there is no methodology available to quantify the impact of each difference in risk characteristics unique to a particular project. Accordingly, Ms. McShane recommends adoption of a single default equity risk premium as a reasonable and efficient approach to setting the premium. The default premium above the Benchmark ROE would apply unless the TES project proponent elects to submit evidence to support a higher equity premium.

To arrive at a reasonable recommendation, Ms. McShane considers different perspectives as follows:

- Equity risk premiums granted in the past by the BCUC (Dockside Green 100 bps, other TES projects 50 bps);
- Equity risk premium previously granted to PNG companies, FEVI and FEW (40 to 65 bps);
- Equity risk premiums adopted for smaller natural gas distribution utilities in other Canadian jurisdictions (Heritage Gas 200 bps, EGNB 275 bps).

Ms. McShane also provided some background on the relationship between size and return in conjunction with a linkage between the equity ratio and ROE. She first estimated a TES differential in the range of 150 to 300 bps. Based on this rationale, and assuming an equity ratio of 45 percent, she reduced the range by 80 bps, arriving at 70 bps at the lower end.

In conclusion, Ms. Shane submits that “taking the above considerations into account” it is her expert opinion that the default equity risk premium above the Benchmark of 75 bps would be applicable. (Exhibit B6-2, pp. 11-18)

Commission Determination

The Commission Panel first adopts the Guiding Principles for Setting Deemed Capital Structure and Deemed Debt as articulated in the GCOC Stage 1 Decision, Sections 7.3 to 7.5. **In reference to the Stage 1 Decision, the Panel confirms that the default debt component of the capital structure is set to track a benchmark credit spread that reflects BBB or BBB(low) rated debt relative to the 10 year Government of Canada bond yield.**

In the Stage 1 Decision, the Panel also posed the following questions for further consideration in the Stage 2 Proceeding:

- Can the combination of the deemed debt/equity ratio and the allowed ROE sufficiently compensate for the unique risks of a particular utility or project?
- How important is it to maintain consistency between the risk premium determination and assigning a deemed credit rating for a small utility without a third party debt? For instance, would it be reasonable to allow no risk premium over FEI for a TES project while setting the debt rate based on a BBB bond rating?

In an answer to these questions, the Panel finds that by setting the minimum default equity ratio above the 38.5 percent Benchmark and an equity risk premium over and above the allowed Benchmark ROE, the Panel is consistent with its deemed debt rate based on a BBB/BBB(low) bond rating. In general, the Panel agrees with the experts that a cushion is required for TES projects as a protection against the additional risk exposure. The Panel also accepts the validity of the eight TES specific risk factors put forward by Ms. McShane.

However, setting the actual amounts is ultimately a qualitative exercise, requiring informed judgement. The Panel notes again that British Columbia is the only Canadian jurisdiction that regulates TES projects. Therefore, it is obvious the most insight into those projects and their inherent risks exists within the Commission, which has been intimately exposed to these projects and their evolution over the last few years. Accordingly, this Panel will put more weight on the

TES decisions of the Commission than equity ratios set for small distribution utilities in other jurisdictions. **The Commission Panel finds that a minimum default capital structure consisting of 57.5 percent debt and 42.5 percent common equity represents a reasonable balance. This equity ratio is 4.0 percentage points higher than that awarded to the Benchmark.**

With regard to the default equity risk premium, the Panel again gives the largest weight to the findings of past TES project Panels. As noted earlier in this Decision, the Panel found there was insufficient data to support the conclusions made by Ms. McShane regarding her quantification methodology. **After considering the past TES project decisions and the evidence put forward by the experts, the Panel accepts the default equity risk premium of 75 basis points recommended by FAES and its expert, Ms. McShane.**

Finally, the Commission Panel finds that a TES project proponent, regardless of whether the project is old or new, retains the right to submit evidence in support of a higher equity risk premium than the default established above.

3.4.2 FAES Kelowna District Energy System

Most of the evidence provided by FAES in the Stage 2 proceeding addressed the current risk profile of FAES as a corporate entity as opposed to having the emphasis of individual TES projects. Similarly, the cost of capital evidence prepared by Ms. McShane addressed the TES projects in general. These submissions have already been summarized in previous sections and therefore there is no need for the Panel to reiterate the related findings here.

The only reference to the Kelowna District Energy System (KDES) is provided in the risk matrix that FAES filed based on a Commission request. Specifically, FAES points out that the KDES has no mandatory connection requirement and faces inherent uncertainty in load forecast. (Appendix B6-2, Appendix A, Table 4) The Panel acknowledges the concerns identified by FAES regarding the use of the risk matrix and refers to the discussion of Use of the Risk Matrix in Section 2.7.

Based on the risk profile of the KDES as compared to the Benchmark, the Commission Panel finds that no sufficient justification has been provided to deviate from the default standard. Accordingly, the common equity ratio for KDES shall be set at 42.5 percent and the equity risk premium at 75 bps.

3.4.3 The Companies Projects

The general submissions related to the risks of TES projects[12] and the requirement for a fair rate of return to compensate for these risks by the Companies have already been covered in previous sections. This section will briefly review the four existing projects: Dockside Green, UniverCity, Central Heat and River District Energy.

3.4.3.1 Dockside Green Energy Inc.

Dockside Green (DGE) provides hydronic energy for space heating and domestic hot water to the Dockside Green community in Victoria using a central plant. The plant consists of a biomass gasification system and a supplementary natural gas boiler. Corix has a 17 percent equity share and also operates the DGE system under an agreement.

[12] C-3-12-FortisBC Energy Inc.-Application for a Certificate of Public Convenience and Necessity for the Construction and Operation of Thermal Energy Service to Delta School District Number 37, March 16, 2012.

C-10-12-FortisBC Alternative Energy Services Inc. Application for a Certificate of Public Convenience and Necessity for the Approval for the PCI Marine Gateway Thermal Energy Project and Approval of Rates for Thermal Energy Service to PCI Developments Inc., September 27, 2012.

G-100-12-FortisBC Energy Inc. Application for Approval of a Capital Expenditure Schedule and Rate Design and Rates Established in an Operating and Maintenance Agreement between FortisBC Energy Inc. and the Strata Corporation of Tsawwassen Springs Development to Provide Thermal Energy Services, July 19, 2012.

C-1-13-FortisBC Alternative Energy Services Inc. Application for a Certificate of Public Convenience and Necessity for the TELUS Garden Thermal Energy System and for Approval of the Rate Design and Rates to Provide Thermal Energy Service to Customers at the TELUS Garden Development, February 4, 2013.

C-8-13-FortisBC Alternative Energy Services Inc. Application for a Certificate of Public Convenience and Necessity for the Kelowna District Energy System and the Approval of the Rate Design and Rates to Provide Thermal Energy Services to Customers in the Kelowna City Centre, July 26, 2013.

DGE currently has an allowed equity risk premium of 100 bps and a deemed equity ratio of 40 percent. Currently, it is significantly under-earning its allowed return on investment due to lack of build-out at its development and according to the Companies, if and when build-out occurs, the utility would expect to earn its allowed return (Exhibit B2-18, BCUC 1.4.5).

According to the Companies, their assessment of non-empirical risk factors for DGE is as follows:

- Competition risk – Low
  - Under the terms of the agreement with the developer, buildings within the DGE site are attached to the utility.
- Customer Load risk – High
  - Very small customer base, even at full build-out, variation of load between buildings difficult to predict.
- Development Cost risk – High
  - New technology with appreciably higher risks than Benchmark.
- Operating Cost risk – Medium
  - Relatively higher risk of operating small district energy system than Benchmark.
- Rate Design risk – Low
  - Similar to Benchmark.
- Regulatory risk – Medium
  - Evolving market.

(Exhibit B2-18, BCUC 8.1)

Commission Determination

The Commission Panel notes that the DGE project continues to face challenges and that its situation has not changed. Accordingly, the Panel is reluctant to reduce the 100 bps equity risk

premium awarded by the Commission previously. **The Commission Panel determines that a reasonable equity ratio for Dockside Green shall be 42.5 percent and the equity risk premium 100 bps.**

3.4.3.2 UniverCity at Burnaby Mountain

UniverCity is developed as a district energy system in the UniverCity on Burnaby Mountain.[13] The initial system will provide service through a temporary natural gas boiler facility. A permanent central biomass energy plant will be constructed in later phases.

UniverCity currently has an allowed equity risk premium of 50 bps and a deemed equity thickness of 40 percent. The customer rates were set using a levelized approach, which helps to mitigate the impact on the initial customers of the large capital outlay required to develop district energy systems by deferring the utility's cost recovery until future years (Exhibit B2-22, BCPSO 1.2). The Companies believe that the Commission should let the terms of the contract determine the recourse either of the parties has in the event the Commission change the cost of capital (Exhibit B2-18, BCUC 4.5-4.6).

As part of Corix Utilities, a utility such as UniverCity is debt financed through Corix's consolidated credit facilities. Corix Utilities provides debt financing to its regulated utilities through intercompany loan agreements with a cost of debt that reflects the specific risk profile of that project. (Exhibit B2-17, p. 15)

According to the Companies, the non-empirical risk factors' assessment for UniverCity is as follows:

[13] C-7-11-Corix Multi-Utility Services Inc. Application for a Certificate of Public Convenience and Necessity to Construct and Operate a District Energy System for the UniverCity Neighbourhood Utility Service Project in Burnaby, BC and Approval of the proposed Revenue Requirements, Rate Design, Levelized rates and Service Agreement, March 6, 2012.

- Competition risk – Low
  - Under the terms of the agreement with the developer, buildings within the UniveCity site are attached to the utility.
- Customer Load risk – High
  - Very small customer base even at full build-out, variation of load between buildings difficult to predict.
- Development Cost risk – Medium
  - Development of small district energy system is relatively more risky than benchmark.
- Operating Cost risk – Medium
  - Relatively higher risk of operating small district energy system than Benchmark.
- Rate Design risk – Low
  - Similar to benchmark
- Regulatory risk – Medium
  - Evolving market.

(Exhibit B2-18, BCUC 8.1)

Commission Determination

The Commission Panel has considered the various risk elements vis-à-vis the Benchmark as well as in relation to the other existing district energy systems. **On balance, the Commission Panel finds that there is not sufficient evidence to deviate from the default standard. Accordingly, the common equity ratio for UniverCity shall be set at 42.5 percent and the equity risk premium at 75 bps.**

3.4.3.3 Central Heat Distribution Limited

Introduction

Central Heat is a provider of thermal energy in the form of steam to over 200 buildings in downtown Vancouver. It has operated as a regulated utility in BC since 1968 and has total assets of nearly $40 million. Central Heat is a mature utility that sets customer rates using a standard utility cost of service (Exhibit B2-22, BCPSO 1.2) and is financed, now on a stand-alone basis, through commercial credit arrangements with a bank, which also requires an equity component of approximately 50 percent. Its variable borrowing rate is prime plus 0.5 percent (Exhibit B2-17, p. 19).

In this Stage 2 proceeding, Central Heat has filed its evidence in conjunction with Corix and River District Energy. The Companies state they have significant differences in their operations but that they also share common perspectives and requested that the Commission establish a default standard, under which:

- The debt/equity ratio for small utilities be set at 40 percent/60 percent;
- The equity risk premium be set at a minimum of 250 basis points relative to the Benchmark utility; and
- The debt component of the capital structure to track a Benchmark credit spread that reflects a BBB or BBB (low) rated debt relative to the 10 year Government of Canada bond yield.

The Commission Panel has already addressed the default standard in earlier sections.

Central Heat describes the changing energy market as a reflection of the public and various levels of government taking more interest in different energy systems that have resulted in certain incentives, new policies, and increased competition from traditional utilities (Exhibit B2-17, p. 18).

Central Heat states that despite being a 45 year old utility, its credit facility requirement reflects materially more risk than the BCUC's Benchmark debt to equity ratio (38.5 equity thickness), and certainly more than the 100 bps equity allowed for Dockside Green. Central Heat also indicates that it had incurred losses during its first ten years of operations and did not achieve a rate of return comparable to the current benchmark (8.75 percent) until after twenty years. Its cost constraint was and continues to be a priority. Central Heat has operated without levelized costs and without deferral accounts in a competitive service area. (Exhibit B2-17, p. 21)

In the earlier parts of this Decision, the Panel has already made certain determinations on a number of contextual issues that should apply equally to Central Heat and will not be repeated here. In particular, this section should be read in conjunction with the Panel's determinations under Section 2.2 to 2.6 above, which also applies to Central Heat.

Risk Assessment

The Companies proposed that Central Heat should be given weighting of 25 percent and 15 percent respectively for utility size risk and financial risk, with the remaining 60 percent split between competition (25 percent), customer load (25 percent) and the remaining development cost, operating cost, rate design and regulatory (10 percent). Central Heat considered that it has low to medium business risk. (Exhibit B2-23, BCUC 1.8.1) Central Heat stated that if the requested risk premium and capital structure were approved, it would look to recover the change over at least two years. It estimated that the rate impact would be 12.7 percent to the utility margin and it would remain competitive with other energy options. (Exhibit B2-18, BCUC 4.4, BCUC 4.4.1)

In terms of the Commission's Risk Matrix, the Companies propose a simplified version of the Commission's risk matrix while providing their own assessment to the risk factors. The risk assessment related to Central Heat is included in pages 21-26 of the Company's evidence (Exhibit B2-17) but emphasizes that size is a major factor of risk because small utilities have fewer resources and are less able to mitigate adverse market effects and are less diverse.

Position of the Parties

The Companies believe that any discussion of the risk matrix must necessarily resolve how to relate the incidental risk factors to the fundamental risk factor of size (Exhibit B2-18, BCUC 4.12). No Intervener made submissions related to individual Group 3 utilities. However, FAES filed evidence with an accompanying proposal for a default capital structure of 45 percent equity ratio and 75 bps over Benchmark ROE.

Commission Determination

The Panel notes that under the Companies' proposed risk matrix, Central Heat and RDE are respectively assigned 25 percent weight in utility size risk whereas DGE and UniverCity are respectively assigned 50 percent. (Exhibit B-23, BCUC 1.9.1) Yet all these utilities have requested the default standard of 60 percent equity ratio and 250 bps size premium. This appears contradictory to the Companies' stated approach. The Panel further notes that a fairly low-risk Central Heat will be sharing the same parameters with RDE which by its own admission "its parent likely would not have undertaken to develop a TES project in the absence of considerations related to its desire to sell real estate." (Exhibit B2-18, BCUC 9.1)

The AES Inquiry Report identified Central Heat as being distinct from the TES projects. (AES Inquiry Report, p. 75) In the case of DGE, UniverCity and RDE, restrictions are in place so that residents are more obliged to use heat provided by the utility. In other words, in these developments customers are captive to the central heating system. Central Heat, on the other hand, operates its steam district energy system in the same geographic area in downtown Vancouver as BC Hydro (electricity) and FEI (natural gas). Building owners in downtown Vancouver are not obligated to obtain space heating from Central Heat, which must compete for the business. In this system there are limited barriers to entry or exit of customers as there are other heating options available. (AES Inquiry Report, p. 75) This comparison puts Central Heat in the higher risk category.

When viewed through a different lens, Central Heat is a mature, established utility which has functioned well in Vancouver as a hybrid, a "competitive natural monopoly," and found its niche next to the electric and natural gas utilities. Yet, the Panel notes that this mature utility continues to operate without any deferral accounts, unlike its other mature counterparts, and that its bank requires an equity component of approximately 50 percent to qualify for debt financing. Central Heat also acknowledged that hybrid energy systems have become both more popular and more practical to develop, and Central Heat itself has been involved in some conversions recently in a shift to using cleaner energy sources. Central Heat may very well find itself in transition and start on the path of conversion towards a low-carbon energy utility. Central Heat described how the public and various levels of government have become more interested in different energy systems recently. This in turn may result in government incentives, new policies, and increased competition from traditional utilities. (Exhibit B-17, pp. 18-19)

Based on the above discussion, which highlights reasons for Central Heat being either of lower or higher risk than the default standard, the Panel finds it cannot at this point in Central Heat's state of transition rationalize any other cost of capital than that resulting from the default standard. Once Central Heat has developed its business plan and timeline for the conversion, it is in a better position to adequately justify its cost of capital in terms of the risk profile on a go-forward basis. **Accordingly, for the time being, the common equity ratio shall be set at 42.5 percent and the equity risk premium at 75 bps as transitional amounts. The Commission Panel directs Central Heat to file within next 12 months either a 2016 or multi-year revenue requirement application with the Commission reflecting the new business plan with a comprehensive justification for the equity thickness and equity risk premium.**

3.4.3.4 River District Energy Limited Partnership

RDE is a district energy utility established to provide thermal energy for space heating and domestic hot water to the River District development in southeast Vancouver.[14] River District is under construction now and, at build-out in approximately 20 years, will contain 7.0 million square feet of residential and 0.5 million square feet of retail/commercial density. The development is to include approximately 60 separate legal parcels in the 130 acre site, each of which may include one or more air space parcels owned by separate stratas. To date, the RDE system consists of a temporary gas fired boiler, distribution piping system and one energy transfer station.

RDE is 100 percent funded by its parent Wesgroup Properties Limited Partnership. RDE will make application for financing in several years when it has positive cash flow to service the debt. (Exhibit B-17, p. 29) RDE currently has an allowed equity risk premium of 50 bps and a deemed equity thickness of 40 percent. Customer rates are set by benchmarking against other TES utilities in the region (Exhibit B2-17, p. 31).

The customer rates were set using a levelized approach which helps to mitigate the impact on the initial customers of the large capital outlay required to develop district energy systems by deferring the utility's cost recovery until future years (Exhibit B2-22 BCPSO 1.2). Based on the Companies' proposed cost of capital, the levelized rate would increase by approximately 5 percent at RDE. The Companies believe that the Commission should let the terms of existing's contract determine any recourse the parties have in the event the Commission changes the cost of capital. (Exhibit B2-18, BCUC 4.5-4.6)

[14] C-14-11-River District Energy Limited Partnership Application for a Certificate of Public Convenience and Necessity to Construct and Operate a District Energy System for the River District Energy System for the River District Development in Southeast Vancouver and Approval of the Proposed Revenue Requirement, Rate Design, Levelized Rates and Revenue Deficiency Deferral Account for the First Five Years of Operations, December 19, 2011.

According to the Companies, the non-empirical risk factors' assessment for RDE is as follows:

- Competition risk – Low
  - Zoning requires mandatory connection but does not preclude discrete building-specific alternatives.
- Customer Load risk – High
  - Customer Load risk is a function of the amount of energy used, which is influenced by occupant behaviour, construction practices and increasingly stringent energy use standards imposed by third parties; and timing which is determined by highly cyclical real estate market.
- Development Cost risk – High
  - Application of technology new to the region and few experienced contractors and suppliers, especially for alternative energy sources.
- Operating Cost risk – Medium
  - Appreciably less operating experience for TES generally than for Benchmark. Cost of fuel risk higher for alternative energy sources.
- Rate Design risk – Low
  - Similar to Benchmark
- Regulatory risk – Medium
  - Evolving market.

(Exhibit B2-18 BCUC 8.1)

Commission Determination

The Commission Panel has already determined the minimum default capital structure and default equity rate premium for KDES and UniverCity. **Similarly, and for consistency, the Commission Panel determines that the common equity ratio for RDE shall be set 42.5 percent and the equity risk premium at 75 bps.**

4.0 OTHER ISSUES

4.1 Stage 2 Cost of Capital Changes – Effective Period

On December 10, 2012, the Commission issued Order G-187-12 and directed the then current ROE and capital structure for FEI, the designated Benchmark as interim effective January 1, 2013. The same order also directed that the then current ROE and capital structure for all regulated entities, in BC that rely on the Benchmark to establish rates were to be made interim, also effective January 1, 2013. This did not apply to British Columbia Hydro and Power Authority.

The Stage 1 Decision and the accompanying Order G-75-13, issued on May 10, 2013, set the common equity component for FEI at 38.5 percent and the ROE at 8.75 percent. The Decision accompanying Order G-75-13 also states that the ROE will be effective until December 31, 2015, subject to variation commencing January 1, 2014, by the Automatic Adjustment Mechanism formula. As a result, the rates for FEI ceased to be interim and permanent rates were approved. Commission Letter L-1-14 issued on January 10, 2014, advises all parties that the Benchmark ROE for 2014 remains at 8.75 percent and that the appropriate ROE in 2014 for individual utilities will incorporate the risk premium for each utility relative to the Benchmark ROE.

Commission Letter L-31-13A issued on June 5, 2013, clarifies for all Parties that the rates for the other regulated utilities that depend on the Benchmark for rate setting will remain interim until a decision is rendered for GCOC Stage 2.

<u>Commission Panel Determinations</u>

In accordance with previous communications, the Commission Panel orders that interim rates be recalculated to include the effect of cost of capital determinations in the Stage 2 proceeding. New permanent rates are to be effective January 1, 2013.

FEVI, FEW and FBC and the PNG-West, PNG (N.E.)-FSJ/DC and PNG (N.E.)-TR are to each file within 40 days of this Decision and accompanying Order G-47-14: (a) a document setting out how and when it will implement the change to its capital structure; and (b) amended rate schedules in accordance to the cost of equity for each utility as determined in this Decision; and (c) a proposal on the treatment of the difference between the interim rates being charged to customers and the permanent rates established by this Order.

Central Heat is directed to inform all its customers that this Decision and accompanying Order G-47-14 approves new permanent rate increases effective January 1, 2013. Central Heat is to file within 40 days of this Decision and accompanying Order G-47-14: (a) a document setting out how and when it will implement the change to its capital structure; (b) a permanent Steam Tariff Schedule of Charges to reflect the changes as a result of this Decision and accompanying Order in a timely manner; and (c) a proposal on the treatment of the difference between the interim rates being charged to customers and the permanent rates established by this Order.

KDES, DGE, UniverCity, and RDE are directed to file with the Commission, within 40 days of this Decision and accompanying Order G-47-14, a document setting out: (a) if it would implement the minimum default capital structure and equity risk premium for rate setting, and if so, the time line; (b) whether it would let the existing contractual customer rates, if applicable, to take its course and if not, its proposed treatment of the difference between the current rates being charged to customers and the allowed rates as ordered in this Decision.

4.2 Impact of Amalgamation Reconsideration

FEVI and FEW, together with FortisBC Energy Inc. and FortisBC Energy Inc. Fort Nelson Service Area (collectively, the FortisBC Energy Utilities) and Terasen Gas Holdings Inc. made an application to the Commission on April 11, 2012, for their amalgamation into a single entity. After considering the matter, the Commission issued Order G-26-13 on February 15, 2013, in which it "declines to find

that amalgamation of the FEU and Terasen Gas Holdings Inc. is beneficial in the public interest." In the accompanying Reasons for Decision, the Commission dismissed the amalgamation application. On April 26, 2013, FortisBC Energy Utilities made application to the Commission to reconsider the matter. By Order G-21-14 and accompanying Amalgamation Reconsideration Decision issued on February 26, 2014, the Commission determined that approval of amalgamation is warranted and approved the amalgamation of FEI,FEVI, FEW and Terasen Gas Holdings and the Fortis Energy Utilities proposal to adopt common rates on a three year phase-in basis for natural gas delivery in their service areas. The service area of Fort Nelson was excluded. This is to be effective upon confirmation that consent of the Lieutenant Governor in Council, by order, to the amalgamation has been received and the amalgamation has been effected.

In the view of the Commission Panel, the creation of a new entity does not necessarily mean that it would be a sum of the parts from the perspective of the cost of capital. For example, it is not unreasonable to assume that risk factors and the ability to raise capital might be affected and significantly alter cost of capital considerations. This point was raised by the Commission in the Amalgamation Reconsideration Decision. In considering the evidence in that hearing with respect to cost of capital in that proceeding, the Commission made the following recommendation:

> "**The Commission Panel finds that a final determination as to the appropriate ROE and capital structure for the amalgamated entity must be deferred to the Generic Cost of Capital Proceeding.**
>
> However, from the evidence and submissions filed in this Proceeding, the Commission Panel would recommend that the capital structure and ROE remain the same for the amalgamated entity as for FEI, as the low risk benchmark utility. In this Panel's view, the major benefit to the shareholder of the approval for the FEU to amalgamate and adopt postage stamp rates is a reduction in the risk faced by the two smaller utilities. The Panel does not see this risk as being transferred to the larger amalgamated entity. Rather, in this Panel's view, the risks attributable to the small size and small customer bases of FEW and FEVI combined with their higher rates, as highlighted in this Application, will be eliminated as these utilities are subsumed into a single, larger entity."

Commission Determination

The Commission Panel notes that evidence in this proceeding has treated FEI, FEVI and FEW as separate entities and does not contemplate the potential impact of an amalgamated entity. Therefore, there is no firm basis on which to make a determination with respect to the amalgamated entity once amalgamation has been effected. **In these circumstances, the Commission Panel determines that the most appropriate approach to the cost of capital is to apply the recommendation in the Amalgamation Reconsideration Decision for the same reasons found at page 30 of that Decision. Accordingly, once amalgamation has been effected and postage stamp rates implemented, the ROE and capital structure will be the same for the amalgamated entity as for FEI as the Benchmark utility. In the alternative, if FBCU considers the cost of capital for the amalgamated entity is not indicative of current circumstances, it may apply to the Commission on behalf of the amalgamated entity.**

4.3 Role of Commission Staff

In their Final Submissions, the Companies expressed concern with the nature and tone of Commission staff IRs with respect to its evidence. Their concern relates to the line of questioning and implied support for a particular position. The Companies state the following:

> "In this proceeding, it has been clear from the nature and tone of the information requests that the Commission Staff support a position that is distinct from any other registered participant. Since the Commission Staff have not filed evidence or argument to explain and support their position, it would be unfair for the Commission to give weight to that position. Otherwise, the Companies must attempt to respond to a position that is both influential and unknown.
>
> Any party that wishes to advocate a position should be obliged to explain and support it on the record so it can be tested and debated by others. This approach would meet the test of procedural fairness and would give the Commission a better record upon which to base its decision."
>
> (the Companies Final Submission, p. 7)

In making their assertions the Companies have not been specific with regards to those IRs that support this conclusion nor have they specified the position that they believe that Commission staff has taken. Lacking the specific examples to support the Companies' assertions, the Commission Panel is unable to respond directly to this matter. The Panel would like to point out that had these concerns been raised earlier in this proceeding, there would have been an opportunity to explore the Companies' allegations more completely.

It is a fundamental principle of natural justice that in administrative proceedings the parties are entitled to know the case they have to meet. The purpose of the IR process is to afford the opportunity for the case to be known and test the evidence. Without this valuable question and answer process a Commission Panel would be forced to make a decision on a less than fulsome evidentiary record. This would not serve the decision making process nor would it be in the public interest. The role of Commission staff is to utilize the IR process to test the evidence fully and provide the Commission Panel a fulsome record upon which to make its determinations and decisions.

DATED at the City of Vancouver, in the Province of British Columbia, this 25th day of March 2014.

Original signed by:

_____

D.A. COTE
PANEL CHAIR/COMMISSIONER

Original signed by:

_____

L.A. O'HARA
COMMISSIONER

Original signed by:

_____

C. VAN WERMESKERKEN
COMMISSIONER

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

Generic Cost of Capital Proceeding
Stage 2

BEFORE: D.A. Cote, Commissioner/Panel Chair
L.A. O'Hara, Commissioner
C. van Wermeskerken, Commissioner

March 25, 2014

O R D E R

WHEREAS:

A. By Order G-20-12 dated February 28, 2012, the British Columbia Utilities Commission (Commission) established a Generic Cost of Capital (GCOC) proceeding to review: (a) the setting of the appropriate cost of capital for a benchmark low-risk utility; (b) the possible return to a Return on Equity Automatic Adjustment Mechanism (ROE AAM) for setting an ROE for the benchmark low-risk utility; and (c) the establishment of a deemed capital structure and deemed cost of capital methodology, particularly for those utilities without third-party debt. The Order also divided all participating public utilities regulated by the Commission into Affected Utilities and Other Utilities for the purpose of the GCOC proceeding;

B. By Order G-148-12 dated October 11, 2012, the Commission determined, among other matters, that: (a) the GCOC proceeding would proceed by way of an oral public hearing commencing December 12, 2012; (b) FortisBC Energy Inc. (FEI) in its pre-amalgamation state would serve as the benchmark utility; and (c) a Stage 2 would be added to the proceeding for the purpose of reviewing all other utilities against the benchmark;

C. A Procedural Conference for Stage 2 was held on April 25, 2013. The following utilities appeared and made submissions at the Procedural Conference: FortisBC Utilities (FBCU) comprising FortisBC Energy Inc. (FEI), FortisBC Energy (Vancouver Island) Inc. (FEVI), FortisBC Energy (Whistler) Inc. (FEW), and FortisBC Inc. (FBC); Pacific Northern Gas Ltd. and Pacific Northern Gas (N.E.) Ltd. (collectively, PNG); FortisBC Alternative Energy Services Inc. (FAES); Corix Multi-Utility Services Inc. (Corix); River District Energy Limited Partnership (RDE); and Central Heat Distribution Limited (Central Heat);

D. The Industrial Customers Group of FBC (ICG) and the British Columbia Pensioners' and Seniors' Organization *et al*. (BCPSO) also appeared and made submissions at the Procedural Conference;

E. On May 10, 2013 the Commission issued Order G-75-13 and the accompanying Decision on Stage 1;

F. By Order G-77-13 dated May 13, 2013, the Commission determined that the Stage 2 review would take place by way of a written hearing for all applicant utilities, in accordance with the three Groupings of Utilities and the Regulatory Timetable that form Attachments 1 and 2 respectively to Appendix A of Order G-77-13. The Regulatory Timetable provided for the filing of evidence by the utilities, two rounds of Information Requests (IRs) on that evidence, the filing of Intervener evidence, and one round of Information Requests on that evidence. Order G-77-13 also deferred the decision on the review format for FBC until the Commission Panel had reviewed FBC's Stage 2 evidence;

G. The following utilities filed evidence: FEVI and FEW (jointly), Corix, RDE and Central Heat (jointly), FBC, PNG, and FAES. ICG filed Intervener Evidence;

H. By Order G-121-13 dated August 14, 2013, the Commission determined that the review of FBC would take place in a written hearing format in accordance with the Regulatory Timetable that forms Attachment 2 to Appendix A of Order G-77-13;

I. The following utilities filed Final Submissions: FEVI and FEW (jointly), Corix, RDE and Central Heat (jointly) FBC, PNG, and FAES ;

J. The following Interveners filed Final Submissions: ICG and BCPSO. BCPSO filed four separate Final Submissions: one for FortisBC; a second for FEVI and FEW; a third for PNG; and a fourth for the Group 3 Utilities;

K. FEVI and FEW (jointly), Corix, RDE and Central Heat (jointly) FBC, PNG, and FAES all filed Reply; and

L. The Commission has considered the evidence and the submissions of the Parties all as set forth in the Decision issued concurrently with this Order.

NOW THEREFORE the Commission orders as follows:

1. The common equity component of the capital structure and equity risk premium over the Benchmark for the following FBCU, effective January 1, 2013 are:

	Common Equity Component (%)	Equity Risk Premium (bps)
FEVI	41.5	50
FEW	41.5	75
FBC	40.0	40

2. The common equity component of the capital structure and equity risk premium over the Benchmark for the following PNG utilities, effective January 1, 2013 are:

	Common Equity Component (%)	Equity Risk Premium (bps)
PNG-West	46.5	75
PNG (N.E.) FSJ/DC	41.0	50
PNG (N.E.) TR	46.5	75

3. The common equity component for small TES utilities, effective January 1, 2013, is a minimum default capital structure consisting of 57.5 percent debt and 42.5 percent common equity. The minimum default risk premium over the Benchmark is 75 bps except for Dockside Green Energy Inc. where its existing 100 bps equity risk premium will not be reduced as a result of establishing the minimum default Equity Risk Premium. The minimum default capital structure and equity risk premium allowed for Central Heat is transitional until a decision on its next revenue requirement application.

	Common Equity Component (%)	Equity Risk Premium (bps)
Kelowna District Energy System	42.5	75
Dockside Green Energy Inc.	42.5	100
Univercity at Burnaby Mountain	42.5	75
Central Heat Distribution Limited	42.5	75
River District Energy Limited Partnership	42.5	75

4. FEVI, FEW, FBC and the PNG-West, PNG (N.E.)-FSJ/DC and PNG (N.E.)-TR are to each file, within 40 days of the date of this Order, a document setting out:

    a) How and when it will implement the change to its capital structure;

b) Amended rate schedules in accordance to the cost of equity for each utility as determined in the Decision issued concurrently with this Order; and

c) A proposal on the treatment of the difference between the interim rates being charged to customers and the permanent rates established by this Order.

5. Central Heat is directed to file, within 40 days of the date of this Order, a document setting out:

   a) How and when it will implement the change to its capital structure; and

   b) A permanent Steam Tariff Schedule of charges that reflects the changes to the cost of equity as determined in the Decision issued concurrently with this Order;

   c) A proposal on the treatment of the difference between the interim rates being charged to customers and the permanent rates established by this Order.

6. The Kelowna District Energy System, Dockside Green Energy Inc. UniverCity and River District Energy Limited Partnership are each to file, within 40 days of the date of this Order, a document setting out:

   a) Whether they would implement the minimum default capital structure and equity risk premium for rate setting, and if so, the time line; or

   b) Whether they would let the existing contractual customer rates, if applicable, take their course, and if not, their proposed treatment of the difference between the current rates being charged to the customers and the allowed rates as determined by this Order.

7. Each utility is to comply with all other applicable directives in the Decision issued concurrently with this Order.

DATED at the City of Vancouver, in the Province of British Columbia, this 25th day of March 2014.

BY ORDER

Original signed by:

D.A. Cote
Commissioner/Panel Chair

Attachment

Exhibit Number	Commission Order (Date)	Determinations
A-30 (Stage 1)	G-187-12 (December 10, 2012)	• Issued Interim Order establishing current ROE and capital structure for the benchmark utility and all regulated entities in B.C. that rely on the benchmark utility as interim, effective January 1, 2013
A-35	G-77-13 (May 13, 2013)	• Utilities divided into three Groups : Group 1-FortisBC Utilities; Group 2 - PNG Utilities; Group 3 – Small utilities engaged in thermal energy services • Issued Regulatory Timetable • Stage 1 record to form part of the Stage 2 record • Costs allocation principles for PACA
A-42	G-121-13 (August 14, 2013)	• Determined the review of FortisBC Inc. (FBC) to proceed by way of a written hearing in accordance with the Regulatory Timetable that is Attachment 2 to Appendix A of Order G-77-1

LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviations and Acronyms	Descriptions
AAM	Automatic Adjustment Mechanism
Act, UCA	Utilities Commission Act
AES Report	Report on the Inquiry into the Offering of Products and Services in Alternative Energy Solutions and Other New Initiatives
BC Hydro	British Columbia Hydro and Power Authority
BCPSO	British Columbia Pensioners' and Seniors' Organization et al.
BCUC, the Commission	British Columbia Utilities Commission
bps	Basis Points
CAPM	Capital Asset Pricing Model
CCAA	Companies' Creditors Arrangement Act
Celgar	Zellstoff Celgar
Central Heat	Central Heating Distribution Limited
CNRL	Canadian National Resources Limited
Corix	Corix Utilities Inc.
CPCN	Certificate of Public Convenience and Necessity
D&P	Duff &Phelps
DBRS	Dominion Bond Rating Services
DC	Dawson Creek
DGELLP, DGE	Dockside Green Energy Inc.
ERP	Equity Risk Premium

FAES	FortisBC Alternative Energy Services Inc.
FBC	FortisBC Inc.
FBCU, FortisBC Utilities	Collective term for FEI, FEVI, FEW and FBC
FEI	FortisBC Energy Inc.
FEVI	FortisBC Energy (Vancouver Island) Inc.
FEW	FortisBC Energy (Whistler) Inc.
FSJ	Fort Saint John
GCOC	Generic Cost of Capital
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWh	Gigawatt hour
ICG	Industrial Customers Group of FortisBC Inc.
IRs	Information Requests
KDES	Kelowna District Energy System
LNG	Liquefied Natural Gas
Moody's	Moody's Investor Services
MW	Megawatt
OATT	Open Access Transmission Tariff
PBR	Performance Based Ratemaking
PCB	Polychlorinated biphenyls
PEC	Pacific Energy Corporation
PNG	Pacific Northern Gas
PNG (N.E.) FSJ, DC, TR	Pacific Northern Gas (North East) Fort St. John, Dawson Creek, Tumbler Ridge divisions

PPA	Power Purchase Agreement
RCA	Retirement Compensation Arrangement
RDE	River District Energy Limited Partnership
ROE	Return on Equity
RRA	Revenue Requirement Application
RSDA	Revenue Surplus Deferral Account
SBBI	MorningStar/Ibbotson Study on Stocks, Bonds, Bills and Inflation
TES	Thermal Energy Services
TGI	Terasen Gas Inc.
TGVI	Terasen Gas (Vancouver Island) Inc.
TGW	Terasen Gas (Whistler) Inc.
TJ	Terajoule
TR	Tumble Ridge
UniverCity	UniverCity at Burnaby Mountain
UPC	Use per Customer
VIGJV	Vancouver Island Gas Joint Venture
WAX	Waneta Expansion
WAX CAPA	WAX Capacity Exchange

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

British Columbia Utilities Commission
Generic Cost of Capital Proceeding (GCOC) Stage 2

EXHIBIT LIST

EXHIBIT NO.	DESCRIPTION
COMMISSION DOCUMENTS	
	STAGE 2
A-32	Letter dated March 22, 2013 – Stage 2 Procedural Conference
A-33	Letter dated April 3, 2013 – Procedural Conference List of Issues
A-34	Letter dated April 11, 2013 – Appointment of Panel Stage 2
A-35	Letter dated May 13, 2013 – Commission Order G-77-13 with Reasons for Decision, Grouping of Utilities, and Regulatory Timetable
A-36	Letter dated July 16, 2013 – Commissioner Mike Harle Withdrawal from Panel
A-37	Letter dated July 30, 2013 – Commission Staff Information Request No. 1 to FortisBC Energy (Vancouver Island) Inc. and FortisBC Energy (Whistler) Inc.
A-38	Letter dated July 30, 2013 – Commission Staff Information Request No. 1 to FortisBC Inc.
A-39	Letter dated July 30, 2013 – Commission Staff Information request No. 1 to FortisBC Alternative Energy Services Inc.
A-40	Letter dated July 30, 2013 – Commission Staff Information Request No. 1 to the Companies
A-41	Letter dated August 6, 2013 – Commission Staff Information Request No. 1 to PNG

A-42	Letter dated August 14, 2013 – Commission Order G-121-13 with Reason for Decision
A-43	Letter dated August 19, 2013 – Request for comments – Information Request No. 2 to Group 3 Utilities
A-44	Letter dated August 27, 2013 – Commission Staff Information Request No. 2 to FortisBC Alternative Energy Services Inc.
A-45	Letter dated August 27, 2013 – Commission Staff Information Request No. 2 to FortisBC Energy (Vancouver Island) Inc. and FortisBC Energy (Whistler) Inc.
A-46	Letter dated August 27, 2013 – Commission Staff Information Request No. 2 to FortisBC Inc.
A-47	Letter dated August 27, 2013 – Commission Staff Information Request No. 2 to the Companies
A-48	Letter dated September 3, 2013 – Commission Staff Information Request No. 2 to PNG
A-49	Letter dated October 22, 2013 – Commission Information Request No. 1 to ICG on the Intervener Evidence
A-50	Letter dated February 21, 2014 – Letter to FAES Request for Clarification

COMMISSION STAFF DOCUMENTS

A2-52	Letter dated July 30, 2013 - Commission Staff filing City of North Vancouver-Lonsdale-Energy – How LEC Rates are Calculated
A2-53	Letter dated July 30, 2013 - Commission Staff filing Statistics Canada-Study on Firm Dynamics
A2-54	Letter dated July 30, 2013 - Commission Staff filing BC Statistics Business Indicators – Manufacturing – June 26, 2013
A2-55	Letter dated July 30, 2013 - Commission Staff filing BC Statistics Industrial Employment – July 5, 2013

A2-56 Letter dated July 30, 2013 – Commission Staff filing Canadian Press Article – Interest Rates

A2-57 Letter dated July 30, 2013 – Commission Staff filing CKNW Article – Hydro rate increase coming within six months

A2-58 Letter dated August 27, 2013 – Commission Staff filing Sampson Research Inc.-2008 Residential End Use Study

A2-59 Letter dated August 27, 2013 – Commission Staff filing Moody's Regulated Utility Methodology

AFFECTED UTILITIES DOCUMENTS

B1-69 **BC UTILITIES OF FORTIS INC. COMPRISED OF FORTISBC ENERGY INC., FORTISBC ENERGY VANCOUVER ISLAND INC., FORTISBC ENERGY WHISTLER INC. AND FORTISBC INC. (FBCU)** Letter dated April 11, 2013 – Registration for Stage 2 and confirmation of intention to appear at Procedural Conference

B1-70 Letter dated April 24, 2013 – FBCU submission on Proposed Regulatory Timetable

B1-71 Letter dated July 9, 2013 –FEVI and FEW Submitting Evidence

B1-71-1 Letter dated August 15, 2013 – FEVI and FEW Submitting Revised Evidence

B1-72 Letter dated July 9, 2013 – FortisBC Inc. Submitting Evidence

B1-73 Letter dated August 13, 2013 – FortisBC Inc. Response to BCUC IR No. 1

B1-74 Letter dated August 13, 2013 – FortisBC Inc. Response to BCPSO IR No. 1

B1-75 Letter dated August 13, 2013 – FortisBC Inc. Response to ICG IR No. 1

B1-76 Letter dated August 13, 2013 – FEVI FEW Response to BCUC IR No. 1

B1-77 Letter dated August 13, 2013 – FEVI FEW Response to BCPSO IR No. 1

B1-78 Letter dated September 17, 2013 - FEVI-FEW Response to BCPSO IR No. 2

B1-79 Letter dated September 17, 2013 - FEVI-FEW Response to BCUC IR No. 2

B1-80 Letter dated September 17, 2013 - FortisBC Inc. Response to BCPSO IR No. 2

B1-81 Letter dated September 17, 2013 - FortisBC Inc. Response to BCUC IR No. 2

B1-81-1 **CONFIDENTIAL** Letter dated September 17, 2013 - FortisBC Inc. Confidential Response to BCUC IR No. 2.35.1

B1-82 Letter dated September 17, 2013 - FortisBC Inc. Response to ICG IR No. 2

B1-82-1 **CONFIDENTIAL** Letter dated September 17, 2013 - FortisBC Inc. Confidential Response to ICG IR No. 2

B1-82-2 **CONFIDENTIAL** Letter dated September 26, 2013 - FortisBC Inc. Confidential Response to ICG IR No. 2 Attachment 3(d) Additional Information

B1-83 Letter dated October 22, 2013 – FortisBC Inc. Information Request No. 1 to ICG on the Intervener Evidence

B1-84 Letter dated November 19, 2013 - FortisBC Inc. Rebuttal Evidence

B2-16 **CORIX MULTI-UTILITY SERVICES INC. (CORIX)** Letter dated April 11, 2013 – Registration for Stage 2 and confirmation of intention to appear at Procedural Conference

B2-17 Letter dated July 10, 2013 –Submission of Evidence On Behalf of Corix, Central Heat and River District Energy

B2-17-1 Letter dated July 10, 2013 –Submission of Additional Evidence On Behalf of Corix, Central Heat and River District Energy

B2-18 Letter dated August 13, 2013 – On Behalf of Corix, Central Heat and River District Energy Responses to BCUC IR No. 1

B2-19 Letter dated August 14, 2013 – On Behalf of Corix, Central Heat and River District Energy Responses to BCPSO IR No. 1

B2-20 Letter dated August 15, 2013 – On Behalf of Corix, Central Heat and River District Energy Responses additional filings related to evidence and IR No. 1 responses

B2-21 Letter dated August 20, 2013 – On Behalf of Corix, Central Heat and River District Energy Submitting Comment

B2-22 Letter dated September 17, 2013 – On Behalf of Corix, Central Heat and River District Energy Response to BCPSO IR No. 2

B2-23 Letter dated September 17, 2013 – On Behalf of Corix, Central Heat and River District Energy Response to BCUC IR No. 2

B3-13	**PACIFIC NORTHERN GAS LTD. AND PACIFIC NORTHERN GAS N.E. LTD. (PNG)** Letter dated April 11, 2013 – Registration for Stage 2 and confirmation of intention to appear at Procedural Conference
B3-14	Letter dated July 9, 2013 – PNG Submitting Evidence
B3-15	Letter dated August 20, 2013 – PNG Response to BCUC IR No. 1
B3-16	Letter dated August 20, 2013 – PNG Response to BCPSO IR No. 1
B3-16-1	Letter dated December 3, 2013 - PNG Revised Response to BCUC IR No. 1.10.2
B3-17	Letter dated September 24, 2013 – PNG Response to BCUC IR No. 2
B3-18	Letter dated September 24, 2013 – PNG Response to BCPSO IR No. 2
B4-9	**BRITISH COLUMBIA HYDRO AND POWER AUTHORITY (BCH)** Letter dated April 9, 2013 – Registration for Stage 2 and comments regarding Procedural Conference attendance
B5-2	**RIVER DISTRICT ENERGY (RDE)** Letter dated April 11, 2013 – Registration for Stage 2 and confirmation of intention to appear at Procedural Conference
B6-1	**FORTISBC ALTERNATIVE ENERGY SERVICES INC. (FAES)** Letter dated April 11, 2013 – Registration for Stage 2 and confirmation of intention to appear at Procedural Conference
B6-2	Letter dated July 9, 2013 – FAES Submitting Evidence
B6-3	Letter dated August 13, 2013 – FAES Submitting notice of delay - responses to BCUC IR No. 1
B6-3-1	Letter dated August 14, 2013 – FAES Response to BCUC IR No. 1
B6-4	Letter dated August 20, 2013 – FAES Submitting Comments
B6-5	Letter dated September 17, 2013 - FAES Response to BCUC IR No. 2
B6-6	Letter dated February 27, 2014 – FAES Submissions response to Exhibit A-50
B7-1	**DOCKSIDE GREEN ENERGY (DGE)** Letter dated April 11, 2013 – Registration for Stage 2 and confirmation of intention to appear at Procedural Conference

B8-1 **CENTRAL HEAT DISTRIBUTION LTD. (CENTRAL HEAT)** Letter Dated April 5, 2013 – Registration for Stage 2 by John Barnes

INTERVENER DOCUMENTS

C4-18 **INDUSTRIAL CUSTOMERS GROUP (ICG)** Letter dated April 11, 2013 – Registration for Stage 2

C4-19 Letter dated April 18, 2013 – ICG submitting Notice of Appearance

C4-20 Letter dated July 30, 2013 – ICG submitting Information Request to FBC

C4-21 Letter dated August 27, 2013 – ICG submitting Information Request No. 2 to FBC

C4-22 Letter dated October 1, 2013 – ICG submitting Evidence

C4-23 Letter dated November 5, 2013 - ICG submitting Response to BCUC IR No. 1

C4-24 Letter dated November 5, 2013 - ICG submitting Response to FBC IR No. 1

C5-16 **BRITISH COLUMBIA PENSIONERS' AND SENIORS' ORGANIZATION (BCPSO ET AL)** Letter dated April 11, 2013 – Registration for Stage 2

C5-17 Letter dated April 16, 2013 – BCPSO submitting comments regarding registration

C5-18 Letter dated April 18, 2013 – BCPSO submitting Notice of Appearance

C5-19 Letter dated July 30, 2013 – BCPSO submitting IR No. 1 to FBC

C5-20 Letter dated July 30, 2013 – BCPSO submitting IR No. 1 to FEU

C5-21 Letter dated July 30, 2013 – BCPSO submitting IR No. 1 to Corix, Central Heat and RDE

C5-22 Letter dated August 6, 2013 – BCPSO Information Request No. 1 to PNG

C5-23 Letter dated August 20, 2013 – BCPSO Submitting Comments

C5-24 Letter dated August 27, 2013 – BCPSO Submitting Information Request No. 2 to FBC

C5-25 Letter dated August 27, 2013 – BCPSO Submitting Information Request No. 2 to Corix et al

C5-26 Letter dated August 27, 2013 – BCPSO Submitting Information Request No. 2 to FEW and FEVI

C5-27 Letter dated September 3, 2013 – BCPSO Information Request No. 2 to PNG

C8-1 **CENTRAL HEAT DISTRIBUTION LTD. (CENTRAL HEAT)** Letter Dated April 5, 2013 – Changed to Affected Utility B8.

British Columbia Utilities Commission

Sixth floor, 900 Howe Street
Vancouver, BC Canada V6Z 2N3
TEL: (604) 660-4700
BC Toll Free: 1-800-663-1385
FAX: (604) 660-1102

ORDER NUMBER
G-129-16

IN THE MATTER OF
the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

FortisBC Energy Inc.
Application for its Common Equity Component and Return on Equity for 2016

BEFORE:
K. A. Keilty, Panel Chair/Commissioner
D. A. Cote, Commissioner
N. E. MacMurchy, Commissioner

on August 10, 2016

ORDER

WHEREAS:

A. On October 2, 2015, FortisBC Energy Inc. (FEI) filed an application for a review of its common equity component and return on equity for 2016 (Application) pursuant to the British Columbia Utilities Commission (Commission) decision in the Generic Cost of Capital Stage 1 proceeding;

B. In its Application, FEI submits that the amalgamated FEI (the amalgamation of three affiliated entities: the former FortisBC Energy Inc., FortisBC Energy [Whistler] Inc. and FortisBC Energy [Vancouver Island] Inc.) continues to be the logical choice to serve as the benchmark utility for the purpose of determining the cost of capital for other utilities;

C. By Order G-177-15 dated November 9, 2015, the Commission established a proceeding to review the Application. The regulatory review was by way of a limited scope oral hearing and included two rounds of information requests (IRs) to FEI and one round of IRs on intervener evidence;

D. Six parties registered as interveners in this proceeding. Among those registered, the most active were the Commercial Energy Consumers of British Columbia, the British Columbia Old Age Pensioners' Association *et al.* and the Association of Major Power Customers of BC (AMPC): collectively, the "Utility Customers";

E. On December 7, 2015, the Commission issued Order G-193-15 in the FEI Annual Review of 2016 Delivery Rates Decision setting interim delivery rates for all non-bypass customers effective January 1, 2016 and approving FEI's existing capital structure and return on equity on an interim basis effective January 1, 2016, pending the outcome of this cost of capital proceeding;

F. On December 15, 2015, the Commission issued Order G-204-15 and ordered, among other things, that FEI's existing common equity component and return on equity would remain the benchmark on an interim basis, effective January 1, 2016;

.../2

G. On January 26, 2016, the Utility Customers filed intervener evidence of their expert witness, Dr. Laurence Booth;

H. The oral hearing took place from March 9, 2016 to March 11, 2016;

I. The argument phase of the proceeding took place from April 3, 2016 to April 28, 2016. On May 5, 2016, AMPC sought leave to file two narrow sur-reply submissions;

J. By Order G-68-16 dated May 13, 2016, the Commission, after considering comments from FEI and other interveners, allowed the sur-reply to remain on record; and

K. The Commission has reviewed and considered all of the evidence and submissions on record for the proceeding.

NOW THEREFORE pursuant to sections 59 to 61 of the *Utilities Commission Act*, the British Columbia Utilities Commission orders as follows:

1. FortisBC Energy Inc.'s common equity component is set at 38.5 percent, effective January 1, 2016.

2. FortisBC Energy Inc.'s return on equity is set at 8.75 percent, effective January 1, 2016.

3. The use of the Automatic Adjustment Mechanism formula is suspended indefinitely.

4. The common equity component and return on equity approved for FortisBC Energy Inc. in the decision issued concurrently with this order will serve as the benchmark cost of capital for any other utility in British Columbia that uses the benchmark utility to set rates.

5. The common equity component and return on equity will remain in effect until otherwise determined by the Commission.

6. FortisBC Energy Inc.'s interim rates set by Order G-193-15 are approved as permanent, effective January 1, 2016. FortisBC Energy Inc. is to file, within 15 working days from the date of this order, updated final rate schedules in accordance with Directives 1 and 2 of this order.

DATED at the City of Vancouver, in the Province of British Columbia, this 10th day of August 2016.

BY ORDER

Original Signed By:

K. A. Keilty
Commissioner

British Columbia Utilities Commission

IN THE MATTER OF

FortisBC Energy Inc.
Application for its Common Equity Component and Return on Equity for 2016

DECISION

and Order G-129-16

August 10, 2016

Before:
K. A. Keilty, Commissioner/Panel Chair
D. A. Cote, Commissioner
N. E. MacMurchy, Commissioner

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EXECUTIVE SUMMARY

On October 2, 2015, FortisBC Energy Inc. (FEI) filed an application for a review of its common equity component and return on equity (ROE) for 2016 in compliance with British Columbia Utilities Commission (Commission) Order G-75-13. After considering and weighing the evidence and submissions in this proceeding, the Panel has determined the following, effective January 1, 2016:

- **FEI's common equity component is set at 38.5 percent;**
- **FEI's ROE is set at 8.75 percent;**
- **The use of the Automatic Adjustment Mechanism (AAM) is suspended indefinitely;**
- **The common equity component and ROE approved for FEI in this decision will serve as the benchmark cost of equity for any other utility in British Columbia that uses the benchmark utility to set rates; and**
- **The common equity component and ROE will remain in effect until otherwise determined by the Commission.**

In reaching this decision, the Panel applied the Fair Return Standard to ensure that the common equity component and ROE met the three tests for a just and reasonable return on equity: the comparable investment, financial integrity and the capital attraction requirements.

Contextual issues

The Panel considered three issues to establish the context for this decision: the key determinations in the 2013 Generic Cost of Capital Decision; the changes in global and economic conditions since 2012; and reliance on decisions and data from other jurisdictions. The 2013 Generic Cost of Capital (GCOC) Decision is viewed by the Panel to be a reasonable reference point to assist in the evaluation of the evidence presented in the current proceeding, including the determinations with respect to the use of the capital asset pricing model (CAPM) and the discounted cash flow (DCF) models and the use of proxy companies comparable to FEI. The expert witnesses in the current proceeding focused on these two models using comparable Canadian and US data. With respect to changes in economic and global market conditions, all parties in this proceeding agree that current conditions are substantially the same as existed at the time of the 2012 GCOC proceeding.

Dealing with uncertainty

As is the case in all hearings dealing with ROE and common equity ratio determinations, in making its decision the Panel is faced with a number of uncertainties. This requires the application of judgment, informed by the evidence on record in the proceeding. The Panel noted a number of areas where uncertainty exists including:

- The use of imperfect models that rely on significant assumptions, subject to a high degree of uncertainty and variability;
- The use of US proxy companies subject to differences in the regulatory treatment and evidence of growth rate instability;
- Reliance on a Canadian group of proxy companies whose business interests are not directly comparable FEI's due to the lack of stand-alone publically traded natural gas distribution companies in Canada;
- The impact of distortions to capital markets resulting from the abnormal conditions in the bond markets resulting from the impact of global bond buying programs;
- Uncertainty with respect to the appropriate adjustment to raw betas for low risk utilities; and

- Sensitivity of the DCF model to growth rate assumptions.

The Panel has endeavoured to deal with these uncertainties by: (a) identifying the uncertainties and quantifying them where possible; (b) using different financial models as a check against the other; and (c) and while not determinative, considering the findings of other regulatory bodies in Canada.

Fair Return Standard

The expected rate of return investors require is based on the risk-return alternatives available in competitive capital markets. The financial models are the primary means used by FEI and interveners to estimate the comparable return available to investors from other entities of like risk. The expert witnesses in this proceeding used both Canadian and US proxy companies to provide input to their models. In determining the appropriate weight to place on the models, the Panel recognized the models are imperfect and considered the totality of the evidence. The Panel noted both the CAPM and DCF model rely on proxy group information and a selection of proxy companies that are imperfect comparators due to business and regulatory environments that differ from FEI. Further, given the current global economic and capital market environment, the reliability of the models is called into question more than in the previous cost of capital hearings, requiring the Panel to exercise its judgement to a greater degree. The Panel also considers whether conditions have changed sufficiently since the 2012 GCOC proceeding to warrant an increase or decrease in ROE. After assessing the output of the models and weighing the uncertainties, the Panel determined that maintaining the return on equity at 8.75 percent is appropriate.

In assessing the common equity component, the Panel determined that while there are some differences in the risks facing FEI relative to the time of the 2012 GCOC proceeding, the changes are not of a substantial nature requiring a change to FEI's ROE or common equity ratio. As a check, the Panel considered that the common equity component and ROE determined by the Panel situates FEI appropriately based on its relative risk to comparable Canadian natural gas distribution utilities.

With respect to debt financing, FEI's ability to attract capital and maintain its financial integrity is impacted by its credit rating. The Panel considered whether a higher ROE or common equity ratio is necessary to maintain FEI's current "A" credit rating given FEI's metrics weak financial metrics relative to the required metrics for a credit rating in the "A" category. The Panel agrees with FEI that maintenance of an A credit rating helps ensure FEI's access to capital in most market conditions, and among other benefits, ensures a lower cost of borrowing. The Panel is not persuaded that the high level of capital expenditures that FEI has planned through 2018 will impact its credit rating given the Panel has maintained of its current allowed ROE and common equity component.

The Panel assessed whether an increase in its common equity component was necessary to support FEI's ongoing debt issuance capacity under its Trust Indenture as a result of the significant new capital requirements facing FEI in the next few years. The Panel concluded that assuming both a 5.0 percent and 6.0 percent yield on new debt issuances, FEI has sufficient capacity under its Trust Indenture to meet its financing needs in the 2016 to 2018 period. The Panel noted FEI does not become constrained until interest rates reach 7.0 percent which given the expert evidence on forecast interest rates for this period, the Panel considers unlikely. Further, in the event FEI is faced with interest rates at this level it has other alternatives including its ability to issue secured debt, alter the timing of certain capital expenditure or bring an application to the Commission for a change in ROE. Accordingly, the Panel is of the view that an increase is ROE or common equity ratio is not required to support FEI's ability to issue debt under its Trust Indenture.

The Panel concludes an ROE of 8.75 percent and common equity component of 38.5 percent meet the comparable investment, capital attraction and financial integrity requirements.

Automatic Adjustment Mechanism

The Panel continues to hold the view that an effective AAM can be a useful tool in providing an updating mechanism for ROE, thereby eliminating some of the need for lengthy and expensive formal reviews. However, we acknowledge that economic conditions are uncertain and accept Dr. Booth's explanation of long Canada bond yields are less affected by investors and more by central banks' policies. Therefore, the Panel does not believe that continuing with an AAM at this time will necessarily result in changes reflecting a fair ROE or meeting the Fair Return Standard.

FEI as the benchmark utility

The Panel notes that there was general agreement among the parties with respect to FEI being made the benchmark for the GCOC proceeding. Accordingly, the common equity component and ROE approved in this decision will serve as the benchmark cost of capital for any other utility in British Columbia that uses the benchmark utility to set rates.

1.0 INTRODUCTION

1.1 Overview of the application

On October 2, 2015, FortisBC Energy Inc. (FEI) filed an application for a review of its common equity component and return on equity (ROE) for 2016 (Application) pursuant to the British Columbia Utilities Commission (Commission) decision in the 2012 Generic Cost of Capital (GCOC) Stage 1 proceeding. In the Application, FEI requests approval of a capital structure of 40 percent equity and 60 percent debt and a return on common equity of 9.5 percent for 2016.[1] This compares to FEI's currently allowed ROE of 8.75 percent and common equity component of 38.5 percent.

1.2 Background

In the 2013 GCOC Decision rendered on May 10, 2013,[2] the Commission determined that:

- FEI's common equity ratio is reduced from 40.0 percent to 38.5 percent, effective January 1, 2013.
- FEI's ROE is set at 8.75 percent, effective January 1, 2013 until December 31, 2015, subject to variation commencing January 1, 2014, by an Automatic Adjustment Mechanism (AAM) formula.
- The AAM formula, based on a two factor model, was to be applied annually to set the ROE of the benchmark utility between ROE proceedings. It will commence in 2014 and operate until December 31, 2015. The implementation of the AAM would only be applied when the long Canada bond yield met or exceeded 3.8 percent.

Commission Order G-75-13 accompanying the 2013 GCOC Decision directed the benchmark utility, FEI, to file an application for the review of its common equity component and ROE approved in that order by no later than November 30, 2015.

Since the 2013 GCOC Decision, FEI has undergone an amalgamation of three affiliated utilities serving distinct service areas: the former FortisBC Energy Inc., FortisBC Energy (Whistler) Inc. (FEW) and FortisBC Energy (Vancouver Island) Inc. (FEVI), to become Amalgamated FEI or, as used in this Application, FEI.

On October 2, 2015, in compliance with Order G-75-13, FEI filed its Application pursuant to sections 59 to 61 of the *Utilities Commission Act* (UCA) seeking approval of its proposed capital structure and return on common equity to take effect January 1, 2016.

At the time of the filing of this Application, FEI's Annual Review of 2016 Delivery Rates proceeding was before the Commission, and FEI's existing common equity component and return on equity was approved as interim in that proceeding, effective January 1, 2016, pending the outcome of this Application.[3] Order G-204-15 ordered that FEI's common equity component and return on equity would remain the benchmark on an interim basis effective January 1, 2016.

[1] Exhibit B-1, p. 1.
[2] British Columbia Utilities Commission Generic Cost of Capital Stage 1 (2013 GCOC), Decision dated May 10, 2013, Order G-75-13.
[3] FortisBC Energy Inc. Annual Review of 2016 Delivery Rates, Order G-193-15 with Reasons for Decision dated December 7, 2015.

1.3 Purpose and scope of the proceeding

The purpose of the proceeding is to establish a fair return for FEI based on the Fair Return Standard and the standalone principle. The focus of this proceeding is on matters that directly affect the fair return of FEI. These matters include:

- Consideration of the amalgamation being a factor affecting FEI's business risk;
- Changes in business risk since the 2012 GCOC proceeding, independent of the effect of amalgamation;
- Changes in economic conditions and capital markets since 2012 and their impact on FEI's cost of capital; and
- Consideration of the appropriate means of determining the allowed ROE reflecting the rate of return being earned by comparable companies.

In addition, this decision examines the need for continuation of an AAM. In accordance with this, by Order G-204-15, the Commission determined that a regulated utility that uses the benchmark to establish its rates must apply to the Commission if it wishes to have its rates made interim pending the outcome of this proceeding. This decision determines the role of FEI as a benchmark utility.

1.4 Regulatory process

The regulatory review was by way of a limited scope oral hearing, as proposed by FEI, which took place after two rounds of information requests (IRs) to FEI and one round of IRs on Intervener Evidence.[4]

Six parties registered as interveners in this proceeding:

1. Commercial Energy Consumers Association of British Columbia (CEC);
2. British Columbia Municipal Electrical Utilities (BCMEU);
3. British Columbia Hydro and Power Authority (BC Hydro);
4. British Columbia Old Age Pensioners' Organization *et al.* (BCOAPO);
5. Industrial Customers Group (ICG); and
6. Association of Major Power Customers of BC (AMPC).

Among the registered interveners, CEC, BCOAPO and AMPC: collectively the "Utility Customers," were most active and they jointly sponsored the expert evidence of Dr. Laurence Booth of the University of Toronto. CEC and AMPC participated separately in the IR process, cross-examination and filing of final submissions. BCOAPO separately participated in the IR process but joined AMPC in filing its final submission. ICG participated in the second round of the IR process and filed a final submission.

A number of regulated utilities either registered as interested parties or provided Letters of Comment to this proceeding in order to provide their views related to issues such as interim rates for utilities that rely on the benchmark utility for setting rates.

[4] Exhibit A-2, Commission Order G-177-15 dated November 9, 2015.

The oral hearing took place from March 9, 2016 to March 11, 2016 where participants cross-examined the expert witnesses, Mr. James Coyne of Concentric Energy Advisors and Dr. Laurence Booth of the University of Toronto, representing respectively, FEI and the Utility Customers.

At the close of the oral hearing, counsel for FEI, AMPC and CEC submitted in turn to the Panel that there was no further need for questions on the business risk of FEI. Accordingly, the Panel closed the evidentiary record on March 11, 2016 and, based on agreement from all parties, established the timing for FEI's final submission, intervener final submissions and FEI reply submission to take place from April 3, 2016 to April 28, 2016.

On May 5, 2016, AMPC sought leave from the Commission to file two narrow sur-reply submissions based on its view that there were new issues raised in FEI's reply submission. The Commission, after considering comments from FEI and other interveners, allowed the sur-reply to remain on record by Order G-68-16. With the admission of AMPC's sur-reply on the record, the argument phase for this proceeding ended on May 13, 2016, the date the Commission accepted the sur-reply by Order G-68-16.

1.5 Approach to the decision

The legal framework for determining a fair return for a regulated utility is called the Fair Return Standard and is discussed in Section 2.

There are a number of broader issues of importance which are contextual in nature and include the following:

- The key determinations in the 2013 GCOC Decision and relevance to this proceeding;
- Changes in economic and global market conditions since 2012/2013; and
- Consideration of other jurisdictions.

These issues are discussed in Section 3 and provide the Panel with a context to assist in reviewing and assessing the evidence.

Section 4 deals with an appropriate capital structure given FEI's business risk and consideration of other items impacting common equity component including: credit ratings, FEI's ability to issue debt under its Trust Indenture and the common equity component decisions in other jurisdictions.

Section 5 considers the appropriate ROE for the benchmark utility with a review of some of the key issues and models employed by the expert witnesses.

Section 6 examines potential AAM models and whether there is justification to continue to rely on such a mechanism. Section 7 deals with the role of FEI as a benchmark utility.

2.0 APPLICATION OF THE FAIR RETURN STANDARD

The principles of the Fair Return Standard were established by the Supreme Court of Canada in the Northwestern Utilities v. City of Edmonton (1929) case. The Fair Return Standard is the legal test applied to ensure that investors receive the opportunity cost on their investment represented by the rate of return investors could expect to earn elsewhere without bearing more risk.

In summary, the Fair Return Standard is fundamental to cost of equity proceedings and has three requirements or tests to be met for a fair and reasonable return on capital:

a) The comparable investment requirement;

b) The financial integrity requirement; and

c) The capital attraction requirement.

FEI submits that under the Fair Return Standard, the overall rate of return allowed for FEI (i.e., the combined capital structure and return on equity must meet the above three distinct elements of the test) must not compromise FEI's legitimate cost of service resulting from these tests in order to achieve lower rates in the short run; must account for the risks that FEI faces in achieving its return on and of its invested capital; and must allow FEI to maintain appropriate access to capital, particularly with FEI's significant capital investment requirements.[5]

In this proceeding, no party has directly challenged the Fair Return Standard or the regulatory compact, although FEI argues that some parties have indirectly done so by raising the issue of rate impacts and by characterizing rates that provide an appropriate risk adjusted rate of return as being unnecessarily high.[6]

AMPC/BCOAPO submit that FEI made an irrelevant argument because AMPC/BCOAPO have not made any submissions related to their members' ability to pay rates but concede the Commission should not simply ignore how its decision will affect ratepayers. They submit the Commission's mandate requires it to balance the interests of ratepayers and utilities investors.[7]

Consistent with previous decisions and the "regulatory compact" the Panel confirms that it has a duty to approve rates that meet this standard, and to provide a reasonable opportunity for the utility to earn a fair return on invested capital. The Panel also concurs with the finding in the 2013 GCOC Decision that in assessing the Fair Return Standard, the utility must be assessed on the basis of the standalone principle. That is, it must be assessed as if FEI is a stand-alone entity, raising capital on the merits of its own economic, business and financial characteristics.[8] No party challenged the application of this principle.

The Panel has not considered rate impacts that result from the revenue required to yield the fair return. The Panel recognizes that once a revenue requirement that has been established consistent with the Fair Return Standard and the regulatory compact, an assessment is required to determine not only that the rates give the utility the opportunity to realize its revenue requirements but also to ensure the rates that are set are structured so that they are consistent with the UCA requirement that they must not be "unjust" or "unreasonable" by being "more than a fair and reasonable charge for the service of the nature and quality provided by the utility."[9]

[5] FEI Final Submission, pp. 8–10.
[6] FEI Final Submission, p. 12.
[7] AMPC/BCOAPO Final Submission, p. 13.
[8] 2013 GCOC Decision, p. 100.
[9] *Utilities Commission Act*, RSBC 1996, Chapter 473, section 59(5).

The Panel agrees with the finding in the 2013 GCOC Decision: "The Commission observes that the application of the FRS (*Fair Return Standard*) leaves room for disagreement, judgment and discretion."[10]

3.0 CONTEXTUAL ISSUES

3.1 Determinations in the 2013 Generic Cost of Capital Decision

3.1.1 Key determinations in the 2013 GCOC Decision

The 2012 GCOC proceeding was initiated by the Commission in 2012 to review and determine the ROE and capital structure for a benchmark low-risk utility, which was last set in 2009 by Commission Order G-158-09 on December 16, 2009.

In the 2012 GCOC proceeding, FEI filed detailed company evidence and tendered four expert witnesses who presented to the Commission a variety of models for determining the appropriate ROE using a number of methodologies that vary in structure, assumptions and the data from which the model results were estimated. The proceeding also raised a number of broader issues that were contextual in nature. The key determinations of the 2013 GCOC Decision are summarized below:

a) Weighting of the models – it was determined that the two most compelling frameworks for assessing the cost of equity are the discounted cash flow (DCF) model and the capital asset pricing model (CAPM). These two models were given equal weight when determining the allowed ROE.[11]

b) Relevance of US data - it was determined that it was appropriate to continue to accept the use of historical and forecast data for US utilities and securities as outlined in the 2006 Terasen Gas Inc. and Terasen Gas (Vancouver Island) Inc. Application to Determine the Appropriate Return on Equity and Capital Structure and to Review and Revise the AAM (2006 TGI ROE) Decision and again in the 2009 Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc. and Terasen Gas (Whistler) Inc. Return on Equity and Capital Structure (2009 TGI ROE) Decision. However, the Commission did not accept that US data should be considered to be the same or necessarily be given equal weight as the data for Canadian utilities. It was of the view that the use of US data must be considered on a case by case basis and weighed with consideration to the sample being relied upon and any jurisdictional differences which might exist.[12]

c) Comparability with other Canadian jurisdictions - the Commission took the view that it is important to consider the methodologies, approaches and regulatory principles related to other jurisdictions' decision. However, it did not accept that results and values from other jurisdictions could be used for the purposes of determining the ROE and common equity component requirements for utilities in BC.[13]

d) Relevance of disparity between allowed and actual ROE[14] - as part of assessing the relevance of the disparity between "allowed" and "actual" ROE, the Commission considered the question of whether FEI faced any short-run risks with respect to its ability to annually earn its allowed ROE given its strong track

[10] 2013 GCOC Decision, p. 8.
[11] 2013 GCOC Decision, p. 80.
[12] 2013 GCOC Decision, pp. 19–20.
[13] 2013 GCOC Decision, p. 20.
[14] The Commission approves a ROE that meets the Fair Return Standard. Based on the approved ROE, a revenue requirement is calculated and rates are set and approved by the Commission at levels that are judged to allow the utility the opportunity to earn its approved ROE. The utility may earn more than its approved ROE or less, depending on the efficiency of its operations and on the economic circumstances it encounters. The term "allowed ROE" or "approved ROE" means the ROE found by the Commission that meets the Fair Return Standard. The term "actual ROE" or "realized ROE" refers to the ROE that the utility ends up achieving.

record of earning more than its approved ROE. The Commission noted that there was no evidence to suggest investors are likely to make a major distinction between short-term and long-term risk; and accordingly, concluded that the relevance of disparity between allowed and actual ROE of FEI is entrenched in the regulatory compact, revenue requirements proceedings and management's proactive approach.[15]

e) Financing flexibility adjustment - expert witnesses in the 2012 GCOC proceeding proposed financial flexibility adjustments ranging from 32 to 100 basis points (bps), dependent on a variety of conditions. The Commission approved the addition of 50 bps to be added to the CAPM and DCF tests in determining the fair ROE after reviewing a range of proposed allowances.[16]

3.1.2 Relevance to current proceeding

The key determinations of the contextual issues in the 2013 GCOC Decision provide the Panel in this proceeding with some guidance when considering the evidence in this proceeding.

3.2 Changes in economic and global market conditions since 2012

All parties in this proceeding approached the review of FEI's proposed ROE and common equity ratio by focusing on the changes in economic and capital market conditions since 2012 rather than undertaking a full analysis of current market conditions. The Panel accepts this approach and considers that changes in the economic and global market conditions should, among other considerations, inform its decision on whether the ROE and common equity component established in the 2013 GCOC Decision should increase, remain in place, or decrease.

In the current proceeding, all parties agree economic and capital market conditions remain much as they were in 2012. With respect to the changes since 2012, Mr. Coyne states:

> Generally, current capital market conditions are not dissimilar to what they were in June 2012. Capital markets continue to recover from the global economic crisis of 2008-2009, but at a slower than expected pace and have shown little change from when FEI last filed its GCOC evidence in 2012. Bond yields have remained low and utility bond spreads have remained somewhat elevated, with no significant movements since June 2012.[17]
>
> …Though financial markets have reflected more optimism in valuations, recent financial market volatility indicates that optimism may be waning and uncertainty persists in today's financial markets, as it did in June 2012, as the pace of recovery proves slower than expected and the impact of China's economic slowdown has yet to be fully realized on the global economy. Though it is difficult to predict what will unfold, I would not characterize the global economy as appreciably improved today from where it stood in its recovery in June 2012, and accordingly, I would not expect investors to view current capital market conditions as dissimilar to those in June 2012.[18]

In Dr. Booth's view, since 2012, conditions have been in a "holding pattern" waiting for the US and Europe to recover from the effects of their recessions. He indicates that the recovery has been impacted by slowed growth

[15] 2013 GCOC Decision, p. 22.
[16] 2013 GCOC Decision, p. 80.
[17] Exhibit B-1, Appendix B, p. 22.
[18] Exhibit B-1, Appendix B, p. 24.

in China which also impacted commodity markets and triggered a correction in the stock market. Dr. Booth states:

> The upshot is that the stronger markets that were expected at that time have not developed as anticipated and Alberta, in particular has been badly hit. Further conditions in the bond market have become even looser than they were in 2012 as the massive amount of liquidity in global markets continues to increase, depressing bond yields.[19]

FEI describes the current Canadian environment as continuing to be dominated by uncertainty and as "not materially different form 2012 levels."[20]

Mr. Coyne analyzes the corporate bond market and notes the Canadian Utilities A-related spread over 30-year government bonds was 1.588 percent in June 2012 verses 1.868 percent in August 2015, an increase of 28 bps.[21] Mr. Coyne states this increase indicates ongoing risk aversion in the wake of continued economic uncertainty. Mr. Coyne also analyzes the change in FEI bond spreads and concluded that FEI's bond spread has increased since June 2012. It is also Mr. Coyne's opinion that the average Canadian distribution utility bond spreads have increased more than the Corporate A-rated bond spreads.[22]

Dr. Booth states that utilities continue to have easy access to debt markets at very low interest rates and similar to 2012, conditions are very receptive to "good credits" like Canadian utilities.[23]

Intervener submissions

CEC describes capital market conditions as not being dissimilar to what they were in June 2012, and capital markets have continued to recover from the global economic crisis of 2008-2009, but at a slower than expected pace.[24]

AMPC/BCOAPO submit the decrease in long Canada yields reflect lower utility borrowing costs, allowing FEI to access the bond market on more favourable terms than in 2013 and resulting in FEI having a lower embedded debt cost, an increase in its interest coverage ratio and an enhancement of its financial flexibility.[25]

FEI reply submission

FEI submits the increase in credit spreads is an indicator of increased investor risk aversion regarding utility equity and therefore implies a higher cost of equity.[26]

FEI submits Dr. Booth has not accounted for credit spreads which quantifies the compensation investors demand for making investment in relationship to risk free rate and in addition, the increased credit spreads since 2012 are an indicator of increased risk of a utility investment.[27]

[19] Exhibit C7-7-2, pp. 2–3.
[20] Exhibit B-1, p. 13.
[21] Exhibit B-1, Appendix B, p. 19.
[22] Exhibit B-9, BCUC IR 32.2.
[23] Exhibit C7-7-2, pp. 34–45.
[24] CEC Final Submission, p. 10.
[25] AMPC/BCOAPO Final Submission p. 37.
[26] FEI Final Submission, p. 32.

Panel discussion

While FEI and AMPC/BCOAPO differ in their interpretation of the meaning of recent movement of utility credit spreads, the Panel accepts that there is little disagreement among the parties that the economic condition of the BC economy and capital market conditions are not materially different from the 2012 levels. In this proceeding, similar to the approach set out in the 2013 GCOC Decision, the Panel has to assess a number of elements to determine if a change in FEI's ROE and common equity component is appropriate. This analysis includes weighing the impact of the changes in economic conditions and global market conditions since 2012 and the extent to which changes in these conditions imply changes in an investor's opportunity cost.

3.3 Consideration of other jurisdictions

The "comparable investment requirement" of the Fair Return Standard requires the return available from the application of the utility's invested capital to be comparable to the return of other enterprises of like risk. The challenge posed by a comparability test is to find a group of proxy companies that reflect the substantially similar environment facing FEI, including the market, regulatory, financial, environmental and political circumstances affecting current and future economic prospects.

All parties acknowledge there are no publically-traded, pure play gas distribution companies in Canada. Hence, both the FEI and the Utility Customers' expert witnesses assessed a sample of US companies that are primarily engaged in natural gas distribution in order to assess the market expectations specific to a natural gas distribution utility.[28]

Mr. Coyne and Dr. Booth also looked at a set of Canadian companies as comparators although they recognized the Canadian comparators were mainly holding companies and not directly comparable to FEI in terms of their business functions.

Details of the assessment and use of the comparators proxy companies are set out in Section 5.

Separate from the use of the Canadian and US proxy companies that were inputs into the assessment of an appropriate ROE, Mr. Coyne and Dr. Booth also provided evidence on the approved equity structures and ROE's of gas distribution utilities in other Canadian jurisdictions and how these awarded capital structures relate to FEI's circumstances. This assessment of how FEI compares to the allowed common equity component of other regulated utilities in Canada is included in Section 4.3.3.

4.0 CAPITAL STRUCTURE

4.1 Assessing business risks

In the 2013 GCOC Decision, risk was viewed "as the probability that future cash flows will not be realized or will be variable resulting in a failure to meet investor expectations."[29] None of the parties in this proceeding raised any issue or provided any alternative to how risk had been defined in past Commission decisions. Therefore, the

[27] FEI Reply Submission, pp. 13–14.
[28] Oral Hearing Transcript Volume 3, pp. 581–595; FEI Final Submission p. 77.
[29] 2013 GCOC Decision, p. 24.

Panel will continue to rely on this description of risk in its review of FEI's risk profile and its determinations on capital structure.

4.1.1 Establishing a framework for assessing risk

In the 2013 GCOC Decision, the Commission explained that inherent in its definition of risk is the recognition there is the risk of potential financial disruption and therefore accepted the distinction made in previous decisions where investment risk comprised business, financial and regulatory risks.[30]

According to Mr. Coyne, the purpose of his testimony related to FEI's risks was to examine FEI's risk profile in comparison to its peers within the context of FEI's request for a 40 percent equity component. Mr. Coyne asserts that risk for utilities or any company comes from two primary sources, business risk and financial risk. He describes business risk as being inherent in a company's operations regardless of how it is financed while financial risk is a function of the extent to which a company incurs fixed obligations in the financing of its operations.[31]

Dr. Booth provides commentary related to the establishment of a framework for assessing risk. Dr. Booth judges the best way to determine capital structure is to assess it based on the business risk of a utility and cites examples of other Canadian jurisdictions relying on this methodology. He states that a utility "with higher business risk should then have more common equity, so that less financial risk offsets higher business risk to equalize total risk" allowing a regulator to award the same allowed ROE from a generic cost of capital proceeding. Dr. Booth does acknowledge however, that there are cases where an adjustment to both the common equity ratio and the ROE is necessary, particularly in those cases where an inefficient capital structure has resulted.[32]

While it has been common practice in the Commission's cost of capital decisions to consider the common equity ratio and ROE at the same time and not uncommon for a decision to result in a change to both components, it is acknowledged that capital structure and cost of equity are not independent but closely linked to one another. The Panel sees no need to move away from past practice in this proceeding and notes there has been no strong argument from the parties to do so. Therefore, consistent with past practice, the Panel has reviewed the evidence and provided its determination on the common equity component with consideration of three factors: (i) changes in FEI's business risk since the last proceeding; (ii) financial implications related to the potential for credit ratings adjustments; and/or (iii) failure to meet the trust indenture issuance test. In addition, the Panel will also examine and address FEI's level of risk relative to other Canadian utilities.

Prior to examining any potential changes in risk since the 2013 GCOC Decision, the Panel will address two factors that have arisen during this proceeding, each of which provide context to risk related issues to be examined. They are as follows:

- Short-term versus long-term risk of earning the allowed ROE; and
- The impact of amalgamation on FEI's overall risk.

[30] 2013 GCOC Decision, p. 24.
[31] Exhibit B-1, Appendix B, p. 61.
[32] Exhibit C7-7-2, p. 64.

4.1.2 Short-term versus long-term risk of earning the allowed ROE

The impact of short-term risk on overall risk, and whether a short-term risk if never realized over a period of time should be considered a long-term risk and evaluated as such was raised by the parties. Specifically, this issue related to FEI's history of achieving actual earnings higher than its allowed ROE and whether the risk of not earning the allowed ROE should be considered a risk at all when viewed in the context of FEI's historical ROE performance.

Mr. Coyne explains that business and financial risks also have a time dimension and both long and short-term risks are considered by investors and affect a utility's business risk profile. He describes short-term risks as those that will reverse and resolve themselves within a one to two year period through either the normal ebb or flow of earnings or through regulatory relief as a utility's short-term risk. Examples of these could include weather events or financial market disruptions. By contrast, longer term risks are those characterized by a business profile shift where mitigation is not foreseeable. Included among his examples of long-term risk is the risk of stranded assets because of market share losses or changes in environmental policies with a substantial impact on operational profitability.[33]

Dr. Booth describes the ability to earn the allowed ROE, reflecting a return on capital, as short-run risk. The return of capital is a long-run risk reflecting the utility's ability to recover its investment in plant and equipment. Dr. Booth asserts however, that to have any impact, long-term risks must eventually become short-term risks and states that: "To all intents and purposes FEI's shareholders have not suffered any losses or experienced any risk." Further, when such serious risks do arise, Canadian utilities typically come before the regulator for a reallocation of costs.[34] Further, AMPC/BCOAPO, with reference to the earning of ROE, explain neither they nor Dr. Booth take issue with FEI's position that the ability to earn ROE in a particular test year represents short-term risk. However, they contend that year after year "FEI continues to face very little short-run risk, such that this pattern of consistent overearning is clearly a long-term phenomenon" and pose the question as to how many years of persistent over-earning does it take for a utility witness to accept the limited risk faced by utility investors.[35]

CEC takes issue with FEI's statement that risk factors impairing the ability of shareholders to recover their invested capital present risks today are considered by investors in making investment decisions. CEC submits that stock equity investors are more concerned with immediate risk and current ROE performance and assert "investors are free to alter their investment at any time if immediate rewards do not match the immediate risk." Moreover, its view is that risks five years in the future will likely already be reflected in the ROE at the time and therefore recommends greater weight be placed on short-term risks.[36]

FEI submits there are two problems with Dr. Booth's position that FEI's history of earning its ROE suggests FEI experienced no risk. First, risk is prospective in nature and FEI benefiting from sound management and executive oversight generally expects to earn its allowed ROE while at the same time acknowledging that variances still occur due to the imprecision inherent in forecasts and circumstances that arise during a test year. Its ability to

[33] Exhibit B-1, Appendix B, p. 61.
[34] Exhibit C7-7-2, pp. 64–65, 69.
[35] AMPC/BCOAPO Final Submission, pp. 18–19.
[36] CEC Final Submission, pp. 59–60.

earn its current allowed ROE provides insight only into how the utility manages its short-term risk. A second problem with Dr. Booth's assertion is the full recovery of invested capital in the future is not guaranteed by a utility's ability to manage its budget within a test year. FEI's position is that investors require risks to be compensated throughout the investment period and would not accept that risks should be considered only when it materializes in earnings.[37]

FEI states that CEC's observation that utilities are "free to alter their investment at any time" is flawed. FEI's investment in long-term assets are subject to statutory obligations concerning safe and reliable service and because of this, the law requires the regulator to meet the comparable investment requirement part of the Fair Return Standard. In addition, no investor would accept the argument that compensation is required only for risks that have materialized.[38]

Commission determination

In the 2013 GCOC Decision, the Commission addressed the relevance of the disparity between allowed and actual ROE stating "the differences in actual and allowed ROE relate to revenue requirements and are influenced by management's ability first to forecast and then to control cost for each test period." The Commission also observed that the relevance of a disparity between allowed and actual ROE is a matter that is "entrenched in the regulatory compact, revenue requirements proceedings, and management's proactive approach."[39]

AMPC/BCOAPO take issue with FEI's position that in a given test year, the ability of a company to earn its ROE is short-term risk. Their collective concern seems to be with the fact that historically, FEI has managed to make and exceed its allowed ROE on a relatively consistent basis and at some point, the risk must be considered very limited or in Dr. Booth's words: "FEI's shareholders have not suffered any losses or experienced any risk."

AMPC/BCOAPO's position is for a risk to remain a risk, it must at some point occur. The Panel is not persuaded that this interpretation of risk is reasonable or reflective of the prospective nature of risk. In the Panel's view, a risk does not disappear because it has not occurred over a period of time and non-occurrence of a risk in the past does not necessarily alter the probability of occurrence in the future.

The Panel does not agree with CEC's assertion that equity investors are concerned primarily with immediate risk and current ROE performance as they can alter their investment when rewards fail to match the immediate risk. While investors certainly consider a risk which has recently occurred, they must be equally concerned about the future prospects of an investment. Further, while it is true investors may sell a particular investment; it would be imprudent of an investor to fail to consider the future prospects of an investment and any potential future risks which may occur.

The Panel accepts FEI's argument that risk is prospective. In the Panel's view, the risk of earning ROE does not disappear in any given test year because of a utility's success in achieving it in prior years. However, this does not mean that an investor does not consider historical performance when choosing to make an investment but in doing so must accept that there is no certainty that past performance will be repeated in the future. Given

[37] FEI Final Submission, p. 51.
[38] FEI Reply Submission, p. 36.
[39] 2013 GCOC Decision, p. 23.

this, we agree with the parties and consider the attainment of ROE to be a short-term risk and if FEI fails to earn its approved ROE in a given test period, it has the capability to initiate actions to resolve the matter in a short time span.

A second issue is whether there has been a change in FEI's ability to earn its ROE in a given year as compared to the period preceding the 2013 GCOC Decision. In the view of the Panel, there is no evidence to suggest there has been a change in this regard. FEI has historically been able, in most circumstances, to earn its ROE in a given test year and none of the parties have taken the position this is likely to change in the foreseeable future. Therefore, **the Panel finds the short-term risk of FEI earning its ROE to be similar to 2013.**

4.1.3 Impact of amalgamation

A noteworthy change that has occurred since the 2013 GCOC Decision is the amalgamation of FEI with FortisBC Energy (Vancouver Island) Inc. (FEVI) and FortisBC Energy (Whistler) Inc. (FEW) that was approved by the Commission on February 26, 2014 by Order G-21-14. This was consented to by the Lieutenant Governor in Council who thereby issued Order in Council No. 300. On December 31, 2014, the three companies amalgamated and are now collectively referred to as FEI. The issue to be considered in this proceeding is whether there has been a material difference in the level of risk assumed by FEI as a result of amalgamation or whether FEI's overall risk has remained unchanged from the period prior to amalgamation.

FEI points out that at the time of the amalgamation, both FEVI and FEW, as a result of the 2014 GCOC Stage 2 Decision had been granted a higher equity ratio and ROE than FEI reflecting the relatively higher business risk of the two entities.[40] However, in this same decision, the Commission stated that once amalgamation was in place and postage stamp rates implemented, the ROE and capital structure for the amalgamated entity would be the same as for FEI. The Commission continued by stating that if the cost of capital was not considered by the amalgamated entity to be indicative of current circumstances, it could make further application to the Commission as the amalgamated entity.

FEI states amalgamation as a factor affects FEI's business risk but is not the principal reason for FEI seeking an increase to either its ROE or common equity component. FEI remains a large natural gas distribution utility and many of the challenges of declining use per customer and low customer growth remain as existed pre-amalgamation. However, FEI does assert that as a result of the addition of these two new territories, there has been increased supply interruption risk related to its dependency on a single pipeline system traversing challenging terrain resulting in greater supply risk. As a result, the amalgamated FEI has exposure to factors resulting from amalgamation that contribute to "a slight increase in overall business risk."[41]

Mr. Coyne notes that FEI has increased its size since amalgamation but, because it was already a large gas distributer, the increase in size has no impact on its risk profile. He also points out that the transitional effects of amalgamation provide help to FEI's risk profile in the short term. Even considering the benefit of higher returns from FEVI and FEW, this does not raise FEI's credit metrics to a level where they fall within Moody's Investor

[40] British Columbia Utilities Commission Generic Cost of Capital, Stage 2 (2014 GCOC), Decision dated March 25, 2014.
[41] Exhibit B-1, pp. 2–3; Exhibit B-1, Appendix C, p. 1.

Services (Moody's) guidelines for the A rating category. The effect of amalgamation is a reduction in FEI's credit metrics, other factors being equal.[42]

Dr. Booth's assessment of the impact of amalgamation does not differ significantly from those of FEI or Mr. Coyne. In Dr. Booth's judgement, the amalgamation of FEI has not materially altered its risk or financial parameters. He recommends no adjustment in consideration of amalgamation noting this conclusion is in line with rating agency decisions which regard amalgamation as not material.[43]

Commission determination

The Panel has determined that the impact of amalgamation for the purposes of assessing FEI's business risk in this proceeding is minimal and has not resulted in any material change to FEI's business risk profile.

Based on the submissions of FEI and the expert witnesses, the Panel notes there is little disagreement among the parties that the impact of amalgamation on business risk is not significant. FEI states it has considered the extent to which its risk profile has changed as a result of amalgamation and describes the change to business risk as being slight. In addition, neither Mr. Coyne nor Dr. Booth makes a case for any significant change in risk resulting from amalgamation and the interveners made no comments in their submissions. Therefore, based on the evidence presented, there is little to justify that amalgamation has had any material effect on FEI's risk profile.

The Panel notes FEI has described the factors resulting from amalgamation that are primarily related to a single pipeline system over difficult terrain as resulting in a slight increase in overall risk but has not explored this issue in any depth. The Panel also notes that FEI focused no attention on the potential positive impact of amalgamation over time. A key element of the Commission decision on amalgamation was tied to moving ahead with postage stamp pricing where rates for most British Columbians will be common. This represents a significant improvement in the former FEVI and FEW customer rates while the impact on FEI's pre-amalgamation customers will be relatively modest. Over time, this has the potential to significantly improve the uptake and use of natural gas on Vancouver Island and Whistler and along with it, FEI's credit metrics, overall profitability and potentially, its risk profile. While not being a factor presently, the Panel considers this as an issue worthy of further examination in future proceedings.

4.2 Assessment of FEI's business risks

4.2.1 Background

An assessment of the level of business risk is a key element in reaching a determination on a common equity component for FEI's capital structure. The Commission has typically found the level of business and other risks are an important factor in determining the equity ratio in a utility's capital structure. In the 2013 GCOC Decision, the Commission determined an appropriate equity thickness for the benchmark utility was 38.5 percent which is 1.5 percent lower than the amount awarded in the 2009 TGI ROE Decision. The determination reached in the 2013 GCOC Decision was heavily influenced by the Commission's finding that there were a number of key risk

[42] Exhibit B-1, Appendix B, pp. 96, 99.
[43] Exhibit C7-7-2, p. 2.

areas where the level of risk had been reduced since 2009 therefore warranting a reduction in the common equity component.

FEI states that utilities are large consumers of equity and debt capital and the financial analyst community for equity investors and the credit rating agencies for debt holders carefully watch and thoroughly scrutinize its fundamentals. Credit rating agencies are particularly sensitive to the cash generated by approved returns to ensure that the interest on its debt can be serviced and the common equity proportion of a utility's capital structure as it provides security for lenders. FEI asserts that its common equity ratio should be increased to 40 percent because of the combination of what it refers to as an "upward trend" in business risk and relatively weak financial metrics.[44]

4.2.2 2016 assessment of business risks

FEI has identified eight risk areas as follows: regulatory risk, market shift risk, political risk, energy price risk, business profile, economic conditions, operating risk and energy supply risk. FEI notes that other risk factors are possible or could be captured differently, but states that relying on the same categories as used in the 2012 GCOC proceeding facilitates comparison of FEI's amalgamated risk profile since the categories are common to all three amalgamated entities.[45] FEI has summarized these business risks in comparison to the 2012 benchmark utility in Table 4.1 and ranked the importance of each.

[44] Exhibit B-1, p. 17.
[45] Exhibit B-1, Appendix C, p. 2.

Table 4.1: Change in Business Risk since 2012 and Business Risk Ranking[46]

Business Risk Category	Risk Factor	Total risk status since 2012, (all business changes incl. amalg.)	Risk status change due to amalgamation alone	Ranking of risk
Regulatory		**Same**		**1**
	Regulatory uncertainty and lag	Same	Same	
	Deferral accounting	Same	Same	
	Administrative penalties	Same	Same	
Energy Prices		**Same**		**2**
	Commodity prices	Lower	Same	
	Commodity price volatility	Higher	Same	
	Upfront and installation costs	Same	Same	
Market Shifts		**Same**		**2**
	New technology and energy forms	Same	Same	
	Perception of energy	Same	Same	
	Housing types	Same	Same	
	Changes in use per customer	Same	Same	
	Changes in the capture rates	Same	Same	
Political		**Higher**		**2**
	Energy policy and legislation	Same	Same	
	GHG emissions reductions initiatives and local governments policies	Higher	Same	
	Carbon tax	Same	Same	
	Aboriginal rights	Higher	Same	
Business Profile		**Same**		**2**
	Type and size of the utility	Same	Same	
	Energy product offering	Same	Same	
	Service area and customer profile	Same	Same	
Economic Conditions		**Same**		**2**
	Overall economic conditions	Same	Same	
Operating		**Same**		**3**
	Infrastructure integrity	Same	Same	
	Third party damages	Same	Same	
	Unexpected events	Same	Same	
Energy Supply		**Higher**		**4**
	Availability of supply	Same	Same	
	Security of supply	Higher	Higher	

FEI states that independent of the effect of amalgamation, FEI's business risk is "broadly similar" to what it was in 2012 but there are some differences that indicate there is somewhat higher business risk than what was reflected in the approved capital structure and ROE resulting from the 2013 GCOC Decision. Most notable among these is political risk where FEI has identified "GHG emission reduction initiatives and local government policies" and aboriginal rights as areas of increased risk. In addition to this, FEI has identified "commodity price

[46] Ibid., pp. 3–4.

volatility" (Energy Price Risk) and "security of supply" (Energy Supply Risk) and potential impacts related to Performance Based Rate-making (PBR) as areas where risk is higher or has the potential to be higher over the next period of time.[47] FEI identifies no areas where risk has been reduced since 2012.

Interveners are in general agreement with FEI on a number of risk areas where there has been little or no change since the last proceeding. Consequently, their submissions include minimal commentary on items such as market shift risk, business profile, economic conditions and operating risk. However, there is significant disagreement between the parties with respect to other risk categories. Both AMPC/BCOAPO and CEC disagree with FEI's stance on increased political risk as well as the impact of PBR on regulatory risk. In addition, the interveners have a different perspective than FEI concerning whether energy supply risk is slightly elevated as claimed by FEI or reduced somewhat. Finally, both AMPC/BCOAPO and CEC take the position that energy price risk is much lower due to current low energy price levels. This is in contrast to FEI's claim they are similar and overall energy price risk is elevated due to increased volatility.

This decision first addresses those categories and related issues where there is disagreement among the parties. These include the following:

- Regulatory Risk – Does the introduction of PBR materially increase risk?
- Political Risk – Do recent provincial and municipal activities concerning greenhouse gas (GHG) emissions reduction and municipal policies mean there has been an increase in overall political risk?
- Political Risk – Do recent First Nations-related court decisions mean that FEI faces greater risk?
- Energy Price Risk – Has continued downward movement in gas prices relative to electricity resulted in less risk to FEI?
- Energy Supply Risk – Has there been any material change in energy supply risk to FEI?

Following our review of the more controversial issues raised by the parties, the Panel briefly discusses the less controversial risk categories where there is general agreement among the parties concerning the lack of change in risk relative to the period dealt with in the 2013 GCOC Decision.

4.2.3 Key differences in views related to FEI's business risks

4.2.3.1 Impact of PBR

Mr. Coyne's evidence is that PBR is generally regarded as higher risk than cost of service regulation, a view FEI states is shared by the rating agencies.[48] Mr. Coyne states that although the specific PBR plan includes some moderating features, "the utility remains subject to the risk the formulaic PBR rates may diverge from just and reasonable rates if, for example productivity gains are not realized." Overall, Mr. Coyne states he considers the PBR to have very little risk in the near term but in later years "the Company will be harder pressed to find productivity gains under the Plan and earnings will be exposed to greater risk."[49]

[47] Exhibit B-1, pp. 12–14; Exhibit B-1, Appendix C, Tab 2, pp. 4–6.
[48] Oral Hearing Transcript Volume 2, p. 347; FEI Final Submission, p. 50.
[49] Exhibit B-1, Appendix B, pp. 74–76.

FEI submits there may be an increase in regulatory risk over the PBR term resulting from the potential of being unable to recover prudently incurred costs for exogenous events as a result of the PBR's materiality threshold or if the formula does not adequately compensate FEI for its capital expenditures. In addition, FEI notes the regulatory framework for the period following PBR has not been determined and remains unknown.[50] Also in its submission, the risk presented by PBR is a function of its design and some of the terms will pose greater risk as FEI moves through the PBR term.[51]

Intervener submissions

CEC submits that Mr. Coyne has placed too much emphasis on PBR risks and has not provided any commentary on the opportunities afforded by the model. It is CEC's position that PBR offers an upside potential which is at least equivalent to any additional risks. Further, CEC points out that Mr. Coyne under cross examination acknowledged that FEI has been able to earn its approved return and in many cases exceed it during periods when FEI has been under a PBR Plan and Mr. Coyne also acknowledges cost of service rate plans can be more risky than PBR. In addition, FEI has availed itself of the opportunity to earn above the allowed ROE under PBR and its history of overearning its ROE and the fact that it has a safeguard allowing it to exit the PBR framework eliminates any risk that could be ascribed to the approved PBR model. CEC also notes that the PBR model allows for relief from unexpected events where there are extraordinary situations.[52]

FEI reply submission

FEI also submits that the risk presented by PBR is a function of its design and some of the PBR terms will prove more challenging towards the end of PBR. FEI explains this is because there is potential for greater risk as it moves through the PBR term.[53]

Commission determination

The Panel is not persuaded by FEI's analysis that being under the current PBR plan contributes to increased regulatory risk over the longer term. **The Panel finds that business risk related to the introduction of PBR in this jurisdiction has not increased when compared with cost of service and may potentially offer FEI a greater opportunity for earnings during the PBR period.**

Mr. Coyne makes the assertion that FEI, over time, will be harder pressed to find productivity gains under PBR thereby exposing its earnings to greater risk. However, PBR as approved by the Commission is designed to allow productivity savings, once in place, to continue to benefit FEI for the entire PBR term. Thus, if FEI is able to make adjustments resulting in productivity gains early in the PBR period, it will continue to derive benefits from these changes for the term remaining under PBR. This offers FEI an incentive to establish their productivity gains early in the PBR term thereby maximizing the benefits accruing over the PBR period. Given that FEI has enjoyed an ROE in excess of the allowed ROE base in the first two years of PBR, it can expect to continue to benefit from these savings initiatives for the remainder of the PBR term assuming the productivity improvements continue.[54] Under a cost of service plan typically covering a one to three year period, the utility benefits from productivity

[50] FEI Final Submission, p. 50.
[51] FEI Reply Submission, pp. 32–33.
[52] CEC Final Submission, pp. 108–109.
[53] FEI Reply Submission, pp. 32–33.
[54] FEI Application for Approval of 2015 Delivery Rates pursuant to the Multi-Year Performance Based Ratemaking Plan approved for 2014 through 2019 by Order G-138-14, Exhibit B-1, p. 4; FEI Annual Review of 2016 Delivery Rates, Exhibit B-1, p. 4.

savings only to the end of that period. In the view of the Panel, this seems to favour FEI continuing to earn its ROE rather than presenting additional risk as implied by the comments made by Mr. Coyne.

FEI raises a concern as to the formula not adequately compensating FEI for its capital expenditures. The Panel notes a feature of PBR is the inclusion of a dead band which allows FEI to apply to rebase its capital expenditures covered by the PBR in the event actual costs exceed formula generated costs cumulatively over two years by greater than 15 percent or 10 percent in a single year.[55] The Panel acknowledges this PBR feature does not mitigate the risk of FEI exceeding its formula-driven capital expenditure limit in any given year but it does limit the impact on FEI's ROE.

With respect to FEI's ability to recover prudently incurred costs for exogenous events that fall under the materiality threshold, the Panel notes that a similar risk exists under cost of service where the materiality threshold may be applied but is not explicitly laid out. Therefore, if an exogenous event were to occur, the utility could seek relief by application to the Commission but the outcome would nonetheless remain at risk.

Given these circumstances, the Panel does not agree with FEI that there is increased material risk due to PBR. In the Panel's view, the existence of PBR is as likely to reduce risk as to increase it as FEI has control over its expense load and by its own acknowledgement has a proven ability to effectively manage its costs.

4.2.3.2 Political risk – recent provincial and municipal activities

FEI argues there are developments at all levels of government (municipal and provincial) that suggest a sharper upward trend in its political risk since 2012.

i) Local governments

FEI asserts that the willingness of local governments to dictate energy choices represents a material increase in risk for FEI. FEI asserts that municipalities have been making significant changes to their operations, policy, codes and regulations which are having a direct negative impact on natural gas throughput. Much of this issue concerns the City of Vancouver (COV), which represents approximately 13 percent of FEI's 2016 forecast load, but it is not restricted to that location. Some examples of changes in municipal operations, codes, policy and regulations are as follows:

- A requirement in COV that all new larger buildings be designed to strict energy standards with an energy reduction of 20 percent below 2007 levels by 2020 and carbon neutral by 2030.
- A requirement in COV that new one and two family homes include a number of sustainable features that focus on creating energy savings of up to 33 percent by 2020. Recent bylaw amendments mandate for boiler or furnace upgrades of over $5,000, the annual fuel utilization efficiency be equal or exceed 90 percent.
- Recent Richmond bylaws require new townhomes be designed to score 82 or higher on the EnerGuide Rating System and be solar hot water ready.

[55] FortisBC Energy Inc. and FortisBC Inc. Multi-Year Performance Based Ratemaking Plans for 2014 through 2019 Approved by Decisions and Orders G-138-14 and G-139-14 Capital Exclusion Criteria under PBR, Order G-120-15 with Reasons for Decision, pp. 16–17.

FEI states similar programs can be found in most municipalities that signed the Climate Action Charter. Specifically, FEI expresses concern with the COV's recent steps to endorse Creative Energy Vancouver Platforms Inc.'s Northeast False Creek and Chinatown projects with exclusive franchise for all space and water heating as a part of COV's Neighbourhood Energy Strategy. This will involve a mandatory connection obligation for developers and prevent FEI from competing for this future load. FEI's estimate is that the Neighbourhood Energy Strategy will represent an annual load of 10.5 PJ or 5 percent of its annual load. However, FEI does not suggest that this amount will be immediately lost and it has no growth forecasts for these areas or forecasts of the rate of redevelopment.[56]

ii) Provincial government policies and legislation

FEI states since the 2012 GCOC proceeding, the provincial government has introduced three minor modifications to existing regulations and has issued a special direction to the Commission for the development of liquefied natural gas (LNG) facilities. FEI acknowledges that these do not represent a change in policy since the last proceeding but note that the provincial emission reduction targets put in place in BC has a disproportionate effect on BC natural gas facilities.[57]

Of some concern to FEI is the fact the BC government has recently announced its plans to build on the success its 2008 Climate Action Plan by developing a new Climate Leadership Plan. While only in the initial development stage, this initiative does increase uncertainty. Further, a Climate Leadership Team has been formed which has recently submitted a series of recommendations to government. These include the following:

- A new GHG emissions reduction target from 2007 of 40 percent.
- The establishment of sectorial GHG reduction goals for 2030 (i.e. 50 percent for built environment and 30 percent for industrial sector focusing on the gas industry).
- An increase in the carbon tax.

FEI acknowledges the Climate Action Team recommendations would have greater weight in an investor's deliberations if they were already adopted. Nonetheless, FEI considers it appropriate for the Commission to consider this uncertainty in its deliberations.

FEI also points out the federal government's recent actions have confirmed Canada's intentions to pursue carbon emission reduction and climate change mitigation initiatives but again, there is nothing firm at this time.[58]

Mr. Coyne's opinion is the risks posed by initiatives undertaken at the provincial and municipal level remain "and are aggressive both in a Canadian and North American context."[59] Mr. Coyne makes no comments as to how these risks compare to what existed during the 2012 GCOC proceeding.

Dr. Booth states that many parties accept natural gas as a solution to the GHG problem pointing to a Canadian Gas Association study which shows even with continued expansion of the natural gas distribution system, GHGs

[56] Exhibit B-1, Appendix C, pp. 64–69; Exhibit B-4, CEC IR 44.1.
[57] Exhibit B-1, Appendix C, Tab 9, pp. 59–63.
[58] FEI Final Submission, p. 49; Exhibit B-4, CEC IR 45.1; Exhibit B-9, BCUC IR 51.1.
[59] Exhibit B-1, Appendix B, pp. 76–77.

are declining. This means the distribution system itself is getting cleaner. Dr. Booth does not see there being a requirement from the provincial government for residential users to modify their use of natural gas for space heating and replace them with more expensive electricity. If FEI does see such a consequence, Dr. Booth believes the correct response will be to perform a depreciation study and depreciate the assets more quickly to reduce any stranded risk thereby keeping FEI whole in terms of risk exposure. In conclusion, Dr. Booth's judgement is that FEI faces lower risk than in 2012 and there is no basis for concluding that its risk has increased.[60]

FEI argues that Dr. Booth's position concerning parties accepting natural gas as a solution to the GHG problem is counterintuitive in the context of a BC utility, makes more sense where natural gas is a clean alternative to coal, and ignores the evidence of local and provincial government action in British Columbia. Further, Dr. Booth's evidence on GHG emissions is based on Canada-wide statistics and not limited to BC and should not be given any weight in light of the limited applicability to this province.[61]

Intervener submissions

AMPC/BCOAPO accept there will be efforts to reduce GHGs over time but argues these will not affect FEI's ability to earn its return on or of its capital. AMPC/BCOAPO also acknowledge district energy systems may limit FEI's future growth in some areas (noting multi-family dwellings) but argue that this does not impact FEI's ability to be competitive. They assert that all the evidence supports natural gas remaining very competitive in its key residential market. AMPC/BCOAPO submit this offsets the price impact from future carbon policies and in addition, notes FEI has not been discouraged from undertaking a large capex program in spite of these policies.[62]

CEC submits that climate change is a real and emerging risk issue for FEI but points out there is an absence of a long-term resource plan outlining the nature of such risk and possible responses. In addition, CEC notes the BC provincial government removed a number of capital investment decisions involving LNG plant expansion and Natural Gas for Transportation (NGT) subsidies from the Commission and the Commission needs to be careful and not assume a risk that has not yet emerged with significant impact.

CEC agrees the mandatory connections in District Energy Systems pose an unrealized risk to FEI and submits the Commission needs to assess the likelihood of such scenarios proliferating in the future. CEC further agrees that there has been an increase in the intensity of local government green initiatives that may contribute to FEI's political risk. However, CEC tempers these comments by stating it is important to bear in mind that there is a 35-year time frame in the COV Neighbourhood Energy Strategy plan.[63]

ICG states there is no evidence local government green initiatives have significantly impacted FEI's operations and no material change to throughput can be attributed to municipally owned district energy systems. In addition, ICG asserts the steps taken by the COV are not recent and FEI was aware that both COV and local governments were considering the use of mandatory connections in 2012. ICG also asserts COV was considering the use of an investor owned utility prior to 2012.[64]

[60] Exhibit C7-7-2, pp. 79–80.
[61] FEI Final Submission, pp. 53–54.
[62] AMPC/BCOAPO Final Submission, p. 32.
[63] CEC Final Submission, pp. 111–113.
[64] ICG Final Submission, pp. 1–2.

More broadly, ICG states that there is no evidence from which the Commission can assess the effect or potential effect of mandatory connections and exclusivity of end-use requirements. It also states the actual implementation of local government policies related to mandatory connections may increase the risks facing FEI but there is insufficient evidence to conclude such policies have affected the cost of capital as FEI had not provided the cost competitiveness of natural gas energy sources.[65]

FEI reply submission

FEI acknowledges what it considers to be CEC's supportive comments but takes issue with CEC's comments regarding a 35-year timeline and its tempering effect on FEI's experiencing a less supportive environment. FEI agrees that the 35-year period is legitimate but the typical life of distribution assets is longer than 35 years and it must still invest to maintain safe and reliable service. Moreover, FEI notes that CEC concedes there are more immediate impacts associated with mandatory connection policies. FEI concludes by stating, "irrespective of the time frame, it is undeniable that the number of customers and the amount of throughput at issue is very significant."[66]

FEI asserts that AMPC/BCOAPO have avoided discussing new government initiatives at the federal, provincial and municipal level. Additionally, FEI describes AMPC/BCOAPO's comments regarding its capex program as a "red herring" pointing out that most of its expenses primarily serve the export markets and natural gas vehicles and are not related to serving its core heating load. Further, FEI describes AMPC/BCOAPO's comments concerning price competitiveness as being of little assistance when customers desire low carbon district energy or when FEI is prohibited from attaching or serving customers.[67]

Concerning ICG's submissions regarding the timing of the steps taken by the COV, FEI submits the relevant inquiry in this proceeding is how FEI's current business risk was reflected in the Commission's deliberations in the 2012 GCOC proceeding. FEI points out they did not figure prominently in FEI's evidence nor were they commented upon by the Commission in its 2013 GCOC Decision. Further, mandatory connections have become a big issue in recent months and are accompanied by a plan which contemplates ending natural gas consumption in COV, a policy ICG has left unaddressed.[68]

Commission determination

The Panel determines that the level of political risk has slightly increased since the 2013 GCOC Decision.

Based on the evidence, the Panel agrees there is considerably more activity at the municipal and provincial level with respect to climate related initiatives and policies than in the 2012 GCOC proceeding and the subject is more topical than it was at the time of the last hearing. However, as noted, the question the Panel must address is whether there is additional material risk associated with these activities than existed when the 2013 GCOC Decision was made.

[65] ICG Final Submission, pp. 3–4.
[66] FEI Reply Submission, p. 22.
[67] FEI Reply Submission, p. 23.
[68] FEI Reply Submission, p. 24.

FEI has relied heavily on recent steps taken by municipal governments with respect to policy development and recent activities undertaken at the provincial government level to support its assertion that the level of material risk has increased.

The Panel agrees the recent steps taken by some municipal governments, most notably the COV have the potential to affect the level of future demand and, at least to some extent, pose a threat to FEI's ability to earn a future return on and of its capital. However, the Panel also agrees with AMPC/BCOAPO's assertion that in spite of governmental efforts to reduce GHGs over time, it will not impact FEI's ability to remain competitive, at least in the short to medium term. The key issue is one of timing and the level of knowledge related to potential impacts. Based on the evidence presented, there is only limited knowledge and a great deal of supposition as to how various issues will ultimately be resolved and the timeframes involved. As pointed out by CEC, the Commission needs to bear in mind the COV's Neighbourhood Energy Strategy represents a 35-year time frame. The Panel agrees and understands that over a time period of this length, there is no certainty as to the eventual outcome.

FEI has expressed concern with the government's recent announcement to develop a new Climate Leadership Plan and the team working on this has already made a number of recommendations. FEI acknowledges the recommendations "would have greater weight in an investor's deliberations at present if they were already adopted…" but argues that significant additional investor uncertainty is created by the potential for future political risk. The Panel finds the steps taken by the provincial government to develop a new Climate Leadership Plan pose a potential threat to possible future demand for natural gas but as acknowledged by FEI, none of the recommendations have been adopted and there is no evidence they will be adopted in the near future.

The Panel notes a common way to approach the assessment of risk is to clearly define the situation and the threat that exists and then determine the magnitude of any potential loss resulting from the threat and the probability of it occurring.

FEI has provided a broad description of the threats it believes to exist but has not provided clarity as to the impact or financial loss resulting from these threats. This point is made by ICG who states there is no evidence to support the effect of mandatory connections and exclusivity of end-use requirements. FEI has made assertions with regard to its estimate of the size of load represented by COV's Neighbourhood Energy Strategy. However, FEI acknowledges it is not suggesting this amount will be immediately lost and further reports there are no growth or rate of redevelopment forecasts for the areas covered by the strategy. CEC has agreed that mandatory connections pose an unrealized risk to FEI but notes there is a need for the Commission to assess the likelihood of this proliferating in the future. In the Panel's view, FEI has not addressed this in its evidence.

The lack of detail provided by FEI makes it very difficult to determine the level of risk that exists and its ultimate impact on FEI. Therefore, given the lack of certainty with respect to what lies ahead, the Panel cannot with any degree of confidence, do more than to acknowledge there is a heightened level of potential threats resulting in a slight to moderate increase to the level of political risk when compared to the period around when the 2013 GCOC Decision was rendered. The Panel views the change in the political landscape to be a risk that is evolving and will need to be monitored in future proceedings.

4.2.3.3 Political risk – First Nations

FEI states its ability to construct and operate infrastructure necessary to provide timely service has an influence on attracting and retaining customers. FEI explains that delays in permitting or interference with construction impacts the level of risk to the extent that it discourages new customers or prevents them from serving customers. In consideration of these factors, recent court decisions with respect to First Nations engagement have had a material effect on risk levels as compared to 2012 as they have changed First Nations' and others' ability to influence project implementation and timelines.[69]

Mr. Coyne agrees the presence of 285 different aboriginal First Nations may lead to additional regulatory process. In his view, this impacts FEI's risk profile by adding potential for protracted regulatory or political proceedings.[70]

Intervener submissions

AMPC/BCOAPO state that Terasen Gas Inc. (now FEI) made a similar argument in the 2009 TGI ROE proceeding. In that decision, the Commission noted court decisions post-2005 did constitute an increase in risk over local distribution companies in other provinces, but did not consider that such risk casts doubt on the utility's ability to earn a return on or of its capital. AMPC/BCOAPO argue FEI has made no substantial connection between recent jurisprudence and its operations that raise doubts as to its ability to earn its return. Consequently, the Commission should reject any suggestion this should drive an increased return.[71]

CEC states it agrees that aboriginal rights continue to create uncertainty for businesses operating in BC. However, there is no evidence of a change in risk profile for FEI nor is there evidence suggesting FEI will not continue to manage First Nations relations effectively and efficiently.[72]

FEI reply submission

With reference to AMPC/BCOAPO's submissions, FEI notes that in the 2009 TGI ROE Decision, the Commission's finding stated "presently" the risks did not cast doubt over the utility's ability to earn a return on or of its capital. FEI reaffirms its position that presently there is potential for Aboriginal rights and title issues to impede FEI's ability to add and maintain throughput thereby having the effect of regulatory lag in capital approvals. FEI points out that because AMPC seems to agree that regulatory lag is an accepted risk factor, any lag related to First Nations issues should be viewed in the same light.[73]

Commission determination

The Panel agrees with AMPC/BCOAPO and CEC and finds the evidence is not persuasive that any change in the threat to FEI's operation caused by recent jurisprudence will have a material effect on the utility's ability to earn a return on and of its capital. As noted by CEC, there is no evidence to suggest that FEI will not continue to be successful in managing its relations in an effective and efficient manner. The Panel agrees and notes that FEI has provided no firm evidence as to the probability of project lag or its impact on earning a return.

[69] Exhibit B-1, Appendix C, Tab 9, p. 72; FEI Final Submission, p. 49.
[70] Exhibit B-1, Appendix B, p. 63.
[71] AMPC/BCOAPO Final Submission, pp. 32–33.
[72] CEC Final Submission, p. 113.
[73] FEI Reply Submission, p. 26.

4.2.3.4 Energy price risk

FEI separates the energy price risk category into risk type as follows: natural gas commodity price risk, commodity price volatility risk and the price competitiveness of natural gas (includes upfront and installati on costs). FEI's position is collectively, these give rise to a similar level of risk to what existed in 2012.

FEI acknowledges commodity prices are reduced from 2012 but have outlined a number of factors to help explain why the impacts of changes in commodity prices do not translate directly to changes in overall risk. In support of its position, FEI makes the following points:

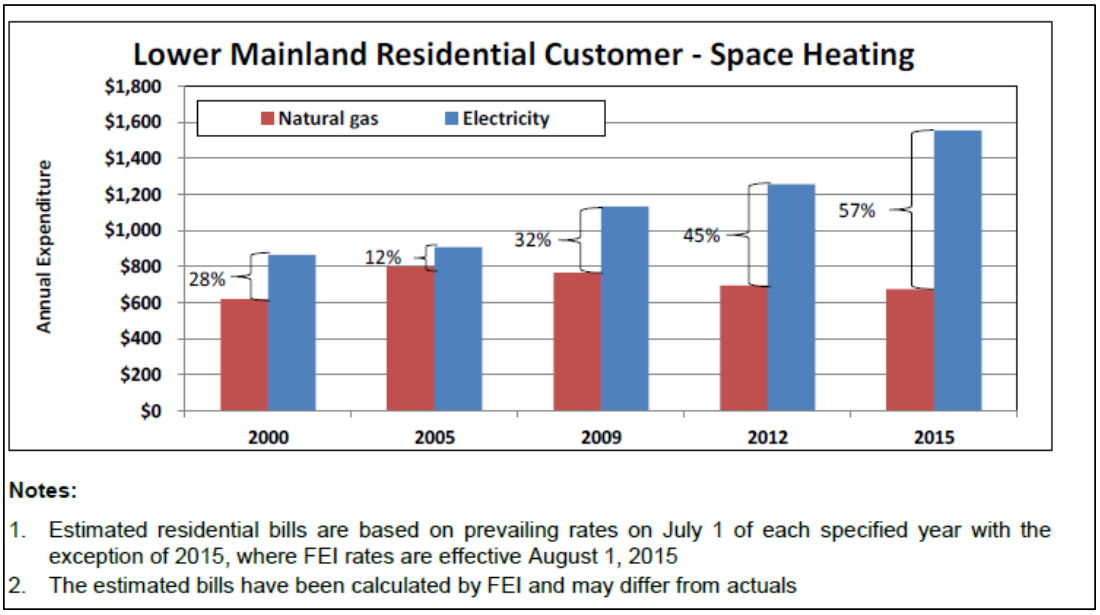
- The capital cost differential between gas and electricity are substantial but developers and builders are the primary decision makers and do not see the operating savings;
- Commodity price volatility has increased since 2012 and while customer rates do not fluctuate with every price change, they remain exposed. In addition to their bills, customers' perceptions are influenced by what they hear on the news; and
- The effect of commodity costs on the total bill is less than in 2012. The commodity prices in 2012 already constituted a small portion of the overall LNG delivered price and therefore, the impact on risk of a price change is in and of itself muted.[74]

Intervener submissions

AMPC/BCOAPO submit that while FEI's bills are similar to five years ago, it does not tell the whole story . AMPC/BCOAPO have identified competitiveness as likely the most important determinant of FEI's business risk and submit that the cost of natural gas by itself tells us little about FEI's competitiveness. The genesis of their position is that energy prices have continued to decrease over the last 10 years yet, customer total billing is similar to what it was five years ago and FEI's rates are now much lower than BC Hydro's. As a result, FEI is in an advantageous competitive position relative to BC Hydro. Figure 4.1 shows the relative cost of natural gas compared to electricity for lower mainland space heating for the period from 2000 through 2015.

[74] Exhibit B-9, BCUC IR 27.1, 27.3; Exhibit B-1, Appendix C, p. 46, pp. 51–56; FEI Final Submission, pp. 42–44.

Figure 4.1: Space Heating Price Comparison[75]

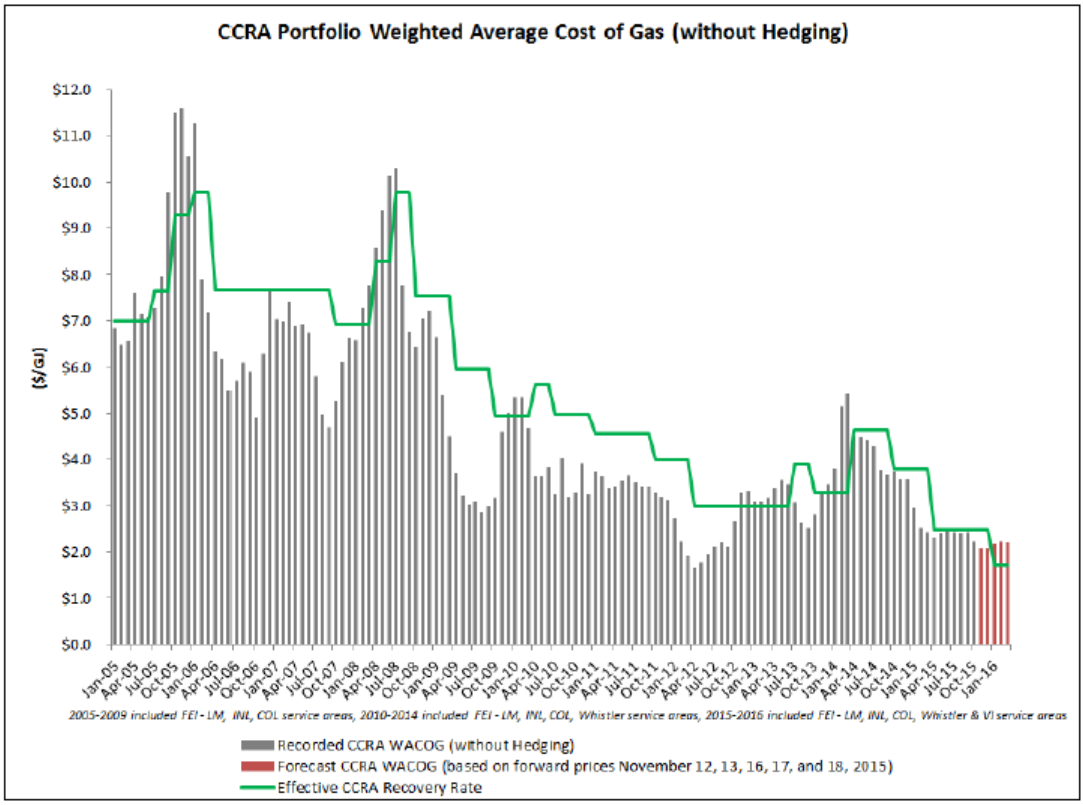


AMPC/BCOAPO point out the evidence shows a positive trend for FEI in its key residential market since 2005 and in the present context, the Commission can definitely conclude gas is more competitive than in its prior reviews. They also point out that in the future, significant electricity rate increases are likely due to anticipated high capital, electricity supply, operating and maintenance costs and large deferral account balances. AMPC/BCOAPO state FEI's competitive advantage over BC Hydro "has increased more since 2012 than it did between 2009 and 2012." Further, they assert this was a key factor in the Commission's 2013 GCOC Decision and suggest "a reduction at least equal to the 1.5 % 2013 reduction in FEI's common equity ratio" in the present circumstance.[76]

Concerning commodity price volatility, AMPC/BCOAPO argue that risk is lower now than in 2013 and reject FEI's claim that risk has increased since 2013. It is AMPC/BCOAPO's position that FEI's evidence, as presented in Figure 4.2, indicates there was high price volatility between 2005 and 2009 and with less volatility since that time.

[75] Exhibit B-7, AMPC IR 2.12.
[76] AMPC/BCOAPO Final Submission, pp. 21–25.

Figure 4.2: Weighted Average Cost of Gas[77]



The most important of these issues to AMPC/BCOAPO is that prices have varied around a lower level. In their view, the likelihood of stable pricing is greater and except for short periods of price disconnects, the risk of dramatically higher natural gas prices remains significantly lower. AMPC/BCOAPO note that consumers might not like significant price volatility, but state it can be assumed in the current low price environment that price fluctuations are less of a deterrent to natural gas use than in the previous high price environment.[78]

CEC makes submissions similar to AMPC/BCOAPO with respect to the competitive pricing advantage FEI has over BC Hydro and does not consider volatility to be an evident concern for customers. CEC submits the overall cost of gas is the most important consideration in customer decision making and recommends the Commission heavily weight the favourable cost of gas and its comparison to electricity and place less weight on the short-term volatility occurrences as it does not affect the customer in any significant way given the current circumstances. Overall, CEC recommends the Commission find "there is no appreciable price risk or volatility risk for natural gas and the overall risk is lower than in 2012 because of prolonged periods of low natural gas prices."[79]

[77] Exhibit B-9, BCUC IR 27.1.
[78] AMPC/BCOAPO Final Submission, pp. 21–22.
[79] CEC Final Submission, pp. 79–88.

FEI reply submission

FEI contends AMPC/BCOAPO and CEC give insufficient weight to factors that mute the impact of reduced prices on FEI's overall competitiveness. It is the increase in the price of electricity rather than a drop in natural gas prices that is the main contributor to improved price competitiveness and lower commodity costs have not translated into lower natural gas bills. FEI asserts the interveners are glossing over the fact it is the consumer's response to changes in relative cost and not the changes themselves that ultimately impacts the company. Despite improved price competitiveness since 2012, the following has occurred:

- Throughput is lower in 2014 than in 2012.
- Use per Customer continues to trend downward.
- FEI continues to lose market share in core space heating and water heating applications.

FEI explains the weak relationship between price competitiveness and these results as being influenced by the following factors:

1) Demand for natural gas is inelastic where a reduction in cost does not result in a similar change in consumption.
2) Factors such as government policies and consumer attitudes about carbon emissions have contributed to the decoupling of price competitiveness from its key indicators.
3) Higher upfront capital costs related to gas appliances and potential main extension test customer contributions continue to be a barrier for builders or developers adopting natural gas.[80]

Commission determination

Because of the importance placed on it by consumers, the Commission in the 2013 GCOC Decision considered energy price to be a key determinant and deserving of significant weight when considering changes to FEI's risk. In the 2013 GCOC Decision, the Commission found there was some reduction in the level of risk related to natural gas' competitive position relative to electricity. The question in this proceeding, as raised earlier is whether the continued improvement in the price of gas has resulted in any further reduction of FEI's risk.

The evidence is clear and points to the fact that the price of gas continues to drop as compared to electricity. As outlined in Figure 4.1, the annual expenditure price differential for lower mainland space heating has increased from a price advantage of 45 percent favouring natural gas in 2012 to a 57 percent advantage for natural gas in 2015. The Panel acknowledges that on the basis of price, the competitive advantage of natural gas has improved over what existed in 2012. However, we also acknowledge there was a substantial price advantage that existed in 2012 resulting in reduced risk as noted in the 2013 GCOC Decision.

In spite of what is clearly a growing competitive price advantage favouring natural gas, FEI reports that key indicators such as throughput, use per customer and market share of core space and water heating applications remain unfavourable. FEI has explained that inelasticity of demand, government policies and consumer attitudes about carbon emissions and higher upfront capital costs have contributed to the decoupling of price competitiveness from the key indicators. The Panel accepts that these factors may be responsible for decoupling

[80] FEI Reply Submission, pp. 26–27.

but suggest that it is equally plausible other factors such as demand side management and weather have had an impact on FEI's more recent key indicator performance.

The Panel continues to put weight on the importance of a competitive price advantage for natural gas over electricity in determining the level of risk for FEI. Therefore, the fact that the gap between natural gas and electricity continues to widen must be given some weight when determining whether the level of energy risk has changed since the 2012 GCOC proceeding. Tempering this somewhat is the fact that some of FEI's key indicators have continued to lag, in spite of a growing competitive price advantage favouring natural gas. **Taking these factors together, the Panel finds the level of energy price risk to have decreased somewhat when compared against the 2013 GCOC Decision.**

4.2.3.5 Energy supply risk

FEI states the continuity of energy supply risk has also remained unchanged since 2012. However, the amount of gas available to FEI could be altered due to the development of several gas infrastructure projects connecting BC deposits with Alberta and with eastern markets in coming years. FEI states this could ultimately impact what customers pay in the coming years. In addition, FEI notes the addition of FEVI and FEW comes with slightly increased exposure to security of supply risk. This is due to its system crossing radial terrain and the Strait of Georgia as well as the fact Whistler is served by the pipeline lateral between Squamish and Whistler which is subject to single point of failure risk.[81]

Mr. Coyne states the expansion of natural gas fired demand related to the retirement of coal plants along with new LNG exports and potential requirements south of the border could result in a capacity shortage on Spectra's T-South pipeline thereby increasing volatility and commodity prices. While acknowledging pipeline expansions are an option, Mr. Coyne's view is the risks with projected additional gas demand in the Pacific Northwest and BC will continue to grow when considered against the availability of pipeline capacity.[82]

Dr. Booth cites data from Canadian Gas Association (CGA) which in their latest analysis states that Canada has over 200 years supply coverage at current production rates. Dr. Booth comments that with such a plentiful cheap resource to distribute "we should expect an expansion in supply which is what happened as there has been significant expenditure on the distribution system." Citing CGA, he notes that 2014 expenditures on pipeline expansion total $1 billion with a further $2.6 billion in distribution spending. This, he states, indicates the industry does not envision long run market problems.[83]

Intervener submissions

AMPC/BCOAPO submit supply risk has been reduced due to further development and quantification of BC's shale gas resources noting this is confirmed by Nova Gas Transmission Ltd.'s (NGTL) further expansion. AMPC/BCOAPO do not consider the security of natural gas supply to be at issue given its important role in the province's future. Further, they submit the province is committed to development of BC's natural gas resources and state there is "no reason to suggest that appropriate infrastructure will not be extended to a resource located in the Province in order to serve the needs of BC customers when it is needed." Nor is there a reason to

[81] Exhibit B-1, Appendix C, p. 46, pp. 51–56; FEI Final Submission, p. 45.
[82] Exhibit B-1, p. 66.
[83] Exhibit C7-7-2, pp. 70–71.

believe gas price competitiveness will be inadequate to support paying for any needed infrastructure by customers. In AMPC/BCOAPO's view, the importance of security of supply is minor in comparison to availability of supply where there is an abundance of the resource in the ground.

AMPC/BCOAPO also submit that amalgamation has resulted in no change to total supply risk as there is no change in the physical risks the combined operations face.[84]

CEC submits the growing use of pipeline capacity could present supply risks but these risks are not attributable to FEI if the utility has reserved adequate capacity for its customers' needs. CEC points out that Mr. Coyne agrees it is the utility's responsibility to look ahead and contract for access to infrastructure reserve opportunity and FEI has a sophisticated gas purchasing group responsible for this. CEC submits that if FEI conducts appropriate planning activities, it is unlikely there will be a gas supply interruption and the Commission "should find it straight forward to assess that the gas supply risk is unchanged and manageable by FEI in the relevant future for this ROE and CEC determination."[85]

CEC submits the FEI characterization of supply availability risk as being unchanged from 2012 is accurate. It notes FEI has acknowledged that supply interruption risk from FEVI and FEW is marginal and those related to amalgamation are modest. Given the marginal nature of the increase in amalgamation risk and the offsetting reduction in risk for interruption of pipeline supply resulting from the Lower Mainland Intermediate Pressure System Upgrade, CEC submits the Commission should consider this as a net reduction in risk.[86]

FEI reply submission

FEI does not share AMPC/BCOAPO's view that availability of supply risk has declined since 2013. It is FEI's view that the production forecast for the Western Canadian Sedimentary Basin indicates the expected production level is lower in the spring of 2015 than it was in 2012, indicating large shale gas reserves will not result in higher production levels. Additionally, NGTL's proposed extensions could potentially represent a challenge to FEI resulting in lower use of Westcoast's T-North and T-South transmission systems impacting the Station 2 marketplace FEI relies upon for much of its supply requirements.

For clarity, FEI notes its evidence is that the security of supply risk is "slightly increased" because of FEVI and FEW being incorporated into its system and FEI has not characterized supply risk as higher than in 2013 because of factors related to bringing gas from northern BC to its system.

FEI rejects CEC's argument that any increase in amalgamated FEI's security of supply is offset by proposed or approved integrity and sustainment projects pointing to their response to BCUC IR 50.2[87] where it was stated that the projects were needed to operate the gas system in a safe and reliable manner.[88]

[84] AMPC/BCOAPO Final Submission, pp. 29–30.
[85] CEC Final Submission, pp. 67–69.
[86] CEC Final Submission, pp. 71–72.
[87] Exhibit B-10, BCUC IR 50.2.
[88] FEI Reply Submission, pp. 33–35.

Commission determination

The Panel finds there has been no change in the level of risk associated with availability of supply and agrees with FEI that the security of supply risk is slightly increased due to the amalgamation of FEVI and FEW into FEI's system.

The Panel rejects AMPC/BCOAPO's assertion there has been a reduction in risk associated with availability of supply as compared to 2012. In the 2012 GCOC proceeding, adequate supply or availability of gas was not an issue and since that time, there has been no significant change in circumstances. However, the Panel agrees with FEI that there has been some change in the risk associated with security of supply due to amalgamation of FEW and FEVI into FEI. In the 2014 GCOC Stage 2 Decision, the Commission found FEI and FEW had additional supply interruption risk when compared to FEI but described them as marginal. In addition, the Commission found that while the possibility of an event related to difficult terrain may exist, the probability of such an event is very low. The Panel notes there is no evidence in this proceeding to suggest that this risk related to terrain has abated. However, as noted in the 2014 GCOC Stage 2 Decision, the probability of an event is very low and therefore is not considered to be a material increase in risk.

4.2.4 Other risk areas

As outlined earlier in this section, there were a number of risk categories where there was general agreement among the parties there was little change in the level of risk as compared to the period preceding the 2013 GCOC Decision; these include risks associated with operating, market shift, economic conditions and business profile.

Operating risk

Operating risk covers any physical risks to the utility system arising from technical and operational factors which includes items like asset concentration, technologies employed to service, geography in the service area and weather. FEI states that since 2012, there has been no change to the level of operating risk of facilities in the mainland service area. FEI also states the amalgamation of FEI with FEVI and FEW has posed no additional operational risk. FEI has focused its assessment on three areas; infrastructure integrity, third party risks and unexpected events. FEI has assessed its infrastructure integrity and although two-thirds of the current assets will need to be replaced over the next 40 years, acknowledges this was understood in 2012 and the risk remains similar for the amalgamated utility. The incidence of third party damage has been decreasing since 2006 and FEI notes this trend was understood in 2012 and has assessed the risk to the amalgamated utility to be similar to that faced by FEI in 2012. The incidence of natural events is one of the higher operating risks to FEI but remain materially unchanged from what existed in 2012.[89]

Neither AMPC/BCOAPO nor CEC take issue with FEI's assessment of its operational risk and both agreed there was no change since last reviewed in 2012.[90] ICG provided no specific submissions with respect to operating risk.

[89] Exhibit B-1, Appendix C, pp. 57–58.
[90] AMPC/BCOAPO Final Submission, p. 33; CEC Final Submission, p. 66.

Market shift risk

Market shifts in the areas of new technology and energy forms, changing customer perceptions of energy and types of homes being built continue to pose challenges to FEI in terms of its ability to attract and retain customers and maintain its market share and throughput levels. FEI has provided a brief description and update for each of these factors and outlines impacts on use per customer and customer additions. FEI submits each of these areas provide similar risks for FEI at present as has existed in the 2012 GCOC proceeding even when considering the effects of amalgamation.[91]

AMPC/BCOAPO, while finding FEI's use of the term "market shifts" misleading and preferring to use the term "market demand," nonetheless seem to agree with FEI's assessment that there is little change with this risk and notes that the utility's customer profile remains very stable. Likewise, CEC prefers to label this group of risks as volume and demand risk but agrees with FEI that the level of risk is likely to differ little from what existed at the time of the 2013 GCOC proceeding. ICG did not specifically address market shift risk but did submit that the Commission should reject loss of market share as a business risk as there is not enough evidence on the record to reach such a conclusion.[92]

Economic conditions

FEI states that economic conditions have an impact on a utility's ability to attract and retain customers and maintain throughput levels and the current economic environment continues to be dominated by uncertainty. The recent drop in oil prices has had a negative impact on GDP growth but this could be partially mitigated by a weaker Canadian dollar combined with the relatively strong US recovery leading to a potential improvement in exports. Given these circumstances FEI assesses the risk related to economic conditions as similar to what existed at the time of the last proceeding.[93]

As noted in Section 3.2 above, there is little disagreement among the parties that the economic condition on the BC economy is not materially different from the 2012 levels.

Commission determination

The Panel finds there has been no change in the level of risk associated with operating risk, market shift risk or economic conditions as compared to what existed at the time of the 2013 GCOC proceeding. In each of these areas, FEI has assessed the factors related to these risks and concluded there is continuity in the level of risk for each, acknowledging this is also the case when considering any additional impacts caused by amalgamation. Interveners either agreed with or took no issue with FEI's conclusions on these risk areas.

4.3 Other items impacting capital structure

FEI submits, in addition to its level of business risk, the following points support a common equity component of 40 percent for FEI as being consistent with the Fair Return Standard:

[91] Exhibit B-1, Appendix C, pp. 39–50.
[92] AMPC/BCOAPO Final Submission, p. 25; CEC Final Submission, p. 96; ICG Final Submission, p. 3.
[93] Exhibit B-1, Appendix C, p. 15.

- FEI's financial metrics, which reflect its allowed ROE and capital structure, are weak for a credit rating in the "A" category and if FEI was to receive a rating downgrade this could adversely impact both its ability to borrow and the cost of borrowing;
- An increase in its common equity component will support FEI's ongoing debt issuance capacity under the Trust Indenture; and
- A comparison to its peers indicates FEI's proposed common equity component is appropriate, but at the low end of the range of reasonableness.[94]

4.3.1 Credit ratings and access to capital

Moody's July 20, 2015 credit rating on FEI stated:

> FEI's credit quality is driven by its credit supportive regulatory environment and its monopoly position. The company has a long term track record of earning its allowed return on equity and its cash flow continues to be highly predictable. This is offset by the company's weak financial metrics, with limited headroom at the current rating level, that are primarily a product of the allowed return on equity and the equity component of its capital structure.[95]

FEI presents the following table outlining its key financial indicator scores compared to the minimum A3 rating per Moody's utility rating methodology:

Table 4.2: FEI's Credit Metrics from 2011 to 2014[96]

	FEI's Score	A3 - Rating Threshold[24]	2011	2012	2013	2014
CFO pre-WC + Interest / Interest	Ba	4.5x	2.3x	2.5x	2.7x	2.8x
CFO pre-WC / Debt	Baa	19.0%	11.2%	14.5%	15.1%	14.4%
CFO pre-WC - Dividends / Debt	Baa	15.0%	6.6%	9.6%	8.0%	10.3%
Debt / Capitalization[25]	A	50.0%	47.4%	44.0%	43.6%	45.2%

FEI notes that with the exception of its Debt to Capitalization ratio, all of its financial metrics are below the Moody's designated threshold for an A3 rating and are generally weaker than its Canadian peer group.[97]

FEI stated that it has not been rated below A3 since 2011 and in 2013, Moody's changed FEI's credit outlook to negative due to the reduction in ROE and common equity ratio in the 2013 GCOC Decision. FEI also indicated that its Moody's rating was eventually amended back to stable in June 2014.[98]

FEI states that Moody's reaction to the 2013 GCOC Decision highlights the risk to FEI's current rating, which is influenced by FEI's relatively weak credit metrics.[99] However, FEI acknowledged that while credit metrics represent a large weighting of the overall methodology, weak credit metrics can be offset by qualitative factors such as strong regulatory support.[100] Nonetheless, a further weakening of these metrics in connection with an adverse regulatory decision on common equity component or ROE would place downward pressure on the

[94] FEI Final Submission, p. 56.
[95] Exhibit B-1, Application, Appendix A, Moody's Investor Services, Credit Opinion: FEI (Moody's Credit Opinion), dated July 20, 2015.
[96] Exhibit B-1, p. 25.
[97] Exhibit B-1, p. 25.
[98] Exhibit B-9, BCUC IR 8.1.
[99] Exhibit B-1, pp. 24–25.
[100] Exhibit B-9, BCUC IR 8.3.

rating.[101] FEI points out that according to Moody's July 2015 Credit Opinion, a weakening of credit metrics in connection with a material adverse regulatory decision could result in a rating downgrade.[102]

Mr. Coyne states that since FEI is rated Moody's A3 and this is the lowest rung in the A rating category, FEI's higher capex spending in the near term may result in downward pressure on FEI's credit metrics and could re sult in a ratings downgrade.[103]

With reference to its July 2015 Credit Opinion, Mr. Coyne notes Moody's assessment states a ratings downgrade is unlikely.[104] However, Moody's opinion indicates there are several factors that could lead to a downgrade including "an unexpected, material adverse regulatory decision or a forecast of a sustained deterioration in credit metrics including CFO/pre-W/C to debt of less than 11%."[105] Moody's currently calculates FEI's March 31, 2016 "CFO/pre-W/C to debt metric at 15.0%."[106]

Mr. Coyne states that a downgrade below an A rating grade is particularly significant in the Canadian credit market due to the following:

- Canada has less trading of debt with a rating below the A ratings grade;
- Institutional investors often face limits investing in Baa/BBB debt; and
- During the financial market dislocation of 2008 and 2009, regulated issuers below an A credit rating, were effectively shut out of the Canadian credit market.

Mr. Coyne also continues that given FEI's expected financing requirements for its large capital projects, a downgrade to below an A rating would result in higher financing costs and "should be avoided."[107] He refers to Moody's most recent credit opinion which states FEI has "limited financial headroom" at the current rating and that large capital projects are expected to place downward pressure on credit metrics in 2015 with improvement forecast as capital projects are completed in 2016 and 2017. In his direct testimony, Mr. Coyne includes a quote from the Moody's July 2015 Credit Opinion which speaks to this. The Panel notes that the last sentence of the paragraph which states that with respect to the downward pressure on credit metrics "this forecasted weakness is incorporated in the current rating"[108] was not included.

Dr. Booth concludes FEI can access the bond market on more favourable terms than in 2013 and in doing so , it will continue to lower its embedded debt cost, increase its interest coverage ratio and enhance its financial flexibility.[109]

Dr. Booth notes "DBRS has long maintained the exact same 'A' rating on FEI and its predecessor companies through periods when it had a 33% common equity ratio, a 35% common equity ratio, a 40% common equity

[101] Exhibit B-9, BCUC IR 9.1.
[102] Exhibit B-1, Application, Appendix A, Moody's Credit Opinion, p. 3; Exhibit B-9, BCUC IR 8.3.
[103] Exhibit B-1, Appendix B, p. 97.
[104] Exhibit B-1, Appendix A, Moody's Credit Opinion, p. 3, the report states that Moody's does not expect the rating to go down.
[105] Exhibit B-1, Appendix A, Moody's Credit Opinion, p. 3.
[106] Exhibit B-1, Appendix B, p. 97.
[107] Exhibit B-1, Appendix B, pp. 97–98.
[108] Exhibit B-1, Appendix A, Moody's Credit Opinion, p. 3.
[109] Exhibit C7-7-2, p. 35.

ratio and most recently a 38.5% common equity ratio."[110] Moreover, he asserts "the guidelines are heavily based on the degree of regulatory protection, where 50% of the weight applied by Moody's is explicitly for this and not the financial metrics. Consequently, the metrics are not the most important issue."[111]

FEI observes that Moody's downgraded FEI's rating from A2 to A3 in 2005 because it considered FEI's financial profile weak relative to global peers and despite receiving increases in ROE and common equity component in subsequent decisions, Moody's has never upgraded FEI's rating back to A2.[112]

FEI submits:

- A combination of financing requirements for capital project, maturity of purchase money mortgages (PMMs) and rising interest rates have the potential to constrain its ability to issue debt under its Trust Indenture at the current common equity ratio. FEI submits that a 40 percent equity ratio will alleviate these factors, and will help to support FEI's credit rating.
- A reduction in allowed common equity, particularly a reduction approaching the levels Dr. Booth has recommended, would have the double impact of constraining debt issuance capacity and making a rating downgrade likely.[113]
- Maintaining an A credit rating is important because the benefits include: a lower cost of borrowing, access to capital markets and credit with FEI's counterparties.
- Maintaining an A credit rating ensures access to the capital markets on reasonable terms and pricing in all market conditions including a market disruption similar to 2008 and 2009. The potential for a market disruption exists despite the current lower interest rate environment.
- Any downgrade of Moody's A3 rating to Baa/BBB category would lead to a split-rating for FEI and result in FEI being considered principally a BBB rated entity thereby having an adverse impact on FEI's cost of debt, access to capital markets and credit with its counterparties.
- A downgrade below an A rating grade is particularly significant in the Canadian credit market where there is less trading of lower-rated investment grade debt.
- A decision to reduce common equity or ROE may be viewed as undermining regulatory support that has otherwise supported FEI's rating in the face of traditionally weak metrics.[114]

Intervener submissions

AMPC/BCOAPO make the following points in their submission:

- It is appropriate FEI be able to maintain its credit and attract capital but FEI should not pay more than necessary to attract capital;
- FEI's present DBRS "A" with a stable trend and Moody's "A3" with a Stable Outlook means FEI's credit metrics are not weak;
- FEI's DBRS credit rating has not changed in a long period of time including during periods when FEI's common equity ratio varied from 33 percent to 35 percent to 40 percent and then 38.5 percent;

[110] Exhibit C7-7-2, p. 81.
[111] Exhibit C7-7-2, p. 82.
[112] Exhibit B-16, p. 9.
[113] FEI Final Submission, p. 4.
[114] FEI Final Submission, pp. 56–58.

- It is not "credible" that FEI's credit rating would change if its common equity ratio is set to the 35 percent it had prior to 2009;
- The Commission can also take note of the Ontario Energy Board's (OEB) recent confirmation of the common equity ratios for Union Gas and Enbridge Gas Distribution Inc. (EGDI) at 36 percent which indicates that there was no concern a 36 percent common equity ratio would put their "A" credit ratings at risk; and
- Nothing in the current market conditions indicate FEI needs any sort adjustment to improve its access to capital markets.[115]

CEC submits that FEI's previous "negative ratings" outlook from both an ROE reduction and equity component reduction did no permanent damage to FEI. CEC also submits the credit metric sensitivities provided by FEI are positive and as a result, there is no compelling evidence upon which to raise FEI's common equity component.[116]

FEI reply submission

FEI submits AMPC/BCOAPO's reference to FEI's maintenance of an A rating when its common equity ratio was 33 percent is for a period 13 years ago and when it had a 35 percent ratio was almost seven years ago. FEI reiterates its view that Moody's June 2013 decision to place FEI on a negative ratings outlook pending further review is a signal that FEI's current rating is not secure.[117]

Commission determination

The Panel agrees maintenance of an A credit rating helps ensure FEI's access to capital in most market conditions, and among other benefits, ensures a lower cost of borrowing. The evidence presented in this proceeding supports FEI's assertion its credit metrics are weak for an A rating, however, at its current ROE and common equity ratio, the rating agencies have offset this weakness in metrics with other factors including a supportive regulatory environment.

The Panel is not persuaded FEI's expected higher capital expenditures through 2017 will in and of itself result in significant downward pressure on its credit rating. Moody's July 2015 credit opinion incorporates the impact of the large capital projects on FEI's credit metrics beginning in 2015 and forecasts improvement as projects are completed in 2016 and 2017. Moody's report indicates "this forecasted weakness is incorporated in the current rating."[118] Moody's report also indicates it does not expect the rating to go down and Mr. Coyne notes in his report that Moody's assessment is that a rating downgrade is unlikely, although it did list some factors that could lead to a downgrade. **Given that Moody's analysis already takes into account the expected capital expenditures with forecast improvements in metrics in 2016 and 2017 and since there is no other evidence forecasting a deterioration in credit metrics, the Panel finds, in the absence of other factors, the expected capital expenditures are unlikely to cause a downgrade in FEI's credit rating at its current equity ratio.**

The Panel accepts FEI's view that a reduction of its common equity ratio, especially to the level recommended by Dr. Booth, could result in downward pressure on the credit rating. Moody's past actions, including its reaction the 2013 GCOC Decision, indicate that any negatively viewed regulatory action could impact FEI's credit rating

[115] AMPC/BCOAPO Final Submission, pp. 65–67.
[116] CEC Final Submission, pp. 51–53.
[117] FEI Reply Submission, pp. 39–40.
[118] Exhibit B-1, Appendix A, Moody's Credit Opinion, p. 3.

due to its weak metrics especially given the additional pressure higher capital expenditures expected over the next few years. With respect to the AMPC/BCOAPO and CEC submissions related to FEI's ability to maintain its credit rating during periods where it was awarded a lower equity thickness, the Panel agrees with FEI that these instances relate to periods prior to 2009 and are unlikely to be relevant to the current decision.

The Panel agrees with the interveners and finds that there is no compelling evidence to support that an increase in common equity component is required to maintain FEI's current credit rating.

4.3.2 Trust indenture issuance test

With respect to its Trust Indenture, FEI states:

> FEI's Trust Indenture governs FEI's debentures including the ability to issue new debt. The debt issuance coverage test in the Trust Indenture provides that FEI will not issue debentures (other than First Mortgage Bonds or Purchase Money Mortgages (PMMs) (both represent secured debt) maturing 18 months or more after the date of issue) unless Consolidated Available Net Earnings (CANE) is at least 2.0 times the annual interest expense on debentures, excluding interest related to PMMs and including the annual interest requirements on the additional debentures being issued (defined as Interest on Funded Obligations under the Trust Indenture). Formulaically, CANE/Interest on Funded Obligations >=2.0. Failure to meet this test would limit FEI's ability to issue long-term debt.[119]

FEI expects the debt financing requirements related to its capital needs for the 2016 to 2018 period could approach $1 billion. In addition, FEI has $275 million of debt classified as purchase money mortgages (PMMs) which are excluded from the debt issuance coverage test of which $75 million matured in 2015 and $200 million will mature in 2016. FEI states that the maturing PMMs are being refinanced with senior unsecured debentures under the FEI Trust Indenture. FEI further states that its Trust Indenture limits the ability to issue secured debt and it is not prudent to continue to use secured debt as it is restrictive and inefficient.[120]

In the Application, using an assumption of a 5 percent yield for new issuances, FEI presented the impact of changes in ROE and common equity ratio under different scenarios on its issuance capacity under the Trust Indenture, as follows:

[119] Exhibit B-1, p. 27.
[120] Exhibit B-1, pp. 27–28.

Table 4.3: Scenario Analysis of ROE and Equity on Issuance Capacity under the Trust Indenture[121]

	(CAD$ 000s)
Increased Scenario - 9.25% ROE and 40% Equity[1,2,3]	767,800
Status Quo - 8.75% ROE and 38.5% Equity	595,600
Decreased Scenario - 8.25% ROE and 37% Equity[1,2,3]	430,000

[1] Impact On Earnings due to change in ROE = (2014 Mid-Year Rate Base X Status Quo Equity % X Incremental Change in ROE from Status Quo)/(1-2014 Effective Tax Rate)

[2] Impact On Earnings due to Change in Equity = (2014 Mid-Year Rate Base X Incremental Change in Equity from Status Quo % X New ROE%)/(1-2014 Effective Tax Rate) + Incremental Interest Due to Change in Debt = 2014 Mid-Year Rate Base X Incremental Change in Debt% from Status Quo X New Issuance Yield (5%).

[3] Impact of Changes in ROE & Equity to Status Quo Issuance Capacity = ((Impact o Earnings due to Change in ROE + Impact of Earnings due Change in Equity)/2) Incremental Interest Due to Change in Debt)/New Issuance Yield (5%)

FEI also demonstrates that its ability to issue debentures becomes more constrained when the new debt yields are assumed to be higher than 5 percent.[122]

FEI stated that if there is a decline in the allowed ROE and/or common equity ratio, there would be implications on its debt issuance capacity including:

- A decline in allowed ROE and/or capital structure would lead to a decline in credit metrics, which in turn could lead to a credit rating downgrade that would increase the cost of borrowing; and
- The resulting increase in the cost of borrowing would further constrain FEI's debt issuance capacity.[123]

FEI provided the following table to show the required debt and equity financing for the capital projects, subject to timing and approval uncertainties.

Table 4.4: FEI's Total Capital Expenditure and Financing 2016-2018[124]

	2016	2017	2018
Approved Major Capital Projects	130,000	160,000	205,000
Potential Growth Projects[3]	-	525,000	525,000
Expected Total Capital Expenditures[2]	**130,000**	**685,000**	**730,000**
Debt Financing[1]	80,000	420,000	450,000
Equity Financing	50,000	265,000	280,000

1 - Excludes refinancing of $200 million of debt maturing during the period

2 - Excludes financing required of formulaic capital which is partially funded through depreciation cost.

3 - Relates to Tilbury 1B expansion and Woodfibre

FEI provided the following table to show the sensitivity of its debt issuance capacity to a range of possible interest rates assuming a decreased, status quo and increased ROE and common equity component.

[121] Exhibit B-1, p. 30.
[122] Exhibit B-1, p. 30.
[123] Exhibit B-9, BCUC IR 11.1.
[124] Exhibit B-9, BCUC IR 11.3.

Table 4.5: Sensitivity of Issuance Capacity to Cost of Debt (Issuance Rate)

(CAD$ 000s)	Decreased ROE & Equity	Status Quo ROE & Equity	Increased ROE & Equity
Issuance Capacity at 5.0%	430,000	595,600	767,800
Issuance Capacity at 6.0%	330,800	473,400	621,400
Issuance Capacity at 7.0%	260,100	386,200	517,000

Mr. Coyne forecasts a risk free rate (long Canada bond) of 3.68 percent based on 2016-2018 forecast data from the Consensus Economics Inc. (Consensus Economics) Survey Data.[125] Mr. Coyne presents the average Canadian utility bond spread vs. 30-year Canada long bond as 1.33 percent and notes that similar to 2013, it has remained somewhat elevated at 1.868 percent.[126] He also presented FEI's spread over 30-year Government of Canada bonds as 1.82 percent for the period from September to November 2015.

Dr. Booth does not agree with FEI's assessment that it might have issues with its interest coverage ratio (ICR) restriction in its bond indenture and as a result, FEI will not have issues accessing capital market. In his view, FEI's ICR analysis has the following deficiencies:

- FEI's ICR is over 2.2 in its recent filing with its securities regulators;
- High quality utilities have no problem accessing capital market; and
- In the current the state of the financial system FEI should have no problems financing itself with his recommended financial parameters.[127]

With respect to debt issuance capacity, Dr. Booth concludes:

> There are some timing differences in the numbers used in the ICR as there are some smoothing options, but the net result is that FEI has considerable financing flexibility and is not currently constrained by the ICR in issuing MTNs. For example, in August 2015 FEI negotiated a syndicated $700 million credit facility of which approximately half is currently unused. On April 8, 2015 FEI issued $150 million of 30 year MTNs at 3.375% using the proceeds to repay short term debt. At the time the 30 year long Canada bond (Cansim V39056) was yielding 2.03% for a 1.35% credit premium. In September 2015 it repaid $75 million of the PMMs with short term notes.[128]

Dr. Booth's evidence includes the Royal Bank of Canada's (RBC) forecast for the 2017 30-year long Canada bond yield of 3.65 percent[129] and notes FEI recently issued bonds at an approximate 1.35 percent over equivalent maturity long Canada bonds.[130] Further, Dr. Booth does not expect the Canada bond yield to exceed 3.8 percent over the next three years.[131]

FEI states that the issuance test under the Trust Indenture differs from the ICR disclosed in FEI's SEDAR filings (SEDAR ratio) in a number of ways. Included among these is the fact the Trust Indenture ratio is prospective whereas the SEDAR ratio is a historic earnings coverage ratio. Further, the SEDAR ratio only includes earnings

[125] Exhibit B-1, Appendix B, p. 41.
[126] Exhibit B-1, Appendix B, pp. 19–21.
[127] Exhibit C7-7-2, p. 2.
[128] Exhibit C7-7-2, p. 85.
[129] Exhibit C7-7-2, p. 23.
[130] Exhibit C7-7-2, p. 1.
[131] Exhibit C7-7-2, p. 2.

and interest from the past year, whereas the issuance test under the Trust Indenture requires the interest on new debentures being issued to be covered as well.[132]

FEI submits:

- Dr. Booth has made the same error in his current evidence as he had made in 2012 in referencing the SEDAR filed ratio as the test used to determine FEI's ability to issue new debt under the Trust Indenture. FEI submits that the SEDAR filing is a requirement for securities compliance purposes and cannot be used as a replacement for the specific terms of FEI's Trust Indenture in determining if it is allowed to issue new debt;[133]
- FEI's issuance capacity would decline materially were the Commission to accept Dr. Booth's recommended ROE of 7.5 percent and a 35 percent common equity ratio;
- There would be considerable risk of a downgrade by Moody's if Dr. Booth's recommended ROE and capital structure are adopted and a downgrade could lead to further constraint on the debt issuance coverage ratio through higher borrowing costs;[134] and
- In an increasing interest rate environment, this capacity would become even further constrained.

FEI reply submission

FEI submits that AMPC/BCOAPO cannot rely on Dr. Booth's evidence on the Trust Indenture and since Dr. Booth did not have a proper understanding of the Trust Indenture, he would not have been able to assess his recommended ROE and common equity ratio against the capital attraction element of the Fair Return Standard. FEI also refers to its rebuttal evidence highlighting how its debt issuance capacity may be significantly constrained in a period of higher debt capital requirements if Dr. Booth's recommended ROE and dee med equity were to be adopted.[135]

Commission determination

In the Panel's view, the key determinants of whether FEI is likely to be constrained in its ability to issue debt under its Trust Indenture for the 2016 to 2018 period include:

1) An estimate of the most probable interest rate for the period;
2) Debt issuance requirements related to expected capital expenditures and debt retirements in the period and the availability of other financing sources that do not impact the Trust Indenture test; and
3) The Commission decision on ROE and common equity ratio.

The Panel focuses on the 2016 to 2018 period since FEI points to its capital expenditure requirements as the key issue impacting its ability to issue debenture especially if new debt yields are assumed to be higher than 5 percent.

In order to evaluate FEI's evidence related to the various scenarios for ROE and common equity ratio and new debt issuance yields, together with its analysis of required debt and equity financings, the Panel first considers

[132] Exhibit B-16, p. 11.
[133] FEI Final Submission, p. 62.
[134] FEI Final Submission, p. 63.
[135] FEI Reply Submission, p. 45.

the expert evidence in the proceeding related to the expected interest rates for the period 2016 to 2018 compared to the interest rate used by FEI in the various scenarios. Although their approach to determining the risk free rate and their source differs, in that Dr. Booth evidence includes RBC's 2017 forecast and Mr. Coyne used the Consensus Economics forecast for 2016 to 2018, these forecasts of the risk free rate within the 2016 to 2018 period are similar at 3.65 and 3.68, respectively. Their reference points for utility bond are also similar with Mr. Coyne's evidence presenting the average Canadian utility bond spread vs. 30-year Canada long bond as 1.33 percent and recent FEI spreads of 1.82 percent and Dr. Booth referencing FEI's recent issuance at a spread of approximately 1.35 percent over an equivalent maturity long Canada bond. **Considering the expert evidence on the risk free rate and the utility bond spread, the Panel finds the most likely interest rate outcome presented in the sensitivity analysis in Table 4.5 is the analysis using an assumption of 5 percent on new debt issuances.**

With respect to the evidence related to the various scenarios for ROE and common equity ratio and new debt issuance yields, together with its analysis of required debt and equity financings, the Panel notes the following:

1) FEI has included the required debt and equity financing for both approved and potential capital projects, subject to timing and approval uncertainties, and the Panel accepts this as a reasonable estimate of the maximum requirements for the 2016 to 2018 period given the number of uncertainties;
2) $200 million PMMs mature September 2016 and that there are no other significant material maturities of long-term debt in the 2016 to 2018 period. FEI has adjusted the issuance capacity scenarios for the refinancing of the $275 million PPMs;
3) Moody's July 2015 credit opinion forecasts improvements in metrics after completion of the expected capital expenditures in 2016 and 2017; and
4) While there are some limits, FEI has the ability to issue some secured debt under its Trust Indenture if necessary and has some remaining capacity on its $750 million credit facility to cover any short-term needs.

The Panel is of the view that the status quo scenario (8.75 percent ROE and 38.5 percent common equity component), assuming both a 5 percent and 6 percent yield on new debt issuances, demonstrates that FEI has sufficient capacity under its Trust Indenture to meeting its financing needs in the 2016 to 2018 period. FEI does not become constrained until interest rates reach 7 percent which given the expert evidence, the Panel considers unlikely. Further, in the event FEI is faced with interest rates at this level, it has other alternatives related to its ability to issue secured debt, alter the timing of certain capital expenditure or bring an application to the Commission for a change in ROE. Accordingly, **the Panel finds that an increase is ROE or common equity component is not required to support FEI's ability to issue debt under its Trust Indenture.**

The Panel agrees with FEI's submission that its issuance capacity would decline materially were the Commission to accept Dr. Booth's recommended ROE of 7.5 percent and a 35 percent common equity ratio. This is demonstrated by the 8.25 percent ROE and 37 percent equity scenario presented by FEI which represents a near break-even point at an assumed interest rate of 5 percent for new debt issues. In addition, the Panel agrees that such a scenario could increase the risk to a level that could lead to a downgrade by Moody's. If a downgrade were to occur, it could lead to further constraint on the debt issuance coverage ratio through higher borrowing costs. Accordingly, **the Panel finds that a reduction of ROE and common equity component to the levels recommended by Dr. Booth could impact FEI's ability to issue debt under its Trust Indenture.**

4.3.3 FEI's common equity component relative to other Canadian utilities

Mr. Coyne's comparison of the Canadian peer group companies' equity components in relation to his overall risk ranking is included in the table below:

Table 4.6: Canadian Peer Group Comparative Risk Analysis and Authorized Equity Ratio[136]

Operating Company	Risk assessment relative to FEI	Authorized equity component
Proposed FortisBC Energy Inc.	N. A.	40.0%
Current FortisBC Energy Inc.	N. A.	38.5%
ATCO Gas	Less risky	38.0%
Enbridge Gas Distribution Inc.	Less risky	36.0%
Union Gas	Less risky	36.0%
Gaz Métro	More risky	38.5%

With respect to FEI's proposed common equity ratio, Mr. Coyne concludes that FEI's proposed capital structure is "appropriate, albeit conservative." Mr. Coyne states that FEI has higher risk relative to its Canadian peer companies with the exception of Gaz Métro. He also states that Gaz Métro is riskier than FEI and it "enjoys a substantial portion of deemed preferred equity, effectively acting as a further buffer for debt holders." His view with respect to the US proxy group is that FEI's proposal would fall below the entire range of US companies in his proxy group and FEI's proposal is conservative because of FEI's higher relative risk.[137]

In his report, Dr. Booth ranks FEI in the same risk category of gas distributors and identifies FEI as slightly riskier than EGDI and ATCO Gas and is lower risk than either Union Gas or Gaz Métro. Dr. Booth also states the differences in risk between the utilities are tiny.[138]

In his rebuttal evidence, Mr. Coyne states he agrees with Dr. Booth that Gaz Métro is slightly riskier than FEI. Mr. Coyne considers Gaz Métro to be FEI's closest comparator and notes it has the same common equity ratio as FEI of 38.5 percent as well as an allowed 7.5 percent deemed preferred equity at a return of 5.95 percent. In Mr. Coyne's opinion, this is equivalent to roughly 43.5 percent equity at Gaz Métro's current authorized return of 8.90 percent[139] which puts Gaz Métro's allowed equity component above that being requested by FEI in this proceeding. Mr. Coyne considers this appropriate given Gaz Métro's relative risk to FEI.

[136] Exhibit B-1, Appendix B, p. 101.
[137] Exhibit B-1, Appendix B, p. 102.
[138] Exhibit C7-7-2, p. 78.
[139] Exhibit B-16, Prepared Rebuttal Testimony of Mr. Coyne, p. 39, Mr. Coyne's calculation supporting the equivalent equity ratio of 43.5% is calculated as follows: ((5.95% x 7.5%)+(38.5% x 8.90%))/8.9%.

With respect to its main Canadian comparators, FEI submits:

- The reasonableness of its proposed common equity ratio of 40 percent is supported by ratios of other major Canadian natural gas distribution utilities in that a 40 percent common equity ratio places FEI between the higher risk Gaz Métro (equivalent of 43.5 percent at its allowed return on common equity) and lower risk utilities EGDI (36 percent), Union Gas (36 percent) and ATCO Gas (38 percent).[140]
- No other Canadian natural gas distributor has an allowed common equity ratio as low as Dr. Booth's recommendation of 35 percent.
- ATCO Gas is less risky than FEI and has a common equity ratio of 38 percent.[141]

Intervener submissions

AMPC/BCOAPO submit that Mr. Coyne recommends a common equity ratio for FEI that is in excess of the ratio of any of the comparable Canadian utilities.[142] AMPC/BCOAPO support Dr. Booth's recommendation of the same capital structure (i.e. 35 percent) for all of the comparative Canadian utilities, with the exception of Gaz Métro. AMPC/BCOAPO submit it is misleading for FEI to refer to the equity component of Gas Métro as 46 percent including preferred shares because preferred shares are very different from the perspective of the ratepayer and the shareholder and should not be equated. AMPC/BCOAPO further submit "if it is necessary that FEI have more 'equity' to meet credit metric requirements AMPC/BCOAPO supports the Board requiring FEI to issue preferred shares rather providing common shareholders with excessive returns or an overly thick common equity ratio."[143] The issue of preferred shares is addressed in Section 4.3.3.1.

CEC prefers Dr. Booth's view of comparative Canadian companies and submits that FEI's view of its risks relative to the risks of comparable Canadian utilities overstates the appropriateness of a 40 percent common equity component.[144]

FEI reply submission

FEI submits its proposed 40 percent common equity component is well below Gaz Métro's 43.5 percent after accounting for Gaz Métro's deemed preferred shares (not the 46 percent referred to by AMPC/BCOAPO) and is above the major natural gas distribution utilities that the experts agree are less risky than FEI.[145]

Panel discussion

The Panel notes Mr. Coyne's opinion that the Canadian regulatory practice differs from the US practice where it is more common for a US regulator to look at the proxy group of similarly situated companies and then make a determination as to whether or not that company's capital structure is reasonably within the range, given its overall risks, its capital expenditure programs, etc. He also states in Canada, it is more common for a regulator to deem a capital structure based on risk analysis and credit metrics.[146]

[140] FEI Final Submission, p. 4.
[141] FEI Final Submission, p. 60.
[142] AMPC/BCOAPO Final Submission, p. 10.
[143] AMPC/BCOAPO Final Submission, pp. 63–64.
[144] CEC Final Submission, p. 48.
[145] FEI Reply Submission, p. 43.
[146] Oral Hearing Transcript Volume 3, p. 372.

In the Panel's view, while there are differences in the parties' views of an appropriate common equity ratio for FEI, there is general agreement of the relative risk ranking of FEI's comparator Canadian natural gas distribution utilities. All parties agree that EGDI, Union Gas and ATCO are less risky than FEI and Gaz Métro more risky. The Panel accepts this relative risk ranking as a check on our determinations.

4.3.3.1 Introducing preferred shares to FEI's capital structure

The issue of introducing preferred shares to FEI's capital structure was raised by Dr. Booth. He states that "FEI should not be allowed more than the Fair Return Standard due to bond market problems. If any such problems exist, and I don't think they currently do, they can be addressed with a short term solution, such as issuing term preferred shares."[147]

Intervener submissions

AMPC/BCOAPO submit that as an alternative to increasing the common equity component, if FEI requires more equity to meet its credit metrics, the Commission can require FEI to issue preferred shares.[148] They further submit that any concerns with Dr. Booth's recommendation of 35 percent common equity ratio can be addressed by deeming some preferred shares in the capital structure.[149]

AMPC/BCOAPO refer to FEI's final submission in the 2012 GCOC proceeding in which FEI submits "the introduction of preferred equity into the capital structure has the same effect on the cost of equity as adding debt." AMPC/BCOAPO submit the introduction of preferred shares into the capital structure will improve access to the debt market because preferred shares dividends are paid out of after-tax income, must be declared by the Board of Directors and do not constitute interest in the interest coverage test for new debt issuances.[150]

FEI reply submission

FEI submits the intervener evidence presented in this proceeding is not sufficient for the Commission to be able to 'properly assess the ramifications of mandating the introduction of preferred shares into FEI's capital structure. FEI states that the interveners put forward the same proposal in the 2009 proceeding, and this proposal was not accepted as the Commission determined that FEI's capital structure should remain in the form of debt and common equity.[151]

Commission determination

The Panel agrees with FEI and the Panel finds the issue of introduction of preferred shared into FEI's capital structure has not been explored sufficiently in this proceeding for the Commission to make a determination on this issue.

[147] Exhibit C7-7-2, p. 86.
[148] AMPC/BCOAPO Final Submission, pp. 63–64.
[149] APMC/BCOAPO Final Submission, pp. 66–67.
[150] APMC/BCOAPO Final Submission, p. 67.
[151] FEI Reply Submission, p. 45.

4.4 Appropriate capital structure

Commission determination

The Panel has determined a common equity component of 38.5 percent is appropriate for FEI, effective January 1, 2016. This represents no change from the 2013 GCOC Decision where the Commission determined the same equity component.

The Panel notes that the 2013 GCOC Decision put considerable emphasis and weight on changes in long-term risk associated with provincial government climate and energy policies as well as the competitive position of natural gas relative to electricity in reaching its common equity ratio determination. In this proceeding, the provincial government climate and energy policies were covered as part of what was termed political risk and the competitive position of natural gas as compared to electricity was addressed under energy price risk.

The parties generally agree there is little change with respect to the level of risk in a number of identified risk areas as compared to the 2013 GCOC Decision. The parties also appear to be in general agreement that there is little change in operating risk, market shift risk and the risk associated with economic conditions since the last decision. In addition, none of the parties take issue with the position taken by FEI that the amalgamation of FEW and FEVI with FEI has not resulted in any material risk change for the amalgamated Company and the combined entity's business profile remains much the same.

However, there were a number of important areas where the parties were in disagreement which were more closely examined by the Panel. Probably most contentious among these was with political risk where the Panel determined there was a slight increase in risk primarily due to developments at municipal and provincial government levels. Under the same political risk category, the Panel was not persuaded the evidence on recent jurisprudence concerning First Nations would have a material effect on FEI's ability to earn a return of on and of its capital. Offsetting the increase in political risk to some degree was the Panel's determination that energy price risk has decreased somewhat. As noted in Section 4.2, the Panel finds there was little change in regulatory risk and only a slight increase in energy supply risk. Taking these factors together and weighing them accordingly, the Panel considers there to be insufficient justification for awarding either a higher or lower equity ratio at this time.

The Panel also examined potential for FEI's credit ratings to affect its access to capital and found there is no compelling evidence to support the need to increase the common equity component to maintain its current credit rating. A similar conclusion was reached with regard to FEI's trust indenture issuance test where it was found that given the current equity ratio and ROE, there is little evidence FEI's ability to issue debt will be constrained.

As a check, the Panel notes FEI's deemed capital structure of 38.5 percent equity falls within the range among its Canadian comparators. This, while not determinative, does provide a level of comfort with respect to the Panel's decision to leave FEI's common equity component unchanged.

5.0 RETURN ON EQUITY

5.1 Overview of issues

In setting a fair ROE, the Panel must make a determination of a return representing the rate of return that equity investors could expect to earn elsewhere in the market without bearing more risk. Since investors' expectations are not directly observable in the market, it is necessary to make an estimate of the opportunity cost of an alternative investment of equivalent risk. The Panel notes the following guidance provided by the Brattle Group Report (Exhibit A2-3):

- There is no single, widely accepted, best financial model used to estimate the cost of capital;
- Models are imperfect tools but can be useful simplifications of reality;
- Cost of capital estimation continues to be as much art as it is science; and
- To make an appropriate estimate one should consider the "totality of information from alternative methodologies."[152]

In this proceeding, Dr. Booth and Mr. Coyne have presented estimates of investors' expectations based on data that they interpret through the use of variations on the capital asset pricing model (CAPM) and the discounted cash flow model (DCF model). The use of these two models is consistent with the 2013 GCOC Decision, where the Commission found that:

> The two most compelling frameworks for assessing the cost of equity are the DCF model and the CAPM. These models have well understood theoretical bases and explicitly recognize the opportunity cost of capital. Accordingly, these two models are given equal weight in determining the allowed ROE.[153]

The experts' approach to the use of these models to estimate an investor's opportunity cost differs significantly in a number of areas and result in recommendations of a fair ROE ranging from Dr. Booth's 7.5 percent to Mr. Coyne's 9.5 percent.

With a focus on the differences in approach by the experts, the key questions the Panel addresses in making its determination of an appropriate ROE are as follows:

i) Should the decision be informed by use of multiple financial models and other indicators of investor expectations?

ii) In the development of the models, is the selection of the proxy group and the weight placed on US data appropriate?

iii) With respect to both the CAPM and DCF estimates, are the model inputs used by the experts reasonable and how much weight should be given to each of these models and the resulting estimates?

iv) In applying the Panel's judgment to the totality of information, what is a fair return on equity for FEI?

[152] Exhibit A2-3, The Brattle Group, Survey of Cost of Capital Practices in Canada, Prepared for the British Columbia Utilities Commission (Brattle Group Report), May 31, 2012, pp. 3–4.
[153] 2013 GCOC Decision, p. 56.

5.2 Key differences in views related to ROE

5.2.1 Use of multiple financial models

Mr. Coyne states that use of the CAPM and DCF models, each with its own set of inherent limitations, provide different perspectives as well as depth to the analysis that helps inform the estimate of ROE. He cautions that neither model should be relied upon individually without corroboration from other approaches. In his opinion, it is necessary to use best judgment to assess the reasonableness of the result and to determine the appropriate weighting to apply to the results under current market conditions.[154]

In arriving at his ROE recommendation, Mr. Coyne considered the results of several tests including his constant growth and multi-stage DCF models, his risk premium analysis and the "alternative" CAPM analysis.[155] Mr. Coyne's overall recommendation is supported by placing equal weight on his multi-stage DCF and CAPM models, the same weighting the Commission applied in its 2013 GCOC Decision.[156] Mr. Coyne states that his approach differs from Dr. Booth who places "predominant weight" on the CAPM model.[157]

Dr. Booth disagrees that he primarily relies on CAPM estimates.[158] In arriving at his ROE recommendation, Dr. Booth's considers and applies his judgment to a variety of different indicators of the fair ROE including:

- capital market conditions;[159]
- his simple CAPM;[160]
- equity risk premium estimate or conditional CAPM (CCAPM);[161] and
- DCF estimates to support his adjustments to the CAPM estimates.[162]

He places weight on survey results from the Fernandez survey,[163] and considers other independent estimates, including TD Economics,[164] Aon Hewitt and Mercer.[165]

Final submissions

FEI underlines the importance of employing multiple tests and cites Mr. Coyne's evidence that the CAPM and DCF bring a different perspective since they are based on different premises. FEI submits only by using multiple tests can the Commission be assured of a reasonable estimate of ROE.[166]

[154] Exhibit B-1, Appendix B, pp. 34–37.
[155] Exhibit B-1, Appendix B, pp. 104–106.
[156] Oral Hearing Transcript Volume 1, p. 20; Exhibit B-1, Appendix B, pp. 104–106.
[157] Oral Hearing Transcript Volume 1, p. 22.
[158] Oral Hearing Transcript Volume 3, p. 503.
[159] Exhibit C7-7-2, p. 8.
[160] Exhibit C7-7-2, p. 41.
[161] Exhibit C7-7-2, p. 50.
[162] Exhibit C7-7-2, p. 56.
[163] Exhibit C7-7-2, p. 40.
[164] Exhibit C7-7-2, pp. 56–57.
[165] Oral Hearing Transcript Volume 3, p. 659.
[166] FEI Final Submission, p. 65.

AMPC/BCOAPO support Dr. Booth's recommendation for using the CAPM and DCF as a "check on one another and applying judgement as necessitated by external conditions."[167]

CEC submits that the evidence resulting from the application of all models presented in the proceeding should be considered but the Commission should apply its own judgment to determine the appropriate ROE in the current circumstances.[168]

Panel discussion

The Panel notes that while there are some differing perspectives among the experts and parties, their views are generally consistent with the Brattle Group Report's finding that decisions should be informed by use of multiple financial models and other indicators of investor expectations where appropriate. The Panel agrees it should consider the "totality of information resulting from applying multiple tests." The Panel also agrees it should consider all of the information from the application of the models presented, as well as other indicators of the fair ROE and should apply its own judgment to determine the appropriate ROE.

5.2.2 Selection of US and Canada proxy groups and US data comparability

As noted in Section 2.0, the "comparable investment requirement" of the Fair Return Standard requires the return available from the application of the utility's invested capital to be comparable to the return of other enterprises of like risk. To assess whether the proposed return meets this requirement, Mr. Coyne and Dr. Booth, on behalf of FEI and the Utility Customers respectively, selected a group of proxy companies in other Canadian and US jurisdictions as comparators for FEI.

The primary use of the proxy companies was in the determination of estimation of beta in the CAPM analysis (see Section 5.2.3.4) and estimating ROE's in the constant growth and multi-stage DCF models (see Section 5.2.4.1).

All parties acknowledge that there are no publically-traded, pure play gas distribution companies in Canada. Hence both Dr. Booth and Mr. Coyne assessed a sample of US companies that are primarily engaged in natural gas distribution in order to assess the market expectations specific to a natural gas distribution utility.[169]

Both consultants also chose a group of Canadian proxy companies. However, because of the lack of pure play gas distribution companies in Canada, the proxy companies are mainly holding companies with a variety of business interests that differ from FEI's business profile.

The uses and limitations of the proxy companies are set out in the followings sections.

[167] AMPC/BCOAPO Final Submission, p. 38.
[168] CEC Final Submission, p. 13.
[169] Oral Hearing Transcript Volume 3, pp. 581–595; FEI Final Submission, p. 77.

5.2.2.1 Selection and use of US proxy companies

FEI asserts that US utilities can be appropriate comparables and that US data requires no adjustment."[170] Mr. Coyne stated US companies are appropriate comparables for use in the various models to estimate a fair ROE for FEI because:

- US and Canadian utilities operate in similar macro-economic environments;
- US and Canadian utilities are governed by comparable regulatory models;
- US and Canadian capital markets are closely linked and move in parallel;
- There is a great deal of cross-border utility investment; and
- Canadian and US utilities compete for capital in a North American market.[171]

Dr. Booth chose his US proxy companies by selecting US companies that had been used in previous proceedings by other expert witnesses for this purpose. Dr. Booth eliminated companies that were no longer appropriate because of merger activity and added three companies based on his review of their descriptions in Google's gas index.[172] Mr. Coyne used a sample of seven US companies while Dr. Booth had eight companies in his proxy group. Six of the companies were common to both samples.

Mr. Coyne asserts that Canadian and US utilities are governed by comparable regulatory models. As evidence of this, he cites a 2013 Moody's report concluding that utility regulation in Canada and the United States is comparable. He also quotes an OEB decision finding that US utility comparators could be used, requiring "only an analytic framework in which to apply judgment and a system of weighting."[173] Mr. Coyne acknowledged that in a 2013 decision, the Newfoundland and Labrador Public Utilities Board made a downward adjustment of 0.5 to 1.0 percent to US DCF results but claimed that this did not reflect "the broader Canadian landscape on this matter."[174]

In his evidence, Mr. Coyne provides detailed information on the proxy companies he used in his ROE models. Table 5.1 summarizes some of the evidence with respect to regulatory practices or actions impacting the US proxy companies that differ from the regulatory practices facing FEI. While the list is not intended to be exhaustive, it demonstrates some of the elements the Panel must consider when evaluating such comparisons.

[170] FEI Final Submission, p. 77.
[171] Exhibit B-1, Appendix B, Evidence of Mr. Coyne, p. 87.
[172] Oral Hearing Transcript Volume 3, pp. 586–587.
[173] Exhibit B-8, AMPC IR 4.2.
[174] Exhibit B-8, AMPC IR 4.5.

Table 5.1: Differences in Regulatory Practices of Mr. Coyne's US Proxy Companies Compared to FEI

US Proxy Company	**Differences in Regulatory Practice Compared to FEI**
Atmos Energy Corporation*	(Comments are related to Texas where 70% of Atmos' regulatory assets are located) • Some capital additions may be brought into rates without prior regulatory approval[175] • Elected regulators who receive political donations from Atmos[176] • Test year determined on a historical basis[177]
South Jersey Resources Corp.*	• Partially forecast test year[178]
Northwest Natural Gas*	Oregon • Partially to fully forecast test year • No interim rates Washington • Historical test period • Interim rates allowed under emergency circumstances[179]
Piedmont Natural Gas*	• Historical test period in North and South Carolina • Formula rate plan (annual rate mechanism) in Tennessee and North Carolina[180]
New Jersey Industries, Inc.	• Partially forecast test year • Interim rates allowed on an emergency basis • Company retains 100% of the first $7.8 million of margins associated with off-system sales, interruptible sales, and interruptible transportation activities. Margins beyond this are allocated 85% to ratepayers and 15% to the company[181]
Southwest Gas Corporation*	• Historical test year • Interim rates not allowed in Nevada, allowed on an emergency basis in California[182]

[175] Oral Hearing Transcript Volume 2, pp. 408–410.
[176] Oral Hearing Transcript Volume 2, pp. 413–414.
[177] Exhibit B-1, Appendix B, Evidence of Mr. James Coyne, Appendix A, p. A-59.
[178] Exhibit B-1, Appendix B, Evidence of Mr. James Coyne, Appendix A, p. A-64.
[179] Exhibit B-1, Appendix B, Evidence of Mr. James Coyne, Appendix A, p. A-68.
[180] Exhibit B-1, Appendix B, Evidence of Mr. James Coyne, Appendix A, p. A-72.
[181] Exhibit B-1, Appendix B, Evidence of Mr. James Coyne, Appendix A, p. A-76.
[182] Exhibit B-1, Appendix B, Evidence of Mr. James Coyne, Appendix A, p. A-81.

WGL Holdings Inc.*	• Historical test year with some items forecast in Washington, DC • Historical test year in Virginia and Maryland • Interim rates are rarely requested in Maryland and generally not requested in Washington, DC[183]

*Also used as a proxy company by Dr. Booth

Mr. Coyne was specifically asked about one of the proxy companies used in his ROE analysis, Atmos Energy Corporation (Atmos), and its treatment by the Texas regulator with respect to allowing capital expenditures that are brought into rates without the regulators' approval. He was also asked to comment on how this treatment compares to the handling of FEI capital expenditures. Mr. Coyne replied that "... just and reasonable rate standards are going to apply at the end of the day and they'll be held to that standard."

When cross-examined about whether there was a difference in political or regulatory risk in jurisdictions where the regulators are elected and utilities may contribute significant funds to regulators running for election, such as in Texas, or where they are appointed, as in BC, Mr. Coyne stated that in his view, the experience and background of the regulators was more relevant than whether they were elected or appointed.[184] He also noted that Atmos operates in eight states.[185]

FEI argues that Mr. Coyne's analysis of regulatory risk facing his US proxy companies demonstrates:

> …the U.S. regulatory environment is generally characterized by widespread use of regulatory mechanisms that are viewed as credit supportive, including accounts that provide for recovery of gas costs for gas utilities and fuel and purchase costs for electric utilities, revenue decoupling, weather normalization accounts, trackers for new infrastructure investment (gas utilities), mechanisms for the recovery of bad debt expenses, and the ability to include CWIP in rate base.[186]

FEI further argues that the majority of the companies in Mr. Coyne's proxy sample operate in more than one regulatory jurisdiction, which diversifies their regulatory risk.[187]

In Dr. Booth's view, there are a number of issues to be considered when using US proxy companies as comparators. These include:

- Growth rate instability related earnings over the past five years. Dr. Booth notes growth rates have varied from negative 17.09 percent for one of the proxy companies to positive 29.23 percent for another.[188]
- Optimism bias of analysts in estimating earnings growth.[189] Dr. Booth states that since analyst earnings forecasts are used to predict growth rates, the use of the DCF model is suspect even for "low risk" utilities.[190]

[183] Exhibit B-1, Appendix B, Evidence of Mr. James Coyne, Appendix A, pp. A-86–A-87.
[184] Oral Hearing Transcript Volume 2, p. 413.
[185] Oral Hearing Transcript Volume 2, p. 415.
[186] FEI Final Submission, p. 78.
[187] FEI Final Submission, p. 78.
[188] Exhibit C7-7-2, Appendix D, p. 14.

- Lower levels of capitalization of US proxy companies. In Dr. Booth's view, this results in some parties arguing that this indicates a higher level of risk for these companies.[191]

Dr. Booth testified he believes the risk of US utilities is clearly higher than Canadian utilities and "the underlying basic estimates indicates that US utilities are riskier than Canadian utilities."[192] CEC agrees with this assessment and argues that the evidence from US companies should be given less weight or should be adjusted based on the inherent differences between Canadian and US utilities.[193]

5.2.2.2 Canadian proxy companies

Because other regulated gas utilities in Canada are not stand-alone companies, in calculating CAPM and DCF rates of return, Mr. Coyne uses the following Canadian proxy group most of which are holding companies:

- Canadian Utilities Ltd. (an Alberta based company that is in the gas distribution business in Alberta and Australia and also in the electric distribution and transmission business as well as in modular construction e.g. work camps etc.);
- Emera Inc. (a Nova Scotia electric company engaged in a takeover bid of TECO in the US. Also provides electric service in Maine and the Caribbean);
- Enbridge Inc. (although it has a large gas distribution company in Ontario, also has a significant oil and gas transmission pipeline business);
- Fortis Inc. (parent of FEI, a holding company with 93 percent of its assets in regulated businesses – gas and electric in Canada, the US and the Caribbean); and
- Valener Inc. (has a 29 percent interest in Gaz Métro as well as significant wind farm interests – partnered with Gaz Métro).[194]

Mr. Coyne states that "only three of the five companies in the Canadian proxy group derived more than 70 percent of their operating income from regulated activities; and only one company, Valener would also satisfy the regulated gas utility screen. This is a clear indication that a Canadian utility group cannot be created to reliably resemble the risks and business profile of FEI."[195] Mr. Coyne further states he includes his Canadian proxy group "to provide a benchmark for the risks and resulting cost of capital for Canadian utilities in general."[196]

Dr. Booth, in assessing other Canadian utilities, looked at the same companies used by Mr. Coyne; Enbridge Inc., Canadian Utilities, Emera, Fortis Inc., Valener, and in addition, Veresen Inc. (a company with pipeline, midstream and electric power businesses) and TransCanada Corporation (a company with natural gas and oil transmission pipelines and electric power generation).[197] Mr. Coyne excluded the use of TransCanada Corporation on the

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[189] Exhibit C7-7-2, Appendix D, pp. 14–16.
[190] Exhibit C7-7-2, Appendix D, p. 14.
[191] Exhibit C7-7-2, Appendix C, p. 9.
[192] Oral Hearing Transcript Volume 3, pp. 662–663.
[193] CEC Final Submission, pp. 15–16.
[194] Exhibit B-1, Appendix B, Evidence of Mr. Coyne, Appendix A, pp. A-16 to A-51.
[195] Exhibit B-1, Appendix B, p. 33.
[196] Exhibit B-1, Appendix B, p. 29.
[197] Exhibit C7-7-2, Evidence of Dr. Booth, Appendix C, p. 8.

basis that it "is subject to a completely different set of competitive risks than the average natural gas distribution utility."[198]

Commission determination

The Panel finds the use of US proxy companies as comparators to assist in the determination of what is the appropriate rate of return for FEI in terms of meeting the Fair Return Standard is relevant.

However, the Panel notes Mr. Coyne's statement that:

> Notwithstanding the care taken to ensure comparability, market expectations with respect to future risks and growth opportunities vary from company to company. Therefore, even within a group of similarly situated companies, it is common for analytical results to reflect a seemingly wide range. At issue, then, is how to select an ROE estimate in the context of that range. That determination must be based on an assessment of the company specific risks relative to the proxy group and the informed judgment and experience of the analyst.[199]

The Panel finds that the screening criteria used by Mr. Coyne to choose his US proxy companies are reasonable for consideration in assessing growth rate in the DCF model and capital structure. The companies chosen are found by the Panel to have business characteristics somewhat but not directly comparable to FEI. The Panel also found the detailed information provided by Mr. Coyne on each proxy company to be useful in its determinations. **The Panel also finds that the eight US proxy companies chosen by Dr. Booth, although not chosen with the same rigour as employed by Mr. Coyne, includes six of the companies used by Mr. Coyne, and is also a reasonable sample.**

However, the Panel does not agree with Mr. Coyne that the regulatory environment affecting FEI is directly comparable to the regulatory environments faced by the US proxy companies. The Panel is not persuaded that Moody's statement that utility regulation in Canada and the United States is comparable means that there are no differences in the respective regulatory environments that affect levels of risk and the comparability of the allowed ROE for US and Canadian utilities. We note that in addition to some of the differences set out in Table 5.1 above, there is also a question as to whether there are significant differences in the use of deferral accounts and differences in approved forecasting methodologies between FEI and the US proxy companies. Mr. Coyne provided evidence with information on what is described as "significant" deferral accounts used by his proxy companies.[200] **The Panel finds that the evidence is not persuasive in demonstrating that the US proxy companies have access to the same suite of deferral accounts that exists in FEI's rate structure.**

The Panel considers the use of US proxies to be a framework against which a fair return ROE may be assessed, but it is not a clear mathematical determinant that can be simply plugged into an ROE calculation. The regulatory environments of US proxy companies operate are varied and differ in a number of respects from the regulatory environment faced by FEI in British Columbia. The US proxy data, while useful, is an imperfect reflection of the circumstances facing FEI and requires considerable judgment as to the weight to be placed on this data. The Panel is not persuaded the evidence in this proceeding is sufficient to warrant a change in the

[198] Exhibit B-1, Appendix B, p. 31.
[199] Exhibit B-1, Appendix B, p. 29.
[200] Exhibit B-1, Appendix B, Appendix A, pp. A-57 to A-87.

Commission's 2013 GCOC Decision conclusion that differences exist in the regulatory environments in the US relative to British Columbia.

The lack of stand-alone publically traded natural gas distribution companies in Canada results in the reliance on data from holding companies whose interests include significant assets outside of the natural gas distribution business. The difference in corporate make-up of these proxy companies compared to FEI requires applying considerable judgment to any calculations flowing from this data. **The Panel finds the differences in the business circumstances of the Canadian proxy companies to FEI are significant.** In the Panel's view, this is evident from the proportion of the proxy companies activities in non-regulated activities or in regulated activities not related to natural gas distribution.

In addition, it is the Panel's view that the evidence with respect to ROE and the equity component of utilities in other jurisdictions and the calculations derived from proxy companies can help inform our decision, but are insufficient, in and of themselves, to define it. As is reflected in the sections in this decision dealing with FEI's risk and the assessment of the models used to calculate a fair ROE, the Panel has needed to weigh the implications of the deficiencies of the Canadian proxy companies in terms of differences in business functions compared to FEI and the deficiencies of the US proxy companies in terms of their different regulatory environments.

The Panel is not persuaded Dr. Booth's observation that lower levels of capitalization of US proxy companies relative to FEI may be indicative of higher risk faced by these companies is correct, and the Panel gives little weight to this evidence. The instability in earnings growth for the US proxy companies is viewed by the Panel as indicative of the abnormal economic circumstances that have existed over the past few years and supports placing less reliance on the models and thus more reliance on judgment.

The Panel notes that proxy companies are used in both the CAPM model (to estimate betas) and in the DCF calculation process. In both cases, as set out elsewhere in the decision, estimates are prepared based on the Canadian sample and on the US sample and from this, a figure applicable to FEI is derived. A number of uncertainties are identified in the modelling processes and inputs. The limitations set out in this section, namely that the Canadian proxy group is flawed due to its lack of comparability in business functions to FEI and the use of the US proxy group is hampered by the differences in the regulatory treatment of the US companies. Collectively, these add to the list of uncertainties that the Panel must take into account in determining the ROE and equity ratio for FEI that meets the Fair Return Standard.

5.2.3 CAPM/risk premium model

5.2.3.1 Overview of the CAPM estimates and model

Mr. Coyne describes the CAPM as a forward looking estimate of a security's required return based on the relationship between its required return and its systematic or non-diversifiable risk.[201] Mr. Coyne states, to calculate the required ROE for a given security it is necessary to estimate the:

i) Risk free rate of return;

[201] Exhibit B-1, Appendix B, pp. 39–40.

ii) Return for the market as a whole or the market risk premium (MRP); and

iii) Beta of an individual security or the measure of covariance between the return on a specific security and the market.[202]

Similarly, Dr. Booth describes the risk premium model as the investor's required or fair rate of return represented by the risk free rate plus a risk premium. He states that the CAPM is a special form of risk premium model that relates the individual risk of a security to the overall market risk and specifies that the risk premium consists of the MRP multiplied by the security's relative risk or beta coefficient (beta).[203]

Issues with the CAPM model

With respect to use of the CAPM, the Brattle Group Report states the CAPM:

> …has a transparent and well-explored economic theory underlying it. Its results can be replicated easily, since the data required are widely available from many public sources. Implementing the CAPM, however, requires a number of subjective decisions – decisions which can be hotly contested and can lead to significantly different results.[204]

Mr. Coyne outlines a number of issues with the CAPM including:

i) The approach is sensitive: the method of calculating the risk premium, the selection of a security for the risk free rate, the use of forward-looking or historical data and the determination of whether adjustments to Beta are appropriate;

ii) The model assumes that: (1) all investors will behave in an efficient manner and manage their portfolios to diversify risk and will make investment decisions considering the impact of a security on the portfolio; and (2) the market is well functioning; and

iii) The problems of the CAPM are exacerbated in the current market environment where risk free rates remain near all-time lows[205] and consistent with the views of Dr. Booth, result in the need to modify the traditional CAPM assumptions to achieve a reasonable ROE recommendation.[206]

Dr. Booth states that the CAPM is the most common way of estimating the fair rate of return and it is so widely used because it is "intuitively correct" in that it captures the time and risk value of money.[207] Dr. Booth explains that under normal or average markets, the traditional CAPM reflects the correct opportunity cost for an equity investor as being the bond market plus a risk premium. This view of opportunity cost assumes that conditions in the bond markets affecting the long Canada bond yield are also driving conditions in the equity market. However, in Dr. Booth's view, at the current point in time, conditions in the Canadian bond market are largely being driven by external factors and do not reflect normal or average market conditions.[208] Accordingly, Dr. Booth considers it necessary to make adjustments to the CAPM to reflect the current capital market conditions and to adjust for abnormally low Canada bond yields resulting from global bond buying programs.[209]

[202] Exhibit B-1, Appendix B, p. 40.
[203] Exhibit C7-7-2, p. 36.
[204] Exhibit A2-3, p. 4.
[205] Exhibit B-1, Appendix B, pp. 35–36.
[206] Oral Hearing Transcript Volume 1, p. 21.
[207] Exhibit C7-7-2, p. 36.
[208] Exhibit C7-7-2, pp. 41–42.
[209] Exhibit C7-7-2, p. 42.

Comparison of CAPM estimates

Table 5.2 compares the expert witnesses' use of the CAPM variants and their estimates.

Table 5.2: Comparison of CAPM Estimates

Expert	Risk-free rate (%)	Market risk premium (%)	Beta	CAPM results (%)	Adjustment (%)	Flotation allowance (%)	CAPM ROE estimate (%)
Mr. Coyne – Canadian proxy group[210]	3.68[211]	7.6[212]	0.65[213]	8.58	--	0.50	9.08
Mr. Coyne – US proxy group	3.68[214]	7.6[215]	0.78[216]	9.58	--	0.50	10.08
Mr. Coyne - average	--	--	--	--	--	--	9.58[217]
Dr. Booth	2.75[218]	5.0-6.0[219]	0.45-0.55[220]	Simple 5.50-6.55[221]	CCAPM (1) +0.45[222] Risk Premium Estimate[223] (2)Operation Twist +1.30[224]	included	7.25 – 8.30[225]

[210] Exhibit B-1, Appendix B, Exhibit JMC-5.
[211] Exhibit B-1, Appendix B, Table 5, p. 41. 3.68 = [(2.1+3.2+3.6)/3]+0.71.
[212] Exhibit B-1, Appendix B, Table 7, p. 49. The Canadian MRP is a range of 5.6 to 9.8 and the US MRP is a range of 7.0 to 8.1 based on historical and forward-looking estimates and 7.6 is the average of the Canadian and US estimates.
[213] Exhibit B-1, Appendix B, Table 6, p. 44.
[214] Exhibit B-1, Appendix B, Evidence of Mr. Coyne, pp. 40–41. 3.68 = [(2.1+3.2+3.6)/3]+0.71; although Mr. Coyne presented 4.29 percent as the US risk-free rate, his US proxy group CAPM calculations in Exhibit JMC-5 Schedules 1 and 2 actually used the 3.68 percent Canadian risk-free rate to arrive at an estimate of 10.08 percent.
[215] Exhibit B-1, Appendix B, Table 7, p. 49. The Canadian MRP is a range of 5.6 to 9.8 and the US MRP is a range of 7.0 to 8.1 based on historical and forward looking estimates and 7.6 is the average of the Canadian and US estimates.
[216] Exhibit B-1, Appendix B, Table 6, p. 44.
[217] Exhibit B-1, Appendix B, Table 21, p. 104.
[218] Exhibit C7-7-2, p. 23, the average of the March and December Consensus Economics forecasts which is a proxy for the average for the year as a whole and consistent with the application to an average forward test year rate base, is 2.75%.

With a focus on the differences in approach by the experts, the key areas the Panel needs to explore in assessing the results of the experts' CAPM estimates are as follows:

i) The adjustments needed to the risk free rate to compensate for the abnormal conditions in the bond markets resulting from the impact of global bond buying programs.

ii) The use of income or total returns in the derivation of the historical MRP.

iii) The methodology to calculate and necessity of using a forward looking MRP to reflect the current expectation of investors.

iv) Testing reasonableness of MRP estimates.

v) The appropriate adjustment to beta.

5.2.3.2 Estimate of risk free rate and adjustment for abnormal conditions

Both Mr. Coyne and Dr. Booth rely on Consensus Economics forecasts of the 30-year Government of Canada bond yield as the risk free rate. However, the experts differ in their approach to an adjustment to the risk free rate to compensate for the abnormal conditions in the bond markets resulting from the impact of global bond buying programs.

Mr. Coyne prepares his estimates of the risk free rate plus an adjustment for abnormal conditions using the 10-year government bond forecast plus the historical spread between 10-year and 30-year government bonds.[226] My Coyne's calculations as follows:

Table 5.3: Mr. Coyne's Calculation of Risk Free Rate Adjusted for Abnormal Conditions[227]

30-Year Risk Free Yield	CDN$	U.S. $
April 2015 Consensus Forecast Average 2016-2018 Forecasts 10-Year bond yield	2.97%	3.60%
Average Daily Spread between 10-year and 30-year government bonds (August 2015)	0.71%	0.69%
Average	3.68%	4.29%

Mr. Coyne selected the 2016 to 2018 period to match the period he expects FEI's rates are most likely to be in effect[228] and explained his use of a three-year forecast in the current abnormal market conditions:

> What I'm saying is that we know conditions are abnormal now. Dr. Booth goes through an exercise he calls 'Operation Twist', to try to account for abnormal bond yields in the government bond yield market. And the approach that I take is to look to a consensus forecast, and to see

[219] Exhibit C7-7-2, p. 39.
[220] Exhibit C7-7-2, p. 41.
[221] Exhibit C7-7-2, p. 41, 5.50= (5.0*.45) + 2.75=2.25+2.75=5.0 + 0.5 flotation = 5.50; and 6.55 = (6*.55) + 2.75 + 0.5 flotation = 6.55.
[222] Exhibit C7-7-2, p. 44.
[223] Exhibit C7-7-2, p. 50, the Risk Premium Estimate is the CCAPM adjusted for an estimate of Operation Twist and is a range of 7.25% to 8.30%.
[224] Exhibit C7-7-2, p. 50.
[225] Exhibit C7-7-2, p. 50.
[226] Exhibit B-1, Appendix B, pp. 40–41.
[227] Exhibit B-1, Appendix B, p. 41.
[228] Exhibit B-1, Appendix A, p. 40.

> what looks like a return to something that's in equilibrium. Just as this commission did in 2012, it made a determination that there should be a floor of the risk-free rate, on a judgment that needed to be something that at least looked like an equilibrium risk-free rate, in order for it to be sensible for a cost of equity determination.
>
> So that's the very same logic here. The difference is that I am not trying to estimate it myself. I am looking at this consensus forecast and I am looking at the shape of it. Because it flattens out once you get to 2018. So it tells me that in that range it gets you to something that looks like equilibrium or more normalized level of risk free bond yield. So, that's the logic. I'm not trying to pinpoint one year, or three years for that matter.[229]

Dr. Booth recommends a 2.75 percent risk free rate based on an average of the 2016 three-month and one-year Consensus Economics forecasts plus the current spread between the 30-year and 10-year bond of 0.75 percent. He concludes that the average of the three month and one year rate is a "proxy for the average for the year as whole and consistent with the application to an average forward test year rate base."[230] In addition, Dr. Booth uses an "Operation Twist adjustment" to adjust for the abnormally low Canada bond yields resulting from rampant bond buying programs by central banks.[231]

In the 2012 GCOC proceeding, Dr. Booth placed the impact of Operation Twist on the Canadian bond market at approximately 80 bps from August 2011 through to May 2013.[232] In the 2013 GCOC Decision, the Commission accepted Dr. Booth's adjustment.[233]

Dr. Booth quantifies the Operation Twist impact by determining the extent to which the differential between the preferred share yield and the corporate A yield has widened under recent market conditions.[234] According to Dr. Booth's evidence, the preferred share yield spread increased from 0.80 percent in 2012 to the current 2015 average of 1.3 percent.[235] Dr. Booth testified that he:

> …looked at the volatility those preferreds and I used the average to try and adjust for their volatility, and I use 1.3. Right now I would lower that to about 60 to 70 basis points, because I've now looked at the composition of that index, and it reflects the behaviour of rate reset preferred shares. I would not continue to make a 1.3 percent spread adjustment based upon those preferreds, because those preferreds are behaving -- significantly behaving as a result of rate reset preferreds.[236]

Dr. Booth also testified he now has less faith in the magnitude of the Operation Twist adjustment but what continues to drive his recommended ROE, consistent with the last four years, is he would not change allowed ROEs until the long Canada rate returns to something approaching normality, which in his view is 3.8 percent.[237]

[229] Oral Hearing Transcript Volume 1, pp. 186–187.
[230] Exhibit C7-7-2, p. 23.
[231] Exhibit C7-7-2, p. 48.
[232] Exhibit C7-7-2, p. 48.
[233] 2013 GCOC Decision, p. 60.
[234] Exhibit C7-7-2, p. 49; Exhibit C7-9, BCUC IR 12.1.
[235] Exhibit C7-7-2, pp. 48–49.
[236] Oral Hearing Transcript Volume 3, p. 538.
[237] Oral Hearing Transcript Volume 3, p. 542.

FEI submits that it is appropriate for Mr. Coyne to use a three-year forecast to estimate a forward looking bond yield that includes anticipated changes over the next few years to reflect the long-term perspective, particularly given current market conditions. FEI also submits that Mr. Coyne's forecast risk free rate plus an adjustment for abnormal conditions of 3.68 percent is very near to the RBC forecast of 3.65 percent for Q4 2017 which Dr. Booth has included on page 23 of his testimony.[238]

FEI submits a reasonable Operation Twist adjustment is an essential precondition to the reliability of the risk premium model output because Operation Twist is the only feature differentiating Dr. Booth's risk premium model from the simple CAPM that he rejected.

Intervener submissions

AMPC/BCOAPO characterize Dr. Booth's Operation Twist adjustment as an adjustment to the risk free rate. AMPC/BCOAPO calculate Dr. Booth's risk free rate plus an adjustment for abnormal conditions to be 2.75 percent plus 1.3 percent for the Operation Twist adjustment, resulting in a "proxy risk-free rate of 4.0 %." AMPC/BCOAPO submit this risk free rate plus an adjustment for abnormal conditions is a proxy for the rate used by investors in trading off risk versus return, similar to AON Hewitt's long run target bond yield of 4.21 percent.[239]

CEC recommends 2.75 percent as the risk free rate and submits:

- It is not reasonable to utilize a three-year average for a 1 year rate;[240]
- Forward looking expectations are already captured in the current forecast of long bond yield;[241]
- It is reasonable to expect the market risk premium to decline if the bond yields are expected to increase in the future given the inverse relationship between market equity returns and bond yields.[242]

CEC accepts Dr. Booth's Operation Twist adjustment which indicates current forecast in long Canada yields are "at least 1.3 % too low."[243]

FEI reply submission

With respect to Mr. Coyne's use of the 2016 to 2018 Consensus Economics forecast, FEI submits:

- Mr. Coyne's approach to addressing the need to compensate for the impact of massive global bond buying by central banks does not assume a three-year test period, rather Mr. Coyne uses the forecast long Canada bond yield to establish a normalized, forward-looking bond yield that reflects changes in the long Canada bond over the next few years;
- Both experts normalize the risk free rate using a different methodology but end up in a similar place i.e. Mr. Coyne's forecast bond yield of 3.68 percent vs. Dr. Booth's proxy risk free rate of 4.05 percent; and

[238] FEI Final Submission, p. 92.
[239] AMPC/BCOAPO Final Submission, pp. 45, 53.
[240] CEC Final Submission, p. 23.
[241] CEC Final Submission, p. 23.
[242] CEC Final Submission, p. 24.
[243] CEC Final Submission, p. 40.

- Although it is true that current bond yields incorporate forward expectations of interest rates, as submitted by CEC, interest rates are constantly shifting due to changing economic conditions. As a result, the interest rate at a single point in time may not be reflective of future market conditions. [244]

FEI points to Dr. Booth's oral testimony that the Operation Twist adjustment should be reduced to about 60 to 80 basis points is not consistent with his written evidence in which he describes his 130 basis point adjustment as the "minimum" required adjustment to compensate for the downward effect of government bond buying programs. Further, his support for the adjustment is based on one sample, Canadian Utilities Limited.[245]

Commission determination

The Panel notes that with respect to determining the appropriate risk free rate and an adjustment for abnormal conditions to input into a CAPM estimate, both Mr. Coyne and Dr. Booth:

i) Rely on Consensus Economics forecasts of the 30-year Government of Canada bond yield as the risk-free rate;

ii) Are very close in their estimates of 10-year and 30-year yield spreads; and

iii) Agree on the need to add an additional adjustment to the CAPM to compensate for abnormal conditions in the bond markets resulting from the impact of global bond buying programs.

The Panel recognizes that a risk premium model or CAPM is based on the assumption that current yields are being determined by investors trading off risk and return in a functioning market. The Panel also agrees capital market conditions are similar to 2012 and accordingly, an adjustment for abnormal conditions continues to be reasonable in the current market conditions.

With respect to Mr. Coyne's use of an average of 2016 to 2018 forecast rates to estimate a risk free rate, the Panel is not persuaded that this simple averaging of the forecast rates for this time period results in a supportable "equilibrium or normalized" risk free rate. We accept the position put forward by CEC that current predictions of bond yields already reflect expectations and therefore the current bond yields should be used. While the Panel does not agree with Mr. Coyne's approach to adjusting the risk free rate, we do acknowledge that this is his attempt to adjust for abnormal conditions.

The Panel notes that in the 2013 GCOC Decision, the Commission accepted Dr. Booth's Operation Twist adjustment and Dr. Booth currently uses a consistent methodology in his prepared testimony with the exception of averaging the 2015 spread to address the volatility in the 2015 spread. With respect to his oral testimony that the Operation Twist adjustment should be reduced, the Panel agrees with FEI that reference to a sample on one utility's preferred shares (Canadian Utilities Inc.) as well as the lack of any other detailed analysis related to the predominance of rate reset preferred shares in the index provides insufficient support for a 60 to 70 basis point reduction in Dr. Booth's Operation Twist adjustment. The Panel also notes that AMPC/BCOAPO and CEC both accept Dr. Booth's original 1.3 percent adjustment.

Although the expert witnesses differ in their approach, they both agree on the need for an adjustment in the CAPM to compensate for abnormal conditions in the bond markets resulting from the impact of global bond

[244] FEI Reply Submission, pp. 52–55.
[245] FEI Reply Submission, pp. 17–18.

buying programs. While the expert witnesses differ in their approach and given there is no precise answer, the Panel takes comfort in the fact they end up with similar estimates. **Accordingly, the Panel, using its best judgment, finds a risk free rate plus an adjustment for abnormal conditions in the range of 3.8 to 4 percent is reasonable for use in the CAPM.**

5.2.3.3 Market risk premium (MRP)

Estimate of market risk premium

Mr. Coyne used a MRP of 7.6 percent in his CAPM, based on an ex-ante (forward-looking) and an ex-post (historical average) derivation of the MRP and using an average of both the Canadian and US equity risk premiums to derive a combined North American equity risk premium as follows:

Table 5.4: Market Risk Premium Values[246]

	Canadian MRP	U.S. MRP
Historical MRP	5.6%	7.0%
Forward-looking MRP	9.8%	8.1%
Average	7.6%	

Mr. Coyne states it is appropriate to combine and average US and Canadian equity risk premiums because the equity markets in the US and Canada are "more similar than not, and there is no reason to expect a divergence in market risk premiums going forward."[247]

Dr. Booth estimates the MRP of common equities over long-term Canada bonds at 5.0 to 6.0 percent using historical Canadian capital market history "going back to 1924 so [the estimate] encompasses periods very similar to today, such as the bleak 1930s of slow growth and falling prices, as well as booms and serious inflation problems such as the 1970's." Dr. Booth also gives weight to US data.[248]

5.2.3.3.1 Use of income or total returns in the derivation of the historical MRP

Mr. Coyne determines his ex-post MRP based on the arithmetic average of historical risk premia: for Canada using Morningstar Direct from 1919 through 2011 and Duff and Phelps thereafter and for the US using Duff & Phelps from 1926 onwards.[249] Mr. Coyne uses estimates of the total return on equities over the income return on bonds[250] consistent with the Ibbotson® SBBI® Valuation Yearbook since in his view, this represents the truly risk free rate.[251]

Dr. Booth states that he suspects the difference between his and Mr. Coyne's Canadian MRP estimates results from Mr. Coyne's use of bond yields rather than bond returns which Dr. Booth uses in his estimate. In Dr.

[246] Exhibit B-1, Appendix B, p. 49.
[247] Exhibit B-1, Appendix B., p. 49.
[248] Exhibit C7-7-2, pp. 39–40.
[249] Exhibit B-1, Appendix B, pp. 45–46.
[250] Oral Hearing Transcript Volume 1, p. 195.
[251] Oral Hearing Transcript Volume 1, p. 198.

Booth's view, it is necessary to subtract bond returns from equity returns to estimate the market risk premium and using bond yields which are not returns "ignores the fact that the equity market reflects interest rate changes, whereas the bond return then does not."[252] Dr. Booth also states:

> It is methodologically incorrect to use yields in risk premium analyses, which is presumably why the CIA [Canadian Institute of Actuaries] does not provide that data. Until relatively recently Dr. Booth had never seen an analyst using yields in a risk premium analysis.[253]

Dr. Booth takes the position it is not acceptable to base a risk premium on the subtraction of a yield from a return, since the equity return will reflect changes in interest rates but the bond yield will not.[254]

Intervener submissions

AMPC/BCOAPO submit Mr. Coyne's use of only the income return on bonds is wrong because it compares distinctly different return types and overstates the result because total returns on bonds have been lower than income returns and the differences can add as much as 1.0 percent to the calculated MRP.[255]

CEC's argument is similar to AMPC/BCOAPO's position.[256]

FEI reply submission

With respect to use of the total return or the income return on Canada long bond yields, FEI submits Mr. Coyne has used the appropriate approach as follows:

- The income returns remove the components of the government bond total return that are not risk free and represent a truly risk free rate;
- Ibbotson and Duff & Phelps provide risk premium calculations based on the income portion of the bond yield. Mr. Coyne uses this data in his analysis; and
- Mr. Coyne sites the 2013 Ibbotson® SBBI® Valuation Yearbook which concludes that the income return is thus used in the estimation of the equity risk premium because it represents the truly riskless portion of the return.[257]

5.2.3.3.2 Use of a forward-looking MRP estimate

With respect to use of historical data, Mr. Coyne's view is the longer the averaging period used, the less responsive the data is to current conditions and in the current market conditions, the historical average will understate the current market risk premium.[258] Mr. Coyne states this is the reason he incorporated a forward-looking into his MRP analysis.[259]

[252] Exhibit C7-9, BCUC IR 11.1.
[253] Exhibit C7-8, FEI IR 11.3.
[254] Exhibit C7-8, FEI IR 10.3.
[255] AMPC/BCOAPO Final Submission, p. 8.
[256] CEC Final Submission, p. 31.
[257] FEI Reply Submission, pp. 56–57.
[258] Exhibit B-1, Appendix B, p. 47.
[259] Exhibit B-1, Appendix B, p. 47.

In his ex-ante MRP, Mr. Coyne uses a constant growth DCF methodology to determine the implied expected market return using the S&P/TSX Composite Index for Canada and for the S&P 500 index for the US[260] and he subtracts his forecast risk free rate from the derived expected market returns to arrive at his forward-looking equity risk premia results of 9.78 percent and 8.08 percent, respectively, for Canada and the US[261] In his view, these results "suggest that a pure historical estimate is too low in today's low interest rate environment."[262]

Mr. Coyne's methodology results in the use of an expected constant growth rate of 10.02 percent for the Canadian market and 9.66 percent for the US market.[263] In contrast, Dr. Booth's estimates of the DCF for the Canadian and US markets are set out in Table 5.5.

In response to a request in the oral hearing, Mr. Coyne also prepared a calculation of his forward-looking MRP using a multi-stage DCF resulting in an estimated MRP of 5.49 percent compared to the 7.6 percent derived from including his constant growth model in his primary analysis.[264] Mr. Coyne views this as an "anomalous result" in that current all-time low bond yields should result in market risk premium that is higher than the long-term average, especially given the inverse relationship between interest rates and the market risk premium.

Dr. Booth questioned the credibility of Mr. Coyne's constant growth MRP estimate because it is based on short-term analyst expectations which "are known to be biased" and include average growth rate estimates that exceed "any plausible long run growth rate for the economy." In Dr. Booth's view, Mr. Coyne's basic approach is incorrect as it is only appropriate to use the constant growth model for the overall economy or low risk stocks such as utilities and not for all the firms in the TSX Composite Index.[265]

FEI submits that Mr. Coyne has appropriately used forward-looking data based on the following reasons:

- The use of forward-looking data is necessary to mitigate the inability of long-term data to respond to changes in market conditions;
- The use of only historical MRP data may not properly reflect the current expectations of investors; and
- Mr. Coyne's ex-ante MRP is lowered by the use of his forecast of the 30-year bond yield (3.68 percent) compared to the result if the 30-year bond yield at August 31, 2015 (2.23 percent) was used.[266]

Intervener submissions

AMPC/BCOAPO submit that Mr. Coyne's ex-ante MRP estimates based on constant growth DCFs are not credible. AMPC/BCOAPO prefer Mr. Coyne's adjustment of his model to a multi-stage DCF model and submit the MRP calculation of 5.39 percent for Canada and 3.96 percent for the US are more in line with historical estimates and the independent survey results.[267]

[260] Exhibit B-1, Appendix B, pp. 45–46.
[261] FEI Final Submission, p. 93.
[262] Exhibit B-1, Appendix B, p. 48.
[263] Exhibit B-4, Appendix B, Exhibit JMC-4, Schedule 1 and 2.
[264] Oral Hearing Transcript Volume 3, pp. 486–488.
[265] Exhibit C7-9, BCUC IR 11.1.
[266] FEI Final Submission, p. 93.
[267] AMPC/BCOAPO Final Submission, pp. 52–53.

CEC submits that the forward-looking evidence presented by Mr. Coyne should not be accepted by the Commission.[268]

FEI reply submission

FEI submits that Mr. Coyne's use of a forecast Canada bond yield reduced his ex-ante MRP estimate and similarly he used a forecast rate in his regression analysis.[269]

5.2.3.3.3 Methods to test the reasonableness of MRP estimates

Mr. Coyne tested his MRP estimates by conducting a regression analysis on long Canada bond yields and annual market risk premiums calculated by Morningstar Ibbotson through 2011 and Duff & Phelps after 2011, removing the effects of the global financial crisis in 2008 on the basis that this was an anomalous event. Mr. Coyne notes his "analysis yielded a statistically significant value at the 85 percent confidence level, and in my opinion is informative of the relationship between bond yields and market risk premiums."[270] Mr. Coyne uses the results of his regression formula to calculate a MRP of 10.09 percent using his estimated long Canada bond yield of 3.68. Mr. Coyne concludes that this supports his 7.6 percent MRP estimate as being reasonable and reflects the current low interest rate environment.[271]

In response to CEC IR 2.46.1, Mr. Coyne re-ran the regression equation used to test his MRP estimates without isolating the effects of the 2008 global financial crisis resulting in a reduction of MRP to 7.46 percent. Overall, Mr. Coyne finds the results of the model requested by CEC "to be inferior to its original analysis."[272] Mr. Coyne also refined his criteria and removed other anomalous outliers and this produced MRP result of 8.5 percent accompanied by a higher level of statistical significance.[273]

Dr. Booth uses survey results by Professor Fernandez as a confirmation that his MRP range is in line with the views of other finance professionals and states the survey results support his estimates.[274]

FEI submits that Mr. Coyne's regression analysis on his MRP estimate yielded a statistically significant value and provides evidence that the MRP and bond yields are inversely related. FEI also reiterates Mr. Coyne's calculation, noting that applying his MRP of 7.6 percent yields an ROE of 10.19 percent when a proxy group beta average of 0.65 was used and when the Canada long bond is 3.68 percent. The ROE estimate is reduced to 9.78 percent when the Canada long bond is equal to the August 31, 2015 value of 2.23 percent.[275]

Intervener submissions

AMPC/BCOAPO submit that Dr. Booth's estimate based on historical data is supported by the November 2015 survey by Professor Fernandez against which Dr. Booth checked his data. In AMPC/BCOAPO's view this survey data represents a large sample of analysts, companies and finance professors estimating the MRP in various

[268] CEC Final Submission, p. 30.
[269] FEI Reply Submission, p. 58.
[270] Exhibit B-1, Appendix B, p. 49.
[271] Exhibit B-1, Appendix B, p. 50.
[272] Exhibit B-12, CEC IR 46.1.
[273] Exhibit B-12, CEC IR 46.8.1.
[274] Exhibit C7-7-2, pp. 39–40.
[275] FEI Final Submission, p. 94.

markets. AMPC/BCOAPO also submit that Dr. Booth's results are comparable to independent and credible forecasts including TD Economics, AON Hewitt and Mercer[276] and the estimates used by Mr. Coyne calculating his MRP exceed the expectations of each of the independent forecasters for the market as a whole .[277]

CEC endorses Dr. Booth's conclusions on the MRP[278] and raises additional issues with Mr. Coyne's evidence as follows:

- The effects global financial crisis of 2008 should not have been isolated in Mr. Coyne's regression analysis;
- The weaker F-statistics cited by Mr. Coyne in the regression analysis reflecting 2008 data are not relevant;[279]
- The results of the revised regression analysis may simply be indicative of a generally poor correlation between the variables and as a result less confidence should be applied to the relationship between bond yields and the annual market risk premiums;[280] and
- CEC submits 7.46 percent best represents the long-term average.[281]

FEI reply submission

FEI submits that each of the regression equations Mr. Coyne was asked to perform by CEC continues to corroborate, rather than undermine, his 7.6 percent MRP. FEI also submits Mr. Coyne arrived at his MRP estimate first and used regression to test its reasonableness and the regression result would have supported an even higher MRP.[282]

In reply to Dr. Booth's use of Professor Fernandez's survey results as a confirmation that his MRP range is in line with the views of other finance professionals, FEI submits AMPC/BCOAPO relied primarily on a Fernandez Survey to support their MRP range and there are a number of shortcomings of the study, including the limited number of estimates provided for Canada and the wide dispersion of those estimates.[283]

Commission determination

With respect to the expert's estimates of MRP, the Panel considered the following areas:

a) Use of income or total returns
b) Use of forward-looking MRP estimates
c) Methods used to test whether MRP estimates were reasonable

[276] AMPC/BCOAPO Final Submission, pp. 50–51.
[277] AMPC/BCOAPO Final Submission, p. 52.
[278] CEC Final Submission, p. 38.
[279] CEC Final Submission, p. 32.
[280] CEC Final Submission, p. 32.
[281] CEC Final Submission, p. 34.
[282] FEI Reply Submission, pp. 58–60.
[283] FEI Reply Submission, p. 60.

a) Use of income or total returns

The Panel notes that both experts use similar historical periods and give weight to US data. The Panel observes that Mr. Coyne's average historical MRP is 6.3 percent, compared to Dr. Booth's average of 5.5 percent. Dr. Booth's attributes this difference to Mr. Coyne's use of income returns on bonds rather than total returns which Dr. Booth uses in his estimate. AMPC/BCOAPO also submit the use of income returns can add as much as 1.0 percent to the calculated MRP. The Panel accepts that the difference between the historical averages of the two experts is attributed to this difference in methodology. While Dr. Booth considers this approach to be methodologically incorrect and one that he has only observed recently, he does not provide any further evidence to support his view. In the Panel's view, the differences in the positions of the expert witnesses should be examined further in the next cost of capital proceeding. While not endorsing this approach, the Panel accepts that Mr. Coyne's position is supported by third party evidence including:

- The reference to the 2013 Ibbotson® SBBI® Valuation Yearbook indicating the income return on bonds represents the truly risk free rate; and
- The use of the income returns by Ibbotson and Duff & Phelps in their risk premium calculations.

Given the use of income or total returns is the only clearly identified difference between the two historical MRP estimates, **the Panel accepts Mr. Coyne's estimate of historical MRP of 6.3 percent calculated giving equal weight to Canadian and US historical MRP.**

b) Use of forward-looking MRP estimates

The Panel notes that Dr. Booth is satisfied to base his estimates on historical data dating back to 1924 and encompassing periods he considers to be very similar to today and confirms his position by comparing them to the Fernandez Survey consisting of current expectations of finance professionals. Mr. Coyne's view is the historical average will understate the current market risk premium given current market conditions. This is why he incorporated a forward-looking approach into his analysis. The Panel notes that while the approaches of the experts differ, both experts agree some consideration of forward-looking expectations and data is necessary to appropriately estimate MRP. **Therefore, the Panel finds that some weight should be given to forward-looking MRP estimates.**

The Panel agrees with the interveners' concerns over Mr. Coyne's use of a constant growth DCF methodology to determine the implied forward-looking expected market return and is concerned the growth rates he uses in these models overstate the MRP. The Panel also put little weight on the multi-stage DCF values Mr. Coyne presented in response to the undertaking at the oral hearing because there was not an opportunity to fully explore it within the oral hearing. Further, the Panel notes Mr. Coyne's lack of confidence in the "anomalous" results given that the current all-time low bond yields should result in market risk premium that is higher than the long-term average considering the inverse relationship between interest rates and the market risk premium. **Accordingly, the Panel finds it can place little weight on Mr. Coyne's constant growth or multi-stage DCF estimates of the forward-looking MRP.**

While Dr. Booth estimates the MRP of common equities over long-term Canada bonds at 5.0-6.0 percent using historical Canadian capital market history, the Panel takes note of Dr. Booth's constant growth DCF estimates for the market as a whole as set out in Table 5.5, where he estimates an average of 8.75 percent for the Canadian market as a whole and 9.6 percent for the US market as a whole based upon his estimates of sustainable growth

rates. Dr. Booth's sustainable growth rates average 5.25 percent and 6.91 percent for Canada and US markets, respectively. In comparison, Mr. Coyne's constant growth DCF estimates for the market as a whole using a constant growth model are 10.02 percent for the Canadian market and 9.66 percent for the US market. The Panel considers a reasonable forward-looking growth rate to be somewhere between the estimates of the two experts. **Therefore, with the application of judgement, the Panel accepts 6.5 to 7.5 percent as a reasonable range of estimates for a forward-looking MRP.**

Mr. Coyne gives equal weight to his historical and forward-looking MRPs estimates, while Dr. Booth uses the Fernandez Survey as a check for his historical MRP estimates. As noted above, the forward-looking estimates for the market as a whole reflect different approaches and a wide range of results, none of which were carefully examined in this proceeding. Further, in the Panel's view, all other things being equal, there is a trade-off between relevance of forwarding-looking data and the reliability of historical data and given the higher reliability of the historical estimates, **the Panel places more weight on historical estimates of MRP and less weight on forward-looking MRP estimates and accepts a range of 6.3 to 7.0 percent as a reasonable estimate of MRP.**

With respect to the use of the equity market return expectations of pension funds and other investment managers including TD Economics, AON Hewitt and Mercer, to the extent they are available, the Panel considers this information may represent a relatively direct view of forward-looking returns expected from the equity markets and can be useful as a check of the expert witnesses' forward-looking MRP estimates. The evidence on the record indicates that pension and investment managers appear to be forecasting returns on the Canadian equity markets in the range of approximately 8 percent to 9 percent on an arithmetic basis.

c) Methods used to test whether MRP estimates were reasonable

With respect to CEC's submissions related to Mr. Coyne's regression analysis, the Panel accepts that Mr. Coyne does not use this approach to develop a point estimate of MRP but rather as a means to corroborate his estimate of MRP. The Panel agrees with FEI that each of the regression equations Mr. Coyne was asked to perform by CEC do not undermine his 7.6 percent MRP.

The Panel does note FEI's view that there are a number of shortcomings of the Fernandez Survey, including the limited number of estimates provided for Canada and the wide dispersion of those estimates. Accordingly, the Panel finds that this survey is not an appropriate tool on which to base an estimate of the current market expectations for MRP but the Panel does accept that its results provide some corroboration of the historical MRPs of the two experts.

5.2.3.4 Beta and beta adjustments

Beta estimates

Beta is a measure of systematic risk that represents the risk of a security relative to the market. Beta is an adjustment to the MRP to account for the degree to which the individual stock contributes to the market risk. With respect to beta, the issue the Panel needs to decide is the appropriate range of the adjustment to raw or historical beta estimates reflective of current market expectation.

Mr. Coyne's beta calulations are adjusted to the market mean of 0.65 for his Canadian proxy group and 0.78 for his US proxy group. Mr. Coyne uses estimates from:

(1) Value Line for the US gas distribution proxy group which reports historical beta based on five years of weekly stock returns and uses the New York Stock Exchange as the market index.

(2) Bloomberg for the Canadian proxy group which Mr. Coyne set to five years of weekly returns on the S&P 500 or S&P/TSX Composite Index.

Both Value Line and Bloomberg betas are adjusted to compensate for the tendency of beta to revert towards the market mean of 1 over time.[284]

Based on his analysis, Dr. Booth judges the relative risk of Canadian regulated utilities to be 45 to 55 percent of the market as a whole.[285] Dr. Booth uses five years of monthly data and estimates each beta using the standard formula covariance (Y, X) divided by Population variance (X).[286] He states that the recent history of the beta coefficients of Canadian utilities is in the approximate range of 0.30 to 0.45 and attributes the higher end of this range to the post-financial crisis and the internet bubble.[287] In Dr. Booth's view, as interest rates increase back to normal levels, he expects their betas to revert back to their long-run average of 0.45 to 0.55.[288]

Dr. Booth compares his beta estimates of seven Canadian utility holding companies estimates by RBC, Yahoo, and Google.[289] He notes that these sources do not indicate that their betas are adjusted.[290] He also considered the history of US firms as a comparison and points out they have a higher beta difference of .10 compared to Canadian utilities.[291]

5.2.3.4.1 The appropriate adjustment to beta

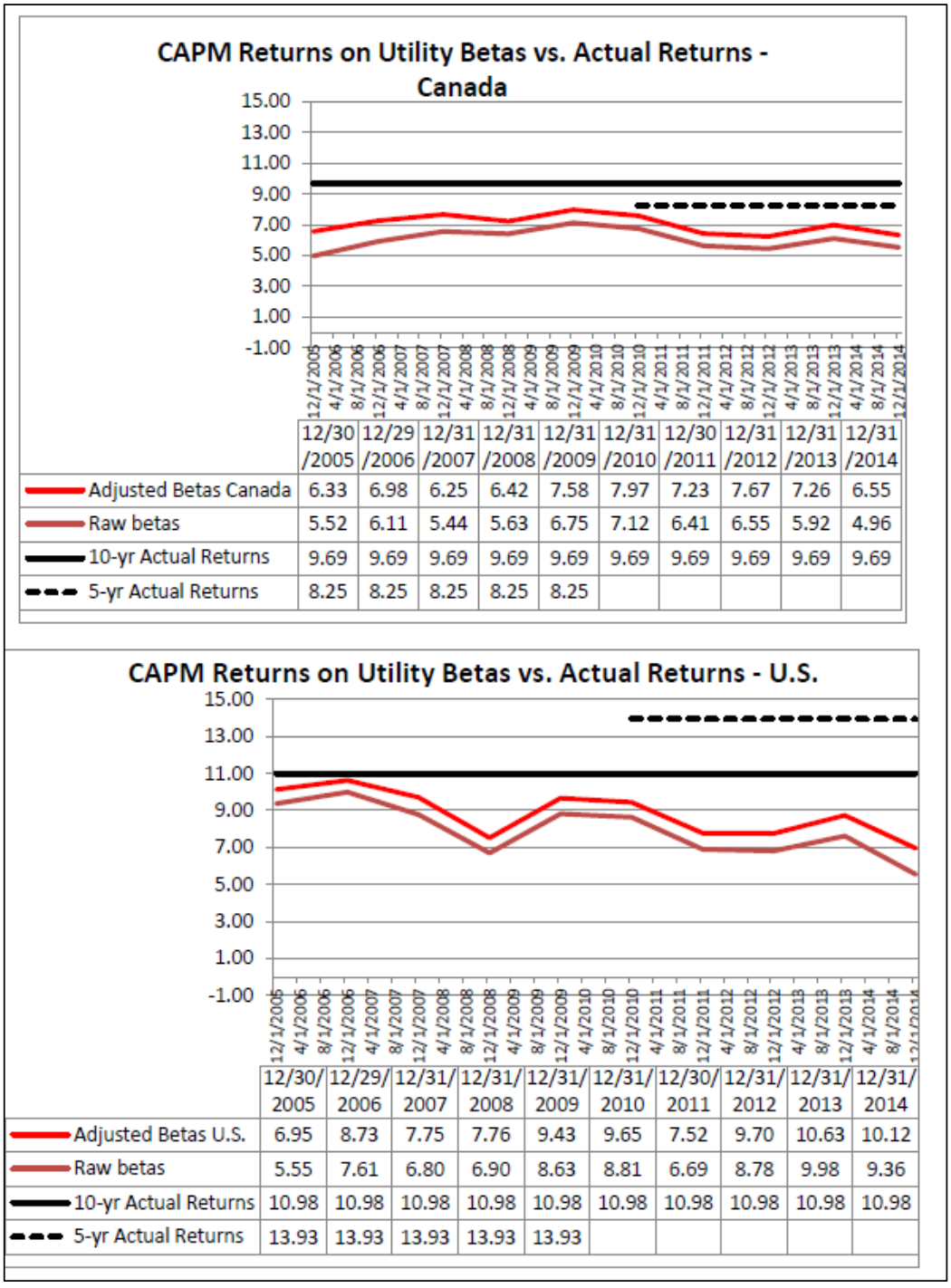
Mr. Coyne cites the empirical evidence, including the Blume studies, supporting a beta adjustment and outlines the statistical purpose for adjusting toward the market average of 1.0. In Mr. Coyne's evidence, he explains the reason to adjust betas toward 1.0 as follows:

> Betas that are below the market average of 1.0 tend to have negative the error terms and underestimate future returns. Consequently, it is necessary to adjust forecasted betas toward 1.0 in an effort to improve forecasts. Because current stock prices reflect expected risk, one must use an expected beta to appropriately reflect investors' expectations. A raw beta reflects only where the stock price has been relative to the market historically and is an inferior proxy for the expected returns when compared to the adjusted beta.[292]

Mr. Coyne presented an analysis to demonstrate it is apparent that unadjusted betas do a poor job of estimated expected returns, as follows:

[284] Exhibit B-1, Appendix B, p. 42.
[285] Exhibit C7-7-2, p. 40.
[286] Exhibit C7-7-2, Appendix C, p. 6, Schedule 2.
[287] Exhibit C7-7-2, p. 40.
[288] Exhibit C7-7-2, Appendix C, p. 6.
[289] Exhibit C7-7-2, Appendix C, p. 8.
[290] Exhibit C7-7-2, Appendix C, p. 10.
[291] Exhibit C7-7-2, Appendix C, p. 6.
[292] Exhibit B-1, Appendix B, pp. 42–43.

Figure 5.1: Comparison of CAPM Returns on Utility Betas vs. Actual Returns[293]



[293] Exhibit B-8, AMPC-Concentric IR 5.4.

Mr. Coyne states the analysis shows that even when applying betas adjusted towards the market mean of 1.0, modifications must be made to the CAPM to reasonably project utility equity returns.[294]

Mr. Coyne also supports his position by stating "the Value Line and Bloomberg methodologies are widely accepted and utilized by financial analysts, investors, corporations, and broadly accepted by U.S. regulatory commissions" referencing a similar finding in the Brattle Group Report.[295]

Mr. Coyne testified that his adjustment methodology was not an issue in the OEB Consultative Process on Cost of Capital and the Board did not take exception to his use of adjusted Value Line and Bloomberg betas.[296] He states he is not aware of a single US state or federal regulatory jurisdiction that takes exception to the use of this adjustment methodology and that this issue only comes up in Canadian regulatory proceedings in which Dr. Booth is a witness.[297] In his opinion, the prevailing wisdom on the required adjustments to utility betas is to use the Blume adjustment.[298]

With respect to adjusted betas, in Dr. Booth's view, utility witnesses frequently adjust toward the overall market average of 1.0 which is the level recommended by Blume for the "whole universe of stocks." He states that low beta estimates for utilities "do not mean they are under-estimates, since utility betas are perennially low due to their low risk"[299] and that there is no evidence of these estimates going towards 1.0.[300] Dr. Booth also discusses the work of Gombola and Kahl who he states demonstrate that utility betas are better mechanically adjusted to their grand mean of around 0.50. Dr. Booth finds that such an adjustment makes very little difference to his estimates. Recognizing that betas need to be adjusted, Dr. Booth prefers to "use judgement constrained by the actual historic evidence."[301]

With respect to the use of Merrill Lynch and Value Line to provide adjusted betas, Dr. Booth notes these are US data providers and companies in Canada such as the Financial Post, RBC and the Globe & Mail do not adjust betas and this approach enables the user to apply judgment. He stated he has no issue with adjusting betas but has a problem with adjusting them towards 1.0.[302]

FEI submits that Mr. Coyne's approach to beta and his results are to be preferred based on the following:[303]

- Both Value Line and Bloomberg betas already incorporate the "Blume adjustment";
- Mr. Coyne's own data analysis, the Brattle Group Report findings and other empirical studies have shown that stocks with low betas, including utility stocks, have achieved returns higher than predicted by the traditional CAPM;
- the Blume adjustment is widely used and accepted in every regulatory jurisdiction without debate, except those jurisdictions in which Dr. Booth testifies;

[294] Exhibit B-8, AMPC-Concentric IR 5.4.
[295] Exhibit A2-3, Brattle Group Report, May 31, 2012, pp. 15–16.
[296] Oral Hearing Transcript Volume 2, pp. 228–230.
[297] Exhibit B-16, Rebuttal Evidence of Mr. Coyne, p. 28.
[298] Exhibit B-16, Rebuttal Evidence of Mr. Coyne, p. 28.
[299] Exhibit C7-7-2, Appendix C, p. 7.
[300] Oral Hearing Transcript Volume 3, p. 577.
[301] Exhibit C7-7-2, Appendix C, pp. 8–9; T3:572, 580.
[302] Oral Hearing Transcript Volume 3, pp. 691–692.
[303] FEI Final Submission, pp. 96–98.

- Adjustment to the grand mean of utility betas is not a suitable substitute for the Blume adjustment because it does not sufficiently compensate for the negatively biased result for low beta firms and does recognize the additional risk inherent in the calculation of beta for interest-rate sensitive firms; and
- Dr. Booth also adjusts his raw betas and has used the same generic beta adjustment for at least ten years.

Intervener submissions

AMPC/BCOAPO make the following submissions in support of Dr. Booth's approach to determining beta:[304]

- Dr. Booth's determination of the relative risk of a Canadian utility of 45 to 55 percent is a generous beta relative to the much lower utility betas that have been experienced in recent years;
- No other Canadian regulatory board has accepted betas adjusted towards 1.0;
- Analysts do not generally adjust betas towards a mean of 1.0 as evidenced by sources examined by Dr. Booth, including RBC, Google, Yahoo, the Globe and Mail and the Financial Post;
- Mr. Coyne's calculation of Canadian beta adjusted to the industry average of 0.57 is very close to the upper end of Dr. Booth's range and the bottom of Dr. Booth's range is comparable to Mr. Coyne's raw Canadian beta of 0.47;
- In the last 22 years, Canadian utility betas have not reached the .60 used by the Commission in 2013; and
- Adjusting beta to the average beta of utilities stocks is "best practice" as this is more indicative measure of where utility stock betas are likely to average over time.

CEC supports Dr. Booth's approach to beta and notes that Mr. Coyne's incorporation of the US utilities data results in a higher beta than would be applicable to Canadian utilities.[305]

FEI reply submission

FEI submits that Mr. Coyne's use of Blume-adjusted betas produces a more reasonable result and should be preferred. In its reply submission, FEI responds to the interveners submissions as follows:[306]

- To respond to its interpretation of AMPC/BCOAPO's characterization of the Blume adjustment, FEI reiterates that the Blume adjustment is:
  (a) Not an adjustment to 1.0 but rather directionally toward 1.0 by giving 2/3 weighting to raw betas and 1/3 weight to the market mean of 1.0.; and
  (b) Does not mean that there is an expectation that betas will reach 1.0.
- In the 2013 GCOC Decision, the Commission found that none of the positions fully explained the beta values and accepted an intermediate beta of 0.60, however in the current proceeding, there is significant evidence on the record to warrant placing greater weight on Blume-adjusted data including:
  (a) the Blume studies;
  (b) excerpts from Dr. Morin's textbook;
  (c) the Brattle Group Report;

[304] AMPC/BCOAPO Final Submission, pp. 46–49.
[305] CEC Final Submission, pp. 28–29.
[306] FEI Reply Submission, pp. 67–72.

(d) the Fernandez studies;

(e) the standard adjustment methodology employed by Value Line, Bloomberg and Merrill Lynch for equity return calculations;

(f) Mr. Coyne's own study results confirm that raw betas, and even Blume-adjusted betas, are understated;

(g) a list of additional studies that Mr. Coyne was asked to provide by way of undertaking;

(h) Mr. Coyne's evidence that Blume adjusted betas are widely used and accepted by regulators; and

(i) The betas used in the pension reports relied on by Dr. Booth as support for his MRP.

- The riskiness of utility stocks relative to the market should not be used as a basis for determining betas and the lower volatility of these stocks only suggests that betas should be less than one. Further, one would expect raw betas to be below adjusted betas for low beta stocks and the fact that the betas are lower is not an indication of whether raw betas need to be adjusted.

Commission determination

Based on the evidence presented by both experts, the Panel finds it is appropriate to adjust historical betas to estimate expected returns using the CAPM. Both experts and all parties agree that an adjustment to historical raw beta is required.

The issue for the Panel to determine is what the appropriate adjustment to raw historical betas should be. In the 2013 GCOC Decision, the Commission found that none of the positions fully explained beta and on that basis, accepted a beta representing the range of reasonable estimates presented. The Panel notes AMPC/BCOAPO's statement that "there is no historical statistical evidence supporting the Commission's use of a beta of 0.60"[307] with reference to the 2013 GCOC Decision. The Panel also notes FEI's argument that there is significant evidence on the record to consider the appropriateness of placing greater weight on Blume adjusted data.

To determine the amount of the beta adjustment, the Panel considers the appropriateness of using an adjustment to the average beta of utility stocks. Both AMPC/BCOAPO and CEC support such an adjustment. While Dr. Booth refers to the Gombola and Kahl study and considers the effect of adjusting to the average beta of utility stocks, he recommends that recent historical betas be adjusted upward to their historical range reflecting normal market risk. Dr. Booth prefers the use of judgment constrained with historical evidence over simply adjusting to the average of utility stocks. Mr. Coyne's view is such an adjustment does not sufficiently compensate for the negatively biased result for low beta firms and does recognize the additional risk inherent in the calculation of beta for interest-rate sensitive firms. **Given that neither expert endorses the adjustment of beta to the average of utility stocks, the Panel finds there is little evidence in this proceeding to support an adjustment to the average beta of utility stocks.**

The Panel does not accept it should rely solely on Dr. Booth's judgement without stronger empirical corroborating evidence to support his beta adjustments. Accordingly, **Panel finds that it can place only limited weight on Dr. Booth's beta estimates.**

[307] AMPC/BCOAPO Final Submission, p. 48.

With respect to the use of the Blume adjustment, the Panel notes Mr. Coyne's evidence presented in Figure 5.1 above which in his view, shows that unadjusted betas do a poor job of estimating expected returns and Blume adjusted betas still understate the actual return but the result is closer than using raw betas. The Panel is of the view that this analysis confirms, consistent with the Fernandez beta study Mr. Coyne refers to in his rebuttal evidence, the beta calculated using historical data is not a good approximation of a company's beta. In the Panel's view, this analysis confirms that an adjustment is needed but does not provide evidence of what the adjustment to beta should be. The Panel is also concerned that given the disruption in the capital markets during the period presented and recent merger and acquisition activity[308] in the industry there may be confounding factors impacting the results of the analysis.

The Panel acknowledges Mr. Coyne's view that the Blume adjusted Value Line and Bloomberg data he uses are used and accepted. On the other hand, Dr. Booth's evidence shows some data providers do not use this method. Further, the Panel considers that findings of the Brattle Group indicate some variation in practice:

> Beta estimates are provided by many data services for Canadian, American and other traded companies. The most common methodology to estimate betas is to use the most recent five years of weekly or monthly return data. These betas may then be adjusted towards one as adjustment for sampling reversion that was first identified by Professor Marshal Blume (1971, 1975).[309]

The Panel also notes Mr. Coyne's testimony that the Blume methodology is a supported and widely used methodology utilized by financial analysts, investors and corporations. However, considering the survey results included in the Fernandez beta study Mr. Coyne refers to in his rebuttal evidence, the Panel considers the justification for doing so is likely more practical than theoretical.

The Panel notes that none of the studies Mr. Coyne refers to in Exhibit B-31 specifically relates to the behaviour of utility stock betas. The Panel is not persuaded the evidence in this proceeding supports the position that the Blume adjustment applies to utilities in the same way it applies to the market as a whole. The Panel notes this was a point made by Dr. Booth in his evidence.

The Panel has also considered decisions in other jurisdictions. While no other Canadian jurisdiction has previously endorsed the Blume methodology, it is not uncommon to rely on adjusted betas; Mr. Coyne testified US jurisdictions regularly consider or rely on Blume adjusted betas.

Although the methodologies may vary, neither of the experts disagree that some degree of upward adjustment is necessary. The Panel agrees.

The Panel accepts that its task is to estimate beta for a utility stock but as pointed out, there is a lack of empirical evidence supporting the applicability of the Blume adjustment to utility stocks. **Because of this, the Panel finds it can place only limited weight on Mr. Coyne's use of the Blume adjustment as a methodology to adjust historical utility betas.**

[308] Oral Hearing Transcript Volume 3, pp. 584–585.
[309] Exhibit A2-3, Brattle Group Report, pp. 15–16. (Emphasis added)

Given that the Panel places only limited weight on the beta estimates of the experts and there has been little change in economic conditions since the last hearing, consistent with the 2013 GCOC Decision, the Panel continues to accept beta estimates representative of the range of estimates presented of approximately 0.6.

5.2.3.5 Dr. Booth's credit spread adjustment

In his evidence, Dr. Booth analyzed the volatility indices and the spread between corporate debt and Canada bonds and concludes that the increase in A credit spread to 191 bps from the typical average for the normal business cycle of 100 bps was caused partially by liquidity problems which have to be disentangled.[310] Dr. Booth recommends 50 percent adjustment to changes in credit spreads or 0.45 percent[311] to adjust the current market effect. Dr. Booth regards this sort of adjustment as converting the CAPM into a conditional CAPM (CCAPM) where the CAPM holds conditional upon the state of the financial markets.[312]

Mr. Coyne's issue with the CCAPM adjustment is that he believes in current market conditions, the default component would be greater than 50 percent, necessitating a higher adjustment.[313]

Intervener submissions

AMPC/BCOAPO reiterated that 0.45 percent adjustment to the CAPM result, as a prudent adjustment is consistent with the objective of ensuring that FEI's fair ROE reflects current capital market conditions.[314] CEC submits Dr. Booth has provided credible evidence with respect to the need for and appropriate calculation of the credit spread adjustment.[315]

Commission determination

The Panel takes no position with respect to the merits of Dr. Booth's recommended credit spread adjustment. **The Panel finds the evidence on the credit spread adjustment is not persuasive enough to warrant a credit spread adjustment.**

5.2.3.6 Appropriate CAPM estimate

Commission determination

In arriving at its overall determination on the CAPM estimate, the Panel recognizes that using a CAPM requires the selection of a number of subjective decisions that can lead to significantly different results. In addition, consistent with the view of the experts, the Panel recognizes the limitations of the model are exacerbated in the current market environment as reflected in the need to modify the risk free rate to adjust for abnormally low bond yields. Recognizing these limitations, the Panel considers it is necessary to use its best judgment to assess the reasonableness of the inputs into the CAPM and to determine an appropriate overall estimate for the model. The Panel will then determine the appropriate weighting to apply to the results under current market conditions relative to the DCF.

[310] Exhibit C7-9, BCUC IR 13.2.
[311] 91 basis point (191-100) with 50 percent adjustment.
[312] Exhibit C7-9, BCUC IR 13.3.
[313] Exhibit B-18, Mr. Coyne Rebuttal, p. 33.
[314] AMPC/BCOAPO Final Submission, p. 53.
[315] CEC Final Submission, p. 40.

With application of appropriate judgement, the Panel accepts an estimate of approximately 8.0 percent, excluding flotation costs, as the CAPM estimate for the appropriate ROE. The Panel arrives at this determination by drawing together its conclusions on the individual inputs to the CAPM estimates as well as considering the level of uncertainty involved, the requirement to exercise its judgment and considering the conclusions reached in previous decisions. As outlined earlier in Section 5.2.3, the Panel's conclusions with respect to individual inputs to the CAPM are summarized below:

i) A risk free rate plus an adjustment for abnormal conditions in the range of 3.8 to 4.0 percent. This is based on both experts agreeing that an adjustment to the risk free rate is necessary in the current market conditions and that both experts' end up with similar estimates.

ii) MRP in the range of 6.3 to 7.0 percent based on:

   a) Acceptance of Mr. Coyne's historical MRP of 6.3 including the use of income returns as opposed to total returns. This is based on third party evidence supporting his view as well as giving equal weight to Canadian and US historical MRP.

   b) Consideration of forward-looking MRP estimates while placing more weight on historical because of the use of largely untested growth estimates in the forward-looking calculations and the Panel's view that forward-looking data is less reliable than historical estimates.

iii) Beta estimate of approximately 0.6. The Panel considers the views of the parties that an upward adjustment to raw historical betas is necessary but given the lack of empirical evidence supporting their positions, the Panel places no reliance on the adjustment methods used by the experts. Consistent with the 2013 GCOC Decision, the Panel bases it determination on the range of estimates presented with an intermediate value of approximately 0.6.

5.2.4 Discounted cash flow estimates

The DCF model is another tool that is commonly used to estimate the cost of capital. This model works directly with an individual asset's cash flows and price. In estimating cost of equity, the DCF model "derives the opportunity cost of equity determined by the market, without having to model explicitly the market risk-return trade-off that generated the market's opportunity set." As such, the DCF model is based on the recognition that the discounted sum of all future expected dividends results in the current stock price and equates the cost of equity with the expected dividend yield plus the expected growth rate of dividends. Therefore, it derives the opportunity cost of equity as determined by the market.[316]

Like the use of the CAPM, reliance on the DCF model to estimate the cost of equity is not without its issues. Two commonly raised issues with this model are the choice of DCF model to be relied upon and the determination of an appropriate growth rate to be used in the formula. With these in mind, the Panel has identified three areas which need to be explored in determining an appropriate DCF estimate. These are as follows:

i) The value of the constant growth versus a multi-stage approach to using the DCF model.

ii) Guidance the Panel can take from the submissions given the difference in approach to DCF taken by Dr. Booth and Mr. Coyne.

iii) The appropriate weight to place on analyst estimates.

In addition to these considerations and further to Section 5.2.2, the Panel must also address Mr. Coyne's proxy group make-up and determine the relative weight given to them.

[316] Exhibit A2-3, Brattle Group Report, p. 26.

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5.2.4.1 Constant growth and multi-stage DCF model variants

There are two types of models which are commonly used for DCF estimates, the constant growth and the multi-stage models. Each of these has been used by the experts in this proceeding.

As outlined by Mr. Coyne, the constant growth DCF model is based on a number of assumptions. These include the following:

- an average growth rate for earnings and dividends which is constant;
- a stable dividend payout ratio;
- a constant price-to-earnings multiple; and
- a discount rate greater than the expected growth rate.[317]

Put simply, the constant growth model yields a cost of equity equaling the expected dividend yield plus the perpetual expected future growth rate for dividends. In implementing this model, the expected dividend, the growth rate and the current stock price must be determined.

Where there is reason to believe that investors do not expect a steady growth rate in perpetuity as an input assumption in the constant growth DCF model, the multi-stage DCF model is another option. As outlined in the Brattle Group Report, the multi-stage DCF model may be appropriate where there is reason to believe investors do not expect a steady growth rate forever, but rather, have different growth rate forecasts in the near term (e.g., over the next five or ten years) converging to a constant terminal growth rate at the end of the near-term (e.g., at the end of five or ten years).[318] A key element of this is the expected growth rate must become and remain constant at some point. However, the choice of an appropriate growth rate is the most controversial part of the DCF model implementation, particularly for the long-term as this has a major effect on the cost of equity estimated by the model. This is further complicated by the fact forecast growth rates are generally unavailable for periods longer than five years. This is important given the Brattle Group Report's statement that "the DCF approach requires that the stable-growth assumption must be reasonable and must be met *within the period for which forecasts are available.*"[319]

Generally, the Brattle Group Report views the DCF approach as being conceptually sound as long as its assumptions are met but in practice, can run into difficulty when those assumptions are so strong and unlikely to correspond to reality. Further, the stability of DCF cost of equity estimates can be a problem across similar companies or over a relatively short time span. The more stable a company or industry the less of a problem such issues pose.[320]

Both Mr. Coyne and Dr. Booth present variants of the DCF model. The following table sets out Mr. Coyne's and Dr. Booth's estimates and variants of the DCF model.

[317] Exhibit B-1, Appendix B, p. 51.
[318] Exhibit A2-3, Brattle Group Report, pp. 9, 26–27.
[319] Exhibit A2-3, Brattle Group Report, pp. 27–30. (emphasis in original)
[320] Exhibit A2-3, Brattle Group Report, p. 30.

Mr. Coyne and Dr. Booth's use of the DCF Model

Table 5.5 summarizes the expert witnesses' use of the DCF model variants and their estimates.

Table 5.5: Summary of DCF Estimates

Mr. Coyne		
DCF model type	**Specification**	**DCF Estimates[321]**
Constant growth model[322]	• Seven US and five Canadian proxy companies; • Earnings growth rates taken from SNL Financial, Value Line, Zacks and First Call for each company in the Canadian and US proxy group.	Canada: 12.20%[323] US: 9.18%[324] Average: 10.69%
Multi-stage model (selected)[325]	• Same companies and growth data source as constant growth model above; • Estimated company growth for Years 1 to 5; declining to long-term growth in Years 6-10; nominal GDP growth in Year 10+	Canada: 9.32%[326] US: 8.39%[327] Average: 8.86%
Dr. Booth		
DCF model type	**Specification**	**DCF Estimates**
Constant growth model[328]	• Whole Canadian market • Sustainable growth rate range of 4.72 to 5.77%	Approximately 8.75%[329]
Constant growth model[330]	• US S&P 500 firms • Sustainable growth rate 6.91% (average)	Range: 9.04% to 10.14%[331]

[321] Mr. Coyne's DCF ROE estimates include 50 bps flotation allowance and therefore, Mr. Coyne's estimates in the table are 50 bps lower for comparison purposes
[322] Exhibit B-1, Appendix B, p. 5; Exhibit B-1, Appendix B, Exhibit JMC-7, Schedule 1.
[323] Canada: growth rates, depending on the company, range from 4.19% to 13.63%. Average growth rate 8.03%; Exhibit B-1, Appendix B, Exhibit JMC-7, Schedule 1, pg. 2.
[324] US: growth rates, depending on the company, range from 4.75% to 6.95%. Average growth rate 5.65%; Exhibit B-1, Appendix B, Exhibit JMC-7, Schedule 1, pg. 1.
[325] Exhibit B-1, Appendix B, p. 5; Exhibit B-1, Appendix B, Exhibit JMC-7, Schedule 2, Column 10.
[326] Canada: Years 1 to 5 growth range from 4.19% to 13.63% with an average of 8.03%. Year 6 to 10-average 5.98%. Nominal GDP growth in perpetuity is 3.94%; Exhibit B-1, Appendix B, Exhibit JMC-7, Schedule 2, pg. 2.
[327] US: Years 1 to 5 growth rates range from 4.75% to 7.25% with an average of 5.65%. Year 6 to 10-average 5.47%. Nominal GDP growth in perpetuity is 4.55%; Exhibit B-1, Appendix B, Exhibit JMC-7, Schedule 2, pg. 1.
[328] Exhibit C7-7-2, Direct Testimony of Dr. Booth, Appendix D, pp. 6–8.
[329] TSX dividend yield at the end of September 2015 is 3.17%; Long run growth rate in dividends and earnings is 5.35%.
[330] Exhibit C7-7-2, Direct Testimony of Dr. Booth, Appendix D, pp. 9–10.
[331] Current dividend yield on the S&P 500 index: 1.99%; S&P 500 firms retention rate (b) is 52.3% since 1956; S&P 500 firms average ROE is 13. 43% since 1987. Median is 14.07%. Over the same period, the retention rates were 51.5% (average) and 57% (median); Growth rates: 57%*14.07% = ~7.99% (median) 51.5%*13.43% = ~6.91% (average).

Constant growth model[332]	• Eight low risk US utilities • Sustainable growth rate	Range: 7.09% to 10.40%[333] Median: 8.65% Sustainable Growth Rate Model: 7.02% median

Mr. Coyne applies both a constant growth and a multi-stage DCF model to the Canadian and US proxy groups he has developed. Mr. Coyne's selection of proxy groups has been discussed in Section 5.2.2. In preparing the DCF models for these proxy groups, Mr. Coyne notes the profiles of US proxy group of companies are more like FEI than the Canadian proxy companies but he has nonetheless given them equal weight because of the importance of providing a Canadian perspective. Growth rates for both Canadian and US proxy groups were developed using data from a number of sources as noted in Table 5.5 above. The first five year's growth estimates were based on an average of analyst's estimates. This was followed by a five year transitional stage designed to change the growth rate each year on a *pro rata* basis and eventually connect with the long-term forecast for Year 11 and beyond. Growth estimates for Year 11 and beyond are based on the long-term forecast of GDP.[334]

Mr. Coyne has relied only on the multi-stage model to inform his recommendations for ROE noting that in the 2013 GCOC Decision, the Commission found the "use of analyst's forecasts is more consistent with the multi stage models where analysts forecasts can inform the early stage and longer term forecasts such as GDP growth, can inform the later stages." As outlined in Table 5.5, which took out flotation for comparability across estimates by the experts, the use of the multi-stage model produced results of 9.32 percent for Canada and 8.39 percent for the US proxy group.

According to Dr. Booth, the DCF model should only be used for low risk dividend paying stocks or the market as a whole, where the expected dividends can be assumed to grow at some long run average growth rate.[335]

Dr. Booth indicates he has placed little emphasis on the DCF model in the past and has traditionally viewed his DCF estimates as "checks" on his CAPM estimates but recent low Canada bond yields have given him cause for re-evaluation. Dr. Booth has relied on a DCF model using sustainable growth rates. The sustainable growth styled model is built on the premise that a company's growth is driven by a firm's expected earnings and the extent to which these earnings are paid out as dividends or retained for future investment in the company. Dr. Booth has applied his model to the market as a whole and estimates "the fair return as being 8.50-9.00% in Canada and slightly higher in the US." Dr. Booth estimates the US equity return in the 9.0 to 10 percent range. When DCF is applied individually against a proxy sample of eight US utilities (six were in Mr. Coyne's proxy group), an equity cost of 8.65 percent results based on median analyst five-year growth forecasts. However, when based on Dr. Booth's sustainable growth forecast approach, 7.02 percent is the median DCF equity forecast for the eight utilities in his proxy group.[336] Dr. Booth did not comment on the inclusion of flotation costs in his DCF estimates.

[332] Exhibit C7-7-2, Direct Testimony of Dr. Booth, Appendix D, pp. 13–14.
[333] Forecast growth rate 4% to 7%; Current dividend yield range from 2.29% to 4.02%. Average: 3.21% and median: 3.2%; Current (November 18, 2015) dividend yield: 1.98%.
[334] Exhibit B-1, Appendix B, pp. 5–6, 58–59.
[335] Exhibit C7-7-2, pp. 50–51, 58; Appendix D, pp. 6–17.
[336] Exhibit C7-7-2, Appendix D, pp. 6–17; Ibid., pp. 50–51, 58.

Mr. Coyne does not agree that the sustainable growth rate approach as applied by Dr. Booth appropriately captures the expected growth rate of a regulated utility. In his words, "In the fullest form of the sustainable growth formula, new equity issuance, or what are commonly known as externally generated funds are also considered."[337] This method is the common approach for sustainable growth rate calculation and Dr. Booth's approach is the model in its simplest form projecting growth as a function of internally generated funds. Mr. Coyne's position is that a firm's growth is understated in this model by the failure to consider debt and equity issuances as a source of future growth.

Mr. Coyne also points out that the Federal Energy Regulatory Commission (FERC) has moved away from using the sustainable growth rates in its DCF methodology and now uses a two-step DCF methodology relying on a combination of analyst growth rates and GDP growth estimates. Dr. Coyne continues by stating he has concerns with the reasonableness of Dr. Booth's sustainable growth rate calculation in that he "has effectively pre-supposed analyst ROE and payout projections for his proxy group companies. Thus, by using this growth measure, Dr. Booth has assumed the reasonableness of analyst's ROE projections, yet, not the analyst's projections of growth rates by the same analysts." By example, he refers to the table on page 13 of Appendix D of Dr. Booth's evidence where the mean and median ROE projections for the proxy group are close to 10.2 percent but Dr. Booth's use of the simple form of the sustainable growth rate method yields ROEs of 6.83 and 7.02, respectively.[338]

In FEI's view, Dr. Booth's sustainable growth DCF approach guaranteed that future utility growth and resulting DCF value would be understated. FEI considers Dr. Booth's simplified sustainable growth model to be unrealistic as the only source of utility growth is the reinvestment of retained earnings and does not take into account funds generated by utilities through the injection of new equity (shown as the product of "s x v" where "s" represents the growth in shares outstanding and "v" is that portion of the market to book ratio that exceeds one). FEI points out that in the full form of the sustainable growth DCF model, the injection of new equity is accounted for and further, Dr. Booth has admitted he has included adjustments for the impact of external financing in his sustainable growth DCF models in the past.[339]

FEI submits Dr. Booth has suggested "the total impact of including the incremental source of financing would be negligible, assuming (a) that utility's market-to-book value is close to one, and (b) the growth in shares outstanding is very small." FEI points out that the eight US utilities he used to calculate his CAPM estimates and his sustainable growth DCF model have market to book ratios that are significantly higher than one and based on Dr. Booth's logic, would provide a higher than the presented DCF result.[340]

Intervener submissions

With reference to Dr. Booth's use of the sustainable growth model, AMPC/BCOAPO assert FEI only partially responded to the points he made during his cross-examination as to why the "s x v" effect is negligible. Concerning FEI's argument that the "s x v" term should be included, "Dr. Booth explained that in any event utility market-to-book ratios ought to be close to one, as regulation should lead to a market price that is approximately equal to the utility's book value, and the term furthermore contains a 'huge' risk of estimation

[337] Exhibit B-16, Rebuttal Testimony of Mr. Coyne, p. 36.
[338] Exhibit B-16, pp. 35–37.
[339] FEI Final Submission, pp. 89–90; T3:501.
[340] FEI Final Submission, p. 90; T3:625–626.

error." AMPC continue by referring to Dr. Booth's point that when the issuance of capital stock is negligible, the "s x v" is effectively zero and FEI has provided no evidence that it will dilute its capital stock by a non-negligible amount and Dr. Booth described why this was highly unlikely during the oral hearing.[341]

AMPC/BCOAPO assert that Mr. Coyne has relied on constant growth calculations and even though he ultimately claims not to have used them, they play a prominent role in his evidence. It is their position that constant growth DCF models are meaningless and have no place in the comparison, particularly where there are predictions of constant growth that exceed the growth of GDP.[342]

CEC submits the estimates from the constant growth model are likely inaccurate and highly inflated and recommends the Commission disregard or place very little weight on Mr. Coyne's constant growth DCF model and "disregard the comparison and the average that Mr. Coyne provides." It is CEC's position that Dr. Booth's evidence is superior to Mr. Coyne's and Dr. Booth's evidence is better used as a check than as a basis for ROE determination. Specifically, CEC states that Dr. Booth's evidence concerning sustainable growth rates "is reasonable and does not unduly understate the firm's growth model, and is superior to Mr. Coyne's analyst forecasts."[343]

FEI reply submission

FEI considers the evidence contradicts Dr. Booth's assumption that price to book ratios equal one pointing out the market to book ratios of the utilities used in Mr. Coyne's proxy groups averaged well over 2.0 and Dr. Booth's estimates based on sustainable growth rates have understated his DCF outcomes. FEI takes issue with Dr. Booth's view that it is unlikely that FEI "will dilute its capital stock by a non-negligible amount" pointing out FEI does not issue equity and Dr. Booth has "overlooked the fact that the S*V term is derived from the proxy group companies." Thus, based on these proxy groups, FEI asserts the results coming from Dr. Booth's simplified model could be significantly understated.[344]

5.2.4.2 Analyst estimates

The Brattle Group Report states the choice of an appropriate growth rate is the most controversial element of using DCF and note most economists are in agreement that investment analyst's expected growth rates are more representative of investor expectations than historical growth rates. The Brattle Group Report acknowledges some critics claim analyst's earnings growth rates are tainted by a bias towards optimism as there is an observed tendency for analysts to estimate growth rates that are higher than what actually occurs. However, the Brattle Group Report also makes the following statement:

> Analyst forecasts for the utility industry are likely to be more accurate than forecasts for other industries because firms with less variability in their earnings tend to have more accurate forecasts. This suggests analyst forecasts for the utility industry are likely to be more accurate and less prone to potential bias when compared to forecasts of other industries.[345]

[341] AMPC/BCOAPO Final Submission, p. 56; T3:601.
[342] AMPC/BCOAPO Final Submission, p. 58.
[343] CEC Final Submission, pp. 19, 41.
[344] FEI Reply Submission, p. 76.
[345] Exhibit A2-3, Brattle Group Report, p. 29.

Mr. Coyne submits that in the US, several regulatory changes have been implemented to deal with this issue. Specifically, both the US Securities and Exchange Commission and the New York Stock Exchange have taken measures designed to provide fair disclosure and remove the incentive for analysts' bias. In Canada, regulators took similar actions to improve the independence of research and ensure Canadian Securities Analysts practiced professionally. Mr. Coyne also noted the 2013 GCOC Decision rejected suggestions of analyst bias.[346]

One of Dr. Booth's arguments for relying upon unadjusted DCF results was his view that optimism bias exists in analyst's growth forecasts. Dr. Booth has provided evidence in the form of a Globe and Mail article based on a study by a consulting firm, McKinsey, reporting that analysts start out optimistic when making a five-year forecast before "they hone in on the correct number" as they get more information. Dr. Booth also reports that a 2007 study by Easton and Sommers documented the optimism bias at 2.84 percent when analyst's estimates are compared to current earnings realizations.[347]

FEI argues there is no evidence of analyst bias in growth forecasts relying upon the following reasons:

- The Brattle Group Report comments concerning the accuracy of forecasts in the utility industry and Dr. Booth's admission in the 2013 GCOC Decision that optimism bias in the utility industry is less evident than in other sectors in the economy.
- The Battle Group Report noted there is "substantial academic evidence that analyst earnings estimates are superior to other forecasts."
- Mr. Coyne identifies several factors explaining why the substantial academic evidence referred to in the Brattle Group Report is reasonable. Included among these are the facts that equity analysts have no incentive to provide optimistic research reports and are industry experts on the companies they follow as well as the regulatory changes that have been made on both sides of the Canada/US border.
- The Commission has rejected Dr. Booth's assertion that upward bias in growth forecasts requires adjustments to DCF results in each of the last three cost of capital proceedings.

FEI also points out that Mr. Coyne's multi-stage DCF limits the use of analyst growth rates to five years with a transition period following.[348]

Intervener submissions

AMPC/BCOAPO submit the potential for upward bias has inflated FEI's DCF estimates to an amount that would not be consistent with a fair return. They consider it problematic to rely on analyst's growth forecasts due to a well-known optimism bias attached to analyst forecasts. In addition to the evidence brought forward by Dr. Booth, AMPC/BCOAPO states this bias is confirmed by the current record "where comparisons to the capital market reports by TD, Aon Hewitt and Mercer show comparable or lower forecast returns for the market as a whole, than for Mr. Coyne's analyst forecasts for low risk utilities." AMPC/BCOAPO refer to a 2011 Alberta Utility Commission decision expressing concern for the potential for upward bias in analyst's growth estimates as further support for its position.

CEC submits the evidence supporting bias toward over-optimism when estimating earnings should be given significant weight. It is CEC's view that Mr. Coyne's use of analyst's growth rates in his multi-stage DCF model

[346] Exhibit B-1, Appendix B, pp. 55–56.
[347] Exhibit C7-7-2, Appendix D, pp. 14–15.
[348] FEI Final Submission, pp. 86–88.

may have inflated the evidence resulting in an ROE recommendation which is too high and therefore should be viewed with caution and adjusted downward. CEC did not share with the Commission how it reached this conclusion.

CEC holds that Dr. Booth's model is both reasonable and superior to Mr. Coyne's analyst forecasts and does not unduly understate the firm's growth model. CEC recommends the Commission heavily weigh the DCF estimate of Dr. Booth.[349]

FEI reply submission

FEI takes issue with the AMPC/BCOAPO suggestion that TD, Aon and Hewitt and Mercer capital market reports show comparable or lower forecast returns for the whole market than Mr. Coyne's analyst forecasts for low risk utilities. FEI asserts there is no evidence suggesting that a specific utility's earnings growth rates and the multi-stage DCF over a specific period of time should always be lower than market returns as a whole.

FEI does not support the use of pension plan information but states that if it were used, it would show that Mr. Coyne's multi-stage DCF results are close to the pension report's corresponding returns as cited by AMPC/BCOAPO. FEI points to the category within the Fearless Forecast and the Aon Hewitt report called US defensive equity. Mr. Coyne describes these as low-risk companies such as utilities. He outlines how when the arithmetic growth rate and an equity beta of .75 as relied upon in these reports are used, a geometric equivalent ROE of 8.5 percent is achieved. When an additional 50 basis points is added for flotation, he notes this would increase the ROE to 9.0 percent.[350]

AMPC/BCOAPO sur-reply

On May 16, 2016, AMPC/BCOAPO filed a sur-reply, which among other things took issue with FEI arguing the nature of pension forecasting for the first time in its reply submission. After submissions from the parties and a reply from AMPC/BCOAPO, the Commission allowed the sur-reply to remain on the record.

AMPC/BCOAPO submit that while it "recognizes that paragraph 144 (not 143, as FEI states) repeats some of the BCUC 1.40.2 response absent citation, the pension fund argument in FEI's Reply submission (pp. 60-64) remains largely general." AMPC/BCOAPO submit it did not argue that "pension returns" are relevant. It did argue that "published pension plan forecasts of general returns (asset classes like Canadian equities, US equities, etc.) are relevant to the returns potential investors might expect from FEI."[351]

Commission determination

There were three areas the Panel identified as needing to be explored in reaching its determination on the DCF model and its weighting in this proceeding: the choice of DCF approaches, guidance to be taken from expert witness submissions and the weight placed on analyst estimates.

[349] CEC Final Submission, pp. 18, 41.
[350] FEI Reply Submission, pp. 73–74.
[351] AMPC/BCOAPO Sur-Reply, pp. 2–3.

a) Constant growth versus the multi-stage approach to using the DCF model

The primary issue with the use of these two models is whether it is appropriate to rely on a growth forecast in perpetuity as implied by the constant growth model or whether the growth forecast should be staged over a period of time settling into a tempered long-term perpetual grow rate thereafter. Dr. Booth favours the constant growth model but only in the context of the market as a whole stating that this and S&P utility indexes "are more reliable than for individual companies due to significant measurement error attached to forecasting future growth rates." Dr. Booth further notes it is impossible for utilities to grow faster than the GDP forever, thereby explaining a significant drawback to a constant growth DCF model when used in the context of a company or small group of companies. Mr. Coyne has prepared both constant growth and multi-stage DCF models but he relies only on the multi-stage model explaining that in the 2013 GCOC Decision, the Commission favoured a multi-stage approach.

The Panel considers the constant growth DCF model to have limited value when applied against a single company or small group of companies and agrees errors in forecasting will likely result due to the improbability of utilities perpetually growing at a rate faster than GDP. The Panel also agrees that if the constant growth model is to have any application, it is when taken in the context of the market as a whole thereby eliminating some of the issues related to determining a reasonable growth rate for a smaller group. **The Panel therefore finds that no weight can be placed on Mr. Coyne's constant growth DCF results as applied to his proxy groups.** For proxy group DCF estimates, the Panel favours use of the multi-stage DCF approach as it provides a more realistic and reasonable approach to estimating growth over the long-term.

b) Mr. Coyne and Dr. Booth's use of the DCF model

Dr. Booth has provided ranges for the overall equity return in the Canadian market of 8.50 percent and 9.5 percent and 9.0 to 10.0 percent in the US market as a whole. As Dr. Booth provided no definitive estimates for utilities as a group, the Panel infers that Dr. Booth intended these estimates to cover the upper end of his DCF estimate range. The fact that utilities are generally considered to be lower risk than the market as a whole would indicate a ROE estimate for utilities or FEI falling somewhere below these levels. However, this is only conjecture and as a result, the Panel places little weight on Dr. Booth's constant growth whole market DCF estimates for the purpose of determining a fair ROE.

Dr. Booth also introduced a version of the sustainable growth rate DCF approach asserting that a median ROE of 7.02 percent results when applied against his US proxy group of eight utilities. Dr. Booth did not provide evidence as to the level of adoption of this approach in Canada and the US although Mr. Coyne pointed out that FERC has moved away from any reliance on sustainable growth rates, a point the Panel notes was not contested. The Panel observes that Dr. Booth took into account only internally generated funds and neglected to take into account externally generated funds such as the issuance of new equity. This concern was raised by Mr. Coyne and AMPC/BCOAPO responded to this by stating Dr. Booth's explanation is FEI has provided no evidence it will dilute its capital stock by an amount that is non negligible and thus the s x v is effectively zero. While FEI does not issue equity to the public, the Panel notes FEI's equity financing requirements of $594 million related to expected capital expenditures in 2016-2018 (see Table 4.4) will likely require the shareholder to make equity injections to maintain FEI's approved equity structure. In addition, , Dr. Booth's sustainable growth model is applied to his proxy group, not FEI, and therefore whether FEI is to issue new equity is irrelevant given they were not part of the proxy group. The Panel is of the view that the lack of consideration of the potential for proxy

companies to issue equity is important and could have resulted in a different set of outcomes. **Therefore, the Panel finds that no weight can be placed on Dr. Booth's sustainable growth rate model for his US proxy group as it is not based on a more robust and comprehensive version of this model.** Moreover, the Panel remains unpersuaded as to whether it is valid to apply the sustained growth rate model itself. There has been limited evidence in this proceeding on the model, its variations and the level of adoption in other jurisdictions. Given these limitations, the Panel views any results attributed to the use of this model with caution.

The Panel notes that Mr. Coyne, while preparing a constant growth DCF model, did not rely on it in his DCF calculations and therefore disagrees with AMPC that this information played a prominent role in his evidence. Instead, Mr. Coyne has relied upon his multi-staged DCF model results for his Canadian and US proxy groups. When commenting on the Canadian proxy group, Mr. Coyne stated he did not think it was anywhere near as good a comparator as his US sample and explains he uses them "because I find it helpful to use a Canadian sample to see what numbers I would derive, but I use them with caution."[352] The Panel agrees noting that in terms of form and function the companies in the US proxy group are closer than the companies Mr. Coyne has selected in his Canadian proxy group. The Panel has provided its assessment of Mr. Coyne's US proxy group data in Section 5.2.2 where it outlined a number of issues related to comparability with FEI and concluded US proxy data "is an imperfect reflection of the circumstances facing FEI requiring considerable judgement as to the weight to be placed on this data."

Given these concerns, the Panel finds that only limited weight can be placed on the DCF estimates based on either the Canadian or the US proxy groups. By Mr. Coyne's acknowledgement, the US proxy group is more comparable to FEI in terms of form and function when compared to the Canadian proxy group. Moreover, in the view of the Panel, the US proxy group companies operate in a different regulatory environment and likely face a greater level of risk than indicated by Mr. Coyne.

c) Analyst's Estimates

In the 2013 GCOC Decision, the Commission found that there was "reason to be cautious of potential bias in the utility sector." However, based the evidence presented by the experts, it was not convinced an adjustment for analyst bias should be made.[353] The Panel holds a similar view in this proceeding. Dr. Booth has provided evidence that support the existence of optimism bias. However, counter to this, the Brattle Group Report states utility industry estimates are likely to be more accurate than those in other industries. Moreover, as argued by FEI, Dr. Booth acknowledges this in the 2012 GCOC proceeding where he stated "optimism bias is probably more evidence (sic) in growth stocks than it is in value stocks, and it's less evident in utilities than in other areas."[354] **Given these considerations, the Panel finds that caution must be exercised with analyst estimates due to the potential for optimism bias but is not persuaded the evidence supports the need to adjust analyst forecasts related to the utility industry.**

[352] Oral Hearing Transcript Volume 2, p. 422.
[353] 2013 GCOC Decision, p. 71.
[354] 2012 GCOC proceeding, Exhibit B-26, p. 21.

5.2.4.3 Appropriate DCF estimate

Commission determination

As noted above, the Panel found that only limited weight could be given to Dr. Coyne's multi-stage DCF estimates, excluding the financing flexibility adjustment, of 9.32 for the Canadian and 8.39 percent for the US proxy groups but has a higher level of confidence in the US estimates due to them being a closer comparator to FEI on many parameters. However, also noted is the Panel's concern there is a greater level of risk faced by FEI's US comparators due to operating in a different regulatory environment which is not directly comparable to British Columbia. Given these factors, the Panel does not consider direct application of Mr. Coyne's estimates for either market to be appropriate. **Accordingly, with application of appropriate judgement, the Panel accepts a maximum 8.4 percent excluding the financing flexibility adjustment as the DCF estimate for an appropriate ROE.**

5.2.5 Financing flexibility adjustment

In the 2013 GCOC Decision, the Commission accepted an allowance for financial flexibility of 50 bps added to the CAPM and DCF tests in determining the fair ROE.[355] The decision referenced a definition of this allowance for financing flexibility as consisting of: (1) flotation costs comprising financing and market pressure costs arising at the time of the sale of new equity; (2) a margin, or cushion, for unanticipated capital market conditions; and (3) a recognition of the "fairness" principle.[356]

Both Mr. Coyne and Dr. Booth agree that 50 bps is a reasonable financing flexibility adjustment[357] and Mr. Coyne is of the view an adjustment of 50 bps is common regulatory practice in Canada.[358]

FEI submits that 50 bps for financing flexibility is consistent with past precedent and expert evidence, that it is a reasonable financing flexibility adjustment, is common regulatory practice in Canada and addresses the utility's need to raise capital without impairing its financial integrity.[359]

CEC submits 50 bps is reasonable.[360]

Commission determination

The Panel notes there is agreement among the experts and parties to a 50 bps financing flexibility adjustment. This is consistent with the 2013 GCOC Decision and given the agreement of the parties, the Panel accepts an allowance for financial flexibility of 50 bps added to the CAPM and DCF tests in determining the fair ROE.

There was not an extensive examination of this issue in the current proceeding and as a result, no evidence to suggest deviating from using the 50 bps financing flexibility adjustment relied upon in recent hearings. However, with respect to Mr. Coyne's testimony that 50 bps is generally used in Canada, the Panel notes that there was no

[355] 2013 GCOC Decision, p. 80.
[356] 2013 GCOC Decision, p. 79.
[357] Exhibit B-1, Appendix B, p. 60.
[358] Exhibit B-9, BCUC IR 39.1.
[359] FEI Final Submission, pp. 99–100.
[360] CEC Final Submission, p. 14.

evidence comparing Canadian jurisdictions on the record to support this. In addition, the Panel notes the Terasen Gas Inc. and Terasen Gas (Vancouver Island) Inc. 2006 ROE Decision, the Commission allowed a "pure" flotation allowance of 25 bps for the DCF test and no flotation cost allowance for the CAPM and stated the Commission "will not automatically add a 50 basis point surcharge to whatever return it deems appropriate, but will exercise its judgment each time."[361] The Panel expects the issue to be more closely examined with a jurisdictional review on the application of a financing flexibility adjustment in Canada in FEI's next hearing dealing with ROE and common equity component.

5.2.5.1 FEI's ROE relative to other Canadian utilities

Mr. Coyne's comparison of the Canadian peer group companies' approved equity ratio and ROE in relation to his overall risk ranking is included in Table 5.6:

Table 5.6: Canadian Peer Group Comparative Risk Analysis and Authorized ROE[362]

Operating Company	Risk assessment relative to FEI	Authorized equity ratio	Authorized return on equity
Proposed FortisBC Energy Inc.	**N. A.**	**40.0%**	**9.50%**
Current FortisBC Energy Inc.	**N. A.**	**38.5%**	**8.75%**
ATCO Gas	**Less risky**	**38.0%**	**8.30%**
Enbridge Gas Distribution Inc.	**Less risky**	**36.0%**	**9.30%**
Union Gas	**Less risky**	**36.0%**	**8.93%**
Gaz Métro	**More risky**	**38.5%**	**8.90%**

Panel discussion

Although none of the parties presented arguments on the comparison of FEI's current or proposed ROE to other Canadian utilities and while not determinative of a fair ROE, the Panel considers this step useful for considering the overall reasonableness of the range of estimates presented in the CAPM and DCF estimates. When compared against FEI's current and proposed ROE to the Canadian peer group's ROEs and equity components compiles by Mr. Coyne, the Panel notes the experts' assessment that FEI is more risky than EGDI, Union Gas and ATCO Gas and less risky than Gaz Métro. Given this ranking, one would expect it is appropriate for FEI's ROE to fall somewhere above EGDI, Union Gas and ATCO Gas and below Gaz Métro. Given that ATCO Gas' ROE is less risky than FEI it is reasonable that ATCO Gas' authorized ROE is lower than that of FEI. With consideration of the inclusion of Gaz Métro's preferred shares in its capital structure and its higher allowed ROE, the Panel is satisfied FEI's current ROE is appropriately positioned relative to the riskier Gaz Métro. The Panel notes that Union Gas

[361] Terasen Gas Inc. and Terasen Gas (Vancouver Island) Inc. Application to Determine the Appropriate Return on Equity and Capital Structure and to Review and Revise the Automatic Adjustment Mechanism (2006 TGI ROE), Decision dated March 2, 2006, pp. 54–55.
[362] Exhibit B-1, Appendix B, p. 101.

and EGDI both have slightly higher authorized ROEs than FEI. However, this is offset by their significantly lower 36 percent equity ratio.

5.3 Appropriate return on equity

Commission determination

The Panel has determined that a return on equity of 8.75 percent meets the Fair Return Standard and is appropriate for FEI, effective January 1, 2016. This represents no change from the 2013 GCOC Decision where the Commission determined the same return on equity.

The Panel notes in the 2013 GCOC Decision, the Commission determined that the most compelling frameworks for assessing the return on equity are the DCF model and the CAPM and placed equal weight on the CAPM and DCF model in determining the allowed ROE.

The experts' DCF models and CAPMs and underlying assumptions have been explored extensively in this proceeding. The Panel notes Mr. Coyne arrives at his recommendation of 9.5 percent ROE based on his detailed analysis, placing equal weight on the estimates produced by his models. On the other hand, Dr. Booth recommends an ROE of 7.5 percent more from an application of his judgment than from any output from his models.

With respect to reliance on the models, the Panel agrees with Mr. Coyne, that the use of the models provides different perspective that helps inform the estimate of ROE but that both the DCF model and CAPM have their own set of inherent limitations. All parties advise the Panel to use its judgment to assess the reasonableness of the results of the models. FEI underlines the importance of using multiple tests to be assured of a reasonable estimate of ROE and AMPC/BCOAPO recommend using the models as a check on each other and applying judgement based on external conditions.

In determining the appropriate weight to place on the models, the Panel recognizes they are imperfect and must consider the totality of the evidence. In Mr. Coyne's approach, both models rely on proxy group information and a selection of proxy companies that are imperfect comparators due to differing business and regulatory environments than FEI. In the view of the Panel, company specific risk is not important in the CAPM. The CAPM depends on a number of subjective decisions including the determination of the risk free rate in the current all-time low interest rate environment. Both experts outline the issues with the CAPM in the current environment. The DCF model is highly sensitive to growth rate estimates and there can be significant variability in analyst estimates and adding to this, there are no strong comparator Canadian companies for use as proxies in the DCF model. As a result of the current global economic environment, the reliability of the models has been called into question more than once in the previous cost of capital hearings, requiring the Panel to exercise its judgement to a greater degree.

Accordingly, in addition to considering its findings on the appropriate ROE indicated by: (1) the CAPM model of approximately 8.5 percent including financing flexibility adjustment; and (2) the DCF model of no more that 8.9 percent including a financing flexibility adjustment, the Panel also considers whether conditions have changed sufficiently since the 2012 GCOC proceeding to warrant an increase or decrease in ROE.

In addition to favouring the application of judgment more heavily than in the previous decision, the Panel does not believe a strict reliance on an equal weighted mechanical calculation of its findings with respect to DCF model and CAPM outputs in this circumstance is appropriate for determining a fair ROE. Given these factors, the Panel has concluded FEI's currently allowed ROE of 8.75 percent, within the context of a 38.5 percent equity capital structure, remains well within the range of current model outputs and is therefore reasonable.

Taking these factors together and weighing them accordingly, the Panel considers there to be insufficient justification for awarding either a higher or lower ROE at this time. The Panel also examined and found there is no compelling evidence to support the need to increase the return on equity given the 38.5 percent common equity component.

As a check, the Panel notes FEI's 8.75 percent approved ROE, given its equity component of 38.5 percent falls into the appropriate range among its Canadian regulated utility comparators. While not determinative, this further supports the Panel's decision to leave FEI's ROE unchanged.

6.0 AUTOMATIC ADJUSTMENT MECHANISM

The issue the Panel must deal with is whether to continue with an AAM as a means of providing annual updates to the benchmark utility's ROE or whether it should be suspended or eliminated entirely.

An AAM based on changes to long-term Canada bond rates was first implemented by the Commission in 1994[363] but in 2009, by Order G-158-09, it was eliminated. In eliminating the AAM in 2009, the Commission stated, "in its present configuration, the AAM will not provide an ROE for TGI for 2010 that meets the Fair Return Standard."[364] In the 2013 GCOC Decision, the AAM was reinstituted on the basis that it "better meets the FRS than giving no consideration to market changes over the period between ROE proceedings." The Commission in this instance addressed some of the concerns with previous mechanisms and established a two variable model taking into account utility bond spreads as well as long-term Canada Bond yields. However, in recognition of the effect of monetary policy on bond rates, the Commission directed any implementation of this mechanism be subject to an actual long-term Canada bond yield of 3.8 percent being met or exceeded. Therefore, the AAM formula would not apply unless the long Canada bond yield was below 3.8 percent.[365] The Canada long-term bond yield has remained below the 3.8 percent threshold since 2013 and therefore, the AAM was not applied to FEI's ROE during the period since the 2013 GCOC Decision.[366]

FEI's position is that a formula cannot capture all of the changes affecting a utility's cost of capital and will yield a return that does not meet the Fair Return Standard. FEI submits the Commission should suspend use of the AAM formula in this jurisdiction and review the cost of capital in a three to five-year time frame. A periodic review is the best way to ensure the ROE is reflective of the true cost of equity and meets the Fair Return Standard. However, if the Commission was to continue to believe an AAM to be an appropriate approach, FEI

[363] 2013 GCOC Decision, p. 81.
[364] Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc., and Terasen Gas (Whistler) Inc., and Return on Equity and Capital Structure (2009 TGI ROE), Decision dated December 16, 2009.
[365] Ibid., pp. 90–91.
[366] Exhibit B-1, p. 32.

recommends a two-factor model capturing corporate credit conditions as well as the prevailing risk free bond rates as approved in the 2013 GCOC Decision.[367]

FEI notes that an AAM has been in place since 2013. Over this period, there has not been an ROE adjustment and over this period, Régie Quebec has suspended application of its formula. Further, FEI points out that Dr. Booth opines he doesn't expect it will be triggered in the next three years.[368]

Mr. Coyne in his Direct Testimony holds views that are consistent with those of FEI.[369] He also notes in his rebuttal testimony that using a formulaic AAM introduces the potential for error in setting ROE as there is risk that bond yields and credit spreads, the formulaic coefficients, do not effectively model utility returns. It is Mr. Coyne's opinion that use of an AAM formula is not a substitute for proceedings where cost of capital evidence is presented and vetted by the stakeholders and it should be only relied upon to make interim changes to the cost of capital between rate proceedings.[370]

Intervener submissions

AMPC/BCOAPO support continuation of the use of the AAM arguing there was substantial work done to arrive at this formula both in the 2012 GCOC proceeding and to a lesser extent this hearing and thereby reinforcing the benefit of an AAM for stakeholders. In their view, the efficiency benefits of the 2013 GCOC Decision approved AAM formula remains relevant and the fact the long Canada bond yield has yet to meet the 3.8 percent long Canada bond trigger does not invalidate its usefulness.[371]

Dr. Booth states that adjustment models allow the ROE to be kept current without a need for extensive hearings but notes that keying a "fair ROE off the long Canada bond forecast currently cause s significant problems due to distortions in that forecast."[372] His current judgement is the fair ROE has not decreased to the same extend as has the long Canada bond yield pointing out they are set by "global policy makers" or central banks rather than investors. Consequently, he judges adjusting the ROE by 50 to 75 percent of the decrease in long Canada bond yields, as recommended in the 2012 GCOC proceeding, underestimates the fair ROE.

Dr. Booth still regards 3.8 percent as "a minimum long Canada bond yield consistent with investors trading off risk and return, since this equates to a negligible real after tax rate of return for a taxable investor." Further, he states that he is not as optimistic as RBC and other forecasters' expectations that the 3.8 percent rate will be reached in 2018, as it will depend on when the Federal Reserve Board begins to sell its stockpile of government debt. Dr. Booth states he is happy to set a fixed rate for the period ending in 2018 noting he does not think in the next three years the one-year ahead forecast long Canada bond yields will reach 3.80 percent.[373]

[367] Exhibit B-1, pp. 32–33; FEI Final Submission, p. 101.
[368] FEI Final Submission, pp. 101–102.
[369] Exhibit B-1, Appendix B, p. 103.
[370] Exhibit B-16, p. 10.
[371] AMPC/BCOAPO Final Submission, p. 69.
[372] Exhibit C7-7-1, p. 63.
[373] Exhibit C7-7-1, p. 63.

CEC recommends the Commission continue with the existing AAM pointing out that the Commission is likely to review the cost of capital regardless of whether an AAM is in place or not. CEC submits that the AAM can provide comfort that the ROE will be responsive to current situations. [374]

Commission determination

The Panel is not persuaded that continuing to rely on an AAM to update FEI's ROE on an annual basis is appropriate or will necessarily meet the Fair Return Standard. Therefore, the Panel suspends further use of an AAM as a mechanism to adjust FEI's ROE on an annual basis.

The Panel continues to hold the view that an effective AAM can be a useful tool in providing an updating mechanism for ROE thereby eliminating some of the need for lengthy and expensive formal reviews. However, the Panel acknowledges that economic conditions are uncertain and accept Dr. Booth's explanation of long Canada bond yields being less affected by investors and more by central banks. Therefore, the Panel does not believe that continuing with an AAM at this time will necessarily result in changes reflecting a fair ROE or meeting the Fair Return Standard.

Over the past three years, bond yields have not reached the 3.80 percent trigger point specified in the 2013 GCOC Decision nor is there conclusive evidence in this proceeding this target will be reached over the next few years. The Panel acknowledges that RBC and other rate forecasters have predicted that the trigger point will be exceeded by 2018. However, there were similar predictions at the time of the 2012 GCOC proceeding which did not occur and in this instance, Dr. Booth has expressed doubt as to the 3.80 percent trigger point being reached by the end of 2018.

In the Panel's view, there is limited benefit to continuing to apply the AAM for the next period of time and there may be potentially undesirable consequences with its continued use. In addition, there has been little examination of the formula itself and no further evidence to suggest a 3.80 percent trigger point is as valid today as it was considered to be in the 2013 GCOC Decision. Therefore, the Panel is persuaded that a suspension of the AAM is warranted. However, once there is a return to more certain economic conditions with more normal interest rates, the Panel believes the re-implementation of an AAM is worthy of further consideration.

7.0 FEI AS THE BENCKMARK UTILITY

In the 2013 GCOC Decision, the Commission found that FEI was the appropriate benchmark utility and stated:

> FEI is well established, of sufficient size and has a diverse customer and asset base. In addition, FEI is well understood as a utility by all the participants as it has traditionally been used as the benchmark utility in British Columbia. This and the fact that there is a substantial body of FEI related evidence already on the record in this proceeding makes FEI a reasonable candidate for the benchmark utility. Therefore, notwithstanding the various positions of the participants as to whether FEI can be described as a pure play gas distribution utility, the Commission Panel agrees with the participants and accepts FEI, in the present time frame, as the most appropriate choice for the benchmark utility.[375]

[374] CEC Final Submission, p. 117.
[375] Order G-148-12, Reasons for Decision, p. 4.

FEI states the Commission should continue to treat FEI as the benchmark utility and based on its current characteristics there is no compelling reason to change.[376]

CEC agrees that FEI should continue as the benchmark utility and recommends that the Commission maintain this status.[377]

Commission determination

No party in this proceeding disagreed with FEI continuing to be the benchmark utility. Accordingly, the Panel directs **the common equity component and ROE approved in this decision will serve as the benchmark cost of capital for any other utility in British Columbia that uses the benchmark utility to set rates.**

[376] Exhibit B-1, pp. 34–35.
[377] CEC Final Submission, p. 118.

DATED at the City of Vancouver, in the Province of British Columbia, this 10th day of August 2016.

Original Signed By

K. A. KEILTY
PANEL CHAIR / COMMISSIONER

Original Signed By

D. A. COTE
COMMISSIONER

Original Signed By

N. E. MACMURCHY
COMMISSIONER

British Columbia Utilities Commission

Sixth floor, 900 Howe Street
Vancouver, BC Canada V6Z 2N3
TEL: (604) 660-4700
BC Toll Free: 1-800-663-1385
FAX: (604) 660-1102

ORDER NUMBER
G-129-16

IN THE MATTER OF
the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

FortisBC Energy Inc.
Application for its Common Equity Component and Return on Equity for 2016

BEFORE:
K. A. Keilty, Panel Chair/Commissioner
D. A. Cote, Commissioner
N. E. MacMurchy, Commissioner

on August 10, 2016

ORDER

WHEREAS:

A. On October 2, 2015, FortisBC Energy Inc. (FEI) filed an application for a review of its common equity component and return on equity for 2016 (Application) pursuant to the British Columbia Utilities Commission (Commission) decision in the Generic Cost of Capital Stage 1 proceeding;

B. In its Application, FEI submits that the amalgamated FEI (the amalgamation of three affiliated entities: the former FortisBC Energy Inc., FortisBC Energy [Whistler] Inc. and FortisBC Energy [Vancouver Island] Inc.) continues to be the logical choice to serve as the benchmark utility for the purpose of determining the cost of capital for other utilities;

C. By Order G-177-15 dated November 9, 2015, the Commission established a proceeding to review the Application. The regulatory review was by way of a limited scope oral hearing and included two rounds of information requests (IRs) to FEI and one round of IRs on intervener evidence;

D. Six parties registered as interveners in this proceeding. Among those registered, the most active were the Commercial Energy Consumers of British Columbia, the British Columbia Old Age Pensioners' Association *et al*. and the Association of Major Power Customers of BC (AMPC): collectively, the "Utility Customers";

E. On December 7, 2015, the Commission issued Order G-193-15 in the FEI Annual Review of 2016 Delivery Rates Decision setting interim delivery rates for all non-bypass customers effective January 1, 2016 and approving FEI's existing capital structure and return on equity on an interim basis effective January 1, 2016, pending the outcome of this cost of capital proceeding;

F. On December 15, 2015, the Commission issued Order G-204-15 and ordered, among other things, that FEI's existing common equity component and return on equity would remain the benchmark on an interim basis, effective January 1, 2016;

.../2

G. On January 26, 2016, the Utility Customers filed intervener evidence of their expert witness, Dr. Laurence Booth;

H. The oral hearing took place from March 9, 2016 to March 11, 2016;

I. The argument phase of the proceeding took place from April 3, 2016 to April 28, 2016. On May 5, 2016, AMPC sought leave to file two narrow sur-reply submissions;

J. By Order G-68-16 dated May 13, 2016, the Commission, after considering comments from FEI and other interveners, allowed the sur-reply to remain on record; and

K. The Commission has reviewed and considered all of the evidence and submissions on record for the proceeding.

NOW THEREFORE pursuant to sections 59 to 61 of the *Utilities Commission Act*, the British Columbia Utilities Commission orders as follows:

1. FortisBC Energy Inc.'s common equity component is set at 38.5 percent, effective January 1, 2016.

2. FortisBC Energy Inc.'s return on equity is set at 8.75 percent, effective January 1, 2016.

3. The use of the Automatic Adjustment Mechanism formula is suspended indefinitely.

4. The common equity component and return on equity approved for FortisBC Energy Inc. in the decision issued concurrently with this order will serve as the benchmark cost of capital for any other utility in British Columbia that uses the benchmark utility to set rates.

5. The common equity component and return on equity will remain in effect until otherwise determined by the Commission.

6. FortisBC Energy Inc.'s interim rates set by Order G-193-15 are approved as permanent, effective January 1, 2016. FortisBC Energy Inc. is to file, within 15 working days from the date of this order, updated final rate schedules in accordance with Directives 1 and 2 of this order.

DATED at the City of Vancouver, in the Province of British Columbia, this 10th day of August 2016.

BY ORDER

Original Signed By:

K. A. Keilty
Commissioner

APPENDIX A

FortisBC Energy Inc.
Application for its Common Equity Component and Return on Equity for 2016

LIST OF ACRONYMS

2006 TGI ROE Decision	Terasen Gas Inc. and Terasen Gas (Vancouver Island) Inc. Application to Determine the Appropriate Return on Equity and Capital Structure and to Review and Revise the Automatic Adjustment Mechanism, Decision dated March 2, 2006
2009 TGI ROE Decision	Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc. and Terasen Gas (Whistler) Inc. Return on Equity and Capital Structure, Decision dated December 16, 2009
AAM	Automatic Adjustment Mechanism
AMPC	Association of Major Power Customers of BC
Application	FortisBC Energy Inc. Application for its Common Equity Component and Return on Equity for 2016
Atmos	Atmos Energy Corporation
BC Hydro	British Columbia Hydro and Power Authority
BCMEU	British Columbia Municipal Electrical Utilities
BCOAPO	British Columbia Old Age Pensioners' Organization *et al.*
BCUC, or Commission	British Columbia Utilities Commission
bps	basis points
CGA	Canadian Gas Association
CAPM	capital asset pricing model
CCAPM	conditional capital asset pricing model
CEC	Commercial Energy Consumers Association of British Columbia
Consensus Economics	Consensus Economics Inc.
COV	City of Vancouver
Creative Energy	Creative Energy Vancouver Platforms Inc.
DCF	discounted cash flow

EGDI	Enbridge Gas Distribution Inc.
FEI	FortisBC Energy Inc.
FERC	Federal Energy Regulatory Commission
FEVI	FortisBC Energy (Vancouver Island) Inc.
FEW	FortisBC Energy (Whistler) Inc.
FortisBC	FortisBC Utilities
GCOC	Generic Cost of Capital
GHG	greenhouse gas
ICG	Industrial Customers Group
ICR	interest coverage ratio
IR	Information Request(s)
LNG	liquefied natural gas
MRP	market risk premium
Moody's	Moody's Investor Services
NGTL	Nova Gas Transmission Ltd.
OEB	Ontario Energy Board
PBR	Performance Based Rate-making
PMM	purchase money mortgage(s)
RBC	Royal Bank of Canada
ROE	return on equity
UCA	*Utilities Commission Act*
Utility Customers	Commercial Energy Consumers Association of British Columbia, British Columbia Old Age Pensioners' Organization *et al.* and Association of Major Power Customers of BC

APPENDIX B

LIST OF APPEARANCES

P. Miller	Commission Counsel
L. Bussoli	Commission Counsel
M. Ghikas	Counsel for FortisBC Energy Inc.
T. Ahmed	Counsel for FortisBC Energy Inc.
R. B. Wallace, Q.C.	Counsel for Association of Major Power Customers of B.C.
C. Weafer	Counsel for Commercial Energy Consumers of British Columbia

---

E. Cheng	Commission Staff
L. Cheung	Commission Staff
S. Allen	Consulting Staff
Allwest Reporting Ltd.	Court Reporters

LIST OF PANELS

FORTISBC ENERGY INC.

Expert Opinion on a Benchmark Fair Return

James M. Coyne	Concentric Advisors

ASSOCIATION OF MAJOR POWER CUSTOMERS OF BC, COMMERCIAL ENERGY CONSUMERS ASSOCIATION OF BRITISH COLUMBIA AND BRITISH COLUMBIA OLD AGE PENSIONERS' ORGANIZATION *ET AL.*, COLLECTIVELY THE UTILITY CUSTOMERS

Laurence D. Booth, DBA	University of Toronto

IN THE MATTER OF
the *Utilities Commission Act*, RSBC 1996, Chapter 473

and

FortisBC Energy Inc.
Application for Common Equity Component
and Return on Equity for2016

EXHIBIT LIST

Exhibit No.	Description
COMMISSION DOCUMENTS	
A-1	Letter dated October 15, 2015 - Appointing the Commission Panel for the review of the FortisBC Energy Inc. Application for Common Equity Component and Return on Equity for2016
A-2	Letter dated November 9, 2015 – Commission Order G-177-15 establishing the Regulatory Timetable
A-3	Letter dated November 25, 2015 – Commission Information Request No. 1 to FEI
A-4	**CONFIDENTIAL** Letter dated November 25, 2015 – Confidential Commission Information Request No. 1 to FEI
A-5	Letter dated November 30, 2015 – Request for Submissions on Interim Order
A-6	Letter dated December 4, 2015 – Commission amending Regulatory Timetable
A-7	Letter dated December 15, 2015 – Commission Order G-204-15 with reasons for decision on interim rates
A-8	Letter dated January 12, 2016 – Commission Information Request No. 2 to FEI
A-9	Letter dated January 15, 2016 – BCUC Rules of Practice and Procedure to parties
A-10	Letter dated February 9, 2016 – Commission Intervener Evidence Information Request No. 1 to Utility Customers
A-11	Letter dated February 16, 2016 – Commission cancelling Procedural Conference and Request for written submissions
A-12	Letter dated February 25, 2016 – Commission clarifying Scope of Oral Hearing in response to FEI (Exhibit B-15)

A-13 Letter dated March 3, 2016 – Oral Hearing information

A-14 Letter dated May 6, 2016 – Request for Submissions on AMPC's request to file sur-reply submissions

A-15 Letter dated May 13, 2016 – Commission Order G-68-16 with reasons for decision on AMPC's request for leave to file sur-reply

COMMISSION STAFF DOCUMENTS

A2-1 Letter dated November 25, 2015 – Commission staff filing FortisBC Energy Inc. – Price Risk Management Workshop Summary Report (October 27, 2015)

A2-2 Letter dated January 12, 2016 – Commission staff filing Morningstar Australasia Pty Ltd. – Morningstar Stock Sector Structure (2011)

A2-3 Letter dated January 13, 2016 – Commission staff filing The Brattle Group – Survey of Cost of Capital Practices in Canada (May 31, 2012)

A2-4 Submitted at Oral Hearing March 10, 2016 - NEW JERSEY RESOURCES, INVESTOR FACT SHEET, DATED NOVEMBER 13, 2015

A2-5 Submitted at Oral Hearing March 10, 2016 - THREE-PAGE EXCERPT FROM STATE OF NEW JERSEY BOARD OF PUBLIC UTILITIES DECISION, "EXHIBIT P-1"

A2-6 Submitted at Oral Hearing March 10, 2016 - TWO-PAGE EXCERPT FROM STATE OF NEW JERSEY BOARD OF PUBLIC UTILITIES DECISION, RE: EVIDENCE OF PAUL R. MOUL

A2-7 Submitted at Oral Hearing March 10, 2016 - EXCERPTS FROM ATMOS ENERGY CORPORATION 2014 SUMMARY ANNUAL REPORT, "INVESTING FOR SAFETY"

A2-8 Submitted at Oral Hearing March 10, 2016 - DALLAS MORNING NEWS ARTICLE DATED AUGUST 19, 2013

A2-9 Submitted at Oral Hearing March 10, 2016 - EXCERPT FROM FORTISBC WEBSITE, "SWITCH TO NATURAL GAS AND SAVE"

A2-10 Submitted at Oral Hearing March 10, 2016 - EXCERPTS FROM WRITTEN EVIDENCE OF JAMES H. VANDER WEIDE

APPLICANT DOCUMENTS

B-1	**FORTISBC ENERGY INC. (FEI)** Letter Dated October 2, 2015 - Application for Common Equity Component and Return on Equity for2016
B-2	Letter dated December 4, 2015 - FEI Submission regarding Interim Order Exhibit A-5
B-3	Letter dated December 9, 2015 – FEI Reply Submission regarding Interim Order
B-4	Letter dated December 18, 2015 – FEI Response to CEC IR No. 1
B-5	Letter dated December 18, 2015 – FEI Response to BCOAPO IR No. 1
B-6	Letter dated December 18, 2015 – FEI Non-Confidential Response to BCUC Confidential IR No. 1
B-7	Letter dated December 18, 2015 – FEI Response to AMPC IR No. 1
B-8	Letter dated December 18, 2015 – FEI Response to AMPC Concentric IR No. 1
B-9	Letter dated December 18, 2015 – FEI Response to BCUC IR No. 1
B-10	Letter dated January 22, 2016 – FEI Response to BCUC IR No. 2
B-11	Letter dated January 22, 2016 – FEI Response to ICG IR No. 2
B-12	Letter dated January 22, 2016 – FEI Response to CEC IR No. 2
B-12-1	**CONFIDENTIAL** – Letter dated January 22, 2016 – FEI Confidential response to CEC IR-2_48.3.3
B-13	Letter dated February 9, 2015 – FEI Information Request on Intervener Evidence to AMPC
B-14	Letter dated February 18, 2015 – FEI Submission on Exhibit A-11 and Request for Clarification
B-15	Letter dated February 22, 2015 – FEI Reply Submission on Scope of Oral Evidence
B-16	Letter dated February 29, 2015 – FEI Submitting Rebuttal Evidence of FEI and Mr. Coyne
B-17	Letter dated March 4, 2016 - FEI Submitting Witness Panel Direct Testimony

B-18	Submitted at Oral Hearing March 9, 2016 - BAR GRAPH ENTITLED "FIGURE 1: RECOMMENDATION VS. ALLOWED FOR Canadian DISTRIBUTORS"
B-19	Submitted at Oral Hearing March 10, 2016 - CHAPTER 5 FROM THE IBBOTSON VALUATION HANDBOOK
B-20	Submitted at Oral Hearing March 10, 2016 - UNDERTAKING NO. 1, RE: TRANSCRIPT VOLUME 1, PAGE 141, LINE 21 TO PAGE 142, LINE 18
B-21	Submitted at Oral Hearing March 10, 2016 - UNDERTAKING NO. 2, RE: TRANSCRIPT VOLUME 1, PAGE 120, LINE 4 TO PAGE 121, LINE 20
B-22	Submitted at Oral Hearing March 10, 2016 - UNDERTAKING NO. 3, RE: TRANSCRIPT VOLUME 1, PAGE 65, LINES 18 TO 20
B-23	Submitted at Oral Hearing March 10, 2016 - UNDERTAKING NO. 4, RE: TRANSCRIPT VOLUME 1, PAGE 144, LINES 7 TO 17
B-24	Submitted at Oral Hearing March 11, 2016 - UNDERTAKING NO. 5, RE: TRANSCRIPT VOLUME 1, PAGE 144, LINE 23 TO PAGE 145, LINE 6
B-25	Submitted at Oral Hearing March 11, 2016 - UNDERTAKING NO. 6, RE: TRANSCRIPT VOLUME 1, PAGE 96, LINE 16 TO PAGE 97, LINE 4
B-26	Submitted at Oral Hearing March 11, 2016 - "DOCUMENTS FOR FEI CROSS-EXAMINATION OF DR. BOOTH"
B-26-1	Letter dated March 17, 2016 - FEI Submitting Revised Undertaking No.6
B-27	Submitted at Oral Hearing March 11, 2016 - MR. COYNE'S CO-AUTHORED EVIDENCE IN FRONT OF THE RÉGIE
B-28	Submitted at Oral Hearing March 11, 2016 - LIST OF COMPANIES WITH A TICKER AND AN M/B ON IT
B-29	Submitted at Oral Hearing March 11, 2016 - UNDERTAKING NO. 7, RE: TRANSCRIPT VOLUME 1, PAGE 135, LINE 3 TO PAGE 137, LINE 22
B-30	Submitted at Oral Hearing March 11, 2016 - UNDERTAKING NO. 8, RE: TRANSCRIPT VOLUME 2, PAGE 460, LINE 25 TO PAGE 461, LINE 9
B-31	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 9

B-32	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 10
B-33	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 11
B-34	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 12
B-35	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 13
B-36	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 14
B-37	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 15
B-38	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 16
B-39	Letter dated March 17, 2016 - FEI Submitting Undertaking No. 17

INTERVENER DOCUMENTS

C1-1	**COMMERCIAL ENERGY CONSUMERS ASSOCIATION OF BRITISH COLUMBIA (CEC)** Letter Dated November 10, 2015 – Request for Intervener Status by Christopher Weafer
C1-2	Letter Dated November 30, 2015 – CEC submitting IR No. 1
C1-3	Letter dated December 4, 2015 - CEC Submission regarding Interim Order Exhibit A-5
C1-4	Letter dated January 12, 2016 – CEC submitting IR No. 2 to FEI
C1-5	Letter dated February 19, 2015 – CEC Submission on Scope of Oral Evidence
C2-1	**UNION GAS LIMITED (UNION GAS)** Letter Dated November 16, 2015 – Request change to Interested Party from Intervener Status by Patrick McMahon - changed to Interested Party see D-1
C3-1	**BRITISH COLUMBIA MUNICIPAL ELECTRICAL UTILITIES (BCMEU)** Letter Dated November 20, 2015 – Request for Intervener Status by Marg Craig and Alex Love
C3-2	Letter dated December 4, 2015 - BCMEU Submission regarding Interim Order Exhibit A-5

C4-1	**BRITISH COLUMBIA HYDRO AND POWER AUTHORITY (BC HYDRO)** Letter Dated November 20, 2015 – Request for Intervener Status by Tom Loski
C5-1	**BRITISH COLUMBIA OLD AGE PENSIONERS' ORGANIZATION, ACTIVE SUPPORT AGAINST POVERTY, DISABILITY ALLIANCE BC, COUNCIL OF SENIOR CITIZENS' ORGANIZATIONS OF BC, AND THE TENANT RESOURCE AND ADVISORY CENTRE (BCOAPO)** Letter Dated November 23, 2015 – Request for Intervener Status by Tannis Braithwaite, Lobat Sadrehashemi and James Wightman
C5-2	Letter Dated November 30, 2015 – BCOAPO submitting IR No. 1
C5-3	Letter dated December 4, 2015 - BCOAPO Submission regarding Interim Order Exhibit A-5
C5-4	Letter dated January 12, 2016 – BCOAPO submitting Comments regarding IR No. 2
C5-5	Letter dated February 19, 2015 – BCOAPO Submission on Scope of Oral Evidence
C6-1	**INDUSTRIAL CUSTOMERS GROUP (ICG)** Letter Dated November 23, 2015 – Request for Intervener Status by Brian Merwin and Robert Hobbs
C6-2	Letter dated December 4, 2015 - ICG Submission regarding Interim Order Exhibit A-5
C6-3	Letter dated January 12, 2016 – ICG submitting IR No. 2 to FEI
C7-1	**ASSOCIATION OF MAJOR POWER CUSTOMERS OF BC (AMPC)** Letter Dated November 23, 2015 – Request for Intervener Status by Matthew Keen, Brian Wallace, and Richard Stout
C7-2	Letter Dated November 30, 2015 – AMPC submitting IR No. 1 to FEI
C7-3	Letter Dated November 30, 2015 – AMPC submitting IR No. 1 to Mr. Coyne (FEI)
C7-4	Letter Dated December 4, 2015 – AMPC Submission on interim order
C7-5	Letter Dated December 9, 2015 –AMPC Comments regarding Reply Submission on Interim Order
C7-6	Letter dated January 12, 2016 – AMPC submitting comments regarding IR No. 2
C7-7	Letter dated January 26, 2016 – AMPC submitting Evidence of Dr. Booth
C7-7-1	Letter dated February 3, 2016 – AMPC submitting Correction to Dr. Booth Evidence
C7-7-2	Letter dated March 4, 2016 – AMPC Submitting Clean Copy of Dr. Booth's Evidence
C7-8	Letter dated February 18, 2016 – AMPC submitting Dr. Booth Information Responses to FEI IR No. 1
C7-9	Letter dated February 18, 2016 – AMPC submitting Dr. Booth Information Responses to BCUC IR No. 1
C7-10	Letter dated February 19, 2015 – AMPC Submission on Scope of Oral Evidence

C7-11 Letter dated March 9, 2016 – AMPC submitting Booth Opening Statement

C7-12 Submitted at Oral Hearing March 9, 2016 - AMPC BOOK OF DOCUMENTS

C7-13 Submitted at Oral Hearing March 10, 2016 - FEI 2016 ROE AMPC WITNESS AID

INTERESTED PARTY DOCUMENTS

D-1 **UNION GAS LIMITED (UNION GAS)** Letter Dated November 16, 2015 – Request change to Interested Party from Intervener Status by Patrick McMahon

D-2 **CORIX MULTI-UTILITY SERVICES INC. (CORIX)** Letter Dated November 18, 2015 – Request for Interested Party Status by Ian Wigington

D-2-1 Letter Dated December 4, 2015 – Corix Submission on interim order

D-3 **PACIFIC NORTHERN GAS LTD. (PNG)** Letter Dated November 23, 2015 – Request for Interested Party Status by Janet Kennedy, Verlon Otto and Anwar Chaudry

D-3-1 **PACIFIC NORTHERN GAS LTD.** Letter dated December 3, 2015 - Submission regarding Interim Order Exhibit A-5

D-4 **CREATIVE ENERGY (CE)** Letter Dated November 23, 2015 – Request for Interested Party Status by Michelle McLarty

D-5 **SENTINEL ENERGY MANAGEMENT INC. (SENTINEL)** Letter Dated December 7, 2015 – Request for Late Interested Party Status by Jim Langley

LETTERS OF COMMENT

E-1 **RIVER DISTRICT ENERGY** Letter dated December 1, 2015 - Submission regarding Interim Order Exhibit A-5

E-2 **FORTISBC ALTERNATIVE ENERGY SERVICES INC. (FAES)** Letter dated December 3, 2015 - Submission regarding Interim Order Exhibit A-5

E-3 **FORTISBC INC. (FBC)** Letter dated December 3, 2015 - Submission regarding Interim Order Exhibit A-5

E-3-1 Letter Dated December 9, 2015 – FBC Reply Submission regarding Interim Order

YUB-YEC-1-63 Attachment 1



Aishihik Hydro (AH0) Asset Assessment

FINAL – REV 0

KGS Group 13-1404-001
November 2014

KGS GROUP
CONSULTING ENGINEERS

ASSET ASSESSMENT

Prepared by:

Shaun Beatty, P. Eng. – Civil

Brad Shalley, P. Eng. – Mechanical

Adam Pawlikewich, P. Eng. – Electrical

Dami Adedapo, P. Eng. – Geotechnical

Approved by:

Joel Lambert, P. Eng. – Project Manager

for mechanical

Issued: November 7, 2014

ACKNOWLEDGEMENTS

The following staff contributed information for this report:

Yukon Energy Corporation Staff

Director, Engineering Services:	Lawrence Joudry
Manager, Systems Control & Mechanical Operations:	Guy Morgan
Manager, Electrical Operations:	Ed Peake
Leadhand, Mechanical Maintenance:	Darrell Johnson
Coordinator, Special Projects:	Albert Schwarz
Records Management, Analyst:	Myrna Engren
Coordinator - Mechanical Projects	Jim Petelski

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1.0 INTRODUCTION

This report summarizes the results of the Asset Assessment carried out at Aishihik Hydro (AH0) generating station, the Canyon Lake Control Structure and the Aishihik Lake Control Structure on September 18 and 19, 2013. The scope of the assessment included Civil, Mechanical, Electrical and Geotechnical aspects and was limited to readily accessible visual inspections of structures and equipment. The table on the following pages summarizes the assessment results of the four disciplines.

TABLE 1
SUMMARY OF ASSESSMENT RESULTS

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
1	Civil	Aishihik Lake Control Structure	Flag and block access to the auxiliary control dam bridge section. See Facility Photographs C-129, C-130 & C131.	$1,000	Immediate 2014	39
2	Electrical	Protections Cabinets	Immediate deficiencies including copper as fuses. See Facility Photograph E-6.	$15,000	Immediate 2015	93
3	Electrical	Station Service	AH3 Project Labelling. See Facility Photographs E-4 & E-5.	$15,000	Immediate 2015	102
4	Electrical	Cabling	MV Cable Clamping. See Facility Photograph E-3.	$150,000 - $200,000	Immediate 2015	107-108
5	Electrical	Grounding	Repair disconnected ground connections.	Part of maintenance	Immediate 2015	116
6	Civil	Intake Structure	Construct and install a structural cover for the ventilation shaft. See Facility Photograph C-89.	$2,000	2015	32
7	Civil	Aishihik Lake Control Structure	Investigate options for the removal or repair of the timber bridge section of the auxiliary control dam including an assessment of any requirements for additional water passage. See Facility Photographs C-129, C-130 & C131.	$25,000	2015	39
8	Mechanical	Aishihik Lake & Canyon Lake Control Structures	Replace the missing bolts. Refer to mechanical photos M3 & M6.	$500	2015	45, 48

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
9	Mechanical	Headworks (Intake) Equipment	Add signage to indicate that building door must remain open during tunnel draining or emergency intake valve closure.	$500	2015	51
10	Mechanical	Generating Units – Turbine Regulating Equipment	Repair/Replace hertz meter on AH2. See Facility Photograph M-22.	$1000	2015	59
11	Mechanical	HVAC	• Remove obstructing material from boiler room combustion air duct. Provide a ducted air trap. See Facility Photograph M-46. • Add filters to air makeup unit. • Repair broken duct at base of service shaft. See Facility Photograph M-49.	$5000	2015	71-72
12	Mechanical	HVAC	• Verify capacity and operation of electric heating coils in air makeup unit. See Facility Photograph M-50.	Part of Maintenance	2015	72
13	Mechanical	Oil/Fuel Handling	• Provide diesel fuel warning signs for bulk tank. • Install protective barriers around bulk fuel storage tank and distribution piping to protect against impact damage. • Re-route the supply distribution piping to feed from the top of the tank and install a pumping system. • Provide double walled piping and a containment sump for underground portion of diesel piping. • Install a manual reset automatic shutoff valve. • Install a main shut off	$100,000	2015	75

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
			valve just outside of service building that is properly identified. See Facility Photographs M-34 & M-44.			
14	Mechanical	Fire Protection	Miscellaneous sprinkler items: • Investigate tagged out valve and exposed tamper switch wiring for switchgear annex zone. • Paint sprinkler piping to switchgear annex. • Reconnect hose reel in service bay. • Provide new valve and hose. • Review and address wall hydrant/ fire department connection. Provide proper signage, valving and supervision to fire alarm. • Install flow switch on switchgear sprinkler system on turbine floor. • Label fire protection piping. See Facility Photographs M-63 to M-67.	$20,000	2015	80-81
15	Mechanical	Fire Protection	• Investigate substation/exposure protection sprinkler system to ensure adequacy and proper design.	Hold allowance of $25,000	2015	80-81
16	Mechanical	Domestic Water and Sanitary Sewer	• Provide proper support for domestic water piping. • Repair urinal. • Address drainage and venting issues. • Service and re-activate water softener. See Facility Photographs M-69 to M-73.	$5000	2015	82

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
17	Geo-technical	Power Canal and Canyon Lake Control Structure	Replace lost backfill material and re-grade the crest of the dyke. See Geo-technical photo G-2.	$50,000	2015	122
			Extend the granular blanket between station 4+250 and 4+450 by at least 2.4 m further downstream of the toe of the dyke and over the existing cracks to improve the stability of this section and mitigate the observed tension cracks.			
			Grade sections of dykes that exhibit longitudinal cracking to prevent further deterioration and to minimize infiltration.			
18	Geo-technical	Access Roads to Tailrace Area	The cut slope along the access road to the tailrace should be stabilized by removing loose boulder to ensure the safety of YEC. See Facility Photographs G-11 & G-12.	$10,000	2015	124
19	Geo-technical	Tailrace Tunnel Portal and Tailrace Channel	Clear excessive vegetation along the tailrace channel. See Facility Photograph G-15.	$5,000	2015	126
20	Civil	Intake Structure	Confirm that adequate space for a fall retrieval tripod or davit exists for accessing the intake water passage. If not, investigate permanent tie-off methods. See Facility Photograph C-89.		2015	33
21	Civil	Service Building	Reinforce the handrail supports and extend the deck for access to the overhead crane. See Facility Photograph C-67.	$5,000	2015	30
22	Civil	Site Security	There are numerous hazards and critical areas at the various Aishihik structures that require additional security and public safety measures to minimize the potential for vandalism or serious	$30,000	2015	42

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
			accidents on YEC property. Conduct a detailed study to determine recommended site security and public safety upgrades to industry and CDA standards (See Section 5.4.8 of the 2007 Dam Safety Guidelines, and the 2011 CDA Guidelines for Public Safety Around Dams) along with cost estimates for the implementation of the recommendations. See Facility Photographs C-138 to C-142.			
23	Civil	Site Security	Review YEC's corporate public safety policies and make recommendations for upgrading signage and security measures to further restrict access by the general public. Provide additional no trespassing signs and signs warning of potential hazards. Current measures are deemed inadequate.		2015	42
24	Mechanical	Oil/Fuel Handling	Provide containment pallets for drums and pails of lubricants. See Facility Photographs M-58 & M-59.	$1500	2015	76
25	Mechanical	Fire Protection	Undertake a study of fire protection for the powerhouse to determine requirements for egress, compartmentalization and fire suppression upgrades.	$50,000	2015	81
26	Mechanical	Generating Units – Turbines	Inspect turbine piping to determine short/long term replacement. See Facility Photograph M-78.	$20,000	2015	58
27	Mechanical	Generating Units – Generator Mechanical	Inspect generator piping to determine short/long term replacement.	Refer to pipe inspections for turbines	2015	63
28	Mechanical	Compressed Air	Confirm cause of oil emulsification. Re-pipe air intakes if needed. See Facility Photograph M-56.	Hold allowance of $2000	2015-2016	73

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
29	Electrical	Station Service	Overhead Feeders Cleanup.	$10,000	2015-2016	100
30	Electrical	Station Service	Blackstart Diesel Generator.	$350,000	2015-2016	100
31	Electrical	Grounding	Prepare a plant grounding study.	$45,000	2015-2019	116-117
32	Geo-technical	Power Canal and Canyon Lake Control Structure	Complete recommendations in the 2010 Dam Safety Review by December 31, 2015.		2015	122
33	Geo-technical	Tailrace Tunnel Portal and Tailrace Channel	Complete detailed geotechnical assessments and slope stability analysis of the cut slope above the portal. 3rd quarter of 2015.	$25,000	2015	126
34	Civil	Intake Structure	Re-shingle the roof, re-clad the exterior walls and install a new exterior door. See Facility Photographs C-83 to C-86.	$10,000	2015-2016	32
35	Civil	Aishihik Lake Control Structure	Repair or replace the bridge section, Cost depends on the rehabilitation option selected. See Facility Photographs C-129 to C-131.	$100,000 - $300,000	2015-2016	39
36	Civil	Aishihik Lake Control Structure	Add handrails or fencing to both downstream wing walls and the west upstream wing wall. See Facility Photographs C-100, C-101, C-111, C-114 and G-5.	$10,000	2015-2016	39
37	Mechanical	Generating Units – Turbines	Study addition of greasing points to reduce maintenance requirements.	$10,000	2015-2016	58
38	Mechanical	HVAC	Install a chemical pot feeder on the hydronic heating system. Implement a chemical treatment program. See Facility Photograph M-45.	$5000	2015-2016	71
39	Mechanical	Sump Systems	Install oil detection and a belt skimmer and label piping. See Facility Photographs M-60 & M-61.	$50,000	2015-2016	77
40	Mechanical	Fire Protection	Provide deluge fire suppression systems on AH1 and AH2.	$150,000	2015-2016	81

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
41	Mechanical	Tailrace Equipment	Service draft tube crane controls. Install panel heaters and replace ODP motor with TEFC motor. See Facility Photograph M-27.	$25,000	2015-2016	64
42	Mechanical	Headworks (Intake) Equipment	Repair geared intake valve operator. See Facility Photograph M-6.	$10,000	2015-2016	51
43	Mechanical	Generating Units – Turbines	Provide wicket gate shear pin detection and annunciation.	$75,000	2015-2016	58
44	Mechanical	Turbine Inlet Valves (TIV's)	Automation of TIVs to allow remote closure.	$190,000	2015-2017	52
45	Mechanical	Turbine Inlet Valves (TIV's)	Tool clean (power tool) and re-paint the TIVs for Units AH-1 and AH-2:	$10,000	2015-2017	52
46	Mechanical	Compressed Air	Labelled compressed air piping.	$500	2015-2017	73
47	Electrical	P&C	Vibration Monitoring Review. Photos E5 & E6.	$10,000	2015-2017	93
48	Electrical	Ancillary	Canyon Lake Control Structure. See Facility Photographs E-13 & E-15.	$35,000	2015-2017	115
49	Electrical	Cabling	Develop a plan for maintenance and replacement of cabling between powerhouse and surface in utility shaft. See Photo E11.	$75,000 - $100,000	2015-2019	108
50	Electrical	Ancillary	Lighting Upgrades (Possibly LED).	$150,000	2015-2020	114
51	Mechanical	Service Water	Provide pipe insulation and PVC jacketing to service water piping. See Facility Photograph M-77.	$1000	2015-2020	83
52	Mechanical	Generating Units – Turbines	Conduct a study to determine feasibility of re-runnering AH1 and AH2 turbines.	$100,000 (to be confirmed)	2015-2020	58
53	Mechanical	Canyon Lake Control Structure	Replace platform handrails (including a toe kick) to meet the current code. Place additional gravel in front of the steps to the platform so operators are not stepping in or over water.	$5,000	2015-2024	48

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
54	Civil	Draft Tube Gallery and Surge Chamber	Replace or rehabilitate (sandblast and paint) the handrails and fencing. Add kick plates. See Facility Photographs C-41, C-42 and C-45 to C-49.	$5,000	2016-2017	26
55	Civil	Draft Tube Gallery and Surge Chamber	Regularly inspect and maintain the monorail hoist support framework including the bedrock anchors. Sandblast and paint the hoist frame and monorail beam. See Facility Photograph C-49.	$10,000	2016-2017	26
56	Mechanical	Sump Systems	Replace dewatering pump. See Facility Photographs M-60, M-61 & M-74.	$15,000	2016-2018	77
57	Electrical	P&C	Protection and Controls Upgrades for AH2. See Photo E7.	$350,000	2016-2019	93
58	Electrical	P&C	Protections Upgrade for AH1 and remaining feeders. See Photo E7.	$250,000	2016-2019	93
59	Electrical	Ancillary	HVAC Power Upgrades. See Facility Photograph E-28	$95,000	2016-2019	114
60	Electrical	Ancillary	Emergency and Exit Upgrades.	$200,000	2016-2019	115
61	Electrical	Ancillary	Fire Alarm Replacement. See Facility Photographs E-2 & E-31.	$550,000	2016-2019	115
62	Mechanical	Canyon Lake Control Structure	Sandblast and paint butterfly valve bodies.	$10,000	2016-2021	48
63	Electrical	P&C	HMI Upgrades.	$300,000	2016-2021	93
64	Electrical	P&C	Temperature Monitoring Head End Upgrades. See Facility Photograph E-43.	$100,000	2017-2019	93
65	Electrical	Communication	Network Connection Communication Upgrade. See Facility Photograph E-41.	$700,000	2017-2019	116
66	Electrical	P&C	SCADA Relocation.	$100,000	2017-2021	93
67	Electrical	P&C	General Plant Controls Upgrades. See Photo E7.	$500,000	2019-2021	93
68	Electrical	Station Service	DC Backup at powerhouse level (Allowance Only).	$300,000	2019-2024	101
69	Electrical	Station Service	Main Station Service Upgrade including all critical components. See Photos E9 & E10.	$2,900,000	2019-2024	101
70	Electrical	Cabling	Cabling Upgrade Project to	$2,500,000 -	2019-2024	108

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
			extend the life of the riser cabling in the main utility shaft from the powerhouse to the surface.	$5,000,000		
71	Mechanical	Fire Protection	Replace sprinkler heads when they are 50 years old. Install wire guards.	$25,000	2025	81
72	Civil	Underground Powerhouse	Monitor the condition of the generator room roof cladding, including the supporting rock bolts and chains. See Facility Photographs C-1, C-3 & C-10.		Ongoing	22
73	Civil	Underground Powerhouse	Monitor the corrosion of the structural supports for the east end wall cladding at the base of the columns. See Facility Photographs C-7 & C-8.		Ongoing	22
74	Civil	Underground Powerhouse	Monitor the condition and alignment of the generator room crane rails. See Facility Photographs C-11 & C-12.		Ongoing	22
75	Civil	Underground Powerhouse	Install new cladding around the access shaft and the elevator shaft in the generator room. See Facility Photographs C-14, C-15 & C-16.	To Be Determined	Covered By Separate Project	22
76	Civil	Underground Powerhouse	Monitor the AH1 and AH2 TIV supports and ongoing leakage.		Ongoing	22
77	Civil	Underground Powerhouse	Monitor ongoing conditions of the AH3 penstock and concrete support components. See Facility Photographs C-33 to C-40.		On Going	22
78	Civil	Draft Tube Gallery and Surge Chamber	Inspect and monitor the condition of the draft tube concrete structure, gate guides, and gate. See Facility Photographs C-41 to C-44.		Ongoing	26
79	Civil	Canyon Lake Control Structure	Monitor the potential movement of the sheet piling and concrete cap at the north end of the structure. See Facility Photographs C-93 to C-96.		Ongoing	35

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
80	Civil	Canyon Lake Control Structure	Conduct periodic diver inspections of the underwater portions of the dam and control structure.		Ongoing	35
81	Civil	Aishihik Lake Control Structure	Monitor the fishway to determine if it continues to move relative to the control structure. See Facility Photographs C-115 to C-123.		Ongoing	39
82	Civil	Site Security	Continue monitoring the existing fencing and warning signs, and perform maintenance as necessary (including brush removal).		Ongoing	42
83	Mechanical	Fire Protection	Ensure no storage of combustible/flammable materials in powerhouse or surge chamber.	-	Ongoing	80
84	General	Emergency Preparedness & Response	Perform yearly review of emergency preparedness plan (EPP) and emergency response plan (ERP).		Yearly	14
85	Geo-technical	Power Canal and Canyon Lake Control Structure	Continue ongoing annual inspections, ideally during spring season when the reservoir level is normally high.		Yearly	122
86	Geo-technical	Aishihik Lake Control Structure	Continue on-going surveillance and monitoring to confirm the performance of the earthfill structures.		Yearly	119
87	Geo-technical	Aishihik Lake Control Structure	Continued monitoring and inspection of anomalies that were observed during the inspection and previous surveillance checks. See Facility Photographs G-6 & G-7.		Yearly	119
88	Geo-technical	Tailrace Tunnel Portal and Tailrace Channel	Remove slumped material and continue to monitor the slope for any sign of deterioration. See Facility Photographs G-13 & G-14.		Yearly	126
89	Geo-technical	Power Canal	Surface grading and placement of minor granular fill on the access road on the crest of the dyke should be performed	$40,000	Every 5 years	122

Priority #	Engineering Discipline	Component	Assessment Results	Remedial Work Cost (2014$)	Remedial Work Year	Page#
			periodically. See Facility Photographs G-8 & G-9.			
90	Geo-technical	Access Roads to Tailrace Area	Vegetation clearing, surface grading, and minor granular fill placement on the gravel surfaces should be performed periodically. See Facility Photographs G-8, G-10 & G-15.	$20,000	Every 5 years	124

2.0 THE FACILITY

Aishihik Hydro (AH0) is a three unit underground hydroelectric generating station located south of Canyon Lake in the Yukon Territory. The facility was placed into service in 1975 with two vertical Francis units each producing 15.0 MW. A third horizontal Francis unit was put into service in 2011 with a maximum continuous rating of 7.0 MW bringing the station maximum continuous rating up to 37.0 MW.

Unit AH1 is a 15.0 MW, 13.8 kV, 720 rpm generator manufactured by the Canadian General Electric Company Ltd. in 1975. The generator type number is AT1 and the serial number is 525L439. AH1 was rewound in 2003 by GE (See Page 59) and overhauled in 2012 but kept its original rating.

Unit AH2 was a 15.0 MW, 13.8 kV, 720 rpm generator manufactured by the Canadian General Electric Company Ltd. The generator type number is also AT1 and the serial number is 525L440. AH2 was extensively overhauled by Voith Siemens in 2006. Its new rating is 17.3 MW. It kept its original output voltage and rpm.

Both AH1 and AH2 generators are connected to 20,500 HP Dominion Engineering vertical turbines which operate at 720 R.P.M. with 592 feet of head.

Unit AH3 is a 7.0 MW, 13.8 kV generator manufactured by TDPS (India). The generator model number is TD172 and the serial number is 2K10041036-01. The generator is connected to a 9,625 HP Kossler/Voith horizontal Francis turbine which operates at 900 R.P.M. with 592 feet of head.

The Aishihik Hydro (AH0) facility includes the following structures:

- One Service Building at Elevation 2721.50ft.
- One Switchgear Building at Elevation at Elevation 2732.50ft.
- One 138 KV Switchyard at Elevation 2732.50ft.
- One Powerhouse Building at Elevation 2364.00ft.
- One Aishihik Lake Control Structure.

- One Canyon Lake Control Structure.
- One Power Canal.
- One Tunnel Intake Structure and Building at Elevation 2983.00ft.
- One Pressure Shaft and Pressure Tunnel connecting to the Powerhouse Penstocks.
- One Surge Chamber on the Tailrace side of the Powerhouse.
- One Tailrace Tunnel.
- One Tailrace Channel.
- One portable Sea-Land Container with Backup Water Supply Tank.

3.0 ASSET ASSESSMENT

Due to the location of the powerhouse, 110 metres below the surface, the limited number of access and egress routes and the difficulty in firefighting, smoke control, etc. it is of paramount importance that YEC maintain documented Emergency Preparedness Plans (EPP) and Emergency Response Plans (ERP) for this facility. These procedures should be reviewed and updated on at least a yearly basis. These procedures should address emergency egress from all areas of the powerhouse, elevator, service shaft, surge chamber, as well as the required preparedness and responses to fires and firefighting, smoke, earthquakes, powerhouse flooding, and any other hazards that are determined in the preparation of the EPP and ERP. YEC's insurer should be consulted in the preparation of these plans.

3.1 CIVIL

3.1.1 General Site

Description

The construction of the Aishihik Generating Station with two Francis units was completed in 1975, and later expanded with a third unit in 2011. The main components of the Aishihik Generating Station include a power canal from Canyon Lake with an intake structure transitioning to a power tunnel, an underground powerhouse, surge chamber, tailrace tunnel, and tailrace canal that redirects flows back into the Aishihik River. A service building is located at the surface directly above the underground powerhouse, which houses the control room, offices, service bay with crane access to the powerhouse, and an elevator. The Aishihik Lake Control Structure regulates flow releases into the Aishihik River and downstream to Canyon Lake. The Canyon Lake Control Structure regulates the lake (forebay) levels and releases riparian and flood flows into Aishihik River. The general arrangement of the development is shown in Figure C1 below, with details of the intake, tunnel, and powerhouse arrangement provided in Figure C2.

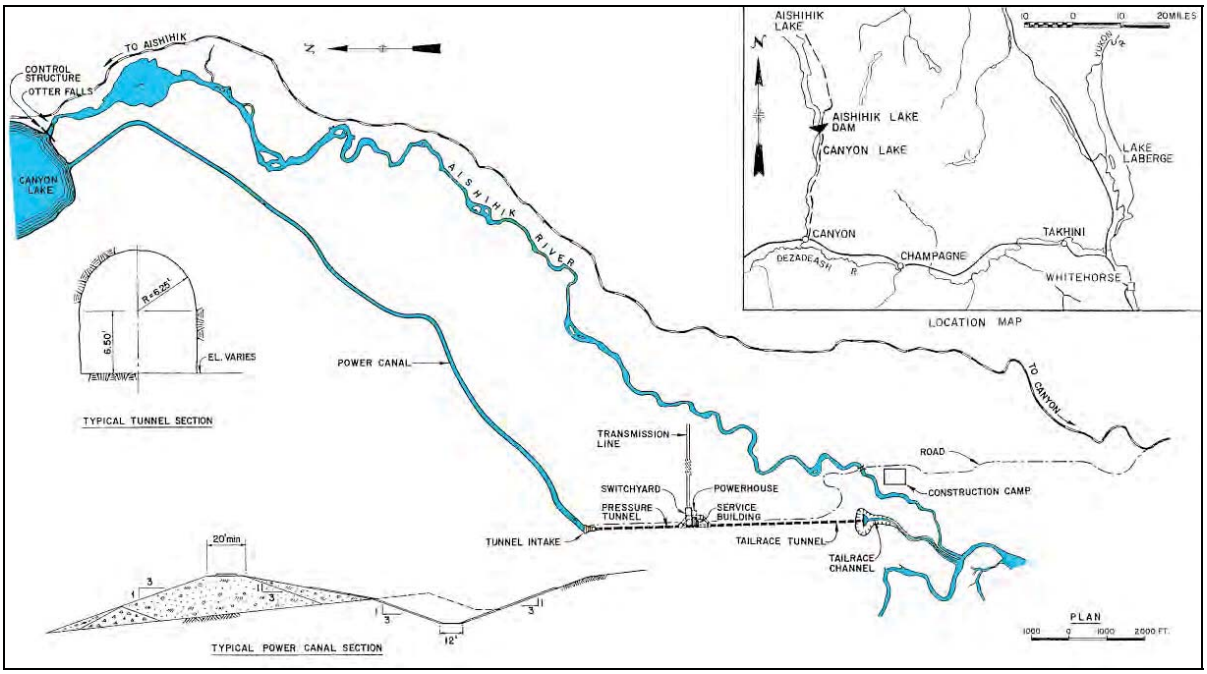


Figure C1 – Plan View of the Aishihik River Power Development

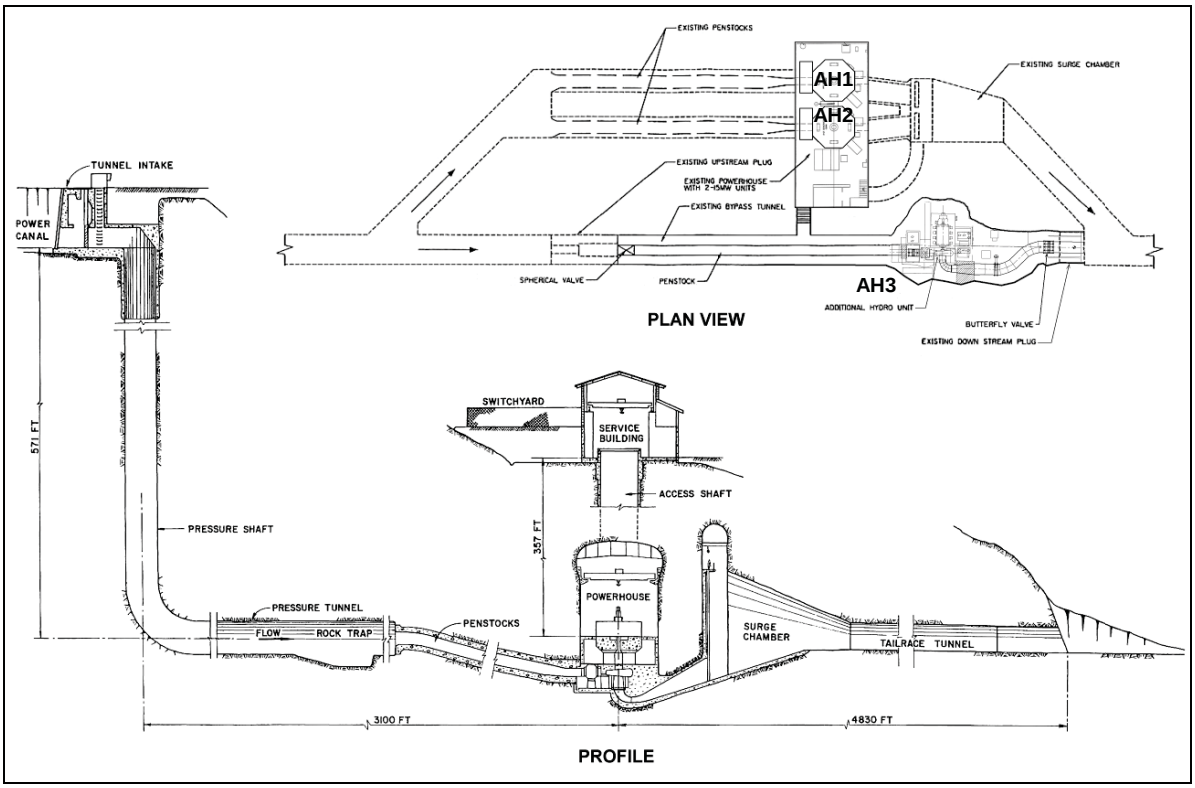


Figure C2 – Plan and Profile of the Intake, Tunnel, Powerhouse, and Tailrace Arrangement

Other civil structures and components include access roads, parking areas, and public safety measures. Note that the tunnel conveyance system (vertical pressure shaft, pressure tunnel, penstocks, and tailrace tunnel) was not dewatered for inspection and KGS Group's assessment is based on information provided by YEC by means of staff interviews, written reports, and video of previous inspections.

In the Civil section, references to photos include those embedded in the text (e.g. Photo C1), and to a larger number of photos found in Section 5 – Facility Photographs (e.g. Facility Photograph C-1).

3.1.2 Underground Powerhouse

Description

The powerhouse is contained within a chamber excavated into bedrock approximately 120 m below the surface. For units AH1 and AH2, a 38 ton overhead crane is supported on concrete corbels anchored into the bedrock as shown in Figure C3 and Photo C1 below. The vertical Francis turbines and generators are supported on a concrete substructure, and the draft tubes are concrete lined. Draft tube gates and guides are provided for dewatering the units as needed.

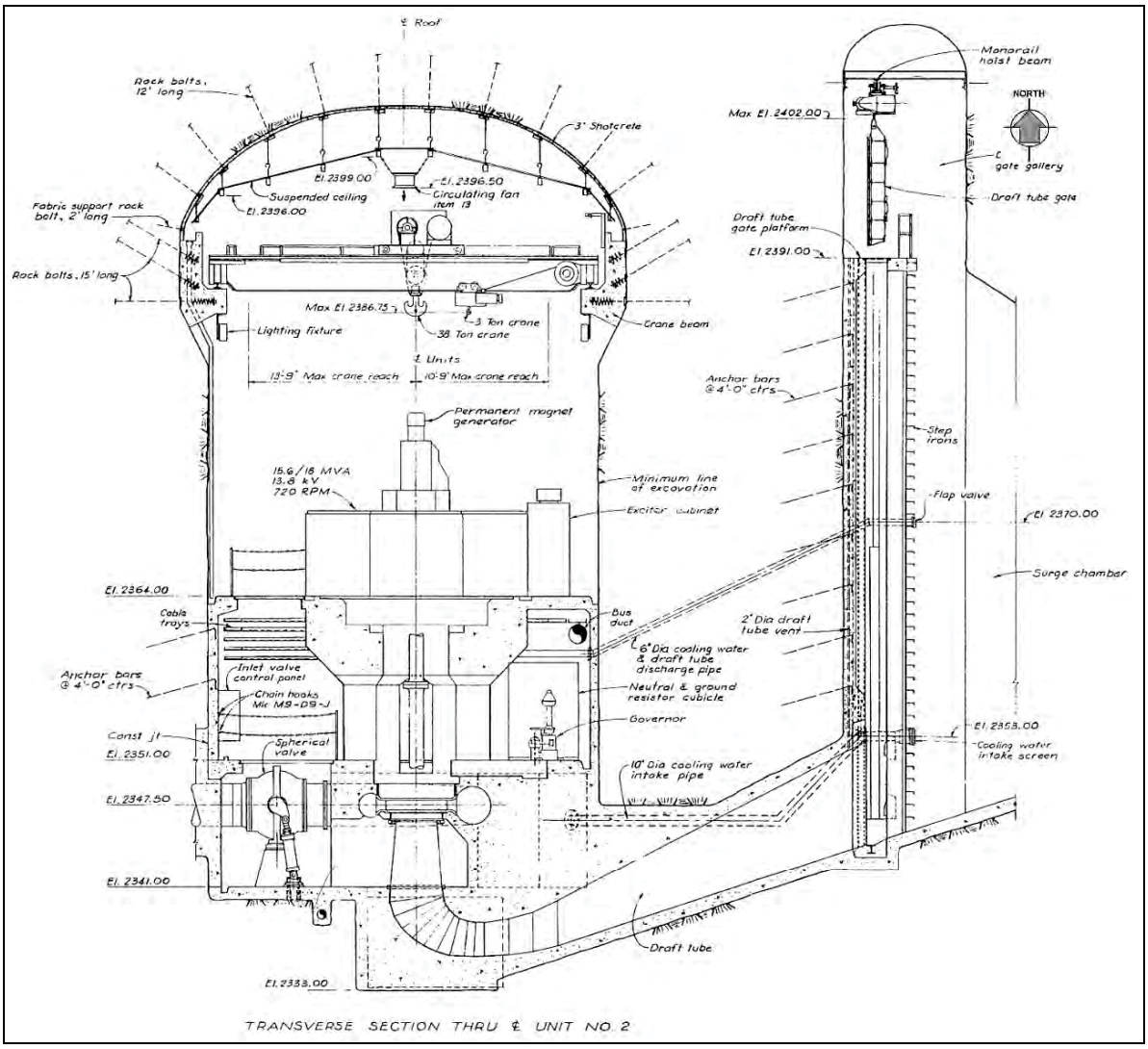


Figure C3 – Powerhouse Section through Unit AH2

Above the generator room floor level, the east end wall by AH1 and the ceiling have been clad with metal sheathing as a safety precaution against falling rock debris and water seepage. Elsewhere, the bedrock is exposed. There is a hatch in the roofing under the main equipment access shaft, and a section of the roof must be dismantled to accommodate the movement of equipment and supplies using the service building crane.



Photo C1 – Elevator Shaft and Crane Supports in Original Generator Room

A vertical shaft in the bedrock connects the underground powerhouse with the service building located at ground level, and is lined with metal sheathing to exclude water and any falling rock debris. Within that access shaft there are four main areas. An existing hoist way primarily used for raising and lowering large equipment into the powerhouse from the surface. It is separated from the rest of the shaft by corrugated metal. There is an access ladder from the generator floor level to the surface that can be used to enter and exit the powerhouse in case of a failure with the elevator. The main elevator section of the shaft accommodates the elevator for normal access to the powerhouse from the surface. Opposite the elevator pathway is a steel structure, which supports the original services (water, original power feeders and controls) from the surface.

As shown in Figure C3, the turbine floor level (El. 2351.00 ft) and the basement level (El. 2341.00 ft) are located below the AH1 and AH2 generator room floor (El. 2364.00 ft). These lower levels are constructed of formed concrete with a concrete lining against the bedrock. The

scroll case and penstocks are encased in concrete, with access to a section of each draft tube and the turbine inlet valves at the basement level.

The newer unit AH3 was constructed in the original bypass tunnel adjacent to the original powerhouse cavern. A section of penstock was embedded in concrete to form a watertight plug in the upstream end of the bypass tunnel. This penstock supplies the unit, and water passing through the turbine continues through a short exposed steel penstock / draft tube section before being embedded in concrete at the downstream end of the bypass tunnel and discharging from there into the tailrace tunnel (see Figure C4 and Photo C2 below). Small areas of the bypass tunnel have been lined with shotcrete near the generator equipment, but the bedrock is otherwise exposed above the poured concrete floor.

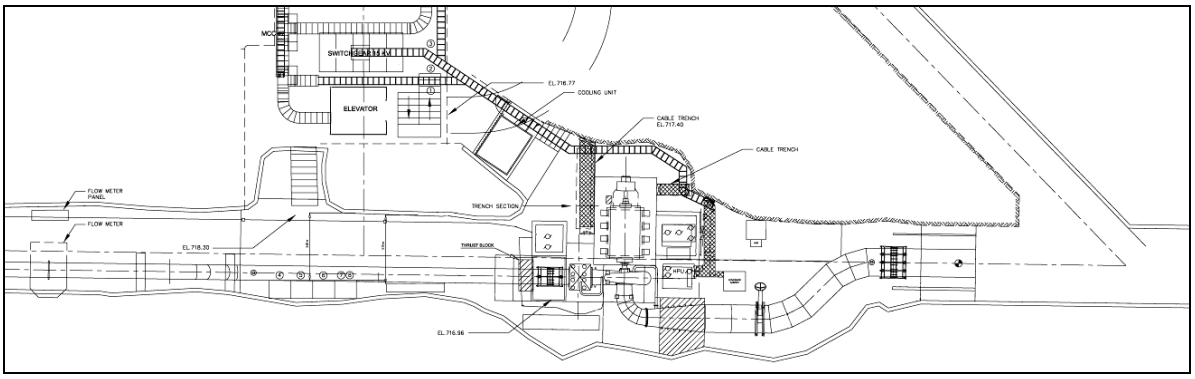


Figure C4 – Unit AH3 Layout



Photo C2 – Unit AH3 in the Former Bypass Tunnel

Assessment

The roofing over the main powerhouse cavern appears to be in good to fair condition when viewed from the interior, with no reported leakage into the interior (see Facility Photograph C-01). There is water dripping from the overhead bedrock onto the roof, and the cladding on the 'exterior' side is experiencing some light corrosion over all observed surfaces (see Facility Photographs C-02 and C-03). The supporting chains visible from the walkway to the draft tube gallery show signs of light rust as well, and the condition of the rock bolts is not known. The concrete roof gutters and drains appear to be in good condition and functioning as intended (see Facility Photograph C-04).

The structural supports and wall cladding on the east wall and at the south-east corner are generally in good condition as observed from the generator room (see Facility Photographs C-05 and C-06), although there are some minor signs of leakage through the wall, and moisture at the base is causing some rusting of the support columns (see Facility Photographs C-07 and C-08).

There are signs of water leakage through hairline cracks in the concrete corbel supporting the crane rails, though there are no other signs of distress and no concerns were noted (see Facility Photographs C-09 and C-10). The crane rails appear to be straight, and no signs of misalignment or issues with crane operations were noted by site personnel. However, due to the dampness from groundwater leakage through the bedrock that drains onto the concrete, the crane rails and tie-down bolts are beginning to corrode in some locations (see Facility Photographs C-11 and C-12).

The cladding around the elevator shaft at the west end of the generator room is damaged and corroding, particularly near the generator room floor (see Facility Photographs C-13 to C-16). The elevator shaft cladding below the generator room floor level is also corroding in some areas (see Facility Photograph C-17).

Between the generator room ceiling and the service building, the humid and damp conditions in the access shaft have caused extensive surface corrosion of the exterior cladding, access ladders and platforms, and the support steel (see Facility Photographs C-18 to C-21). The corrosion reportedly gets worse closer to the surface, and the cladding has reportedly almost rusted through in some areas near the top. Based on a cursory visual inspection, there is material loss due to corrosion at some structural supports that is of concern. The condition of the bedrock anchors supporting the structural steel could not be observed or assessed. It was reported by site personnel that some anchors reportedly extend into the access shaft, causing interference when raising or lowering equipment through the shaft.

Access ladders, handrails around openings in the generator floor, and stairs are in good condition, with minimal corrosion noted and no areas of concern (see Facility Photographs C-22 to C-25). There are no kick plates at any of the edges around openings or at landings.

The generator room floor is in good condition, with no cracks or spalling of any significance noted (see Facility Photographs C-23 and C-26). All steel grating is also in good condition. The concrete substructure below the generator room floor level is in similarly good condition at both the turbine floor and basement levels (see Facility Photographs C-27 to C-30). There is moisture around the exposed TIV valves, and the support pedestals have some minor cracks (see Facility Photographs C-31 and C-32).

The AH3 construction was completed in 2011. In general the concrete and penstocks are in good condition, though there is some moisture at the upstream and downstream diversion tunnel plugs (standing water and condensation). This moisture appears to be accelerating the deterioration of the penstocks and potentially the concrete supports in those locations (see Facility Photographs C-33 to C-40).

Recommendations

The recommended projects and costs related to the underground powerhouse are:

- Monitor the condition of the generator room roof cladding, including the supporting rock bolts and chains. The visual inspections may be conducted by qualified Yukon Energy Corporation operations or engineering personnel. Preferably, once this person or persons has/have been selected, he/she/they should be the personnel to conduct the follow-up inspections. As it is understood that there are no records of past inspections, the initial assessment should include visual inspection with written documentation, observations and photographs of the roof support system, including potential signs of distress or movement of the supporting rock, excessive corrosion or deterioration of the rock bolts/anchors, and corrosion of the supporting hangers, roof panels, and roof panel connections. This inspection should be as rigorous as possible as it will serve as the benchmark against all future inspections and all information should be recorded and included in the report. Furthermore, all visible structural connections, hangers, hanger connections and rock bolts should be visually inspected, and the existing condition shall be documented and photographed. Follow up inspections are to be performed periodically, preferably on a yearly basis or as deemed necessary by YEC. Observations from the inspections should be reviewed against the previous inspections and any changes in status should be noted for additional review.
- Monitor the corrosion of the structural supports for the east end wall cladding at the base of the columns. Significant corrosion will require a detailed review of the cladding loads and remaining support capacity.
- Monitor the condition and alignment of the generator room crane rails.
- As part of the rehabilitation and upgrading of the access shaft structural supports for the cladding, elevator and cables, install new cladding around the access shaft and the elevator shaft in the generator room. This work should include the incorporation of a hatch in the generator room under the hoist way access shaft. Total costs for the rehabilitation and upgrading program are currently being developed as part of a separate work program.
- Monitor the AH1 and AH2 TIV supports and ongoing leakage.
- Monitor ongoing conditions of the AH3 penstock and concrete support components.

3.1.3 Draft Tube Gallery and Surge Chamber

Description

The surge chamber is located immediately downstream of the draft tubes and draft tube gate guides for AH1 and AH2, as shown in Figure C5 below.

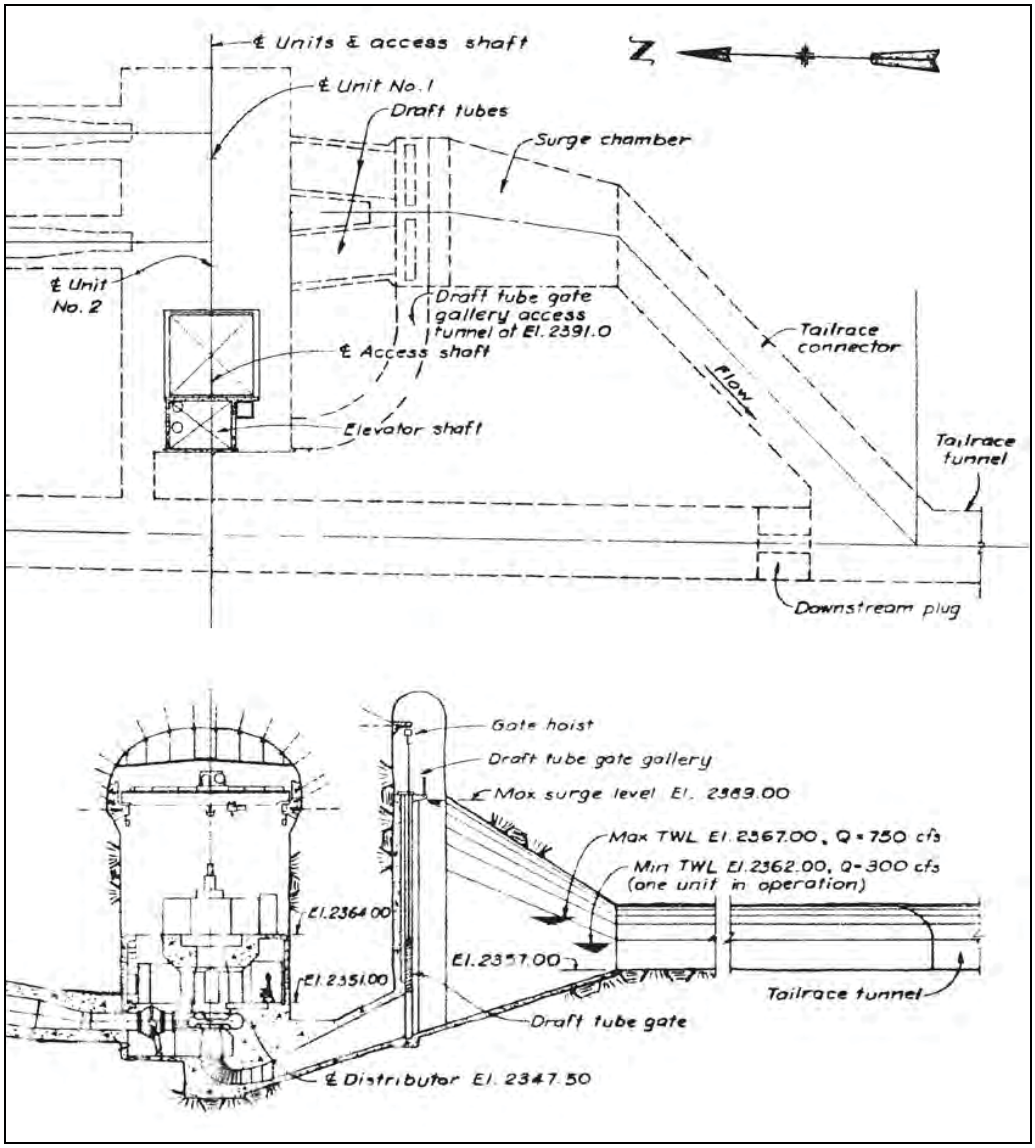


Figure C5 – Layout of Draft Tube Gate Gallery and Surge Chamber

The draft tube gate gallery is a concrete structure located on the upstream face of the surge chamber, with a set of gate guides for each of the two draft tubes (see Photo C3 below). The deck is slightly higher than the estimated maximum surge level. There is a single draft tube gate that can be installed in either of the two gate guides, operated by an overhead monorail beam and hoist supported on a steel frame anchored to the bedrock. The gate is typically dogged at the top of the AH2 guides. An inflatable boat is permanently maintained at the draft tube gate gallery, which can be winched down to the tailrace to be used as an emergency escape route.



Photo C3 – Draft Tube Gate Gallery

An access ladder on the downstream face of the draft tube guide concrete provides access down to the tailrace.

The draft tube gallery is accessed from a short tunnel between the elevator and the surge chamber. There are two bulkheads between the elevator / main powerhouse chamber and the draft tube gallery / surge chamber with steel doors that can be opened or closed to control air flow between the powerhouse and tailrace areas.

Assessment

The draft tube guide concrete that could be seen from the gallery deck appeared to be in good condition (see Facility Photograph C-41). No operational difficulties with the draft tube gate were reported by staff personnel. The deck concrete surface, including the downstream deck edge and edges around the gate hatches, appear to be in good condition with no visible spalling or cracks (see Facility Photographs C-42 and C-43). The gate opening covers are in good condition with some minor surface corrosion, as are the gate dogging supports that span across the AH2 gate guides (see Facility Photograph C-43).

The draft tube gate was stored below deck level at the time of the site visit. The portion that could be seen appeared to have some minor corrosion, particularly the upper side roller (see Facility Photograph C-44).

The downstream deck handrails and fencing are corroding in the damp environment, and the bottom of the fencing is not supported (see Facility Photographs C-45 to C-47). The embedded ladder rungs down to the tailwater level appear to be in good condition near the deck elevation, with some light corrosion on the rungs and cage, though the support bracket for the ladder cage is beginning to corrode (see Facility Photograph C-48). The lower levels of the access ladder were not visible.

The monorail hoist for the draft tube gate runs on a monorail beam supported by a steel frame anchored into the bedrock. The monorail beam support frame was sandblasted and re-painted in 2007 (approximate), though localized areas of corrosion are now evident (see Facility Photographs C-49 and C-50). The adequacy of the bedrock support bolts could not be determined.

The two bulkheads and doors between the draft tube gate gallery and the elevator appear to be in fair condition, with no signs of damage or displacement due to pressure extremes that may have occurred in the past if the doors were closed. No issues with the operation of the doors or problems with air leakage around the bulkheads were noted by site personnel (see Facility Photographs C-51 and C-52).

Recommendations

The recommended projects and costs related to the draft tube gallery and surge chamber are:

- Inspect and monitor the condition of the draft tube concrete structure, gate guides, and gate on a regular basis. Monitor for deflections, excessive steel corrosion or pitting, concrete deterioration, and deterioration or damage to the seals and sealing surfaces.
- Replace or rehabilitate (sandblast and paint) the handrails and fencing and add kick plates by 2016-2017 for an estimated $5,000, unless regular inspections indicate excessive corrosion requires earlier action.
- Regularly inspect and maintain the monorail hoist support framework, including the bedrock anchors. Sandblast and paint the hoist frame and monorail beam in 2016-2017 for an estimated $10,000.

3.1.4 Service Building

Description

The service building is a two-story cedar log structure with steel cladding and a concrete foundation and lower level. The building is located directly above the underground powerhouse with the two original generating units, and measures 19.8 m by 10.4 m (65’ x 34’) (see Photos C4 and C5 and Figure C6 below).



Photo C4 – Aishihik Service Building

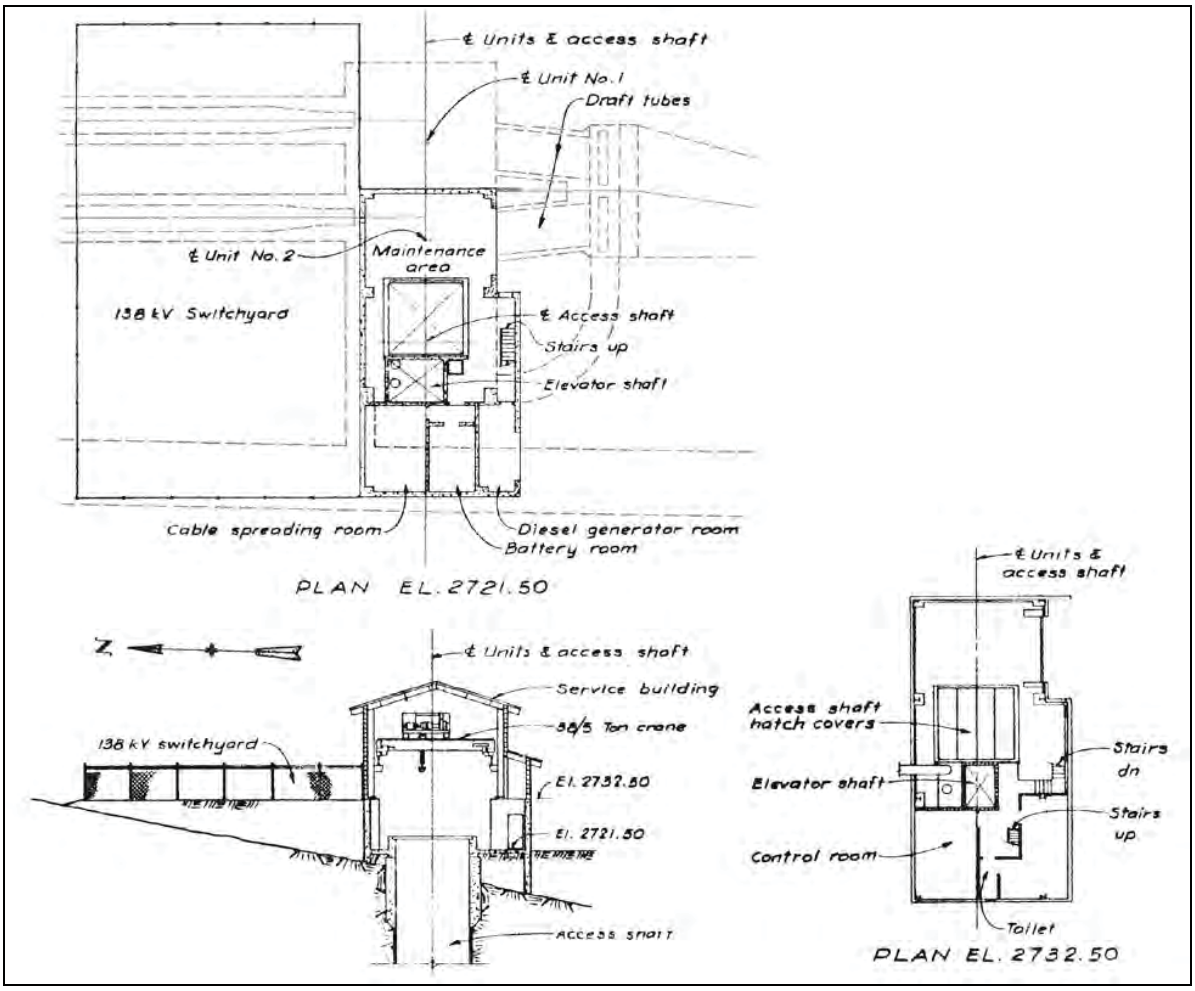


Figure C6 – Service Building Plan and Section

The concrete lower level contains the maintenance area, access to the underground powerhouse, the standby diesel room, the battery room, and the cable spreading room. The maintenance area at the east end of the building is accessed by an equipment door and a man door in the south wall. The maintenance area is open to the ceiling and encloses the overhead crane, elevator, and access ladder located within the vertical shaft in the bedrock that provides access to the underground powerhouse (see Photo C5 below). A man door in the standby diesel generator room provides access to the exterior.



Photo C5 – Service Building Maintenance Area

Steel columns encased in concrete support the steel crane girders for an electrically operated 38 Ton (34.5 Tonne) traveling crane in the maintenance room. The crane rails are connected to the top flange of the steel beams.

Concrete stairs and the elevator provide access to the second level, which contains an office area, a washroom, the control room, and a steel staircase leading to the third level. A man door in the west wall of the control room provides access to the switchgear building, which is a newer steel structure on a concrete foundation that was added to the west end of the service building in 2010. The third level contains the air conditioning equipment room, the elevator machinery room and the Roof Top Unit (RTU).

The roof structure is supported on the log walls and by a steel framework supported on the overhead crane columns. The steel roofing and exterior insulated metal wall cladding were installed approximately six years ago. The windows and exterior man-doors appear to be newer and were likely replaced when the cladding was installed.

The service building floors consist of painted concrete. The lower level interior walls are concrete. The second and third level interior walls were constructed of concrete blocks, except for the wall between the bathroom and the office area which is of wood construction.

Assessment

The concrete lower level is generally in good condition. The concrete walls typically had no observed cracks, distress, or signs of movement (see Facility Photographs C-53 to C-58). Walls around the elevator and the concrete stairs to the second level are in similarly good condition, as are the concrete floors. The concrete encasing the steel columns supporting the overhead crane and roof superstructure shows no signs of distress or cracking (see Facility Photographs C-59 and C-60). No areas of structural concern were noted in the second or the upper level of the service building (see Facility Photographs C-61 to C-66).

The third floor walkway that provides access to the service building crane is in good condition. However, the safety handrails are not rigidly attached at their base, and there is a large gap between the walkway and the crane that must be stepped over to access the crane (see Facility Photograph C-67).

The interior steel superstructure frame and log walls are in good condition overall. The rigid steel frame, roof trusses, and crane supports show no signs of deformations (see Facility Photographs C-68 to C-70). No operational concerns for the crane related to misalignment of the rails were noted by site personnel.

The exterior roof and wall cladding are only six years old and are in good condition (see Facility Photographs C-71 and C-72). The equipment door, exterior man doors, and windows are also relatively new and in good condition (see Facility Photographs C-73 and C-74). The exterior stairs from the vehicle access and parking area to the switchyard are in fair condition, with some minor surface corrosion of the treads (see Facility Photograph C-75).

The switchgear building is a relatively new structure and is in good condition. No issues with the cladding, interior, or access doors were noted (see Facility Photographs C-76 to C-78).

Recommendations

The recommended projects and costs related to the service building are:

- Reinforce the handrail supports for the upper level platform used to access the overhead crane and extend the deck closer to the crane, at an estimated cost of $5,000 in 2015.

3.1.5 Intake Structure

Description

The concrete intake structure is a separate structure located at the downstream end of the intake canal (see Photo C6 below).



Photo C6 – Upstream View of the Intake Structure

The intake structure was constructed on bedrock in the dry, prior to flooding the intake canal. After passing through an upstream set of three trashrack panels, flows transition to a vertical

pressure shaft and then a horizontal power tunnel excavated in bedrock to the Aishihik powerhouse (see Figure C7 below). Flows through the structure are controlled by a 3.05 m x 3.05 m (10’ x 10’) butterfly valve located downstream of the trashracks. A timber ventilation building encloses the access and air shaft to the intake just downstream of the butterfly valve.

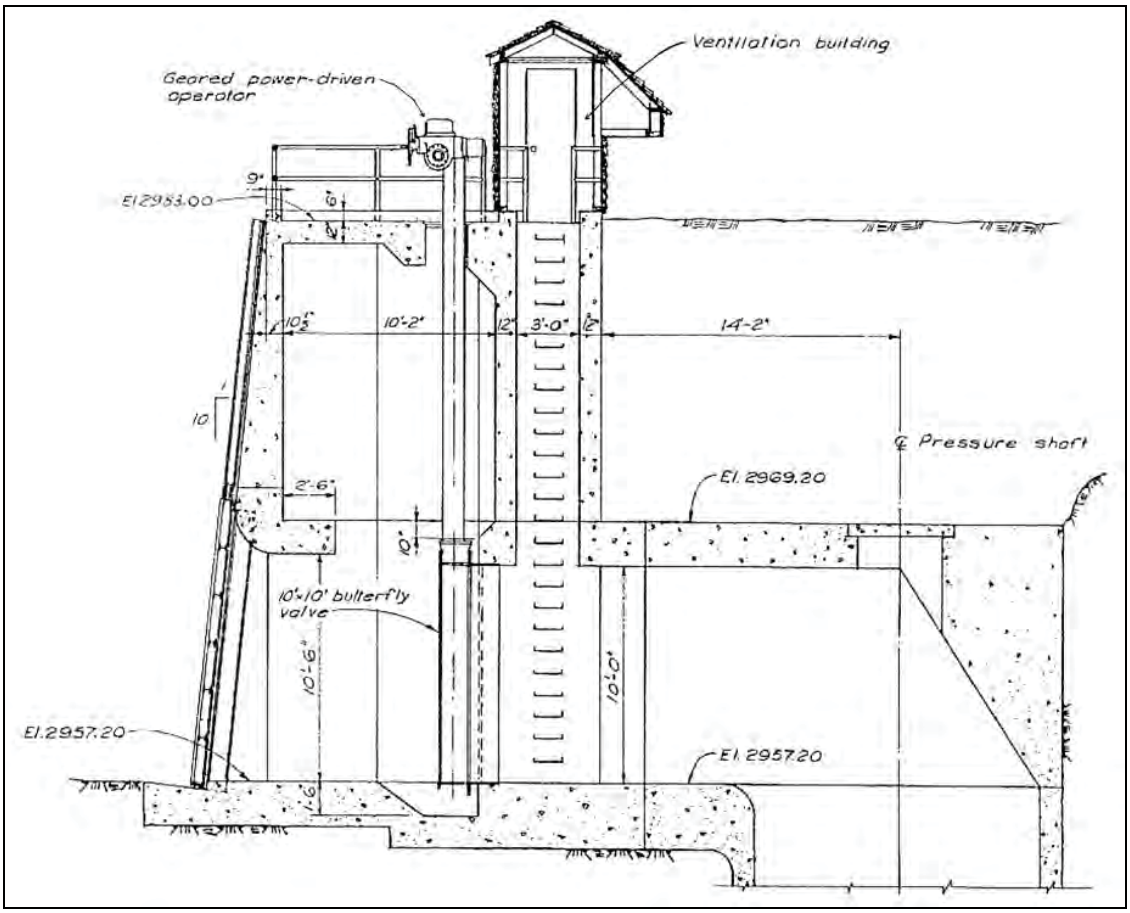


Figure C7 – Section through the Intake Structure

Assessment

The visible portions of the concrete are in good condition, and no concerns were noted (see Facility Photographs C-79 to C-82). Handrails are solid and in good condition. The steel guides for the trashrack panels are experiencing minor surface corrosion above the waterline. The underwater portions of the structure were not dewatered or inspected.

The wood siding and cedar shake roof is in poor to fair condition (see Facility Photographs C-83 to C-86). The siding is splitting in some locations and has numerous cracks and open knot

holes, some of which have been filled with expanding foam insulation, and the paint is significantly deteriorated. The cedar shakes are deteriorated, several are missing or loose, nails are loose, and the ridge is poorly protected. The plywood door is in fair condition, though the paint is deteriorated.

The plywood interior of the ventilation building is in good condition, with no signs that the roof is leaking (see Facility Photograph C-87). The plywood flap over the ventilation opening in the downstream side of the building also appeared to be in good condition, though the adequacy of its operation is not known. Water is entering the building under the access door, which is showing signs of water damage along the bottom (see Facility Photograph C-88). The protective cover over the ventilation shaft consists of an open steel grating with no structural members resting on the concrete curb. There is no gate or handrail to prevent personnel from accidentally stepping or falling on the grating over the ventilation shaft, and the interior door to this section of the building has been removed (see Facility Photograph C-89). There is no safety tie-off point for personnel descending the ventilation shaft to access the butterfly valve or pressure shaft.

The bulkhead gates stored adjacent to the intake structure appear to be in good condition (see Facility Photographs C-90 and C-91). The paint is fading but is generally intact, with only local areas of minor corrosion noted on the upstream skin plate, side members, and top girder. The timber seals are somewhat weathered but are solid and well attached. The downstream side of the gates could not be inspected due to the way the gates were stored.

A metal clad storage shed located adjacent to the intake structure appears to be new and is in good condition (see Facility Photograph C-92).

Recommendations

The recommended projects and costs related to the intake structure are:

- Re-shingle the roof, re-clad the exterior walls, and install a new exterior door in 2015-2016 for an estimated $10,000.
- Have a structural cover for the ventilation shaft constructed and installed in 2015 for an estimated $2,000.

- Confirm that there is adequate space for a fall retrieval tripod or davit system for accessing the intake water passage in 2015. If not, investigate methods of providing a permanent tie-off location above the ventilation shaft.

3.1.6 Canyon Lake Control Structure

Description

The Canyon Lake Control Structure is located 6 km north of the Aishihik Powerhouse at the south end of Canyon Lake just upstream of Otter Falls to regulate the flow of water from Canyon Lake into the Aishihik River. The geotechnical portions of the dam consist of steel sheet piling embedded in a concrete base on bedrock to cut off flows, with rockfill downstream of the sheet piling and impervious fill with a layer of rip rap on the upstream side (see Figure C8 below).

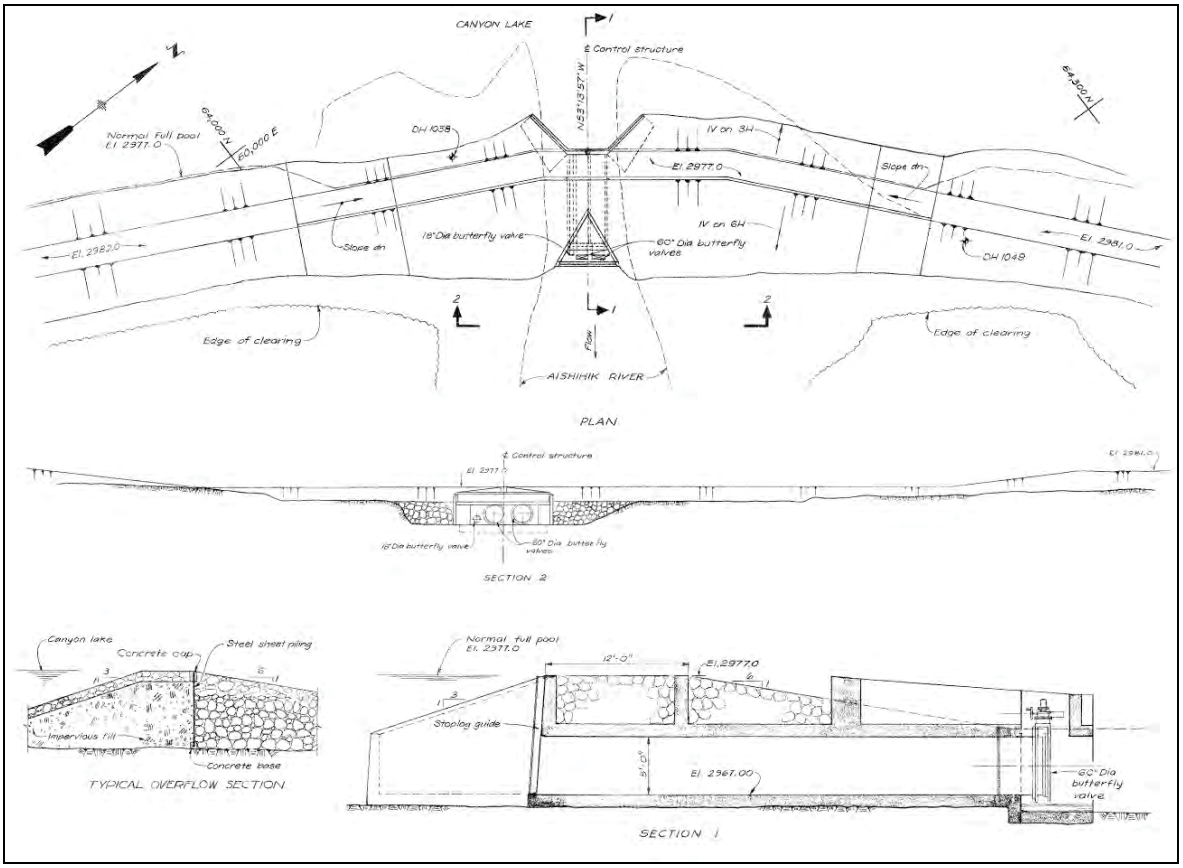


Figure C8 – Canyon Lake Control Structure Plan and Sections

The concrete section of the structure consists of two wing walls that direct flows to two conduits, each equipped with a set of upstream stoplog guides and a 60" diameter butterfly valve at the downstream end of the conduit. As shown in Figure C8 above and Photo C7 below, the center section of the dam, including the rockfill section over the concrete conduits that forms part of the access road, was designed as an overflow structure to pass additional flows as required. The "V" section of concrete diverts these overland flows and any ice or timber debris around the butterfly valve stems.



Photo C7 – Canyon Lake Control Structure (looking upstream)

Assessment

The upstream concrete wing walls are primarily below the Canyon Lake water level and could not be observed, though the top portions are in good condition with some minor edge spalling (see Facility Photographs C-93 and C-94). The top of the concrete cutoff wall above the conduits and the concrete cap at the top of the sheet piling cutoff wall are also in good condition, though the north end of the pile cap (and probably the sheet piling as well) is heaving,

as the end of the cap is clear of the fill over the road (see Facility Photographs C-95 and C-96). For further information, refer to subsection 3.4.1 Power Canal & Canyon Lake Control Structure.

The downstream end of the concrete conduits is generally in good condition, except at the extension of the south protective wall where there is some spalling at construction joints (see Facility Photographs C-97 to C-99). Again, due to the water level, most of the concrete conduit and the downstream wing walls were not visible for inspection.

Recommendations

The recommended projects and costs related to the Canyon Lake control structure are:

- Monitor the potential movement of the sheet piling and concrete cap at the north end of the structure.
- Conduct periodic diver inspections of the underwater portions of the dam and control structure.

3.1.7 Aishihik Lake Control Structure

Description

The Aishihik Lake Control Structure is located approximately 18 km north of the Aishihik Powerhouse at the south end of Aishihik Lake. Aishihik Lake is used as a storage reservoir for the Aishihik Hydro Plant, and the primary concrete control structure regulates the flow of water into Canyon Lake and the Aishihik River with three manually operated 8’ x 8’ butterfly valves. The structure is also equipped with a fishway to allow the passage of fish upstream, as shown in Photo C8 and Figure C9 below.



Photo C8 – Aishihik Lake Control Structure (upstream & downstream views)



Figure C9 – Aishihik Lake Control Structure and Fishway

An auxiliary control structure located approximately 100 m west of the primary control structure is reportedly the original control structure at this location prior to the construction of the concrete structure. This auxiliary structure consists of an embankment dam with six buried conduits (culverts) controlled by timber stoplogs on the upstream side of the dam (see Photo C9). A short timber bridge over what appears to be the original timber fishway is located at the east end of this control structure. The control structure was recently re-built with new culverts and timber stoplogs, but the fishway appears to be original.



Photo C9 – Aishihik Lake Auxiliary Control Structure

Assessment

The concrete control structure is generally in good condition. The visible portions of the upstream west wing wall above the waterline have only minor cracking and spalling evident (see Facility Photographs C-100 and C-101). The construction joint between the wing wall and the main structure is slightly open and offset at the top (see Facility Photograph C-102). No concerns were noted regarding the upstream face of the control structure, and the above-water

portions of the steel pier nosings and stoplog guides are in good condition with minor paint failure and light surface corrosion (see Facility Photographs C-103 to C-106).

The top of the pier nose concrete is generally in good condition, though the upstream deck surface is cracking and delaminated in some areas (see Facility Photographs C-106 to C-109). The timber bridge deck is relatively new and in good condition (see Facility Photograph C-110).

The downstream side of the control structure is also in good condition generally, with some typical surface cracks and map cracking, with some efflorescence noted (see Facility Photographs C-111 to C-114). Very little spalling or erosion was noted, though high water levels and turbulence prevented good observation of the concrete at the waterline, particularly at the lower pier surfaces.

Handrails on the control structure were recently repainted (since 2011) and are in good condition. All sections appeared to be solidly attached to the concrete and no concerns were noted with their condition. However, the handrails are only located on the upstream and downstream edge of the control structure deck. As seen in Facility Photographs C-108 to C-110, the handrail does not extend to the wing walls. This structure is fully accessible to the public, and there is a significant fall hazard at the two ends of the control structure at the wing walls.

The fishway was constructed at the same time as the control structure, and the concrete is in similarly good condition (see Facility Photographs C-115 to C-120). However, differential movements between the two structures has resulted in cracks and spalling at the upstream joints at the fishway / control structure connections (see Facility Photographs C-120 to C-123). The fishway appears to be rotating or sliding due to earth and/or hydrostatic pressures, to a maximum distance of approximately 40 mm at the top of the fishway walls. The handrails on the fishway are solidly attached, are in good condition and have been repainted since 2011.

The auxiliary control structure appears to be in good condition, with no discernable movement of the upstream stoplog guides, retaining wall, or upper sections of the stoplogs (see Facility Photographs C-124 and C-125). The stoplogs are relatively new and in good condition, though there is minor leakage between the logs (see Facility Photograph C-126). The six culverts are similarly in good condition, though there is minor surface corrosion along the bottom third of the interior (see Facility Photographs C-127 and C-128). The stoplogs were not raised or lowered

during the site inspection, so it is not clear if there are any issues with removing the stoplogs if needed to pass water. The guides had light surface corrosion, but no obvious signs of misalignment were noted that could interfere with gate operations.

The bridge section is in very poor condition (see Facility Photographs C-129 to C-131). The condition of the upstream stoplogs could not be verified. The deck timbers are worn and rotting / splintered, and some of the support beams are crushed and are in danger of failing completely. The structure is unsafe and should be flagged and blocked to exclude vehicles.

Recommendations

The recommended projects and costs related to the Aishihik Lake control structure are:

- Add handrails or fencing to both downstream wing walls and the west upstream wing wall in 2015-2016 for an estimated $10,000.
- Monitor the fishway section to determine if the structure continues to move relative to the main section of the control structure.
- Flag and block access to the auxiliary control dam bridge section immediately in 2014 for an estimated $1,000.
- Investigate options for the removal or repair of the timber bridge section of the auxiliary control dam in 2015, including an assessment of any requirements for additional water passage, at an estimated cost of $25,000. If this section is not required to pass water, it could be replaced with an impervious earthfill dam. Repair or replace the bridge section in 2015-2016 for an estimated $100,000 to $300,000, depending on the rehabilitation option selected.

3.1.8 Site Security and Public Safety

Description

The Aishihik intake, service building / powerhouse, and tailrace are located 20 km north of the Alaska Highway and the town of Canyon, accessed by a gravel road. Approximately 17 km of the distance is on a public road from the highway to Canyon Lake and onwards to Aishihik Lake, with the road to the powerhouse and intake and along the power canal to the Canyon Lake control structure owned by YEC.

The Aishihik tailrace and tailrace tunnel portal, intake structure, intake canal, Canyon Lake control structure, and Aishihik Lake control structures are all readily accessible by the public, either directly by vehicle or within a relatively short walk of vehicle access. Warning signs are infrequent or non-existent, and fencing, handrails and warning booms are in limited use. Equipment such as the butterfly valves at the intake and control structures could be operated or damaged / sabotaged with relatively little effort, and there are no cameras monitoring these assets.

Section 5.4.8 of the Canadian Dam Association's 2007 Dam Safety Guidelines refers to Public Safety and Security as part of regular dam safety assessments, and states "The review engineer should verify that public safety hazards at the dam have been identified and addressed and that a management plan has been established to ensure the public safety measures are periodically reviewed, inspected and maintained." This section goes on to say that "Some dams, in view of their size, location, and purpose, as well as the consequences of their failure, can be considered critical infrastructure that merits special security measures", and that 'The review engineer should verify that operating equipment is secured against vandalism or operation by unauthorized individuals…",

Additional recommended practices can be found in the published 2011 CDA "Guidelines for Public Safety around Dams", which also includes technical bulletins for public safety around dams regarding signage, booms and buoys, and audible and visual signals.

Assessment

The tailrace area and portal are easily accessed by the public, with no fencing or gates to prevent vehicles or people from going to this area. There is no signage along the tailrace channel or at the portal, and no safety boom to prevent boaters from actually entering the tailrace tunnel (see Facility Photograph C-132). These issues pose a concern for public safety.

The service building / powerhouse area is relatively secure, with perimeter fencing, gates and warning signs to keep the public out. However, the main gate does not appear to be locked or monitored during the day, and it is not known if it is locked at night (see Facility Photograph C-133). The gate at the road to the intake structure and power canal is typically kept locked. The fencing around the switchyard adjacent to the Service Building is kept locked, is well

maintained and has extensive signage warning people to avoid the area (see Facility Photograph C-134).

While the general public is prevented from driving to the intake, it is possible for people to hike along the power canal from Canyon Lake. There are no warning signs at the intake or fencing around the structure to prevent people from accessing the intake butterfly valve actuator or breaking into the ventilation building (see Facility Photograph C-135). There is a new safety boom at the entrance to the power canal at Canyon Lake, but no signage to warn people of the dangers of entering the canal (see Facility Photographs C-136 and C-137). These concerns affect both public safety and the security of the facility.

The Canyon Lake control structure is located immediately adjacent to the public access road and a picnic area along the shore of Canyon Lake. There is a locked gate to prevent vehicle access to the control structure, along with signage (see Facility Photographs C-138 and C-139). There is signage warning of strong currents at the upstream side of the intake facing landward, but no signs facing the water to warn boaters, and no signage at the downstream side by the outlet and no upstream safety boom (see Facility Photograph C-140). There is no fencing to prevent people from walking to the area or to prevent access to the butterfly valve actuators, water level gauge, and the power & communications to the site. The flip top of the water level gauge is not locked. These concerns affect both public safety and the security of the facility.

The Aishihik Lake control structure is located immediately adjacent to a public boat launch. There is a locked gate across the top of the abutment dam to prevent vehicle access onto the structure, but no fencing to prevent foot traffic (see Facility Photographs C-141 and C-142). There is a single warning sign about strong currents on the fishway handrail, one on the peninsula on the far side of the main control structure, and one at the boat launch (see Facility Photographs C-142 and C-143), but no signs on the upstream face of either the main or auxiliary control structures to warn boaters. There is an older safety boom across the upstream side of the main control structure, as well as a log boom with orange buoys across the entrance channel (see Facility Photographs C-143 and C-144), but no boom across the auxiliary control structure or the entrance channel. There are potentially significant public safety concerns at this location, though site security issues are minimal as the manual control wheels that operate the butterfly valves the slide gates are removed for security.

Recommendations

The recommended projects and costs related to Site Security are:

- Continue monitoring the existing fencing and warning signs, and perform maintenance as necessary (including brush removal). No additional allowance from current plant expenditures is proposed at this time.
- Review YEC's corporate public safety policies and make recommendations for upgrading signage and security measures at the site to further restrict access by the general public and provide additional no trespassing signs and signs warning of potential hazards in 2015. Current measures are deemed inadequate in the context of the updated CDA Guidelines.
- There are numerous hazards and critical areas at the various Aishihik structures that require additional security and public safety measures to minimize the potential for vandalism or serious accidents on YEC property. Conduct a detailed study to determine recommended site security and public safety upgrades to industry and CDA standards along with cost estimates for the implementation of recommendations. The study should be completed in 2015 at an estimated cost of $30,000.

3.2 MECHANICAL

The mechanical assessment of the Aishihik Hydro (AH0) generating station is based on site observations, review of drawings, major overhaul and maintenance history information (listed in Section 4 – References) and discussions with YEC staff. A detailed in-depth disassembly of the units was not conducted.

YEC typically conducts unit overhauls on a ten year cycle. At that time, the units are completely dismantled and verified. The runner is removed and the distributor is disassembled. Any damaged bushings, seals, etc. are then repaired or replaced. AH1 had a 10 year overhaul in 2003 and 2012. AH2 last had a 10 year overhaul in 2006 and it is assumed that its next overhaul will be in 2016.

3.2.1 Aishihik Lake Control Structure

Description

The Aishihik Lake Control Structure is located 18 km north of the Aishihik Powerhouse at the south end of Aishihik Lake at Elevation 3,014.00ft. The concrete structure is equipped with three

manually operated geared 8’ x 8’ butterfly valves. The structure is also equipped with a Fishway to allow the passage of fish upstream. The purpose of the control structure is to regulate the flow of water from Aishihik Lake into Canyon Lake. Refer to Photos M1 and M2 below.



Photo M1 – Upstream View of Aishihik Lake Control Structure



Photo M2 – Downstream View of Aishihik Lake Control Structure

Assessment

At the time of the inspection, the three butterfly valves were partially open and the gear actuators as well as the access hatches on the road deck appeared to have been recently painted. They were all in good condition with the exception that all three gear actuators were

missing bolts that secure the protective cap on the drive shaft. Furthermore, one of the protective caps was dented but it is not known if the drive shaft underneath was damaged. See Photo M3 below.

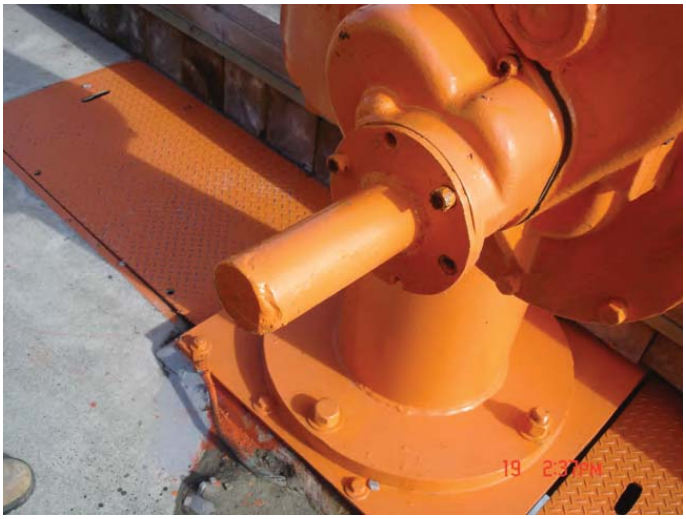


Photo M3 – Missing Bolts and Damage on Gear Actuator Drive Shaft Cover

YEC staff have indicated that the manual control wheels are removed from the gear units to prevent unauthorized tampering with the flows of the butterfly valves and that the operators bring the control wheels with them when the valves need to be operated (refer to Facility Photograph M-1).

In addition to the three flow control butterfly valves, the control structure is equipped with two slide gates with crank operated hoists on the Fishway. The purpose of these two slide gates is to regulate the amount of water entering the Fishway. The slide gates are manufactured by ARMCO. The model number is CPE-2 Lift. The slide gates appeared to be in good condition with only minor surface corrosion. Again, the gate operator wheels have been removed for security. Refer to Facility Photograph M-2.

Lastly, the orange hatches which provide access down to the butterfly valves have been partially covered by the new wooden road deck. It is not known if the hatches can be removed to provide access without removing a portion of the road deck.

Recommendations

The recommended projects and costs related to the Aishihik Lake Control Structure are:

- Replace the missing bolts for the protective caps on the gear actuator drive shafts: $500 – 2015.

3.2.2 Canyon Lake Control Structure

Description

The Canyon Lake Control Structure is located 6 km north of the Aishihik Powerhouse at the south end of Canyon Lake just upstream of Otter Falls at Elevation 2,977.00 ft. The concrete and rock filled structure is equipped with one 18” diameter bypass butterfly valve and two 60” diameter electrically operated geared butterfly valves to regulate the flow of water from Canyon Lake to Otter Falls and the Aishihik River beyond. Refer to Photos M4 and M5.



Photo M4 – Upstream View of Canyon Lake Control Structure



Photo M5 – Downstream View of Canyon Lake Control Structure

Assessment

At the time of inspection, the two electrically operated geared 60” diameter butterfly valves were open but it was not apparent if the 18” diameter butterfly valve was open. The actuators on the 60” diameter butterfly valves appeared to have been recently painted but were electrically disconnected (Facility Photograph M-3). Furthermore, both 60” butterfly valves are missing bolts between the valve and the actuator as shown in Photo M6.



Photo M6 – Missing Bolt between Valve and Actuator

The 18” diameter butterfly valve also looked to be in good condition externally.

YEC staff have indicated that the manual control wheel for the gear unit on the 18” diameter butterfly valve is removed to prevent unauthorized tampering with the flow. The operators bring the control wheel with them when the valve needs to be operated. Refer to Facility Photograph M-4.

The paint of the valve bodies appeared to be deteriorated but the metal surface appeared to be in good condition with only minor corrosion. To extend the life of the valve bodies, they should be coated with a suitable paint the next time the flow through the control structure can be shut off. This would likely require sandblasting of the visible surface. The condition of the valve discs and valve seats could not be inspected. The integrity of the valve seals should be reviewed when the valves are next shut completely.

Lastly the lake level monitoring sensor (Facility Photograph M-5) appeared to be in good working order. However, the access platform to the lake level monitoring sensor is not up to current code. Although the platform is equipped with handrails, the members that make up the

handrails are not rigid enough and there is no toe kick. Furthermore, due to the high water level of the lake during the site visit, KGS personnel had to step over water to access the platform.

Recommendations

The recommended projects and costs related to the Canyon Lake Control Structure are:

- Replace the missing bolts between the valve and actuators: Cost included in the Aishihik Lake recommendations to replace missing bolts. – 2015.
- Sandblast and paint butterfly valve bodies: $10,000 – 2016 to 2021.
- Replace platform handrails (including a toe kick) to meet the current code. Place additional gravel in front of the steps to the platform so operators are not stepping in or over water. $5,000 – 2015 – 2024.

3.2.3 Headworks (Intake) Equipment

Description

The Headworks (Intake) at the Aishihik Hydro site is comprised of the Power Canal Intake at Canyon Lake, the 5.6 km Power Canal, the Tunnel Intake Structure, the 571 feet (174 m) deep Pressure Shaft, the 3,100 foot (945 m) long Pressure Tunnel and the Penstock. Only the Tunnel Intake Structure contains mechanical equipment.

Intake and Bypass Valves

The Tunnel Intake is comprised of a concrete structure equipped with a ventilation building and three steel trashracks filtering the inlet water to a 10’ x 10’ geared, electrically-driven butterfly valve. The 10’ x 10’ butterfly valve regulates the flow of water into the pressure shaft. There is also a geared, manually operated butterfly valve on an 8” diameter bypass pipe. Both geared operators are accessible from the top of the concrete deck at Elevation 2983.0 ft. Refer to Facility Photographs M-6 and M-7.

Building/Tunnel Ventilation and Heating

The ventilation building is mounted over the ventilation shaft. It is equipped with baseboard heaters and the ventilation shaft is lined with six embedded heaters. Refer to Facility Photographs M-8 and M-9.

The building is equipped with a plywood ventilation flapper (field fabricated backdraft damper). This flapper is arranged to allow air to exit the ventilation building, but prevents air from entering. Refer to Facility Photographs C-87.

Trashracks, Guides & Bulkhead Gates

The intake is equipped with three steel trashrack sections. The trashrack guides are I-beam sections mounted to the upstream face of the intake structure. The trashrack sections are fixed to steel cables that are used to pull the trashrack sections out of the water in order to install the stoplogs for tunnel dewatering. Refer to Facility Photograph C-82.

Three steel bulkhead gates are stored on dunnage adjacent to the intake structure. These bulkheads are equipped with wood plank sliding/sealing surfaces.

Assessment

Intake and Bypass Valves

In general, the exterior of both geared valve operators looked to be in good condition with only minor surface paint chipping and corrosion evident. A report from the intake valve work performed in 2011 indicated that the geared actuator on the 10’ x 10’ valve had a cracked quadrant at the last inspection.

The valves were not witnessed in operation. YEC records indicate that work was performed on the intake butterfly valve in 2011 to grind the sealing surfaces, adjust clearances and a bearing plate was replaced. As this valve was recently serviced, it is expected that the valve is in good condition.

Building/Tunnel Ventilation and Heating

At the time of the assessment, the outdoor temperature was warm enough such that the ventilation building baseboard heaters and embedded guide heaters were not on. As the vent shaft needs to remain clear of ice, the baseboard heaters and the embedded shaft heaters should be checked at the beginning of each heating season and at regular intervals throughout the winter.

The air flapper arrangement is suitable to relieve air from the tunnel during filling, but will not allow air into the tunnel when it is being drained or if the intake valves are closed in an emergency situation when water is flowing. High negative pressures can develop if sufficient air cannot enter the tunnel when it is being drained. These negative pressures would be enough to severely damage the building and possibly the tunnel. Because of this, signage should be added locally to ensure that the door to the building is kept open during tunnel draining or if the valves are ever closed in flowing water conditions. Alternately, the flapper could be modified or replaced to allow air to pass in both directions. It should be noted that if remote closure capability is ever implemented for the intake valve, the flapper would need to be made to allow air into the building automatically.

Trashracks, Guides & Bulkhead Gates

The trashracks could not be inspected during the site visit.

The bulkhead gates appeared to be in good condition. The paint appeared weathered but not peeling; therefore, no corrosion was observed. The wooden seal/slide surfaces are in fair condition, but since they are exposed to the elements, it is expected that they will degrade and will require repair or replacement within a few years. Consideration should be given to protect the wood components. Indoor storage would be ideal, but tarps could be used to protect them from the sun and rain.

Recommendations

The recommended projects and costs related to the Headworks (Intake) Equipment at the Aishihik hydro facility are:

- Add signage to indicate to keep building door open during tunnel draining or emergency intake valve closure: $500 – 2015.
- Repair geared intake valve operator: $10,000 – 2015-2016.

3.2.4 Turbine Inlet Valves (TIV's)

Description

The Turbine Inlet Valves for Units AH-1 and AH-2 are 39 inch (1 m) diameter horizontal spherical valves designed and manufactured by Dominion Engineering Works Limited in 1974. Both spherical valves include upstream and downstream seals and are operated by penstock water pressure through a water-hydraulic cylinder. As such, the valves cannot be operated when the penstock is dewatered unless another source of pressurized water is used. A 1.75 inch (44.5 mm) locking pin is used to lock the lever in the closed position when required.

The spherical valves must be operated locally at the control panel located at the turbine floor level.

Assessment

The Turbine Inlet Valves for Units AH-1 and AH-2 are showing signs of external surface corrosion and the Piezo tubes on Unit AH-1 have rusted off and are now plugged. As such, the TIV's should be tool cleaned (wire brushed) or sandblasted and re-painted. Staff did not indicate any concerns with the internal condition of the valves and their ability to seal.

The inside of the valves was inspected by Klohn Crippen Berger in June of 2012 and it was their conclusion that the valves were in good condition, with only minor surface corrosion on the plug. For further details, refer to the Klohn Crippen Berger report, Aishihik Units 1&2 TIV SDI Report. This report certifies the TIVs for use as a single point of isolation until July 2017.

As mentioned above, the AH1 and AH2 TIVs must be operated locally. Due to the limited access to the powerhouse and the lack of emergency closure capability at the intake, the TIVs should be remotely operable. A loss of unit control (wicket gate operation failure), or a breach in the water passage could not be stopped without sending staff into the powerhouse. This situation would more than likely be unsafe. As such, remote operation capability should be implemented for the AH1 and AH2 TIVs. At this time, the addition of a counterweight could also be investigated to improve reliability.

Recommendations

The recommended projects and costs related to the Turbine Inlet Valves (TIV's) at the Aishihik hydro facility are:

- Tool clean (power tool) and re-paint the TIVs for Units AH-1 and AH-2: $10,000 – 2015-2017.
- Automation of the operation of the TIVs to allow remote closure: $190,000 – 2015-2017.

3.2.5 Generating Units - Turbines

Description

The two original vertical Francis turbine generating units (AH1 & AH2) at the Aishihik Hydro facility were manufactured by Dominion Engineering Works Limited in 1974 and placed into service in 1975. They are 15 blade 20,500 H.P. turbines rated for 720 R.P.M. with 592 feet of head. The serial numbers are 1014 and 1015 respectively. Refer to Facility Photographs M-10 and M-11.

The newer horizontal Francis turbine generating unit (AH3) was manufactured by Kossler/Voith and was placed into service in 2011. It is a 9,625 H.P. (7,180 kW) turbine rated for 900 R.P.M. with 592 feet of head. The serial number is 004141. Refer to Facility Photograph M-12. However, this unit is not covered under this review.

Assessment

At the time of inspection, only units AH2 and AH3 were operating. Unit AH1 was undergoing maintenance. As a detailed in-depth dissection of the units was not conducted, the overall condition of the shaft, wicket gates, operating rings, servo motors, bearings, shaft seals, runners, embedded parts and head covers are not known at this time. However, it was observed that one of the air admission valves on unit AH2 was leaking badly at the time of inspection as illustrated in Facility Photograph M-13. Information from YEC staff indicated that this leaking valve was in the process of being replaced. Further information from YEC is as follows:

- Unit AH1 had a 10 year overhaul in 2011.
- Unit AH2 had just been overhauled in 2013.
- There has never been a bearing wipe at the AH0 facility.
- There are currently no cavitation issues at the AH0 facility as minor cavitation repairs had been performed this year.

Runner Cavitation

The AH1 runner had a significant amount of cavitation in the radius between the blades and the skirt on the extrados during its 10 year overhaul in 2012. Repairs were made at site, with the runner removed from the pit. Information from YEC staff indicates that the runners are inspected annually for cavitation. Refer to Photos M7 and M8 below.



Photos M7 – Cavitation before Repairs



Photo M8 – NDT after Welding Repairs

Turbine Re-runnering

While the AH2 generator stator was re-rated to 17.24 MW from its original 15.3 MW after being rewound in 2012, its runner was left relatively untouched. There appears to be opportunity to improve the AH2 turbine output to match the higher generator rating. Advances in runner design and manufacturing processes in the last 40 years could provide this improvement. There could also be benefits to re-runnering AH1 if a parallel effort was made to increase the stator rating.

Since increases in runner output has ramifications throughout all primary and secondary equipment, expert support should be sought for the modernization assessment process.

Wicket Gate Bushings

The AH1 lower wicket gate bushings were found worn in the area of the upper seal during the 2012 outage. The bushings were changed to Orkot greaseless bushings (not sure if this includes the upper bearings). At the time of our site visit, YEC staff indicated that this changeover required an increase in the servo closing pressure of the governor in order to reliably operate the wicket gates. A follow up review by YEC staff discovered that there was misalignment within the vertical wicket gates due to clearance issues. YEC staff have since indicated that the misalignment has been corrected.

Wicket Gate Levers and Arms

The AH1 wicket gate operating levers and gate arms were found rusted to each other during the 2012 overhaul. Some arms were damaged during the dismantling process due to the force required to separate them. The contractor estimated that the levers would not have separated if the shear pin had failed in operation. If that is true, then the servos could overpower the linkages and twist them beyond repair if the wicket gate jammed during closure. Refer to Photo M9.



Photo M9 – Wicket Gate Levers and Arms

The probability of rust welding of the linkage elements would be reduced if they were separated by a lubricating film or by other means. EnerServ (the overhaul contractor) recommended that the linkage be dismantled and greased every three years. Alternatively, greasing points could be added to the shear lever and the area greased at regular maintenance intervals. Installing sheets of self-lubricating materials on one of the elements would also provide protection against bonding. This would be a more expensive fix than lubrication, but it has the advantage of being greaseless.

Lastly, an engineering review should be undertaken to identify all areas of the turbine that may benefit from adding greasing points or self-lubricated materials to machine elements prone to binding. The study should be made in time to support the AH2 - 2016 outage.

Vibration Monitoring

AH1 and AH2 are equipped with a modern Bentley-Nevada vibration monitoring system.

Wicket Gate Shear Pin Breakage Monitoring

The units are not currently equipped with wicket gate shear pin breakage sensors. A broken shear pin detection and annunciation system would alert station operators or SCC of the fact that a unit may not stop turning after being shut down. Consideration should be given to adding shear pin breakage monitoring capabilities, complete with annunciation to SCC.

Air, Oil and Water Piping

The air, oil and water pipes and related valves and instrumentation servicing the turbine are almost 40 years old. Their condition should be assessed and the remaining life estimated utilizing NDT (Ultrasonic) inspection techniques. The measured piping thicknesses can be compared against pipe thickness charts for the velocities and pressures of the respective systems. Typical corrosion allowances on piping systems are 1/16" (1.6 mm). If the measured areas of the piping systems (elbows, fittings, bends, etc.) are found worn or corroded beyond 1/16" (1.6 mm), then a wholesale investigation and change-out of the system should be considered for the next 10 year overhaul. The systems that should be included in this recommendation are:

- Piezometer piping.
- Bearing cooling water piping.
- Head Cover Sump Pumps.
- Shaft Seal Water piping.
- Shaft Seal Air piping.
- Turbine Bearing Oil piping.
- Turbine Air Admission piping.

In the event that the above program cannot be executed in its entirety, focus should be placed on the Piezometer piping and the turbine air admission piping which have visible signs of distress.

Water leak – Unit AH2

YEC staff have indicated that there is a water leak on unit AH2. Water reportedly leaks from between the spiral case and the concrete. The inside of the spiral case has been inspected in the past but the source of the water leak was not found. At the next unit dewatering, further investigations should be carried out to determine the source of the leak. It should be noted that the leak may be from embedded sections of piezometer piping. Selectively pressurizing these tubes, or possible the use of dyes may assist in finding the source of this leak.

Recommendations

The recommended projects and costs related to the Generating Units - Turbines at the Aishihik hydro facility are:

- Conduct a study of the benefits to re-runner the AH1 and AH2 turbines: $100,000 (to be confirmed) – 2015-2020.
- Provide wicket gate shear pin detection and annunciation: $75,000 - 2015-2016.
- Identify all areas of the turbine that may benefit from adding greasing points or self-lubricated materials to machine elements prone to binding. The study should be made in time to support the AH2 10 year overhaul in 2016: $10,000 – 2015-2016.
- Inspect all air, oil and water piping systems and determine which elements need to be replaced in both the short and long term: $20,000 – 2015.

3.2.6 Generating Units – Turbine Regulating Equipment

Description

The governors and hydraulic power systems for the Aishihik generating units AH1 and AH2 are the original Woodward mechanical systems shown in Facility Photographs M-14 and M-15. As generating unit AH3 is a new horizontal Francis turbine, the unit is equipped with a digital governor, a hydraulic power unit (HPU) and a lubrication pressure unit (LPU). Refer to Facility Photographs M-16, M-17 and M-18.

Assessment

As unit AH1 was off during the inspection, the governor and hydraulic power unit could not be assessed for mechanical operation but looked to be in good condition for their age and extent of use. That being said, minor oil leaks were observed with the presence of oil absorbing pads and drip pans on both the governor and the HPU. The HPU has been fitted with a steel drip pan which funnels the oil into a cut off plastic container. The HPU has also had its drive chains replaced with belts. Refer to Facility Photographs M-19 and M-20.

The governor and HPU for Unit AH2 were in equally comparable shape as Unit AH1. The hydraulic power unit for AH2 was also fitted with an oil drip pan cut out from a plastic container as shown in Facility Photograph M-21 and the drive chains have been replaced with belts. The Hertz display for unit AH2 was reading 425 R.P.M. at 35 Hz as shown in Facility Photograph M-22, but the unit was running at full R.P.M. of 720. Hence the Hertz display is malfunctioning and requires maintenance and/or replacement.

During the on-site assessment, information from YEC staff had indicated that since the wicket gate bushings on Units AH1 and AH2 had been replaced with Orkot Bushings, there had been higher friction causing the units to stall at their designed working pressure of 200 psi. As documented in Section 3.2.5 above, a review of the units discovered a misalignment of the vertical wicket gates due to clearance issues. YEC staff have since repaired the wicket gates and now the governors and hydraulic power units operate at 180 psi. Therefore, no further action is recommended.

Recommendations

The recommended projects and costs related to the Generating Units - Turbine Regulating Equipment at the Aishihik hydro facility are:

- Repair or replace the malfunctioning Hertz display on Unit AH2: $1000 – 2015.

3.2.7 Generating Units – Generator Mechanical

Description

Units AH1 and AH2 generators have been rewound and rerated since they were installed in 1975. Unit AH1 was rewound in 2003 by GE and overhauled in 2012 and is now rated for 15.3 MW with an 80°C stator and rotor temperature rise. The generator model number is AT1 and the serial number is 525L439. Refer to Facility Photograph M-23.

Unit AH2 was rewound in 2006 by Voith Siemens and is now rated for 17.24 MW with an 80°C stator and rotor temperature rise. The generator model number is AT1 and the serial number is 525L440. Refer to Facility Photograph M-24.

Unit AH3 is a 7.0 MW, 13.8 kV generator manufactured by TDPS (India). The generator model number is TD172 and the serial numbers is 2K10041036-01. Refer to Facility Photograph M-25.

The upper bearings of units AH1 and AH2 are the traditional GE spring thrust bearing design with Babbitt thrust and guide shoes and are water cooled. Both generators' lower guide Babbitt bearings are also water cooled. Furthermore, the generators have surface air coolers.

The generators were originally equipped with Halon based fire protection systems, but these have since been removed; presumably due to environmental concerns.

Assessment

Only generator mechanical aspects are discussed in this section. Refer to the electrical section for the assessment of the generator electrical. As detailed inspections and disassemblies were not performed, this assessment relies on past reports, maintenance histories and discussions with staff. Only areas of concern are mentioned.

Stators

When Unit 3 was added in 2010-2011, the expansion of the tunnel would have created a lot of airborne dust which could have settled in the stator bores. This settled dust would affect the

stator's heat dissipation capability. Information from YEC staff indicates that the AH1 stator was cleaned in 2012 and that the AH2 stator was cleaned in 2013.

Generator Lower Bearings

Based on experience with the AH1 lower guide bearing in 2012, YEC staff indicated that they inspected the AH2 lower guide bearing in 2013 for signs of separation between the Babbitt and the metal housing. No separation issues were reported to KGS Group. Refer to Photo M10.



Photo M10 – AH1 Lower Guide Bearing as Found in 2012

Generator Brake Runner Plate

Based on the wear and distortions of the AH1 generator brake runner plates in 2012, YEC staff indicated that they inspected the condition of the AH2 runner plates in 2013. No issues were reported to KGS. Refer to Photo M11.



Photo M11 – AH1 Old Brake Runner Plate as Found in 2012

Air, Oil and Water Piping

The air, oil and water pipes and related valves and instrumentation servicing the generator are almost 40 years old. Their condition should be assessed and the remaining life estimated utilizing NDT (Ultrasonic) inspection techniques. The measured piping thicknesses can be compared against pipe thickness charts for the velocities and pressures of the respective systems. Typical corrosion allowances on piping systems are 1/16" (1.6 mm). If the measured areas of the piping systems (elbows, fittings, bends, etc.) are found worn or corroded beyond 1/16" (1.6 mm), then a wholesale investigation and change-out of the system should be considered for the next 10 year overhaul. The systems that should be included in this recommendation are:

- Surface air cooling piping.
- Generator brakes and jacks air and oil piping.
- Upper and lower bearing oil piping.
- Upper and lower bearing cooling water piping.
- Lube oil piping.

Recommendations

The recommended projects and costs related to the Generating Units – Generator Mechanical at the Aishihik hydro facility are:

- Inspect all air, oil and water piping systems and determine which elements need to be replaced in both the short and long term: cost is included in the inspection of the turbine piping above – 2015.

3.2.8 Tailrace Equipment

Description

The tailrace deck is located at elevation 2391.0 ft on the south face of the powerhouse facility and forms part of the surge chamber. The draft tube gate gallery (surge chamber) excavation supports a steel monorail crane structure with a maximum load rating of 5,000 kg (5 Tonnes) for transporting the single steel draft tube gate into either the AH1 or AH2 draft tube guides. Refer to Facility Photographs M-26, M-27, M-28 and M-29. Unit AH3 is not equipped with a traditional draft tube gate. Isolation of the AH3 turbine from the tailrace is accomplished by the closing of a large knife gate as shown in Facility Photograph M-30.

In addition to the standard tailrace equipment, the draft tube gate gallery excavation within the surge chamber supports a small manual hoist which raises and lowers a small zodiac dingy. The dingy is used to inspect the tailrace tunnel and also provides a secondary escape route out of the powerhouse facility as shown in Facility Photograph M-26.

Assessment

The draft tube steel monorail structure and hoist are in good condition. The humidity level in the surge chamber is very high, which causes condensation and surface corrosion on the draft tube crane structure and equipment. Refer to the Civil section of this report for a discussion on the condition of the crane structure and the draft tube gate. The high humidity levels and condensation is reportedly causing control issues with the side to side travel for the 5,000 kg (5 Tonne) crane. Controlling humidity levels in the surge chamber would be very difficult, therefore, it is recommended that the crane controls be serviced to address the issues currently being

experienced and that consideration be given to install panel heaters, etc. in order to address the humidity related effects. The existing ODP hoist motor should be replaced with a TEFC motor, complete with standby heaters.

The knife gate valve for unit AH3 was installed in 2011 and as such is in very good condition.

Recommendations

The recommended projects and costs related to the Tailrace systems for the Aishihik hydro facility are:

- Service draft tube crane controls, install panel heaters to mitigate effects of humidity and replace the ODP motor with a TEFC motor: $25,000 – 2015 – 2016.

3.2.9 Ancillary Equipment

Description

The ancillary equipment of the Aishihik hydro facility entails the following equipment:

- The service bay crane in Facility Photograph M-31.
- The powerhouse crane in Facility Photograph M-32.
- The diesel backup generator (service bay) in Facility Photograph M-33.
- The small diesel backup generator (powerhouse) in Facility Photograph M-35.
- The elevator and elevator shaft in Facility Photographs M-36 and M-37.

Service Bay Crane

The service bay crane was manufactured by the Hepburn Company of Toronto and is rated for 38 Tons on the main hook and 5 Tons on the auxiliary hook. This crane is used in the service building and to lower equipment from the service building to the powerhouse below. As such, it is capable of approximately 110 meters lift.

Powerhouse Crane

The powerhouse crane was manufactured by Heede and is also rated for 38 Tons on the main hook. No sign was visible for the rating of the crane auxiliary hook capacity but the Aishihik drawing lists it as 3 Tons.

Backup Diesel Generator

The diesel backup generator was manufactured by Detroit Diesel and was placed into service in 1975. The Lima generator on the unit provides 175 kW of 575 volt electricity to the facility from a Detroit Diesel engine. The model number of the diesel engine is DD671T and the serial number is 6A0284137. The Lima generator serial number is A371850A.

Small Backup Diesel Generator in Powerhouse

The small diesel backup generator located in the powerhouse basement was manufactured by Stamford. The generator provides 8.2 kW of power and its purpose is to provide backup power to the Flygt drainage sump pumps in the event of a loss of AC and DC power from the station service.

Elevator

The elevator was originally manufactured by Otis Elevator and it was modernized by Thyssen Krupp Northern Elevator in 2011. It is serviced regularly and exclusively by Thyssen Krupp. The elevator extends from the service bay floor at elevation 2721.50 down to the powerhouse generator floor at elevation 2364.00. The elevator pit extends down to elevation 2351.00.

Assessment

Service Bay and Powerhouse Cranes

The service bay and powerhouse cranes appear to be in good condition. Both cranes have had electrical upgrades in the recent past as there are new pendant controllers on each crane. Information from YEC staff indicated that the service bay crane was recently re-roped due to load rotation problems. The crane drums have multiple wraps with no rope guides which could

cause accelerated wear. This may not be a significant issue due to the very limited use of the service bay crane.

Furthermore, access to the service bay crane trolley platform is poor. As Facility Photographs M-38 and M-39 illustrate, to gain access to the trolley platform, the maintenance staff must first move the crane to the extreme southwest corner of its travel path and staff must climb onto the crane aided by a handrail. Refer to the Civil section of this report for the recommendations related to the service building crane access.

Refer to the Civil section of this report for information on the condition of the crane rails for the powerhouse crane.

Backup Diesel Generator

The backup diesel engine and generator were not operated but appear to be in good condition for their age with only minor oil drips (contained with blotters). The hour meter displayed only 10.5 hours which seems to indicate that the hour meter is either new or defective.

At the time of inspection, two new batteries had just been delivered to replace the two existing batteries mounted inside a wheeled cart. However, the in-service batteries are not housed inside protective containment boxes and the diesel generator room appears to also be used as a housekeeping storage and laundry room. Refer to Facility Photograph M-40.

There is no combustion air inlet into the generator room other than a grill mounted within the access door. This “steals” air from the service bay. Furthermore, the only room ventilation is provided by an undersized 12” wall fan and consequently, the room overheats when the diesel generator is run.

Fuel is brought to the “day” storage tank from the bulk fuel storage tank through the generator access door. The “Day” storage tank is a 264 Gal. (1,000 L (Estimated Volume)) vertical single walled tank mounted inside a steel containment berm. The vertical day tank is not equipped with a vent whistle or a high level alarm. The day” storage tank is also equipped with a secondary fuel filling line which is cantilevered through the generator access door to the building exterior. Refer to Facility Photographs M-41, M-42, M-43 and M-44.

The “Enviro Tank” bulk diesel fuel storage tank will be discussed in greater detail in the Oil/Fuel Handling System section below.

The 175 kW backup generator is reportedly undersized and slated for replacement within the coming year. It would be recommended that the other issues identified with the diesel generator room, ventilation, day tank and piping be addressed as part of a complete project. Replacement of the diesel generator will be further discussed in Section 3.2.4 AC/DC Station Service below.

Small Backup Diesel Generator in Powerhouse

The small diesel backup generator for the Sump located in the powerhouse basement appeared to be in good condition but was not witnessed in operation during the inspection. At the time of the inspection, the unit exhausted directly into the underground powerhouse with no exhaust extraction system. Information from YEC staff is that the basement smells bad when the unit is first started up, but that the air quality seems to improve once the unit heats up to its running temperature. The exhaust could be ducted to the surface (not likely feasible), an alternate energy source could be employed to operate the drainage pumps in an emergence, or air quality testing should be performed to determine if the installation is acceptable. Consideration could be given to using an Eductor (jet pump) that operates with water pressure from the penstock. Such a system is to be arranged in a fail-safe manner that causes it to start pumping on a complete loss of electrical power.

Since our site visit, YEC has indicated that they have conducted the appropriate air quality testing and they have installed an air scrubber on the diesel backup generator to allow for it’s continued use. Therefore, no further action is recommended.

Elevator

The elevator and the structure in the elevator shaft were in working condition but showed signs of corrosion. The condition of the elevator itself is beyond the scope of this review. However, the elevator was modernized in 2011 and it maintained at regular intervals by ThyssenKrupp Elevators. Remediation of the structure in the elevator shaft is now in the planning stages (under separate project) and is not covered by this report.

Recommendations

There are no recommendations related to the Ancillary Equipment for the Aishihik hydro facility.

3.2.10 Heating, Ventilation and Air Conditioning Systems

Description

The heating, ventilation and air conditioning systems of the Aishihik Hydro facility are differentiated between the service building, the switchgear annex and the powerhouse.

The service building contains the following equipment:

- One air makeup unit (AMU) to supply air down the service shaft to the powerhouse. This AMU is located on the third floor between the service building crane electrical panels and newer SCADA and surveillance system panels.
- Two oil-fired low pressure hydronic unit boilers manufactured by the Burnham Corporation of Lancaster, PA, USA with a gross output of 299 MBH and a net rating of 260 MBH.
- Two large exhaust fans located on the north face of the building venting air from the powerhouse and shaft. The ducting reportedly extends from the wall fans down just below the service hatch cover.
- One bathroom exhaust fan.
- Various electric unit heaters and baseboard heaters.
- Various hydronic unit heaters and baseboard heaters.

The switchgear annex is comprised of the following:

- One electric wall mounted unit heater.
- One wall mounted supply fan on the east face of the switchgear building.
- One wall mounted exhaust fan on the west face of the switchgear building.

The powerhouse is equipped with the following:

- Three electric unit heaters at the AMU supply duct outlet to supplement the heat to the powerhouse.
- Two electric unit heaters in the TIV compartments in the basement.
- Three circulation fans located near the ceiling of the powerhouse.

Assessment

Boilers

The HVAC equipment in the service building was generally in good condition. Information from YEC staff indicated that the original electric unit heaters and baseboard heaters were not sufficient to maintain a comfortable working temperature within the service building during the coldest winter months. As such, two oil-fired hydronic boilers with hydronic unit and baseboard heaters were added throughout the service building. Both boilers were installed in 1999 and appear clean and well maintained with service stickers indicating that they were last serviced in November of 2012. Refer to Facility Photograph M-45. However, two deficiencies were noted at the time of inspection:

- The boilers are connected to a glycol hydronic system that is not equipped with a chemical pot feeder for treatment of the glycol. The lack of chemical treatment will reduce the life of the piping and boilers and will lead to pre-mature valve failures/sticking.
- The combustion air duct into the boiler room has been plugged to stem the flow of cold air into the service building as illustrated in Facility Photograph M-46.

Air Makeup Unit (AMU)

The air makeup unit (AMU) in the service building appeared to be in generally good condition but staff indicated that it lacked the heating capacity needed during cold weather. It is unclear whether this is due to defective heating elements or due to a design issue.

The following deficiencies were noted with the AMU in the service building:

- The electric and hydronic heating coils and the fan motor within the air plenum were dirty and should be cleaned.
- There were no air filters in the AMU. The unit looks like it was meant to have disposable "Blanket" filters.
- The automatic outside air damper was broken. The damper is currently manually opened which is acceptable as the unit runs continuously.

Exhaust Fans

The two large fans (one new and one old as illustrated in Facility Photographs M-47 and M-48) on the north wall of the service building are used to exhaust the hot moist air rising from the powerhouse via the equipment shaft. They both appear to be in good condition but were installed in locations that have poor access for maintenance. Lastly, the bathroom in the service bay is equipped with a newer looking exhaust fan and ducting but the exhaust fan was not working at the time of the inspection.

Switchgear Annex

The HVAC equipment for the new switchgear annex was in very good condition as should be expected for the limited age of the building (2011). The large equipment door has been insulated and covered with checkerplating. Staff have indicated that prior to this the building was cold in the winter.

Powerhouse HVAC

The unit heaters and fans for the powerhouse HVAC are operational. No specific upgrades are required at this time, but unit heaters and fans will need to be replaced as they fail.

The supply air duct from the AMU in the service building is broken at the bottom of the access shaft, must above the louver that discharges air into the powerhouse. and the louver is showing signs of corrosion. Refer to Facility Photograph M-49. To supplement the heat to the powerhouse, three electric unit heaters and an electric furnace have been located on a frame at the louver outlet as illustrated in Facility Photograph M-50 to supplement the heating of the supply air.

Information from YEC staff indicates that the chimney effect provides a natural ventilation source from the tailrace through the surge chamber into the powerhouse and up the equipment shaft.

The three circulation fans shown in Facility Photograph M-51 mounted at the ceiling of the powerhouse were in good condition at the time of the inspection. The fan motor casings were in good condition, but the untreated metal angle iron support brackets showed signs of minor corrosion.

In addition to the equipment listed above in the powerhouse, small exhaust fans were installed on the upper brush compartments of the AH1 and AH2 generators. Refer to Facility Photographs M-52, M-53 and M-54. Information from YEC staff stated that the exhaust fans were installed to remove oil vapors from the generator so that the brushes do not become contaminated with oil. Although the fans and ducting of these two units are functional, the installation appears to be of a temporary nature. The ducting should be replaced with more permanent ducting at the next unit overall.

Recommendations

The recommended projects and costs related to the heating, ventilation and air conditioning systems for the Aishihik hydro facility are:

- Install a chemical pot feeder on the hydronic system and implement a glycol treatment program: $5000.00 – 2015-2016.
- Ductwork/Sheet metal work:
    - Remove the obstructing materials from the combustion air duct for the boiler room and provide a ducted air trap.
    - Install air filters in AMU.

- Repair broken duct at base of service shaft:
  - As these items can all be done by the same trade, it is recommended that they be done together as a single work item: $5000.00 – 2015.
  - Verify operation of electric heating coils in the AMU as well as their capacity and repair/replace as necessary. Then confirm whether three unit heaters and the electric furnace at the louver outlet in powerhouse are still required. Ideally, the heating in the AMU should be sufficient and the heaters at the louver outlet should be removed: 2015.

3.2.11 Compressed Air System

Description

There are two compressed air system at the Aishihik Hydro facility; one in the service building and one in the powerhouse the powerhouse. The service building is equipped with a 5 HP Ingersoll Rand air compressor mounted on a vertical 60 gallon receiver tank. Refer to Facility Photograph M-55. The model number is 2340L5-V and the serial number is 1004300012. The unit is rated for a maximum pressure of 175 psig and provides compressed service air to the service building only.

The powerhouse below is equipped with two 2011 Model QR-325 Quincy air compressors connected to a small desiccant air dryer which provides compressed air to the service air system at 125 psi. The compressors are located in the basement of the powerhouse and are equipped with a manually operated Lead-Lag controller to switch between the two compressors to even out the run times. Refer to Facility Photograph M-56.

Assessment

The service building Ingersoll Rand compressed air system appears to be in very good condition.

The powerhouse Quincy compressors are also in very good condition as would be expected for systems that are only two to three years old. However, staff have indicated that the two Quincy air compressors have oil emulsification issues and it is suspected that this is due to their location in the high humidity conditions of the powerhouse basement. Staff have indicated that since the generator floor typically has a lower relative humidity, that this would be a better location for the compressors.

There were no obvious air leaks at the time of inspection. The compressed air piping is a combination of older painted copper and newer stainless steel. There are also a few flexible hoses to provide vibration isolation and the compressed air to the AH3 area was run using a long flexible hose (similar to hydraulic hose). This may be acceptable but it should be inspected periodically to confirm the condition acceptable. All of the compressed air piping looked to be in good condition. The only observed deficiency was the lack of compressed air labelling and flow directional markers on the compressed air piping.

Recommendations

The recommended projects and costs related to the compressed air systems for the Aishihik hydro facility are:

- Confirm cause of oil emulsification issue with compressor supplier and if required pipe the intake of the compressors to a location with lower relative humidity, such as the generator floor. This will be more cost effective than relocating the compressors and air driers: hold an allowance of $2000 for re-piping air intakes if required – 2015-2016.
- Identify the compressed air piping with labels and flow directional arrows: $500 – 2015-2017.

3.2.12 Oil/Fuel Handling System

Description

The oil/fuel handling systems in use at the Aishihik Hydro facility are:

- One 1,200 Gal. (4,540 L) double containment bulk fuel tank as illustrated in Facility Photograph M-34.
- One single walled “Day” tank inside a steel containment berm inside the backup diesel generator room as shown in Facility Photograph M-42.
- Lubrication drums and pails.

The “Enviro Tank” bulk diesel fuel storage tank was manufactured by Clemmer Technologies Inc. of Waterloo Ontario in 2000. The tank is fabricated to ULC-S601 and ULC-S653 standards for contained aboveground tank assemblies for flammable liquids. The tank has a diameter of 1.27 m with a volumetric capacity of 1,200 Gal. (4,540 L) and is located outside the service building mounted on a raised wooden skid. There is limited information available on the “Day”

tank located inside the backup diesel storage room as the name plate was not visible due to its orientation and position within the steel containment berm. Its volume is estimated at 264 Gal. (1,000 L). There are various 45 gallon drums and 5 gallon pails of lubricant located in the service bay and on the generator and basement floors of the powerhouse.

Assessment

The “Enviro Tank” bulk diesel fuel storage tank was in good condition at the time of inspection. The tank is equipped with the proper filling apparatus and venting but has no vent whistle or high level alarm. Furthermore, the tank has a bottom outlet which connects via a flexible hose to a single walled steel pipe. This single walled steel pipe is buried below ground from the bulk fuel tank on the northwest corner of the switchgear annex to where it daylights on the southwest corner of the switchgear annex. The pipe is then fastened to the exposed concrete foundation of the switchgear annex for the rest of the travel distance to the boiler and backup diesel generator rooms. Refer to Facility Photographs M-33, M-44 and M-57. The bottom draw off from the tank and the single walled buried fuel pipe are in violation of the applicable following NFPA codes and will need to be rectified.

An in-depth review of the codes applicable to the storage of diesel fuel in above ground storage tanks has yielded the additional following deficiencies with the arrangement of the bulk fuel storage tank:

1. The tank is missing diesel fuel hazard warning placards as per NFPA 30, Section 21.7.2.1.
2. The fuel outlet pipe connection to the tank is below the maximum liquid level within the tank. All piping connections to the tank shall be made above the maximum liquid level to prevent siphon flow as per NFPA 30, Sections 22.11.4.2 and 22.11.4.3.
3. The tank is missing protective barriers to protect the tank and distribution piping from impact damage as per NFPA 30, Section 22.11.4.7.
4. The underground portion of the fuel distribution piping should be double walled and equipped with a containment sump as per CSA B139-09, Section 9.3.2.1.2 and 9.3.2.1.4.
5. The manual reset shutoff valve is missing as per CSA B139-09, Section 11.5.2.
6. The main shutoff valve is missing as per CSA B139-09, Section 11.5.7.

For a more in-depth review of the applicable codes listed above, please refer to Appendix A at the end of this report.

The “Day” storage tank located within the backup diesel generator room is also in good condition. However, the vertical “Day” tank is not equipped with a vent whistle or a high level alarm. The vertical “Day” storage tank is also equipped with a secondary fuel filling line which is cantilevered through the generator access door to the building exterior. Refer to Facility Photographs M-41, M-42 and M-43. This cantilevered secondary fuel filling pipe should be properly supported.

At the time of inspection, all of the 45 gallon and 5 gallon drums of lubricant were stored on the service bay and powerhouse generator and basement floors. There was no storage of lubricants on containment pallets witnessed and the condition of the lubricant dispensing system is unknown as no hand pumps were witnessed at the Aishihik facility. All stored lubricants should be located on containment pallets. Refer to Facility Photographs M-58 and M-59.

Recommendations

The recommendations for the oil/fuel handling/purification system are as follows:

1. Bulk Fuel Storage Tank
    - Re-route the supply distribution piping to feed to the top of the tank and install a pumping system.
    - Provide double-walled piping and a containment sump for underground sections of piping.
    - Attach diesel fuel warning signs to the bulk tank.
    - Provide protective barriers around the bulk fuel storage tank and distribution piping to protect against impact damage.
    - Install a double-walled piping system equipped with a containment sump for the underground portion of pipe.
    - Install a Manual Reset Automatic Shutoff Valve in the supply distribution pipe.
    - Install a main shut-off valve just outside of the building that is properly identified and protected from damage:

      It is recommended that the above work items be completed as part of a single project: $100,000 – 2015.

2. "Day" Fuel Storage Tank

   - Equip the day tank with a vent whistle and/or high level alarm: included in cost shown for diesel generator replacement.
   - Properly support the secondary "Day" tank filling line: included in cost shown for diesel generator replacement.

3. Lubricants

   - Provide containment pallets for all 45 gallon and 5 gallon drums of lubricants: $1,500 – 2015.

3.2.13 Sump Systems

Description

The sump system at the Aishihik Hydro facility is comprised of a single combined drainage and dewatering sump located in the basement of the powerhouse (Elevation 2,341.00) between units AH-1 and AH-2. The bottom of the sump is Elevation 2,333.25. The combined sump system is equipped with one submersible drainage pump and one vertical turbine dewatering pump. Refer to Facility Photographs M-60 and M-61. The pumps are then connected to a common discharge pipe which rises up to the turbine floor and connects to the 6" diameter cooling water discharge pipe. This pipe discharges to the tailrace at Elevation 2,370.00.

Drainage within the service building is collected and gravity drained down the elevator/service shaft and discharges to the tailrace. Drainage from the service building does not drain to the powerhouse sump and there is no oil/water separator or containment in the line before the drainage is expelled.

Drainage from within the powerhouse is collected from the perimeter trench drains located on the generator floor (El. 2,364.00); the turbine floor (El. 2,351.00) and the basement floor (El. 2,341.00). There is also no oil/water separator or containment in the sump system before the drainage and dewatering water is expelled to the tailrace. Furthermore, the drainage and dewatering sump is not equipped with any oil detection systems.

Assessment

The sump system at the Aishihik Hydro facility appears to be in good condition. The drainage and dewatering pumps appear to be the original pumps from 1975. Staff indicate that the cooling water pumps are in good condition and that parts are readily available. They did however state that obtaining spare parts for the Dewatering pump is becoming increasingly difficult.

The submersible drainage pumps are re-built every 5 years according to YEC staff. The piping appears to be in good condition with no evident leaks and is painted green in colour which could be confused with the green cooling water piping. There is one section of black pipe that has not been painted. Information from YEC staff indicates that the pipe was replaced due to corrosion and is in the process of being painted to match the existing piping. All valves also look to be in good condition. Pipe labelling should be added.

As stated above however, there is no means of oil/water separation and the sump pit is not equipped with oil detection to shut down the drainage and dewatering pumps. There is also no means of skimming oil out of the sump water before it is pumped to the tailrace. An oil detection system should be installed and alarmed back to SCADA. Consideration should be given to providing an oil skimmer in order to reduce the chance of an oil spill from making its way to the tailrace. Oil skimmers require a calm water surface, so the addition of a belt skimmer would require the installation of a means to provide a quiescent surface to oil to float to the surface. The drain pipes currently discharge into the sump above the water line and this causes the water surface to be rough. Simply extending these drain pipes so they discharge well below the water line will likely provide the quiescent water surface needed.

Recommendations

The recommended projects and costs related to the Sump systems for the Aishihik hydro facility are:

- Replace aging dewatering sump pump: $15,000 – 2016-2018.
- Install oil detection equipment, a belt skimmer in the sump and label piping: $50,000 – 2015-2016.

3.2.14 Fire Protection System

Description

The Aishihik Hydro facility is equipped with a wet pipe sprinkler system that serves the service building, switchgear annex, the cable trays in the service shaft down to the powerhouse and the switchgear in the powerhouse. Water for the sprinkler is fed from the penstock, via the bypass tunnel. The system operates on penstock pressure alone; there are no fire pumps.

There are multiple portable fire extinguishers located throughout all levels of the Aishihik facility.

A Siamese connection on the outside of the service building overhead door as shown in Facility Photograph M-62 allows an external water supply to supplement the sprinkler systems in the powerhouse, or to be used as a primary water source when the tunnel is dewatered.

There is no fire suppression on the generators in the powerhouse. The former Halon suppression systems have been removed.

Assessment

The service building fire protection systems appear to be in good condition. The piping does not exhibit any external corrosion and it is painted red as is customary for fire protections systems. The following issues were noted with the fire protection systems in the service building and switchgear annex.

- At the time of the site visit, the valve off of the sprinkler tree to the switching annex is tagged out, the electrical junction box is open and the wires for the tamper switch are exposed. As such, the switchgear annex is not currently protected by the sprinkler system.
- The sprinkler piping to and within the switchgear annex is not painted red.
- None of the sprinkler piping is labelled.
- The valve on the piping to the substation (exposure protection) is not supervised nor locked. There does not appear to be a glycol system or a dry pipe valve. It is not clear what method of frost prevention is being used for this system. A flow switch could not be located on this system. The system should be reviewed to ensure that it offers adequate

protection and that a flow switch is indeed present. This will ensure that the fire alarm system will notify staff if these sprinklers are activated.

- The standpipe hose reel in the service bay is disconnected and the hose is missing. There is a nozzle at that location, but no apparent means to easily connect it for use. Also, the valve that appears to be the intended source of the water for the hose reel is not appropriate for the application. An NFPA 14 compliant valve should be installed.
- The valve to the wall hydrant adjacent to the overhead door is closed and the wires for the tamper switch are not connected for supervision. The purpose of this wall hydrant should be reviewed to ensure it is adequate. Staff reported using this wall hydrant to supply water to the sprinkler system when the penstock is dewatered. If this is the case, it should be labelled as a Fire Department Connection (FDC) and not a wall hydrant. Other requirements would have to be met if the purpose is to supply water to the sprinkler systems. This includes the addition of a check valve and a ball/drum drip. The valve to this FDC would need to be opened and either supervised or chained.
- Lastly, none of the sprinkler heads are protected from impact damage with wire guards. Wire guards are not a code requirement, but are appropriate in this type of environment.

Refer to Facility Photographs M-63, M-64, M-65 and M-66.

The powerhouse fire protection system consists only of the sprinklers located within the cable tray area within the service shaft and the sprinklers above the switchgear on the turbine floor. The powerhouse housekeeping was good and there were no large quantities of combustible or flammable materials observed. There were a few drums with lubricants present, but it is suspected these were related to the ongoing maintenance work on one of the units.

The following issues were noted with the powerhouse fire protection systems:

- No flow switch could be located for the sprinklers protecting the switchgear on the turbine floor.
- The generators are not currently protected by any fire suppression systems. Due to the critical nature of this facility, as well as the difficulty of access for firefighting and the issues of smoke in an enclosed cavern, it would be advisable to install fire protection on the generators. YEC may want to contact their insurer to determine fire suppression requirements.

Refer to Facility Photograph M-67.

There are few fire rated or smoke separations in the powerhouse, if any, which is typical for a facility of this vintage. There are steel bulkheads between the surge chamber and the powerhouse cavern. It is unknown whether these would meet modern requirements for fire

separations. The three floors of the powerhouse are interconnected and there is only sheet metal cladding separating the powerhouse from the service shaft up to the surface. Therefore, smoke and heat from a fire anywhere in the powerhouse could fill the powerhouse making egress and firefighting difficult. Because of this, Yukon Energy Corporation must ensure that all staff and visitors in the powerhouse are trained to use the area of refuge and that this area must be continually and appropriately stocked.

NFPA states that sprinklers (sprinkler heads) should be replaced every 50 years. This milestone date will be achieved in 2025, at which time all sprinklers should be replaced. This would be an opportune time to equip all sprinklers with listed wire guards.

Recommendations

The recommended projects and costs related to the fire protection systems for the Aishihik Hydro facility are listed below. As much of this work should be performed by an experienced sprinkler contractor, some work items have been grouped together. This should result in lower costs than if each item was completed separately.

- Miscellaneous sprinkler items:
- Investigate tagged out valve, exposed tamper switch wiring for switchgear annex zone.
- Paint the sprinkler piping for the Switchgear annex.
- Label all fire protection/sprinkler piping.
- Reconnect hose reel in service bay, provide hose and new valve.
- Install flow switch on switchgear sprinkler system on turbine floor and connect to fire alarm.
- Review and address wall hydrant/fire department connection, provide proper signage, valving and supervision.
- The estimated cost for the above work items is: $20,000 – 2015.
- Maintain powerhouse housekeeping and ensure no flammable/combustible materials are stored in the powerhouse or surge chamber. This reduces the fire risk and severity.
- Investigate substation/exposure protection sprinkler system to ensure adequacy and proper design: hold an allowance of $25,000 – 2015. Actual cost will depend on outcome of review.

- Provide deluge fire suppression systems on units AH1 and AH2: $150,000 – 2015 – 2016.
- Undertake a study of fire safety in the powerhouse to determine fire and smoke separation requirements (compartmentalization), additional egress requirements and potentially additional fire suppression system requirements. Those conducting this study should be familiar with fire protection in underground facilities. $50,000 – 2015.
- Replace all sprinkler heads (except Switchgear annex) and install wire guards on all sprinkler heads: $25,000 – 2025.

3.2.15 Domestic Water and Sanitary Sewer Systems

Description

The service building at the Aishihik Hydro is equipped with a domestic water system. It is fed from the fire protection feed line just ahead of the main sprinkler isolation valve but after the valve to the standpipe hose reel. Water softeners are provided but are not currently in use as they are bypassed. The domestic water system feeds the washroom, boiler room, and laundry facilities. Other than the water softeners, there is no domestic water treatment and the water is not potable for consumption.

Waste water from the washroom and laundry facilities is drained into a septic field.

Assessment

The domestic water piping is a mixture of copper and PEX piping. The sanitary piping is ABS. While the condition of the piping is ok, the support of the plumbing piping is poor, especially in the boiler room. Refer to Facility Photographs M-68, M-69 and M-70.

The water softeners are currently bypassed and unplugged and the brine tank looks to be in need of maintenance as shown in Facility Photograph M-71.

The urinal in the bathroom is marked “Out of Order” and the venting arrangement for the urinal and laundry tub is questionable with the wrong fittings used in some cases. Refer to Facility Photograph M-72. Furthermore, the vent stack in the washroom has a pipe opening closed off with tape as shown in Facility Photograph M-73.

The 6-10 gallon hot water tank appears to be newer and in good working order.

Staff did not report any issues with the septic field.

Recommendations

The recommended projects and costs related to the Domestic Water and Sanitary Sewer systems for the Aishihik Hydro facility are:

- Provide proper support for the sanitary drainage piping.
- Have qualified plumber repair the urinal.
- Address drainage and venting piping issues and cap the opening in the vent stack.
- Service and re-activate the water softener system and brine tank.
- Since the domestic water is not potable, signage should be added at the bathroom lavatory indicating this.

As these items can be done by a single trade, it is recommended that these items be done as part of a single work package: $5000 – 2015.

3.2.16 Service Water System

Description

The service water system at the Aishihik Hydro facility for the two original turbine units (AH-1 and AH-2) is comprised of three cooling water pumps fed from a single Ø10” cooling water supply pipe which takes water from the tailrace. There is one cooling water pump for each turbine with a third cooling water pump as a standby unit. Refer to Facility Photograph M-74. After flowing through the generator coolers, the cooling water is then discharged back to the tailrace via a Ø6” pipe.

Assessment

The service water system for the original installation appears to be in good condition for the age of the facility. Information from YEC staff indicates that even though the cooling water pumps

are original, they are still able to acquire spare parts for everything when the pumps require repair/rebuilding.

The cooling water outlet piping above the NGR cabinet for Unit AH-2 is insulated with duct tape and foil faced wrap. Other locations are also insulated in this manner. Although this insulation appears to be effective in controlling condensation, consideration should be given to providing proper pipe insulation jacketing on this piping. Refer to Facility Photographs M-77 and M-78. Since some of the newer AH3 piping has yet to be insulated, it would be advisable to have this piping insulation repaired/replaced at when the AH3 piping is insulated.

Recommendations

The recommended projects and costs related to the service water systems for the Aishihik Hydro facility are:

- Apply pipe insulation and PVC jacketing to service water piping: $1000 – 2015-2020. This assumes this work will be done at the same time the newer AH3 piping is insulated.

3.2 ELECTRICAL

3.2.1 Generators

Description

Aishihik Hydro (AH0) is a three unit underground hydroelectric generating station located south of Canyon Lake in the Yukon Territory. The facility was placed into service in 1975 with two vertical Francis units each producing 15.6 MVA (14.0 MW). A third horizontal Francis unit was put into service in 2011 with a maximum continuous rating of 8.25MVA (7.0 MW).

Unit AH1 was rewound in 2003 to a rating of 15.3 MW/ 17MVA, 13.8 kV by GE. The generator type number is AT1 and the serial number is 525L439. It kept its original output voltage and rpm.



Photo E1 – Units AH1 and AH2

AH2 was extensively overhauled by Voith Siemens in 2006. Its new rating is 17.3 MW (19.2kVA). It kept its original output voltage and rpm.

Both AH1 and AH2 generators are connected to 20,500 HP Dominion Engineering vertical turbines which operate at 720 R.P.M. with 592 feet of head.

Unit AH3 is a 7.0 MW, 13.8 kV generator manufactured by TDPS (India). The generator model number is TD172 and the serial number is 2K10041036-01. The generator is connected to a 9,625 HP Kossler/Voith horizontal Francis turbine which operates at 900 R.P.M. with 592 feet of head.



Photo E2 – Unit AH3

Assessment

All generators at the AH0 plant are in good condition and show no signs of breakdown or wear. There were no visible signs of deterioration or major dirt accumulation on the windings. There were no signs of looseness in any of the stator or rotor components. The brushes for the excitation system were in service at the time of inspection, however, this is routine maintenance and there were no further reported problems.

There appears to be an exhaust system installed on the top bearing of the unit to ventilate the unit and help keep oil laden air out of the unit. The system itself appears to be more residential than utility in nature, however there was no signs of any contamination in the windings beyond a small oil containment mat.



Photo E3 – AH1 Generator Stator Windings in Good Condition

In general, rewound or new units would be expected to have a life span of 40 years. As such, these units effectively have 30-35 years remaining before any further generator rewind is required.

There are currently no issues with deterioration of the units either from PD monitoring or excessive vibration.

Recommendations

There are currently no recommendations which relate to the generators.

3.2.2 Excitation Systems

Description

AH1 and AH2 both have self-exciting (Permanent magnet rotating DC generators with ratings of 85V at 670A.).

The new Unit AH3 has a brushless excitation system with a permanent magnet DC stage and an AC stage. The excitation stage is rated at 239A at 265V.

AH1 and AH2 excitation appears to have had its rheostat replaced with a Basler RA70 controller and APR124 Voltage Regulators. Rheostat controls appear to still be installed presumably for backup.

The Excitation equipment for the units AH1 and AH2 is mounted in excitation cabinets close coupled to the units on the generator floor. There is a local disconnect for the exciter adjacent to the unit at the base of the cabinet.



Photo E4 – AH3 Excitation Cubicle

The excitation equipment is housed in a cabinet labelled as “Phase Cabinet” for the unit AH3 and appears to be based on a modern DECS 200 Basler AVR.

Assessment

The excitation equipment for AH1 and AH2 appear to be well maintained and in reasonable condition. Rheostatic controls are typically no longer used as they decrease in reliability over time. The Rheostats may be left in for a backup; this would be typical to many facilities with the older cabinets. Complete upgraded excitation systems may provide marginally improved reliability or performance and could be reviewed for upgrade during any major plant controls upgrades or potentially during a re-runnering.

Recommendations

There are no recommendations at this time.

3.2.3 Protections and Control Systems

Description

Controls in the plant are essentially upgraded to a mix of controls that appear to be original and some that are of early 2000s Vintage and are typically PLC GE-Fanuc Based. A single PLC is provided for each unit AH1 and AH3. One is provided for general plant control in the control room. It is not clear that the controls for AH2 have been totally upgraded to a modern control system.

There appears to have been significant field modification of the controls for the AH1 and AH2 units over the years and there are some questionable items in the panels which should be addressed. There are currently solid copper pipe pieces used in place of fuses and a number of loose interconnecting untagged wires in the cabinets.

There is significant variability in the annunciation / HMI information for the plant as well. Much of the plant annunciation is annunciated via original indicator-light style annunciator panels. There

are modern touch screen displays for AH1 and AH3 to accompany their more modern control systems.

The protections in place at the plant are a mix of original controls, some upgraded approximately mid-plant life and some modern digital multifunction protection relays.

The protections on AH1 and AH2 are a mix of original mechanical protective relays and mid-life upgrade vintage of solid state Beckwith Protective relays.

Protections for AH3 are provided by a modern Beckwith M 3425 digital protection relay.

Feeder and switchyard protective relaying has primarily been upgraded to modern SEL multifunction digital protective relays.

There are a number of condition monitoring components which are in place at the plant which are in various conditions.



Photo E5 – AH3 Protective relay

There is a new Bentley Nevada 3500 Series Vibration monitoring system in place for all three units AH1, AH2 and AH3. This equipment is new and in good condition. This system appears to be monitoring x and y plane vibration for AH1 and AH2 on both the generator and turbine. The AH3 monitoring is listed as Generator Drive End, Drive End Axial and Gen Exc. It is anticipated that this is sufficient monitoring for the units.



Photo E6 – Bentley Nevada System

There is an existing temperature monitoring system for the units currently has an antiquated Xycom CRT based HMI installed at the generator level. This equipment has reached the end of its useful life.

The SCADA for the plant is appears to be in transition and a newer Survalent SCADA system is installed in the penthouse level of the powerhouse superstructure building. One concern with the SCADA system is that it has been installed blocking the access for maintenance to the air

handling equipment draw out area requirements This could potentially result in a period of loss of remote monitoring when mechanical work needs to be performed.

There is also provision for PD measurements on the units at site. This equipment appears to be relatively modern.

Assessment

Generally the control systems in place at the plant are in fair to reasonable condition. The controls in place for units AH1 and AH2 are in good condition, but could use some upgrading over time.



Photo E7 – Main Plant Control Board

Some of the short term maintenance work in place (Pipe in lieu of fuses, loose wiring etc.) could potentially cause issues or could be a sign of more significant issues in the facility. It would be

expected that a moderate controls refresh could bring the control systems up to a complete modern standard in line with AH3 and result in standard controls for the whole facility.

The controls in place for AH3 are in good condition as they are effectively new.

There have been significant upgrades performed for a number of the protections along with the switchgear upgrades which have been performed in the last five years. These protections are in good condition. The remaining protections which are left should be considered as reaching the end of their useful life and should be scheduled for upgrade.

There are controls installed for the facility which are intended to control the TIV equipment, however, these controls are in various states of upgrade and not currently automated or remote operable. Upgrades to these controls have been included in the mechanical section.

While the new SCADA equipment appears to be in reasonable condition, its location is poor and should be corrected. There is also legacy equipment installed in the PLC/ MCC / Battery Room which should be removed.

In general a trend to overall upgrade of the site appears to be underway as there are a number of different projects in various states of completion. A proper plan of segregating portions of the upgrades and completing in an ordered sequence may add to the reliability of the site in the long run, and make assessment and maintenance simpler.

Recommendations

In general there are a number of large scale planned upgrades which should occur at the site. This should occur in logical grouped units as shown it the following table.

TABLE 2
PLANNED UPGRADES

Item	Timeframe	Anticipated Cost
Repairs to urgently deficient control items	Immediate	$15,000
Protections and Control Upgrade for AH2	2-5 Years	$350,000
Protections Upgrade for AH1 and remaining Feeders	3-5 Years	$250,000
HMI Annunciation Upgrade	3-7 Years	$300,000
Vibration Monitoring Review	1-3 Years	$10,000
Temperature Monitoring Head End Upgrades	3-5 Years	$100,000
Relocate SCADA Equipment	3-7 Years	$100,000

It is recommended that a plant controls upgrade for the plant controls and the AH1 and AH2 controls be planned for 5-7 years. It is anticipated that this upgrade would cost on the order of $500,000.

3.2.4 AC/DC Station Service

Description

There are a number of critical components to the station service at the AH0 site. They can be summarized as follows:

- Secondary Auxiliary Service Entrance (Overhead).
- Station Service AC Distribution Equipment at Grade Level.
- Backup Diesel Generator at Grade Level.
- DC Distribution Equipment.
- AC Station Service in the Powerhouse Turbine Level.
- Station Service MCCs.
- Miscellaneous Distribution.
- Small Diesel Generator at the Turbine Level of the Powerhouse.

Secondary Auxiliary Service Entrance (Overhead)

There is a traditional service entrance to the plant from the distribution in the area from an overhead poletop entrance and is comprised of three poletop transformers for a total of 150 kVA. This is relatively typical for this type of plant. This service is essentially a backup to the plant systems should they ever be completely out of service.



Photo E8 – Overhead Auxiliary Service Entrance Transformers

Station Service AC Distribution Equipment at Grade Level

There are several distribution panels at the grade level building of a variety of vintages. Most of the original station service distribution is built into MCC 3 in the MCC / PLC / Battery Room. There are also some sub panels throughout this level.

Backup Diesel Generator at Grade Level

There is a backup diesel generator referred to as the black start unit on the grade level of the plant. This generator is original to the plant and is rated at 175kW. The generator is comprised of a Lima Electric Company Generator and a Detroit Diesel Motor. The generator is connected to the powerhouse via an automatic transfer switch, however, to manually start the generator requires someone to go to the turbine level and disengage the lower level transfer switch. The generator has a local distribution panel to provide its local support services including the local DC charger. Ancillary to the generator are an exterior diesel tank, an interior diesel tank and exterior radiator to provide cooling for the generator.

DC Distribution equipment

The main plant 125VDC battery is located in the DC / PLC room in the grade level portion of the powerhouse. There is a bank of G&B Absolyte Batteries with a Cordex Redundant charger and a more traditional RIC style DC charger. This equipment is connected to the main DC distribution panel DC1 which is a square D distribution panel. The Battery Bank is approximately 8 years of age at the time of inspection.

There is a secondary DC distribution system in place in the switchgear room addition. This system also has G&B Absolyte batteries, but it includes a G&B charger and a Powell Distribution panel with GE Breakers. This secondary DC system appears to service the new switchgear.

There are also other miscellaneous batteries throughout the plant. There is a DC system serving the vibration monitoring system, one serving the start for each Diesel Generator.

AC Station Service in the Powerhouse Turbine Level

The main service for the powerhouse is provided via SST – 600 which is located on the powerhouse Turbine level. This transformer is fed from the new station switchgear in the new switchgear building. This transformer is a 13.8kV / 600V, 500kVA dry type transformer close coupled to FPE 600V draw out switchgear. This switchgear has five air circuit breakers feeding

the various station loads. Some basic mechanical protection relaying is provided for the transformer. This switchgear feeds all of the original station MCCs.



Photo E9 – Main Station Service switchgear

Station Service MCCs

There are several MCCs throughout the powerhouse. There are four original MCCs from the powerhouse. MCC 1 and MCC 2 are located on the turbine floor in the main powerhouse. MCC 2 is also equipped with a transfer switch for emergency loads. MCC 3 is located in the grade level of the powerhouse in the MCC / PLC / Battery room. MCC 4 has the main generator transfer switch and this transfer switch has been upgrade in recent years. These original MCCs are Westinghouse MCCs.

There is also a Square D MCC provided with the new unit AH3. This MCC is also labelled as MCC AH3.

In general, MCCs on the powerhouse turbine floor show significant signs of rust and deterioration on the exterior.



Photo E10 – MCC2 Typical MCC

Miscellaneous Distribution

The original plant 600V distribution was incorporated into MCC1, MCC2 and MCC3. A number of additional distribution panels have been installed over the years and a large portion of the AH3 installation components are fed from new distribution panels. Any distributions outside those in the panels are generally in good condition, however, panel C in the MCC / PLC/ Battery room is missing a number of cover plates.

Small Diesel Generator at the Turbine Level of the Powerhouse

There was an additional small 8kW Diesel Generator installed on the powerhouse turbine floor to provide emergency power to the powerhouse low level sump in case of a complete emergency system failure.

Assessment

Secondary Auxiliary Service Entrance (Overhead)

The secondary auxiliary service entrance transformers are in reasonable condition. However, there is a significant amount of loose cabling connecting to the service building. This cabling should be properly installed as this is a critical component in case of an emergency and should not be left installed this way.

Station Service AC Distribution Equipment at Grade Level

The AC equipment at this level is in reasonable condition, however its condition and upgrades should be considered with an overall station service upgrade. The environment for this condition is significantly less severe than that at the subterranean powerhouse level.

Backup Diesel Generator at Grade Level

The backup Diesel generator is a critical component to the plant and the grid in case of a significant failure. While maintained, this generator has reached the end of its anticipated life and should be considered for replacement. It should also be noted that while tested regularly, this generator is rarely if ever tested with a full load.

DC Distribution equipment

The main DC equipment for the site is generally in good condition. The only item of concern is that the DC equipment is critical to the operation of the powerhouse and it is located at the top of the service shaft while the main requirements are located at the bottom of the access shaft. Should this link become severed, there is no DC battery capacity of note in the lower level. It may be worth considering an alternate DC battery installed in the lower level of the plant for critical plant operations.

AC Station Service in the Powerhouse Turbine Level

The AC stations service at the lower level is at the end of its expected life span and should be considered for replacement. While this equipment could be refurbished and some components replaced, the costs of such life extensions are often greater than new equipment. New equipment would typically also come with better arc resistance and safer maintenance possibilities. It should also be noted that this equipment shares similar liabilities as the DC system where its service is fed from the surface switchgear. It may be worth assessing the possibility of taking an alternate feed from the generator switchgear at the turbine level if possible.

Station Service MCCs

The MCC equipment which is original to the powerhouse have reached the end of their anticipated life. MCC equipment which is located on the turbine floor is showing significant signs of deterioration and should be replaced. While some replacement wrappers can be purchased for these MCCs it would be typical to replace them at this point as the replacement component costs are extremely high.

Any equipment which was installed with the AH3 upgrade is in good condition, however, labelling is extremely poor and a program of proper labelling and documenting needs to be undertaken. The current state of labeling where many new items have no clear source marked and in some cases no disconnection means could potentially lead to an unsafe condition for workers and should be addressed ASAP.

In general, any original MCCs on the powerhouse turbine floor show significant signs of rust and deterioration on the exterior.

Miscellaneous Distribution

For distribution equipment located in the MCC refer to the MCC recommendations. For all other distribution equipment not related to AH3, they are generally in good condition and some cleanup of labelling and covers should be implemented but these are minor items.

For the equipment installed with AH3, see the above comment on labelling.

Small Diesel Generator at the Turbine Level of the Powerhouse

The small Diesel Generator is to provide power to the sump pumps and is in good condition. However, it is not in a recommended location. Running a diesel driven generator in an indoor space with air supply not specifically designed for that purpose is not a recommended practice. This should be removed and consideration given to alternate means of power (either battery or UPS) installed at this level to provide critical power.

Recommendations

Secondary Auxiliary Service Entrance (Overhead)

The secondary auxiliary overhead service entrance cabling should be remedied in the next 1-2 years (2015-2016). The anticipated cost of this item is $10,000.

Station Service AC Distribution Equipment at Grade Level

Minor updates to the Grade Level AC distribution equipment should be implemented with a station service upgrade and has been included in that cost.

Backup Diesel Generator at Grade Level

The backup Diesel generator should be replaced with a new diesel generator within the next 1-2 years (2015-2016) or as part of the station service upgrade. The cost of this upgrade is anticipated to be $350,000. Replacement of the backup diesel generator should include battery boxes, combustion air damper/louvers upgrades, an exhaust fan, a high level alarm for day tank and additional piping supports. The laundry facility should also be relocated.

DC Distribution Equipment

There is no recommendation with the existing DC Distribution equipment.

YEC should review the potential need for a DC system in the generator level of the powerhouse. Should this be required it would be part of larger upgrades in 5-10 years and the anticipated cost would be on the order of $300,000 as it would involve decoupling a number of existing DC services.

AC Station Service in the Powerhouse Turbine Level

The AC station service has reached the end of its useful life and should be considered for replacement. This is a major undertaking and would require some planning. It is anticipated that this would occur in 5-10 years and would be part of a program on the order of $2,900,000. It is anticipated that this would occur alongside a major cabling upgrade in the plant which includes any new plant risers. The cost of the station service riser cabling has been included in his portion of the estimate; however, this does not include the setup costs of such a major undertaking.

It is anticipated that this station service upgrade would include:

- Assessment and replacement of all grade level station service equipment and cabling not part of the AH3 upgrades.
- Installation and hardening of risers for the station service feeders from the grade level to the subterranean level.
- Installation of new station service transformer and associated arc resistant switchgear.
- Installation of new MCCs to replace the original MCCs.
- Installation of new wiring for all devices connected to new equipment.
- Installation of new cable tray to allow routing of new equipment while maintaining operation of existing equipment.

Station Service MCCs

With the exception of the MCC installed with AH3, all MCCs should be replaced as part of a major station service upgrade and the amount has been included with that upgrade.

Miscellaneous Distribution

Any remaining minor distribution should be replaced with the station service upgrade and is included with that cost.

Upgrades to Labelling

A number of items have no labelling on them as a result of the AH3 project upgrade. A number of the labels that do exist are temporary. There are also cases (as with the lubrication skid) where the source of power is not clear and there is no local disconnect. A program of identifying the power supply to the equipment and providing permanent labelling should be undertaken. This could be an involved task depending on the level of drawings available. As the sources of power are at times unknown, it will likely also require arc-flash resistant clothing to be used when opening and tracing some circuits. This should be performed immediately. The anticipated cost is $15,000.

3.2.5 Generator and Line Switchgear

Description

There are two sets of 13.8kV switchgear at the AH0 facility. They are located at the turbine level and in the new switchgear building.

The original switchgear at the turbine level was refurbished with the AH3 installation and consists of five 13.8kV Air circuit breakers with arc-chutes. This gear is Federal Pioneer metal clad switchgear with top exits for all cabling. The gear and all internal breakers were reportedly refurbished in the last five years and are in reasonable condition. This gear has one breaker section for each unit. This gear is rated at 2000A and provides two feeder breakers to the surface switchgear.

The other main switchgear for the facility is the arc-resistant totally enclosed metal clad switchgear located in the new switchgear building is Powell Electric 15kV metal-clad arc resistant switchgear. This gear as rated at 2000A and has several breakers. There are a total of seven breakers in use in this switchgear. There are:

- Two breakers which connect to the feeders at the generator switchgear.
- Three breakers which feed out to the power transformers T1, T2 and T3.
- One breaker feeding the reactor bank R1 in the switchyard.
- One breaker feeding the station service transformer SST-600 in the lower level of the plant.

There is also one space which can be used for a 1200A breaker which is currently spare.

Assessment

The switchgear in the facility is generally in reasonable condition. Some of the cabling exiting the lower level switchgear should be reviewed for configuration, however, the switchgear was reportedly refurbished in the last five years and is likely good for another 15-20 years of life. The switchgear in the expansion building is in good condition (It is basically brand new.) The only small deficiency is that there is a protective relay which has been removed and the opening has been covered with cardboard rather than a metal plate.

Recommendations

There are no urgent recommendations at this time which relate to the plant switchgear.

Some consideration may be given to the possibility of providing an alternate station service feeder from the original plant switchgear, however this should be considered as part of any service upgrade work.

3.2.6 Transformers

Description

There are a number of small 600/120/208V transformer throughout the plant which provide service power, these generally appear to be in good condition and are not specifically addressed in this assessment as they are generally commodity items and can be replaced as a matter of maintenance should any issues arise.

The station service transformer 600 SST is located in the lower level and is a dry type transformer. This is a 500 kVA Federal Pioneer 13.8kV to 600/347V Transformer. The transformer itself is close coupled to the existing station service switchgear.

High voltage transformers are not covered in this section some notes are made in the switchyard comments.

Assessment

In general the low voltage transformers are in good condition and are all relatively new with the exception of a couple of original units. There are no reported issues with the transformers.

The station service transformer shows no sign of deterioration of the casement or accumulation of significant dust. As this is a critical asset, however, more detailed investigation as to the condition of the transformer insulation could be obtained through testing.

Recommendations

The low voltage transformers throughout the plant should be reviewed during any station service upgrade and any transformer older than 30 years old may be considered for replacement at that time. This is a minor cost but has been included with the station service upgrade.

The main station service transformer, while in relatively good condition, is reaching a vintage age where insulation breakdown may become a problem. This transformer would typically be replaced during a major station service upgrade and it is anticipated that this would be the case here as well. It has been included with that piece of work.

3.2.7 Power Cabling / General Comments

Description

There are two types of cabling which will be addressed as part of this review, the general multipurpose power and control cabling and the medium voltage power cabling used to transport the power to the surface from the powerhouse.

The medium voltage power cabling at Aishihik is generally Okonite cabling rated with 173% or 133% insulation at 15kV (The 173% cabling is actually rated at 100% to 25kV). There are two main feeders which run from the powerhouse level to the surface up through the shaft which provides routing for all critical services. This cabling is typically installed in tray and held on with plastic Ty-Wraps. These cables also extend from the units to the generator switchgear. At the surface, these cables extend to the new switchgear and out into the yard.

There are some three conductor 15kV cable assemblies with unit AH3, and feeding the station service transformer. These assemblies are typically AETNA wire 3/c 4/0 AWG and some 3/C 500MCM Teck style medium voltage red power cabling.



Photo E11 – Cabling entering riser shaft, note deterioration of cable tray

In general, the medium voltage cabling is new, recently replaced or in good condition.

There is also a significant amount of plant cabling which is installed in the shaft from the lower level powerhouse to the surface. Much of this cabling is critical to the operation and control of the facility, and much of this cabling is original. The configuration of cabling in a riser is relatively unique to this facility.

There is also an abandoned metal bus duct which previously extended from the surface to the lower levels which is no longer in use.



Photo E12 – Exposed Conduit heavily corroded and needing replacement

Assessment

There are a few issues which relate to the cabling installed at the AH0 plant, these issues primarily relate to the cables which extend from the plant itself up to the surface. These cables will be referred to as the riser.

The first issue is the cable clamping on the medium voltage cabling does not meet modern standards for supporting long runs of vertical rise cable, nor is it appropriate for keeping the cables in place under the significant magnetic forces of a major fault. This is of concern where the large ampacity feeders are installed with single conductor runs. This installation has a lower reliability than a modern clamped system when a fault occurs.

There is also some cable tray and conduit from the original installation which show signs of corrosion and deterioration. This is a concern where this corrosion occurs in the riser shaft cables. The removal and replacement of these components is not a trivial issue and will require careful planning.

Typically in a generating station, when an item is upgraded in a facility, the associated cabling is replaced with new. Due to the logistical difficulties in installing new cabling in the riser shaft for this facility, much of the original cabling continues to be reused. This issue is compounded by the fact that much of this cabling at this vintage was not specifically designed to withstand long-term riser installation.

As such, much of the cabling in the plant which is in the riser is nearing the end of its reliable life. Replacement of this cabling could pose significant technical challenges as there is no alternate path to install cabling to provide a controlled transfer scheme.

Recommendations

Given the criticality of the AH0 plant, it is recommended that YEC undertake a planning process for the replacement of any cabling in the riser shaft which is nearing the end of its life. In preparing this plan, it is recommended that the following items be considered:

- Durability of critical risers for service power controls and communications. Use of MI cabling and potential heavy armoring should be considered to maintain power and control in the event of any potential event in the shaft.
- Method of installing an alternate path or sequencing to reduce the downtime of the plant to an acceptable level. As this plant is critical to power in the Yukon and a major cable replacement could have significant outages, the staging of this cable replacement needs to be very carefully undertaken.
- Modern cable composition and construction to be used on long risers.

- Corrosion resistance of new installation.
- Minimization of flame spread and smoke which is a concern in a riser shaft.
- Installation features which could be implemented to minimize impact of seismic events.

It is recommended that the development of this riser replacement plan be developed within the next 5 years (2015-2019). It is anticipated that the cost of this plan would be $75,000 - $100,000.

There should also be a plan to upgrade the mounting for the new and original MV cabling with modern cable clamps to improve its reliability. This should first be performed on the newly installed feeders as these should have had proper support at the time of installation. This should be done immediately and is anticipated to cost $150,000 - $200,000.

It is anticipated that once a plan is developed to replace the main cable risers in the plant that this upgrade (Excluding station service feeders which are addressed elsewhere) would cost on the order of $2,500,000 - $5,000,000 and should be implemented in 5-10 years (2019-2024). As this plan will involve significant technical challenges, this estimate has some significant variability.

3.2.8 Auxiliary Systems

Description

There are a number of smaller systems of note in the plant and its supporting structures which were reviewed as part of this report. They include:

- Lighting.
- HVAC Control.
- Emergency Lighting.
- Security.
- Fire Alarm System.
- Plant Intake structure Electrical.
- Canyon Lake Control Structure Electrical.

- Aishihik Lake Control Structure Electrical.

Lighting

The lighting throughout the facility is primarily fluorescent in the low ceiling areas, and in the grade level buildings it is T-12 fluorescent lighting. The lighting in the powerhouse is comprised primarily of Metal Halide and HPS lighting.

HVAC Control

There are minimal HVAC control items of note, however, with the original air handling equipment is a large electrical control panel mounted in the penthouse of the grade level building.

Emergency Lighting

There are a number of miscellaneous emergency and exit lights throughout the facility. These fixtures point to some critical elements of egress but areas such as the main exit stair appear to have very few fixtures.

Fire Alarm System

The plant fire alarm system is a basic Edwards fire alarm system, which appears to be nearly original to the plant. This system has minimal devices and pull stations and the coverage of the bells in the plant is minimal.

Plant Intake structure Electrical

There is minimal electrical at the plant intake structure. There is some distribution equipment which is basic but in good condition. There is some DC equipment at this location, but the charger for this equipment appears to be a Canadian Tire Brand Charger. There is also a wireless radio to extend the data back the plant.

Canyon Lake Control Structure Electrical

The Canyon lake control structure has some electrical equipment and there is a water level which is transmitted back to the plant. There are some valves at this location which can be automated and electrically actuated. However, the electrical portions of the actuation have been disconnected. There appears to be some new equipment which is being installed, but the intent of this equipment is not clear.

Aishihik Lake Control Structure Electrical

There is no electrical equipment in the Aishihik Lake control Structure.

Assessment

Lighting

The lighting in the facility is in reasonable condition, however, much if it is reaching the end of its useful life. A program of lighting upgrades should be undertaken in the reasonable future.

HVAC Control

With the exception of the AH3 controls, the HVAC power equipment has reached the end of its useful life. The main HVAC control panel in the penthouse is still in use, however, all indication lights are no longer functioning. This item should be reviewed for replacement in the near future. This replacement should be coordinated with the SCADA panel relocation as space at this level should be well coordinated.

Emergency and Exit Lighting

Emergency lighting appears to be inadequate in the facility to modern standards. The emergency lighting appears to be very deficient in the riser ladder area as well. Exit signage does not appear to be adequate in the facility. This should be reviewed as part of an overall life safety / egress plan.

Fire Alarm System

The plant fire alarm system is at the end of its anticipated life. The existing system does not provide sufficient coverage or advance notice which should be considered as a critical element for a plant of this type.

Plant Intake structure Electrical

The plant intake structure is a critical element, however the electrical equipment is minor. Consideration should be given to replacing this equipment. Residential style DC chargers may work in the short term, however, typically cannot be relied upon in an emergency. This equipment was faulted at the time of inspection.

Canyon Lake Control Structure Electrical

Requirements for the canyon lake control structure should be reviewed as there is currently no functioning electrical equipment with the exception of the level indication. Any equipment no longer in use or no longer required should be tagged as such for future reference.



Photo E13 – Canyon Lake Electrical Box



Photo E14 – Interior of Canyon Lake Electrical Box



Photo E15 – Cabling from Electrical Box to Canyon Lake Control Structure



Photo E16 – Cabling entering control box at Canyon Lake Control Structure



Photo E17 – Severed cables to butterfly valve motors



Photo E18 – Abandoned cables within Canyon Lake Control Structure electrical box

Recommendations

Lighting

A lighting upgrade should be undertaken within the next 5 years (2015-2020). This would involve upgrading the lighting as required to modern fixtures (possibly LED). This would also involve improvements in lighting along the shaft from the surface to the powerhouse. The anticipated cost would be $150,000.

HVAC Control

HVAC electrical should be reviewed for upgrade in the next 2-5 years (2016-2020) and the anticipated cost is $95,000.

Emergency and Exit Lighting

Emergency and Exit lighting should be upgraded as soon as possible. A program of upgrades is likely to require a proper analysis of the life safety plan for the plant. It is anticipated that there will be approximately $200,000 of cost once a plan is complete and this should be done within 2-5 years (2016-2020).

Fire Alarm System

The fire alarm system should also be replaced in conjunction with a life safety plan. The cost of this upgrade is anticipated to be $550,000 to bring this facility up to a more modern standard. This work should be performed in the next 2-5 years (2016-2020).

Plant Intake structure Electrical

Upgrades at this location should be undertaken as part of maintenance and there are no capital items of significance at this location.

Canyon Lake Control Structure Electrical

The Canyon Lake Control structure should be electrically assessed to determine the operating requirements. It is anticipated that there could be approximately $35,000 of work which should be done in the next 1-3 years (2015-2017).

3.2.9 Communications

Description

The Communication systems to AH0 are relatively basic and are basically satellite and a power line carrier signal. There are also wireless radios to the telemetry units located at the intake and the Canyon lake control structure.

The voice communication systems are tied into this network and are based on a Nortel Meridian system.

Assessment

Communications both in data and voice to the plant is poor and operationally problematic. During the site review, voice and data connections periodically disconnected.

Recommendations

A study should be undertaken to determine if there are potentially other solutions for the communication to the site and a reliable method should be installed. It is anticipated that there could be some significant cost to this item but it is relatively urgent.

It is expected that these upgrades could be on the order of $700,000 and should be done in the next 3-5 years (2017-2019).

3.2.10 Grounding

Description

The grounding for the plant effectively appears to be a number of copper electrodes buried in the structure of the facility itself. There appears to be significant grounding, however, no grounding studies are available for review.

Assessment

Most of the exposed ground was either in excellent condition, or in a moist area and totally deteriorated and disconnected from structure. While this may not be a significant issue, the grounding of the facility can lead to potentially dangerous situations if it is allowed to remain disconnected.

Recommendations

A program of inventorying and inspecting ground connections should be undertaken as part of maintenance in the next year. It may be beneficial for YEC to undertake a ground study to

determine the condition of the overall ground. It is anticipated that this study would occur in the next five years and the cost would be on the order of $45,000.

3.3 GEOTECHNICAL

The following were inspected as part of the geotechnical assessment performed at Aishihik Generating Station Facility: (i) Control Structures, (ii) Power Canal, (iii) Tailrace Portal and Channel, and (iv) Access Roads. The description and condition of the components that were inspected, as well as recommendations are provided in the following sections.

3.3.1 Aishihik Lake Control Structure

Description

The Aishihik Lake Control Structure consists of a concrete structure with three butterfly outlet valves, earthfill embankments and an auxiliary sluice to the west (right of the concrete structure looking downstream). The structure is located approximately 18 km north of the Aishihik Generating Station. The two embankment structures associated with the Aishihik Lake Control Structure are situated on the western and eastern arm of the concrete structure as shown in Photo G1 below.



Photo G1 – Aishihik Lake Control Structure

Assessment

In general, the geotechnical components of the structures were all in good condition, and appeared to have performed well and consistent with previous reports and observations. Specific items of note include the following:

- The earthfill embankments at Aishihik Lake Control Structure have performed well, and there were no visible signs of distress, deformation, instability or seepage of concern observed during the site inspection.
- The upstream slopes of both the left and the right earthfill embankments did not show any visible signs of instability, erosion or deterioration (See Facility Photographs G-1 and G-2). The rockfill riprap placed on the upstream face of each of the embankments appeared intact and has performed well.
- The downstream slopes for the left and right embankment fill are covered with gravel, occasionally cobbles and spare vegetation (See Facility Photographs G-3 and G-4). The downstream wing walls are armored with large size rock-fill. There were no visible signs of instability or actively flowing leakages observed on the downstream slopes.
- The abutment contacts for the earthfill were intact, and no seepage of note or separation was observed (See Facility Photographs G-4 and G-5).
- There was some excess vegetation noted on part of the earthfill embankments; however it wasn't severe and did not threaten the integrity of the structure (Refer to Facility Photographs G-1 and G-2).
- The downstream channel of the spillway was found to be in good condition. No visible instability or erosion was noted on either sides of the channel and the conditions appeared consistent with previous observations.
- There were no geotechnical instrumentations installed on the earthfill embankment structures. The surveillance and monitoring of the earthfill structures have primarily been through visual inspections to determine whether there are any significant changes to the condition of the structures that could threaten the operation and integrity of dams. In most recent years, routine surveillance check and annual dam safety general Inspections have been conducted by YEC staff to assess the condition of the dam.

Differential movement of the upstream right concrete wing wall and the upstream left wing wall / fish ladder was noted relative to the top of the abutment concrete (See Facility Photographs G-6 and G-7). It is anticipated that the wing walls are rotating slightly due to the differential earth pressures that exist above the forebay water levels.

Recommendations

The primary recommendations related to the geotechnical component for the Aishihik Lake Control Structure are as follows:

- Continue with on-going surveillance and monitoring to confirm the performance of the earthfill structures consistent with previous YEC methods and standards.
- Continued monitoring and inspection of anomalies that were observed during the inspection and previous surveillance checks, in particular the observed displacement of the concrete walls.

3.3.2 Power Canal and Canyon Lake Control Structure

Description

The power canal is approximately 5.6 km long and conveys water from Canyon Lake to the vertical shaft at the intake structure. The canal was excavated into the side of a hill with the associated dyke and roadway constructed on the downslope side of the canal as illustrated in Figure G1 below.

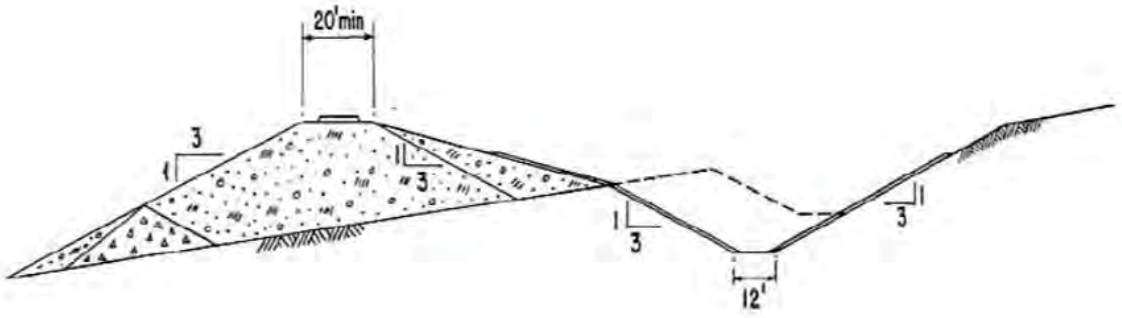


Figure G1 – Typical Power Canal Section through Overburden (from Construction Drawings No. C5-D18 dated April 10, 1974)

The review of the design drawings and background documents showed that the most of the canal was founded on permafrost-affected ground with the exception of the upstream end and downstream end that were constructed through bedrock as shown in Figure G2 below.

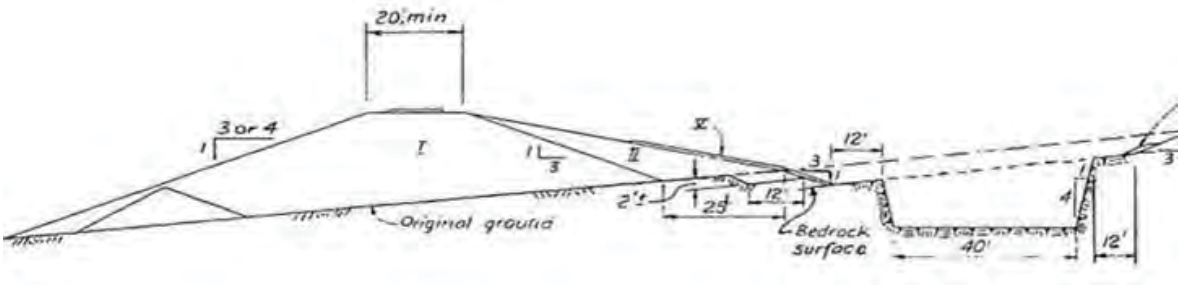


Figure G2 – Power Canal Section through Bedrock
(from Construction Drawings No. C5-D18 dated April 10, 1974)

The excavation side slope for the canal varied from approximately 3H:1V to 3.5H:1V through the overburden materials to near vertical (1H:4V) through the bedrock sections. The native overburden material beneath the canal primarily consist of frozen silts overlying frozen glacial till.

It is understood that the wetted section of the canal was entirely placed within the cut section while the dykes were constructed primarily to provide freeboard. The downstream embankment slope for the canal dyke varies from 3H:1V to 5.5H:1V.The bulk of the dyke was constructed with frozen silt and glacial till. The upstream face of the dyke was lined with a low permeability blanket that consisted of compacted glacial till.

Geotechnical instrumentation is installed at specific locations along the power canal to monitor the performance of sections of the dykes that have displayed signs of distress such as seepage, excessive deformation, and slumping in the past. The instruments primarily consisted of piezometers and thermistors strings and are located at approximately stations 0+065, 0+300, 0+770, 1+392, 3+837, 4+370 and 4+902; where station 0+000 corresponds to the tunnel intake structure location. The data obtained from a number of thermistors installed along the canal suggests that most of the permafrost has thawed following the construction of the canal.

Assessment

The assessment provided herein is based on information obtained from background documents provided by YEC and a cursory onsite inspection of the dyke along the canal.

In general, the crest of the dyke along the power canal access is in good condition with the exception of the section of the dyke at the Canyon Lake Control Structure that requires additional backfill (See Photo G2 below). The actual elevation of the crest was not surveyed during the 2013 inspection; however, a detailed survey performed in 2007 showed that the elevation of the dyke is higher than El. 909.5 m which corresponds to the 1 in 1000 years peak level for the Canyon Lake.



Photo G2 – Condition of Crest of Dyke near the Canyon Lake Control Structure

The upstream slope of the canal dyke is mostly protected with vegetation (See Facility Photograph G-8) while a few sections of the dyke are protected with riprap and/or gravel (see Facility Photograph G-9). The riprap and gravel protection was applied to areas where the native soils are highly susceptible to erosion (e.g. silt and sandy silt) and to areas that may be prone to wave erosion such as bends at the ends of long straight stretches of the canal.

In general, the upstream slope appears to be adequately protected. The presence of up to 30 m long longitudinal tension cracks have been observed along the dyke and reported in previous inspection reports since 1975 and are well documented in the most recent dam safety report that was completed in 2010. These cracks have been attributed to the deformation/settlement within the foundation soils as a result of the permafrost degradation. The cracks should continue to be graded on an ongoing basis to close and seal them to minimize water infiltration.

Some wetness was observed at the toe of the dyke immediately downstream of the granular filter blanket that was placed around station 4+150 to 4+500. The granular blanket was placed to remedy the historic slumping and cracking that have been observed along this section of the dyke during previous inspection. The historical tension cracking within the dyke fill has propagated to the surface and is now visible through the surficial granular blanket. These deficiencies have been well documented in previous inspection reports and it does not appear the condition has improved over time. Piezometers have been installed within this section to monitor the performance of the dyke.

Recommendations

It was indicated in the background document that the design of the power canal and the dyke were based on a risk management approach that involved minimizing capital cost, observing the performance of the dyke and carrying out maintenance program as required. It is therefore very imperative to continue to regularly inspect the power canal, especially during the spring season when the lake level is high, so that any required maintenance work can be identified and completed on a timely basis. Based on KGS Group's site visit and review of background information the following recommendations are made:

- Replace backfill material that was lost when the control structure was overtopped and re-grade the crest of the dyke (See Photo G2).
- Extend the granular blanket between station 4+250 and 4+450 by at least 2.4 m further downstream of the toe of the dyke and over the existing cracks. This is required to improve the stability of this section and mitigate the observed tension cracks.
- Grade sections of dykes that exhibit longitudinal cracking to prevent further deterioration and to minimize infiltration.
- Continue ongoing annual inspections, ideally during spring season when the reservoir level is normally high.
- Surface grading and placement of minor granular fill placement on the access road on the crest of the dyke should be performed periodically as necessary. The estimated cost for this maintenance work is approximately $40,000 every five years.
- Complete recommendations in the 2010 Dam Safety Review by December 31, 2015.

Work items No 1 through 3 should be completed in 2015. The estimated cost to complete the tasks would be $50,000.

3.3.3 Access Roads to Tailrace Area

Description

The access road to the tailrace area runs off the main road into the plant to the east side of the tailrace portal and channel. The single lane road has a gravel surface as seen in Photo G3 below and is used by YEC for maintenance and operation of the tailrace structure.



Photo G3 – Access Road to East side of the Tailrace Channel

Assessment

Overall, the tailrace access road was in fair condition and provides functional access to the tailrace with relatively low usage. However, excessive rutting and vegetation encroachment was noted on a portion of the road during the inspection. See Facility Photograph G-10. Furthermore, the cut slope along the road is unstable and a number of loose boulders from the slope were found along the roadway. See Facility Photographs G-11 and G-12. The unstable slope and falling rocks constitute an imminent hazard and significant safety concern to YEC staff that are using this access road.

Recommendations

The recommended projects and costs related to the access roads to the Tailrace Area are:

- The cut slope along the access road to the tailrace should be stabilized by removing loose boulders to ensure the safety of YEC staff using the road. The work is estimated to cost $10,000, and should be completed in 2015.
- Vegetation clearing, surface grading, and minor granular fill placement on the gravel surfaces should be performed periodically as necessary. The estimated cost for this maintenance work is approximately $20,000 every five years.

3.3.4 Tailrace Tunnel Portal and Tailrace Channel

Description

The unlined tailrace tunnel is approximately 4.27m (14 ft) in diameter and was excavated through component bedrock. There is approximately 45 m thick overburden material above the tailrace tunnel at the portal location. See Photo G4 below. The overburden material above the tunnel portal consists of fine grained sediments and is sloped at 1.5H to 1V as illustrated in Figure G3.



Photo G4 – General View of Tailrace Tunnel Portal (looking north)

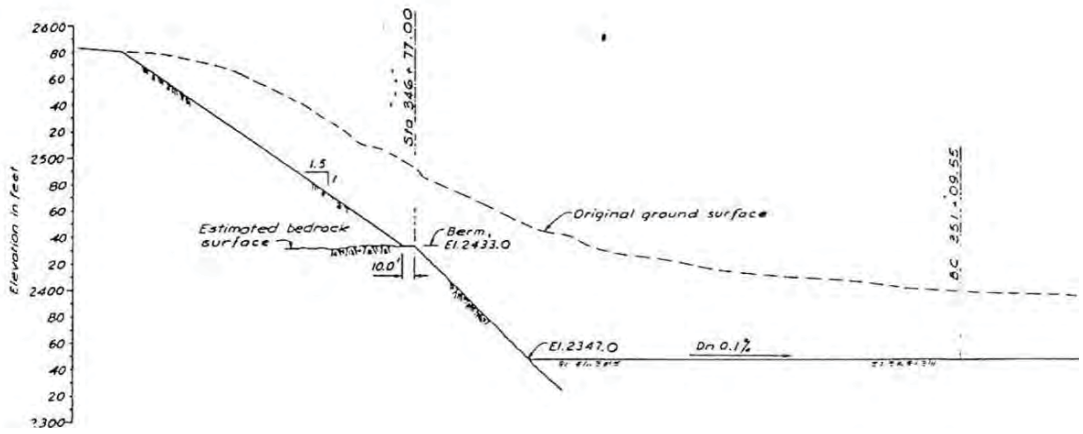


Figure G3 – Typical Design Cut Slope above the Tailrace Tunnel Portal (Construction Drawing No. D9 dated June 1, 1973)

The tailrace channel is approximately 762 m (2500 ft) long and is mostly through overburden soils with cut side slope that ranged from 1.5H:1V to 2.0H:1V as illustrated in Figure G4.

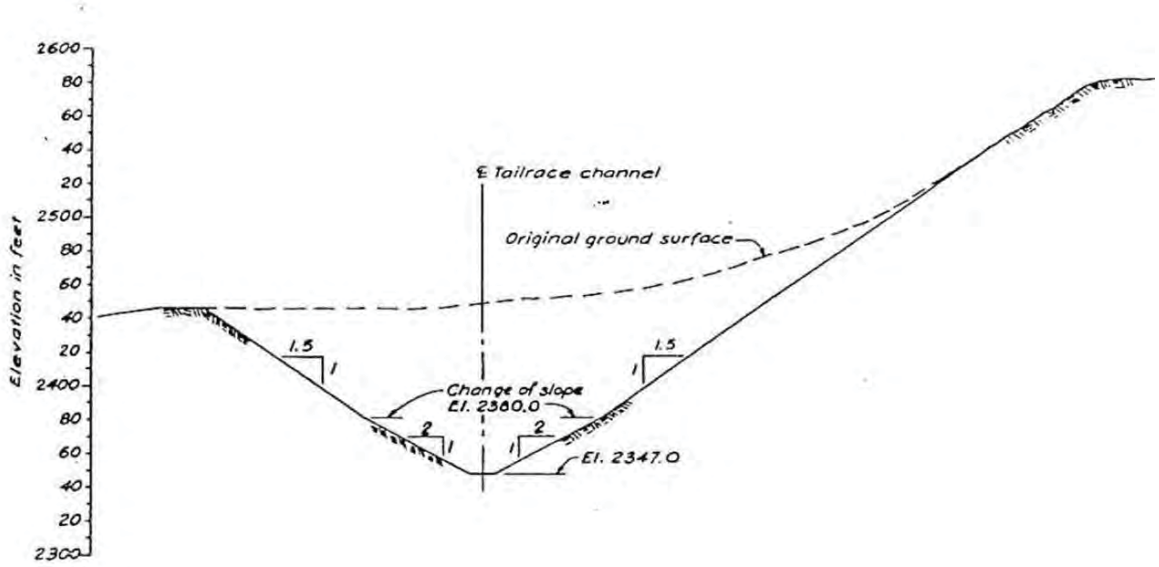


Figure G4 – Typical Design Cross-Section for the Tailrace Channel (facing downstream) (Construction Drawing No. D9 dated June 1, 1973)

Assessment

In general, the tailrace tunnel portal and cut slopes above appear to be in good condition. Some erosion gullies were observed in the cut slope above the portal (See Photos G4 above and Facility Photograph G-13). The presence of these erosion gullies have been reported in previous inspection reports since 1975. Sloughing was also observed in the overburden materials on the right side of the cut slope as shown in Photo G4. The slumped materials should be prevented from washing down the tailrace and attempts should be made to remedy the slumping.

A number of tension cracks were observed through the overburden material along the cut slope (See Facility Photograph G-14). These cracks were reported and well documented in the 2013 Tailrace Tunnel inspection report prepared by EBA. EBA recommended that detailed assessment of the overall stability of the cut slope above the portal should be performed to qualitatively evaluate the risk of failure and develop mitigation measures.

The cut slopes along the side of the tailrace channel appears to be stable, however, overgrown vegetation was observed on the slopes of the channel downstream of the portal. See Facility Photograph G-15.

Recommendations

The recommended projects and costs related to the Tailrace Tunnel Portal and Tailrace Channel are:

- Complete detailed geotechnical assessments and slope stability analysis of the cut slope above the portal by the 3rd quarter of 2015. The cost to complete the detailed stability analysis work is estimated at $25,000.
- Clear excessive vegetation along the tailrace channel. The work is estimated to cost $5,000 and should be completed in 2015.
- Remove slumped material and continue to monitor the slope for any sign of deterioration such as enlargement of tension cracks and retrogressive slumping.

4.0 REFERENCES

1. CSA Standard B139-09 “Installation Code for Oil-Burning Equipment”.

2. CCME PN 1326 “Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products”.

3. NFPA 30 “Flammable and Combustible Liquids Code – 2012 Edition”.

4. NFPA 37 “Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines – 2006 Edition”.

5.0 STATEMENT OF LIMITATIONS AND CONDITIONS

5.1 THIRD PARTY USE OF REPORT

This report has been prepared for the Yukon Energy Corporation to whom this report has been addressed and any use a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

5.2 GEOTECHNICAL INVESTIGATION STATEMENT OF LIMITATIONS

The geotechnical investigation findings and recommendations of this report were prepared in accordance with generally accepted professional engineering principles and practice. The findings and recommendations are based on the results of field and laboratory investigations, combined with an interpolation of soil and groundwater conditions found at and within the depth of the test holes drilled by KGS at this site. If conditions encountered during construction appear to be different from those shown by the test holes drilled by KGS or if the assumptions stated herein are not in keeping with the design, this office should be notified in order that the recommendations can be reviewed and modified if necessary.

5.3 CAPITAL COST ESTIMATE STATEMENT OF LIMITATIONS

The cost estimates included with this report have been prepared by KGS Group using its professional judgment and exercising due care consistent with the level of detail required for the stage of the project for which the estimate has been developed. These estimates represent KGS Group's opinion of the probable costs and are based on factors over which KGS has no control. These factors include, without limitation, site conditions, availability of qualified labour and materials, present workload of the Bidders at the time of tendering and overall market conditions. KGS does not assume any responsibility to the Client, in contract, tort or otherwise in connection with such estimates and shall not be liable to the Client if such estimates prove to be inaccurate or incorrect.

PHOTOS



Facility Photograph C-1 – Powerhouse Ceiling Panels



Facility Photograph C-2 – Elevator to Draft Tube Gate Gallery Level and Roof over Generator Cavern



Facility Photograph C-3 – Upper side of Roof Panels and Support Chains



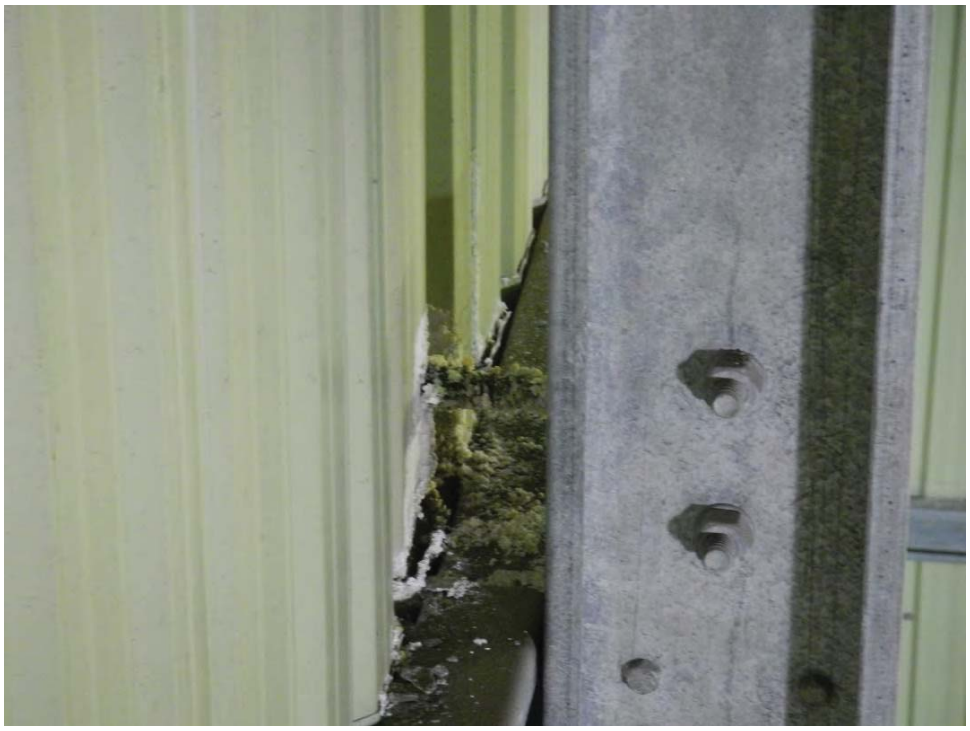
Facility Photograph C-4 – Concrete Gutter and Drains built into the top of the Concrete Crane Support Corbel



Facility Photograph C-5 – East End Wall Cladding in Generator Room



Facility Photograph C-6 – Southeast Corner Wall Cladding in Generator Room



Facility Photograph C-7 – Signs of Minor Leakage through Wall Cladding



Facility Photograph C-8 – Corroding Wall Cladding Supports at the Southeast Corner of the Generator Room



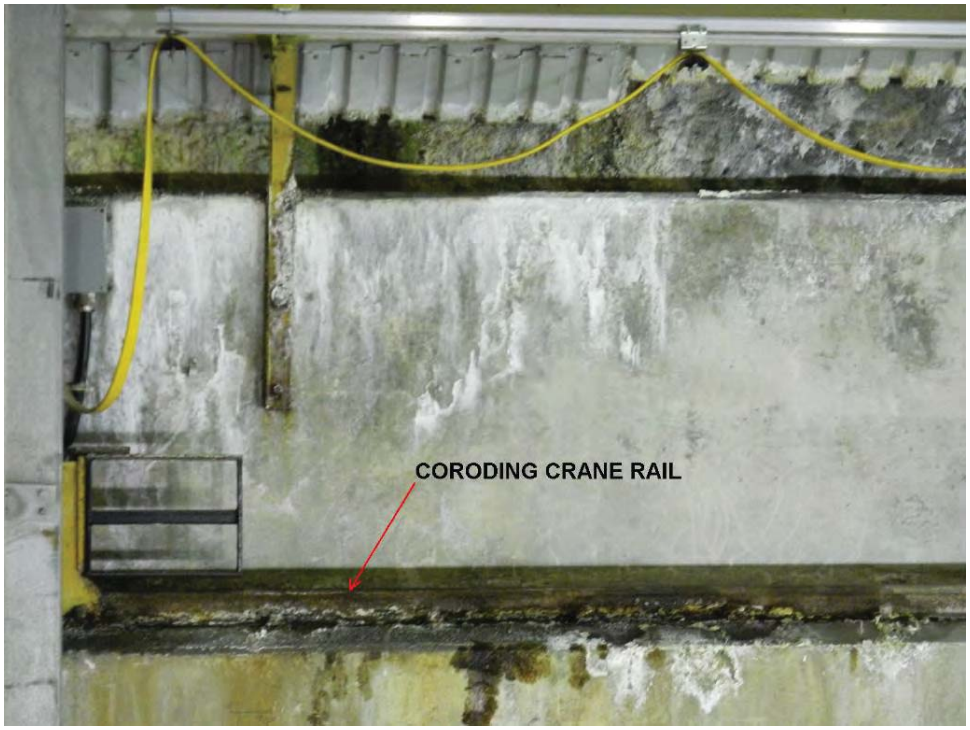
Facility Photograph C-9 – Underside of Concrete Corbel supporting Generator Room Crane



Facility Photograph C-10 – Concrete Corbel at Northeast Corner of the Generator Room



Facility Photograph C-11 – South Crane Rail – Note signs of previous dampness on the adjacent concrete



Facility Photograph C-12 – Generator Room Crane Rail at Southeast Corner – Note dampness and corrosion



Facility Photograph C-13 – Cladding around the Elevator Shaft in Generator Room



Facility Photograph C-14 – Damaged and Corroded Elevator Shaft Cladding at the Generator Room Floor Level



Facility Photograph C-15 – Damaged Elevator Shaft cladding



Facility Photograph C-16 – Corroded Elevator Shaft Cladding



Facility Photograph C-17 – Corroded Cladding around Elevator Shaft below the Generator Room Floor Level



Facility Photograph C-18 – Access Shaft Cladding – Note water on wall



Facility Photograph C-19 – Access Ladder, Platform, Handrail and Cladding Condition



Facility Photograph C-20 – Access Platform (underside) and Support Steel in the Access Shaft



Facility Photograph C-21 – Support Steel in Access Shaft



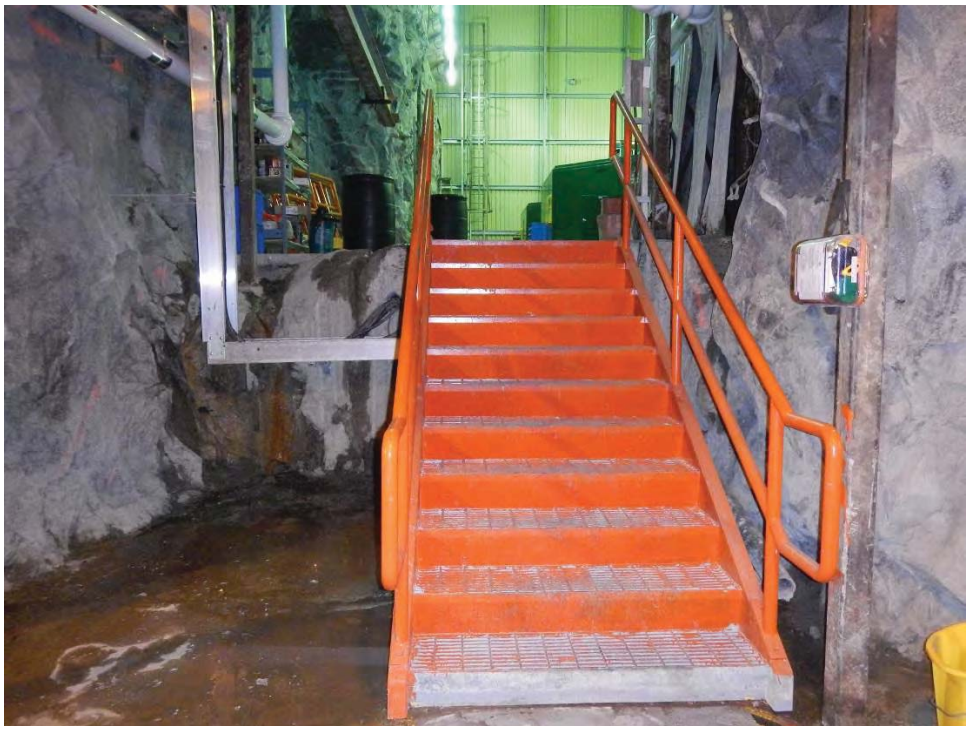
Facility Photograph C-22 – Access Ladder to Generator Room Crane Rail



Facility Photograph C-23 – Handrails and Ladder down to Lower Generator Floors



Facility Photograph C-24 – Stairs and Handrails from Generator Floor to Lower Levels



Facility Photograph C-25 – Stairs from Generator Room to Bypass Tunnel & AH3



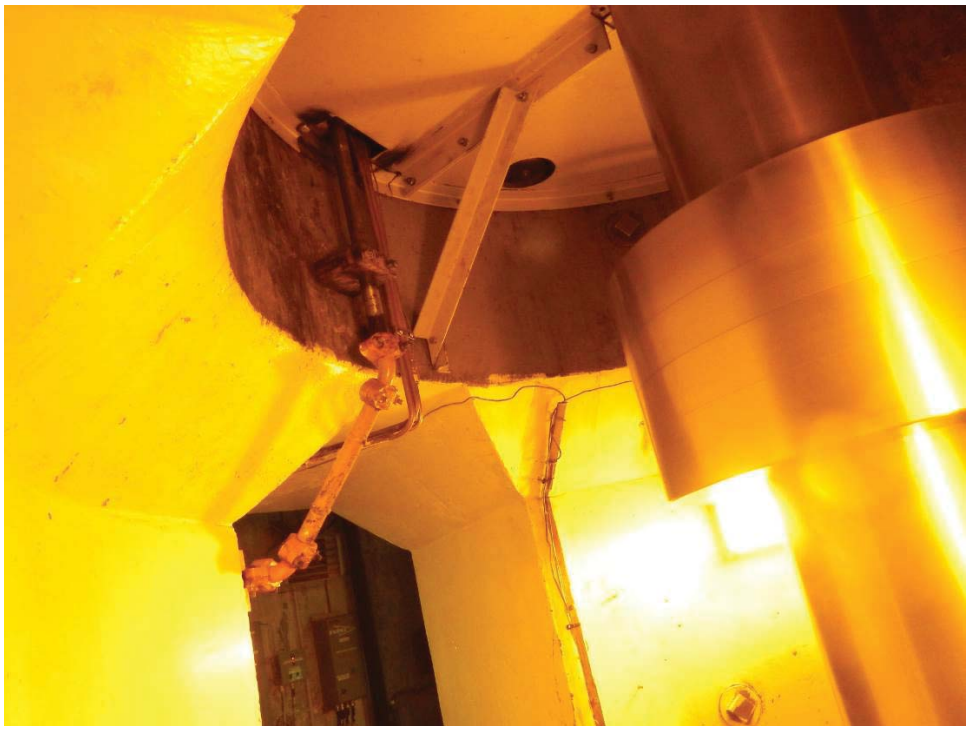
Facility Photograph C-26 – Generator Room Floor Concrete and Grating



Facility Photograph C-27 – Lower Turbine Floor Level



Facility Photograph C-28 – Support Concrete under the AH1 Generator



Facility Photograph C-29 – Concrete around the Turbine Shaft



Facility Photograph C-30 – Draft Tube Access at Basement Level



Facility Photograph C-31 – TIV and Supporting Concrete



Facility Photograph C-32 – TIV Support Pedestal



Facility Photograph C-33 – Upstream End of the AH3 Penstock



Facility Photograph C-34 – AH3 Penstock and Upstream Plug in the Diversion Tunnel – Note moisture and light penstock corrosion



Facility Photograph C-35 – Upstream Thrust Block for AH3 Penstock



Facility Photograph C-36 – Diversion Tunnel Area between Upstream Thrust Block and AH3



Facility Photograph C-37 – Floor, Hatches and Handrails around AH3



Facility Photograph C-38 – Enlarged Tunnel and Shotcrete adjacent to AH3



Facility Photograph C-39 – AH3 Penstock embedded in Downstream Diversion Tunnel Plug



Facility Photograph C-40 – Corroding Embedded Collar and Damaged Penstock Paint at Downstream Diversion Tunnel Plug



Facility Photograph C-41 – Draft Tube Gate Guide Concrete and Surge Chamber



Facility Photograph C-42 – Draft Tube Gallery Deck Concrete



Facility Photograph C-43 – Draft Tube Deck Concrete and Gate Hatch Cover



Facility Photograph C-44 – Draft Tube Gate stored in the AH2 Guides



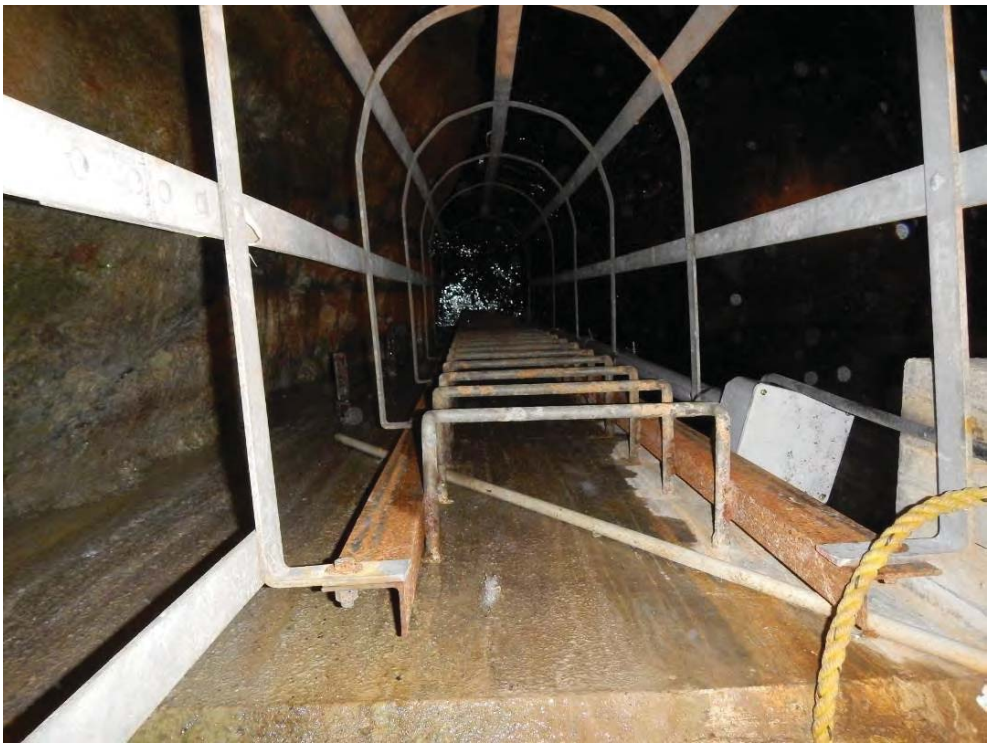
Facility Photograph C-45 – Draft Tube Deck Handrails and Fencing



Facility Photograph C-46 – Draft Tube Deck Fencing and Handrails near the Emergency Boat Winch



Facility Photograph C-47 – Draft Tube Deck Handrail and Tailwater Access Ladder Cage



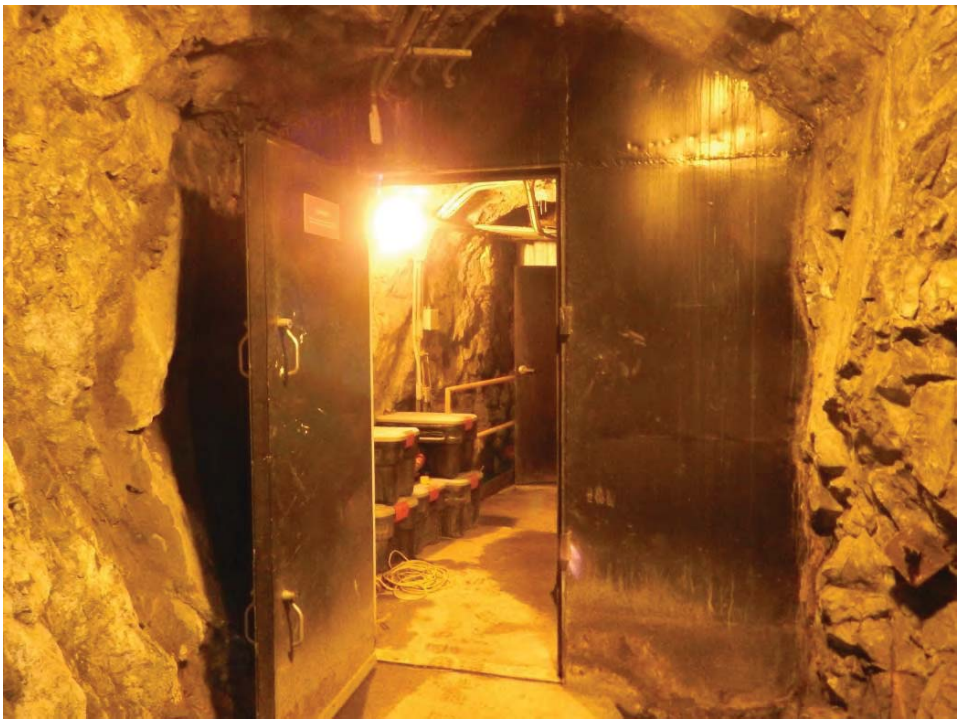
Facility Photograph C-48 – Embedded Rungs for Access Ladder to Tailwater



Facility Photograph C-49 – Draft Tube Gate Monorail Hoist and Support Frame



Facility Photograph C-50 – Monorail Hoist Support Bracket and Anchor into Bedrock



Facility Photograph C-51 – Upstream Bulkhead and Steel Door in the Draft Tube Access Tunnel



Facility Photograph C-52 – Downstream Bulkhead and Steel Door in the Draft Tube Access Tunnel



Facility Photograph C-53 – Maintenance Area



Facility Photograph C-54 – Concrete and Concrete Block West Wall of the Maintenance Area



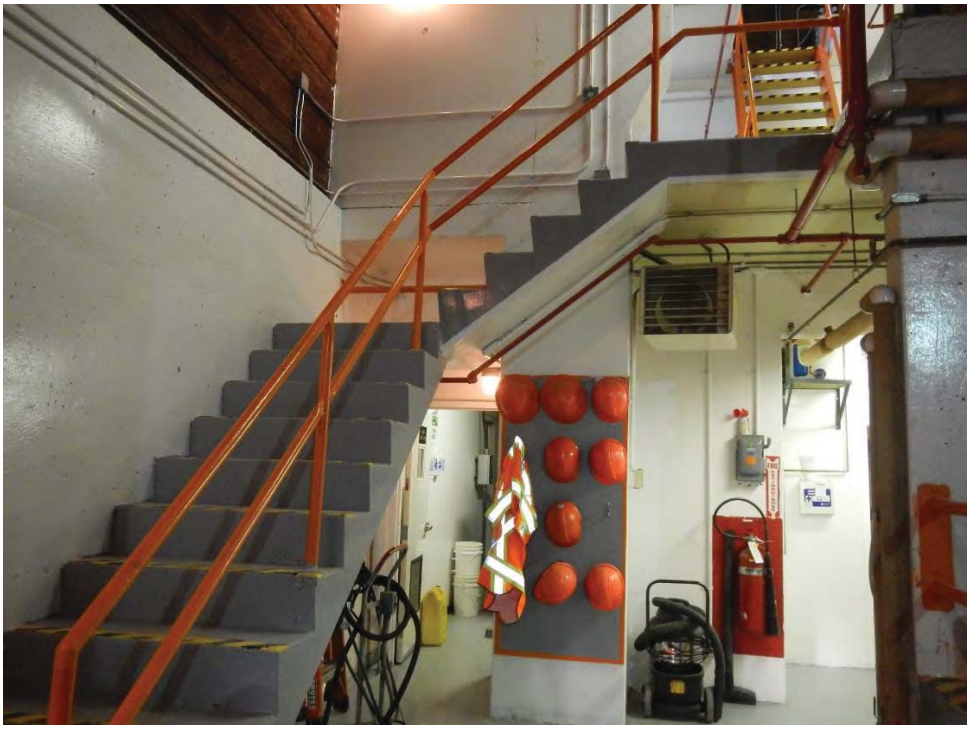
Facility Photograph C-55 – Service Building Standby Diesel Room



Facility Photograph C-56 – Service Building Battery Room



Facility Photograph C-57 – Service Building Lower Level Elevator Access



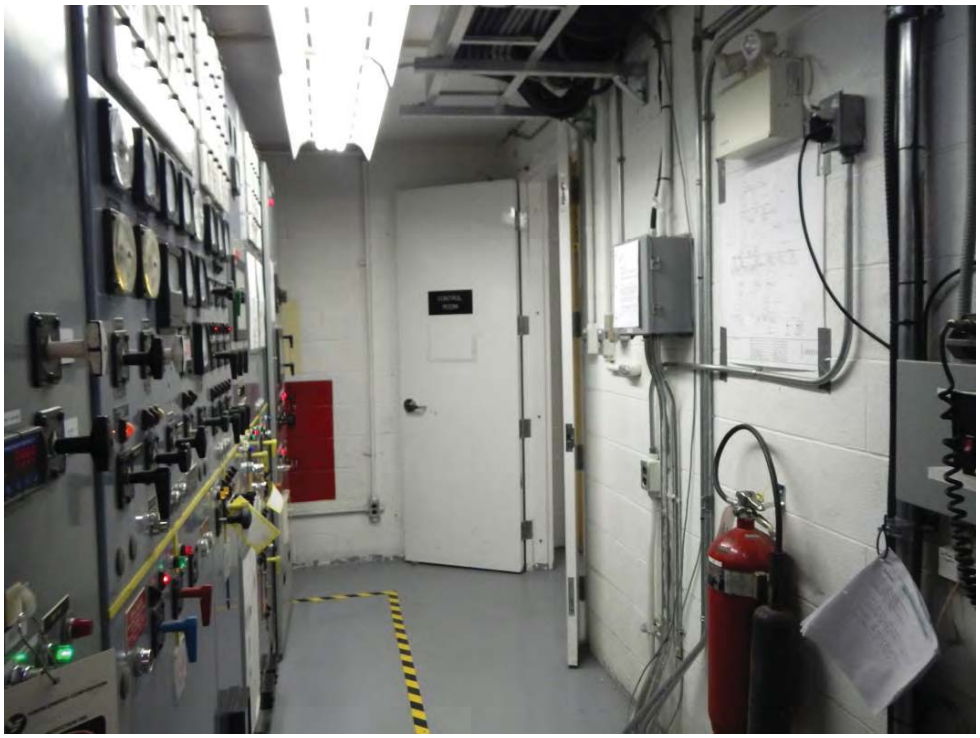
Facility Photograph C-58 – Service Building Stairs to Second Level



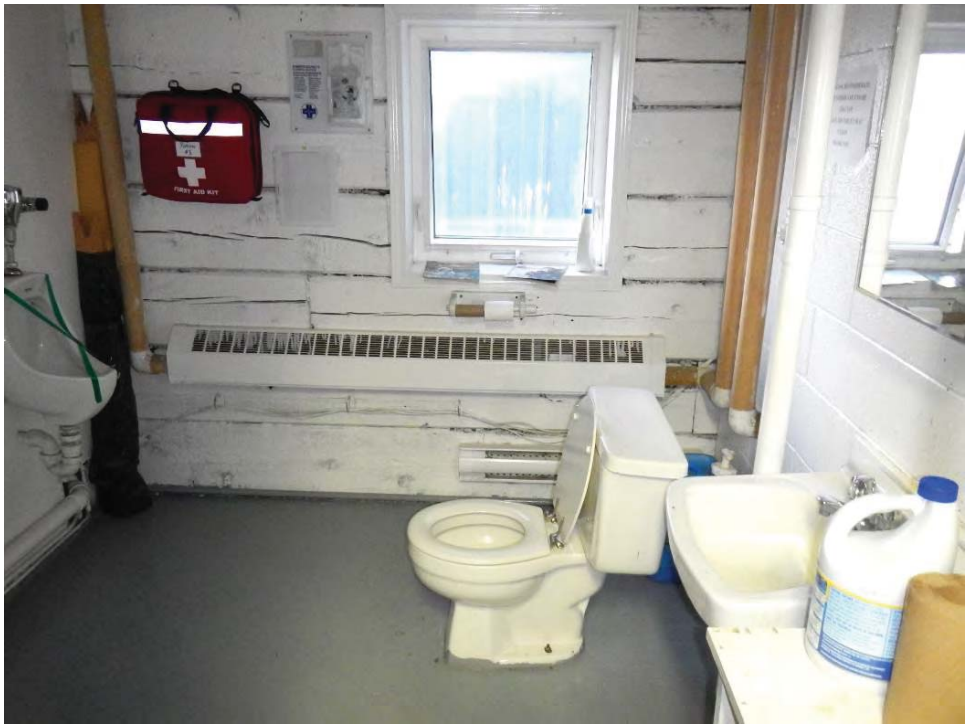
Facility Photograph C-59 – Service Building Maintenance Area Superstructure



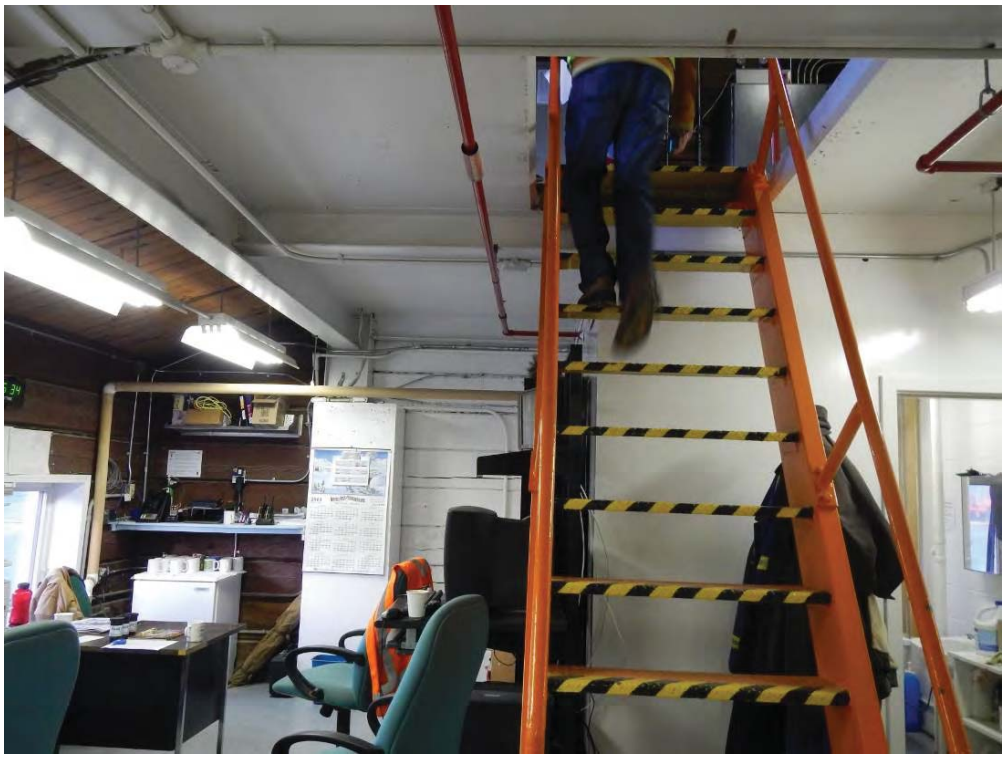
Facility Photograph C-60 – Service Building Crane Support Column and Beam



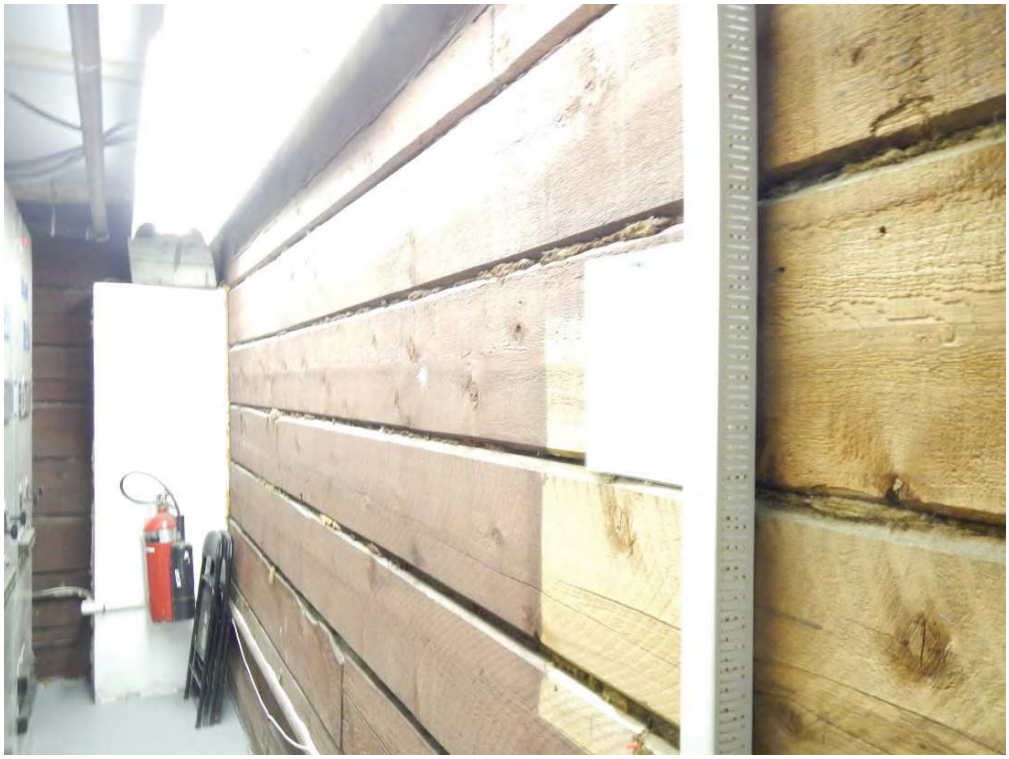
Facility Photograph C-61 – Service Building Control Room and Access to Switchgear Building



Facility Photograph C-62 – Service Building Washroom



Facility Photograph C-63 – Service Building Office Area on Second Level



Facility Photograph C-64 – Service Building Cedar Log Wall in Control Room



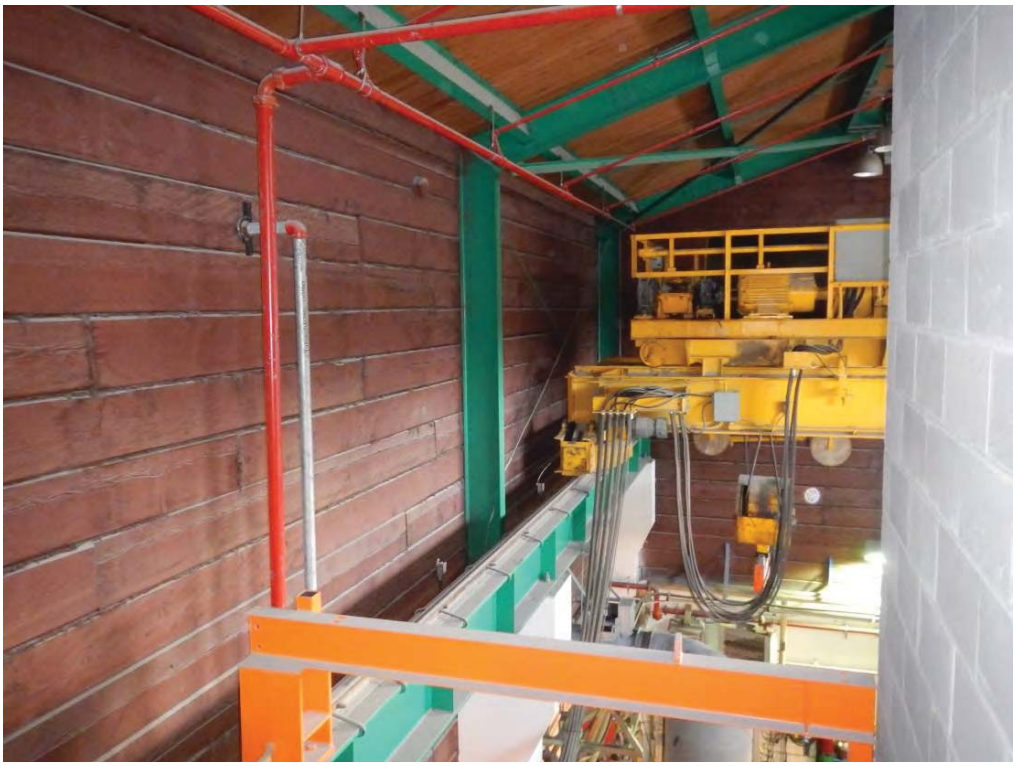
Facility Photograph C-65 – Service Building Third Floor – Air Conditioning Room and Door to Elevator Equipment Room



Facility Photograph C-66 – Upper Level Floor of Service Building in the Air Conditioning Equipment Room



Facility Photograph C-67 – Service Building Platform for Accessing the Overhead Crane



Facility Photograph C-68 – Service Building Superstructure above the Crane Rails in the Maintenance Area



Facility Photograph C-69 – Service Building Roof Support Framework



Facility Photograph C-70 – Service Building Overhead Crane Support Beam and Crane Rail



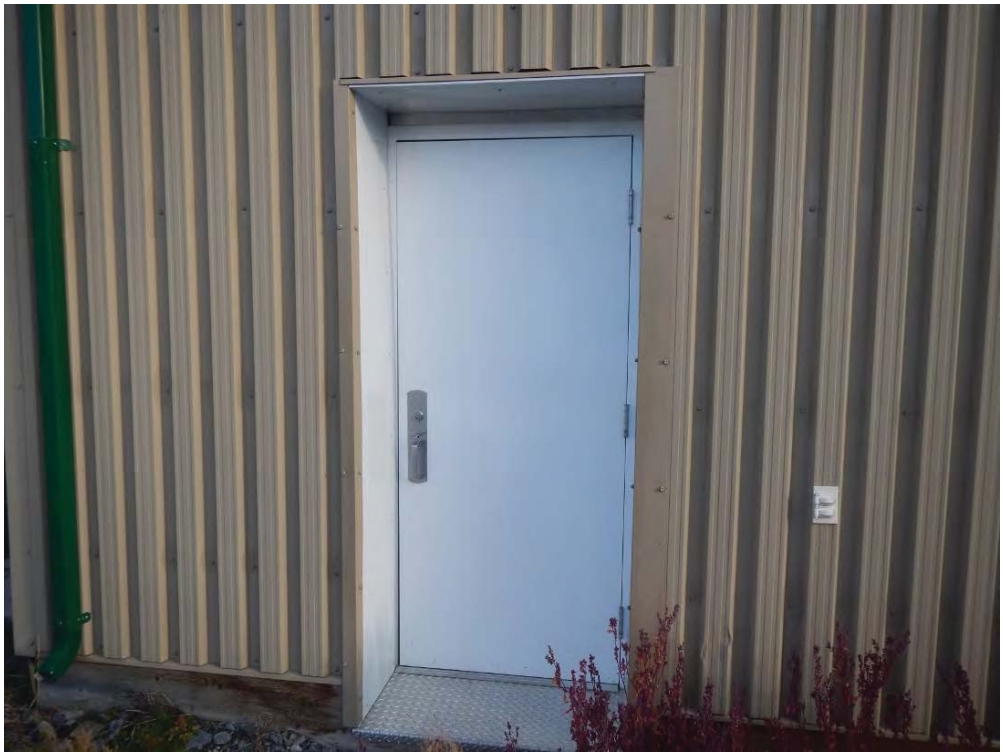
Facility Photograph C-71 – Exterior Service Building Wall Cladding



Facility Photograph C-72 – South Wall of Service Building



Facility Photograph C-73 – Service Building Equipment and Man Doors



Facility Photograph C-74 – Man Door to the Service Building Standby Generator Room



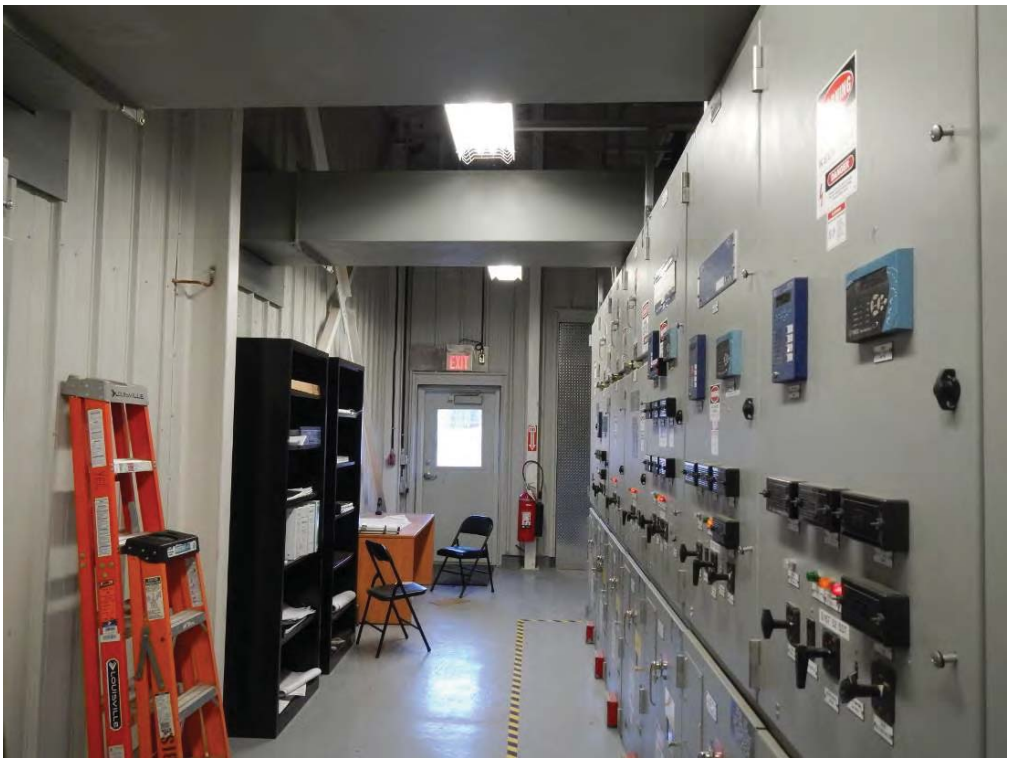
Facility Photograph C-75 – Exterior Stairs at the East End of the Service Building



Facility Photograph C-76 – Switchgear Building



Facility Photograph C-77 – Switchgear Building Equipment and Man Doors



Facility Photograph C-78 – Switchgear Building Interior



Facility Photograph C-79 – Intake Structure Concrete Side Wall



Facility Photograph C-80 – Intake Structure Concrete Side Wall and Deck



Facility Photograph C-81 – Intake Structure Deck and Handrails



Facility Photograph C-82 – Upstream Edge of Intake Structure Deck and Trashrack Guide



Facility Photograph C-83 – Upstream Side of Intake Ventilation Building



Facility Photograph C-84 – Downstream Side of the Intake Ventilation Building



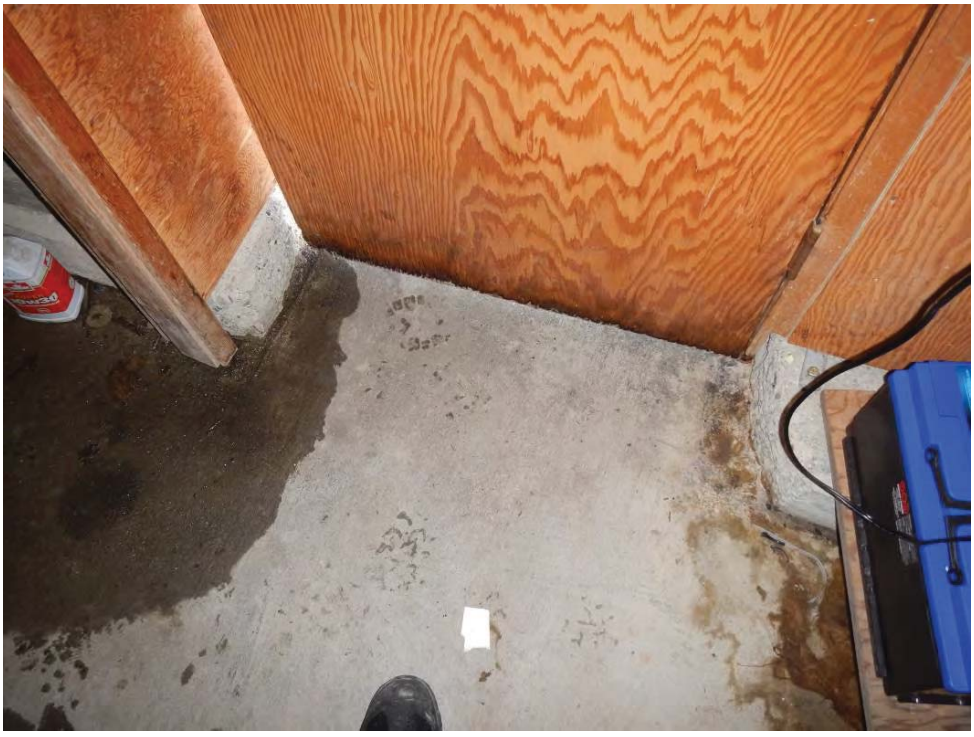
Facility Photograph C-85 – Intake Ventilation Building Roof



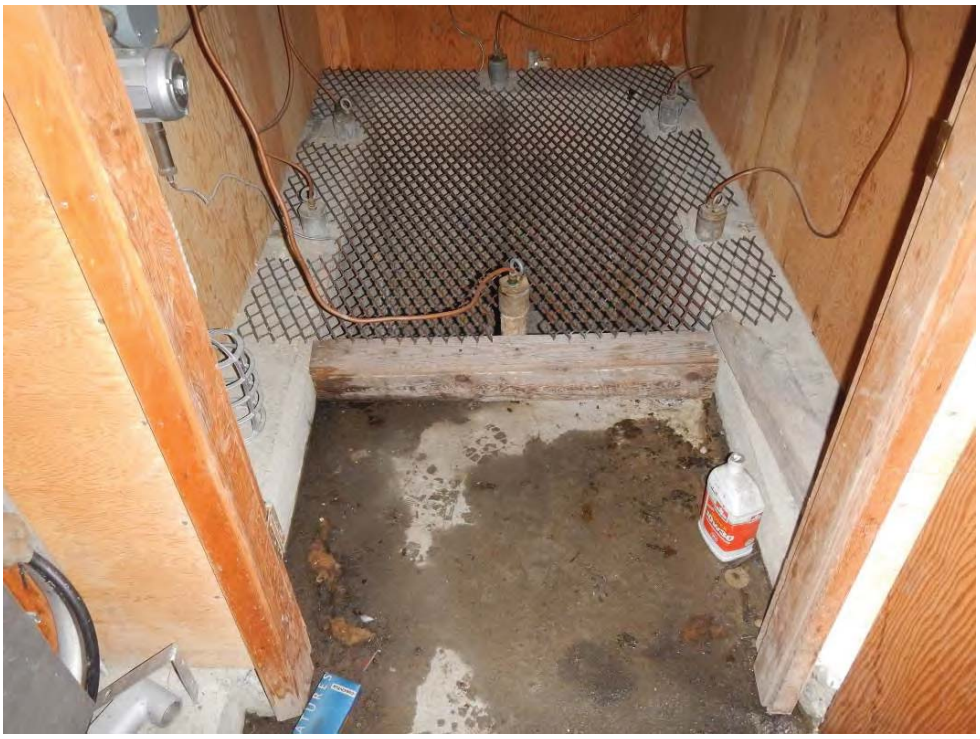
Facility Photograph C-86 – Access Door into the Ventilation Building



Facility Photograph C-87 – Interior of the Intake Ventilation Building



Facility Photograph C-88 – Interior Side of the Intake Ventilation Building Door – Note the moisture affecting the bottom of the door



Facility Photograph C-89 – Cover over the Intake Ventilation Shaft in the Ventilation Building



Facility Photograph C-90 – Three Bulkhead Gates stored at the Intake Structure



Facility Photograph C-91 – Bulkhead Gate Lintel, Side Seals, Top Girder and Lifting Plate



Facility Photograph C-92 – Storage Shed at the Aishihik Intake



Facility Photograph C-93 – Upstream End of the Canyon Lake Control Structure Conduits



Facility Photograph C-94 – Top of Concrete over Conduits and Sheet Piling



Facility Photograph C-95 – North Section of Rockfill Dam – Note heaving of the concrete sheet pile cap



Facility Photograph C-96 – North End of Sheet Pile Concrete Cap is above grade, exposing the Sheet Pile below



Facility Photograph C-97 – Downstream End of Canyon Lake Control Structure and Butterfly Valve Stems



Facility Photograph C-98 – Downstream End of Canyon Lake Control Structure and North Butterfly Valve Stem



Facility Photograph C-99 – Spalling of Protective Concrete Section by the Canyon Lake Control Structure South Butterfly Valve



Facility Photograph C-100 – Aishihik Lake Control Structure – Upstream West Wing Wall



Facility Photograph C-101 – Aishihik Lake Control Structure – Upstream Face and West Wing Wall



Facility Photograph C-102 – Aishihik Lake Control Structure – Top of Joint between the Upstream Face and the West Wing Wall



Facility Photograph C-103 – Aishihik Lake Control Structure – Upstream Face and Steel Pier Nosings



Facility Photograph C-104 – Aishihik Lake Control Structure – Pier Nosing and Guide Steel at West End



Facility Photograph C-105 – Aishihik Lake Control Structure – Typical Condition of Stoplog Guides above the Waterline



Facility Photograph C-106 – Aishihik Lake Control Structure – Upper Deck and Pier Concrete, Pier Nosing and Guide Steel at West End



Facility Photograph C-107 – Aishihik Lake Control Structure – Top of Pier Concrete and Delaminating Area of Upstream Deck



Facility Photograph C-108 – Aishihik Lake Control Structure – Upstream Deck Surface and Timber Roadway



Facility Photograph C-109 – Aishihik Lake Control Structure – Upstream Deck Surface, Timber Roadway and Fishway



Facility Photograph C-110 – Timber Roadway over the Aishihik Lake Control Structure



Facility Photograph C-111 – Downstream Face of the Aishihik Lake Control Structure



Facility Photograph C-112 – Aishihik Lake Control Structure Downstream Piers



Facility Photograph C-113 – Typical Condition of the Downstream Concrete Surfaces of the Aishihik Lake Control Structure



Facility Photograph C-114 – Downstream East Wing Wall of the Aishihik Lake Control Structure



Facility Photograph C-115 – West Face of the Aishihik Lake Control Structure Fishway



Facility Photograph C-116 – East Face of the Aishihik Lake Control Structure Fishway



Facility Photograph C-117 – Interior Fishway Concrete at the Aishihik Lake Control Structure



Facility Photograph C-118 – Interior Concrete at a bend in the Aishihik Lake Control

Structure Fishway



Facility Photograph C-119 – Intake and Stoplog Slot for the Aishihik Lake Control Structure Fishway



Facility Photograph C-120 – Fishway at the Aishihik Lake Control Structure



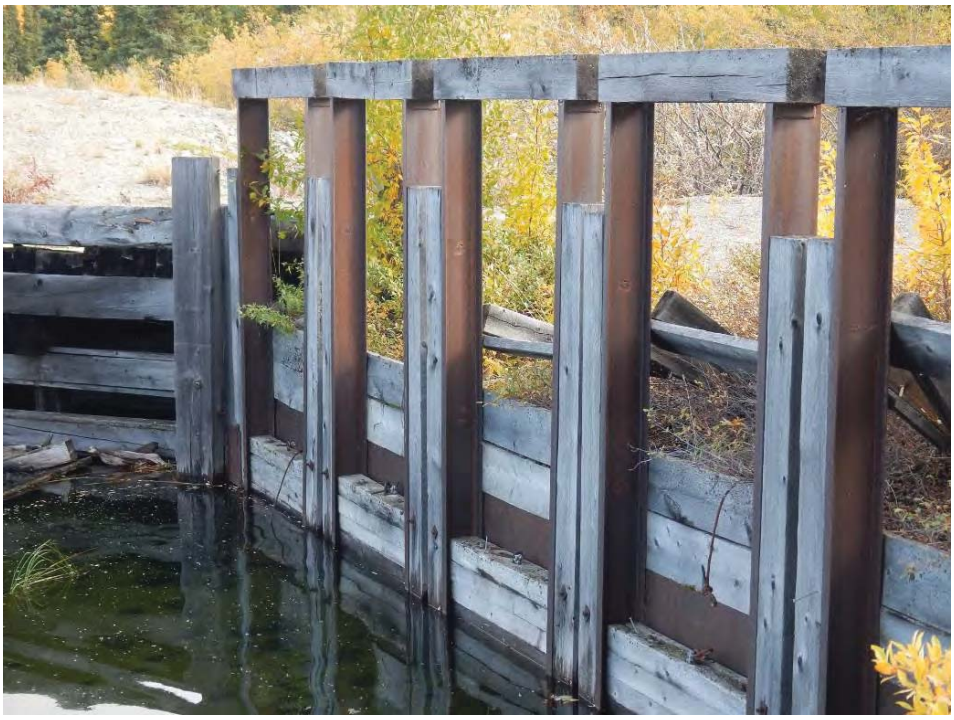
Facility Photograph C-121 – Offset Joint in West Fishway Wall



Facility Photograph C-122 – Offset and Spalled Joint in West Fishway Wall



Facility Photograph C-123 – Offset Joint and Broken Concrete at Top of East Fishway Wall



Facility Photograph C-124 – Upstream Face of the Aishihik Lake Auxiliary Control Structure



Facility Photograph C-125 – Upstream Face of Stoplogs and Retaining Wall of the Auxiliary Control Structure at Aishihik Lake



Facility Photograph C-126 – Downstream Face of Stoplogs and Culvert Interior at the Auxiliary Control Structure



Facility Photograph C-127 – Typical Interior of a Culvert at the Aishihik Lake Auxiliary Control Structure



Facility Photograph C-128 – Downstream End of the Culverts at the Aishihik Lake Auxiliary Control Structure



Facility Photograph C-129 – Deteriorated Deck of the Aishihik Lake Auxiliary Control Structure Bridge Section



Facility Photograph C-130 – Upstream Section of the Aishihik Lake Auxiliary Control Structure Bridge Section



Facility Photograph C-131 – Crushed Beams supporting the Aishihik Lake Auxiliary Control Structure Bridge Section



Facility Photograph C-132 – Aishihik Tailrace and Portal Area



Facility Photograph C-133 – Fencing and Main Access Gate at the Service Building Area



Facility Photograph C-134 – Fencing around the Switchyard at the Service Building



Facility Photograph C-135 – Intake Structure – Note the lack of fencing or warning signs



Facility Photograph C-136 – Warning Boom at the entrance to the Power Canal at Canyon Lake



Facility Photograph C-137 – Entrance to Power Canal – Note lack of signage



Facility Photograph C-138 – Locked Gate at the Canyon Lake Control Structure – Note the picnic area beyond



Facility Photograph C-139 – Locked Gate and Signage at the Canyon Lake Control Structure – Note the lack of fencing



Facility Photograph C-140 – Signage at the upstream side of the Canyon Lake Control Structure – Note the lack of signage facing Canyon Lake



Facility Photograph C-141 – Locked Gate at the Aishihik Lake Control Structure



Facility Photograph C-142 – Gate and Handrails at the Aishihik Lake Control Structure – Note the single warning sign on the Fishway



Facility Photograph C-143 – Upstream Side of the Aishihik Lake Control Structure – Note Landward Facing Sign



Facility Photograph C-144 – Log Boom across the Aishihik Lake Control Structure Entrance Channel



Facility Photograph M-1 – Three Manually Operated Butterfly Valve Gear Sets



Facility Photograph M-2 – Fishway Manually Operated Slide Gate Gear Sets



Facility Photograph M-3 – Electrically Disconnected 60” Diameter Butterfly Valve Gears



Facility Photograph M-4 – Manually Actuated 18” Diameter Butterfly Valve Gear



Facility Photograph M-5 – Lake Level Monitoring Equipment



Facility Photograph M-6 – 10’ x 10’ Butterfly Valve Power-driven Gear Set



Facility Photograph M-7 – 8” Diameter Bypass Valve Manually Operated Gear Set



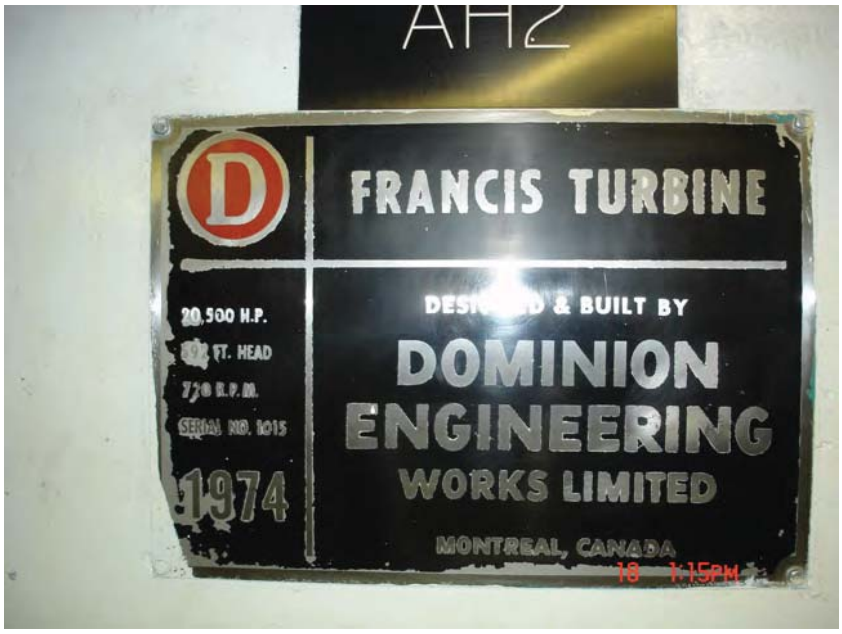
Facility Photograph M-8 – Ventilation Building Space Heaters



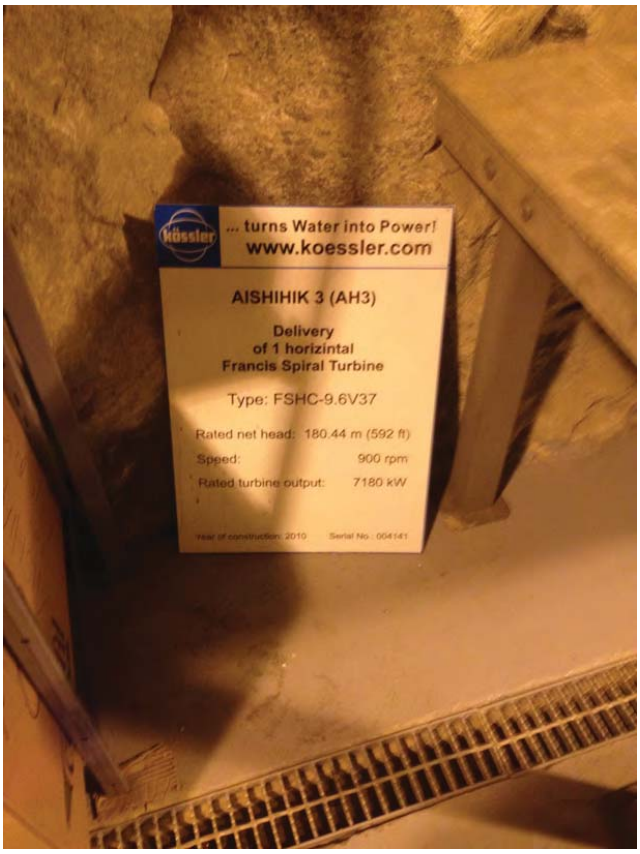
Facility Photograph M-9 – Ventilation Shaft Embedded Guide Heaters



Facility Photograph M-10 – Unit AH1 Nameplate



Facility Photograph M-11 – Unit AH2 Nameplate



Facility Photograph M-12 – Unit AH3 Nameplate



Facility Photograph M-13 – Leaking Air Admission Valve



Facility Photograph M-14 – AH1 Woodward Governor and HPU



Facility Photograph M-15 – AH2 Woodward Governor and HPU



Facility Photograph M-16 – Digital Governor Control Panel for AH3



Facility Photograph M-17 – HPU and LPU Control Panels for AH3



Facility Photograph M-18 – LPU Pump Skid for AH3



Facility Photograph M-19 – Minor Oil Seepage from AH1 Governor



Facility Photograph M-20 – Minor Oil Seepage from AH1 HPU



Facility Photograph M-21 – Minor Oil Seepage from AH2 HPU



Facility Photograph M-22 – Faulty Hertz Display Gauge on AH2 Governor



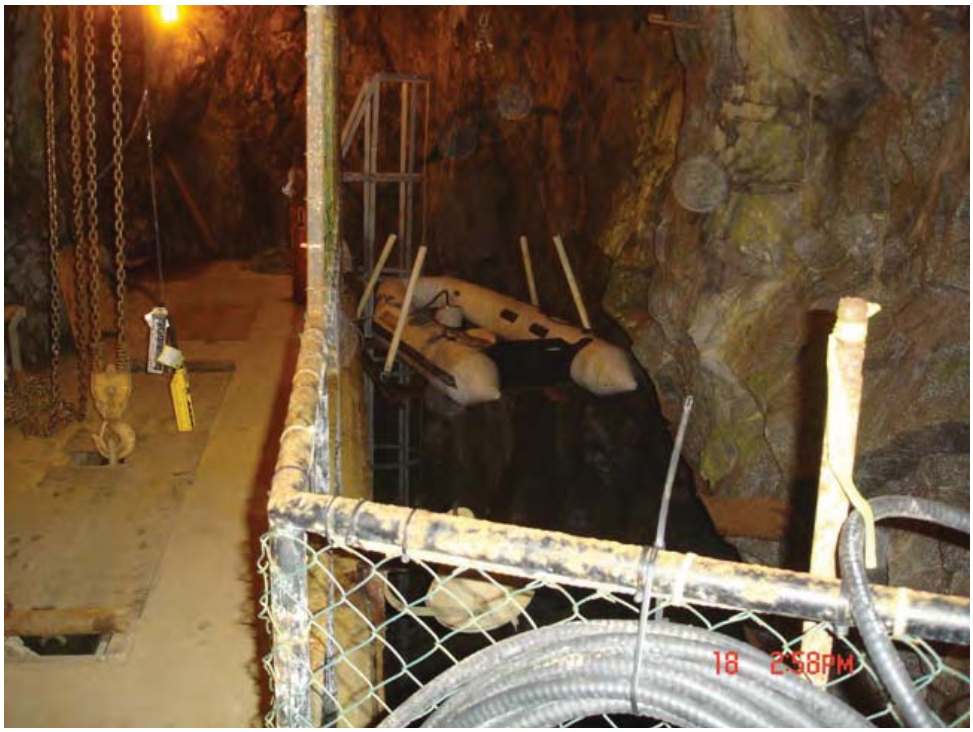
Facility Photograph M-23 – 15.0 MW AH1 Generator Work-in-process



Facility Photograph M-24 – 15.0 MW AH2 Generator



Facility Photograph M-25 – TDPS (India) 7.0 MW AH3 Generator



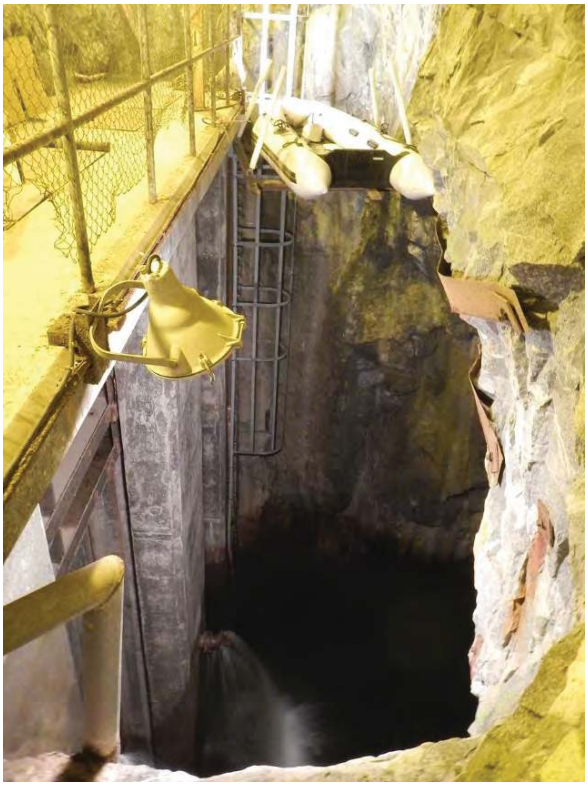
Facility Photograph M-26 – Aishihik Tailrace Deck and Surge Chamber



Facility Photograph M-27 – Tailrace 5 Tonne Monorail Draft Tube Gate Crane and Hoist



Facility Photograph M-28 – Draft Tube Gate Checked in Unit AH2 Draft Tube



Facility Photograph M-29 – Draft Tube Guides to Tailrace



Facility Photograph M-30 – AH3 Knife Gate Valve



Facility Photograph M-31 – Service Bay Crane



Facility Photograph M-32 – Powerhouse Crane with Elevator Shaft Behind



Facility Photograph M-33 – Service Bay Backup Diesel Generator



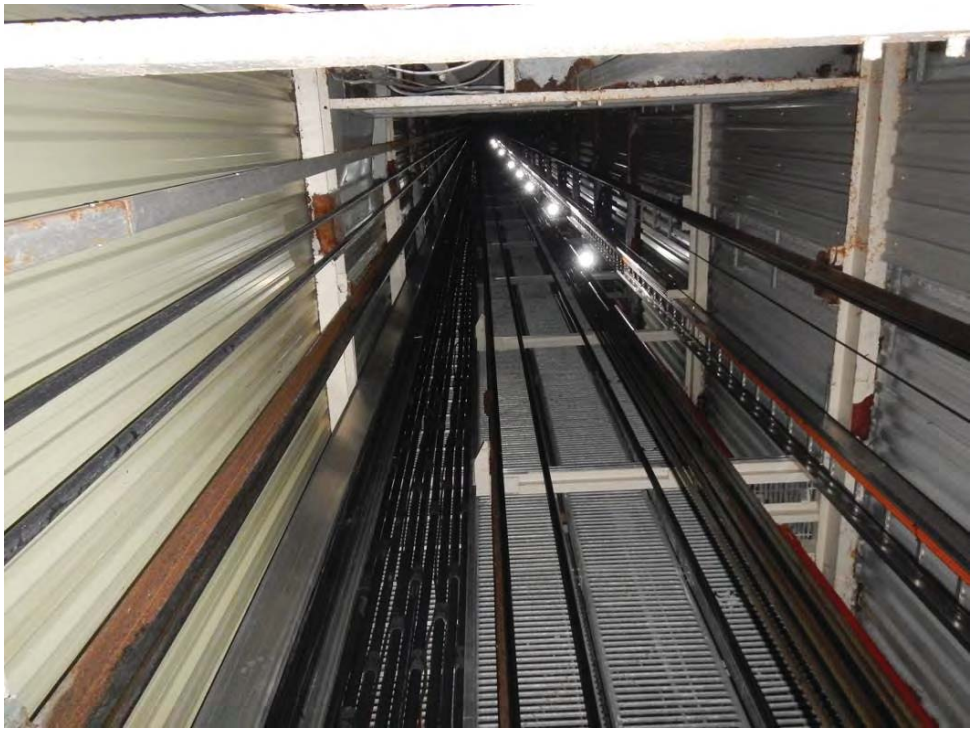
Facility Photograph M-34 – Bulk Diesel Fuel Tank



Facility Photograph M-35 – Powerhouse Backup Diesel Generator



Facility Photograph M-36 – Top View of Aishihik Elevator at Powerhouse Floor



Facility Photograph M-37 – View of Elevator Shaft Looking Up



Facility Photograph M-38 – Service Bay Crane Access Walkway from Main Floor



Facility Photograph M-39 – Service Bay Crane Access Walkway



Facility Photograph M-40 – Backup Diesel Generator Room (also used as storage room and laundry room)



Facility Photograph M-41 – Manual Fill Valve on "Day" Tank



Facility Photograph M-42 – Steel Containment Berm for "Day" Tank



Facility Photograph M-43 – Counterbalanced Secondary "Day" Tank Fill Line



Facility Photograph M-44 – Yellow Diesel Fuel Line Gravity Feed to Backup Diesel Generator "Day" Tank



Facility Photograph M-45 – Diesel Fuelled Hydronic Boilers at Aishihik



Facility Photograph M-46 – Plugged Combustion Air Inlet into Boiler Room



Facility Photograph M-47 – New Equipment Shaft Exhaust Fan



Facility Photograph M-48 – Old Equipment Shaft Exhaust Fan



Facility Photograph M-49 – Broken Air Plenum at Base of Elevator Shaft



Facility Photograph M-50 – Supplemental Electric Unit Heaters at AMU Louver



Facility Photograph M-51 – One of Three Circulation Fans in the Powerhouse



Facility Photograph M-52 – Oil Mist Ducts from Top of Generators



Facility Photograph M-53 – Ducting from Top of Generator



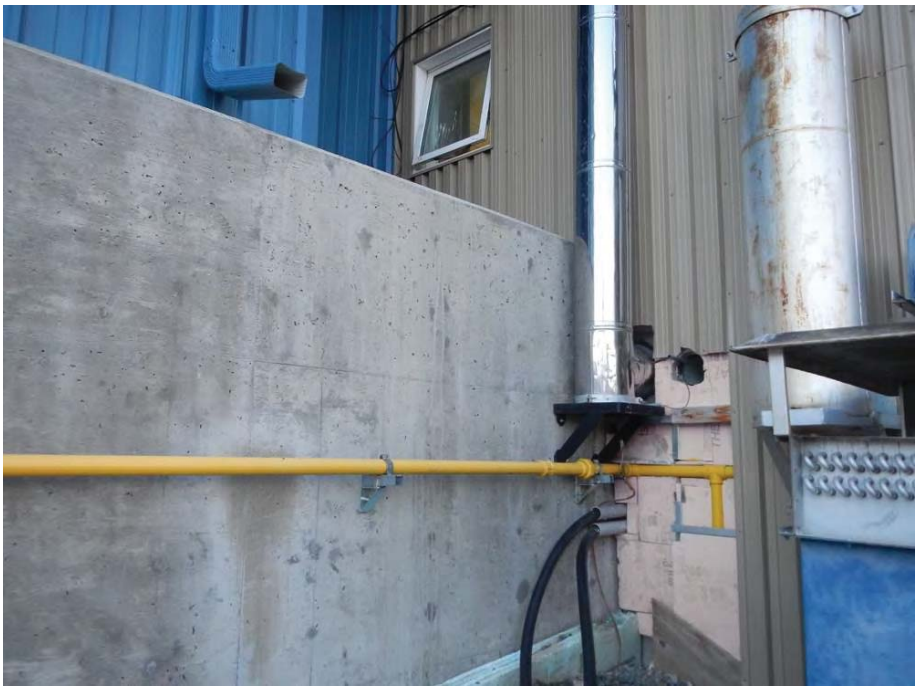
Facility Photograph M-54 – Exhaust Fan from Top of Generator



Facility Photograph M-55 – Service Building Air Compressor



Facility Photograph M-56 – Powerhouse Compressed Air System



Facility Photograph M-57 – No Fuel Shut-off Valve Outside of Building



Facility Photograph M-58 – Lubricants Not Stored on Containment Pallets in the Service Bay



Facility Photograph M-59 – Lubricants Not Stored on Containment Pallets in the Powerhouse



Facility Photograph M-60 – Aishihik Drainage and Dewatering System



Facility Photograph M-61 – Backup Diesel Generator Powered Submersible Drainage Sump Pump



Facility Photograph M-62 – Service Building Fire Protection Siamese Connection



Facility Photograph M-63 – Service Building Sprinkler Tree



Facility Photograph M-64 – Switching Annex Valve with Exposed Wires



Facility Photograph M-65 – Siamese Connection Tamper Switch Not Connected



Facility Photograph M-66 – Piping to the Siamese Connection



Facility Photograph M-67 – Sprinklers over Switchgear on Turbine Floor in Powerhouse



Facility Photograph M-68 – Poorly Vented and Supported Vent Piping



Facility Photograph M-69 – Poorly Supported Piping



Facility Photograph M-70 – Poorly Run and Supported Piping



Facility Photograph M-71– Bypassed Water Softeners and Brine Tank



Facility Photograph M-72 – Out of Order Urinal and Laundry Tub



Facility Photograph M-73 – Opening in Vent Pipe Closed Off with Tape



Facility Photograph M-74 – Three Original Service Water Pumps



Facility Photograph M-75 – Unit AH3 Service Water Supply Line



Facility Photograph M-76 – Unit AH3 Service Water Discharge to Tailrace



Facility Photograph M-77 – Duct Tape Cooling Water Wrap over AH2 NGR



Facility Photograph M-78 – Cooling Water Lines Wrapped with Tape



Facility Photograph E-1 – AH0 Switchyard



Facility Photograph E-2 – Plant Fire Alarm Panel



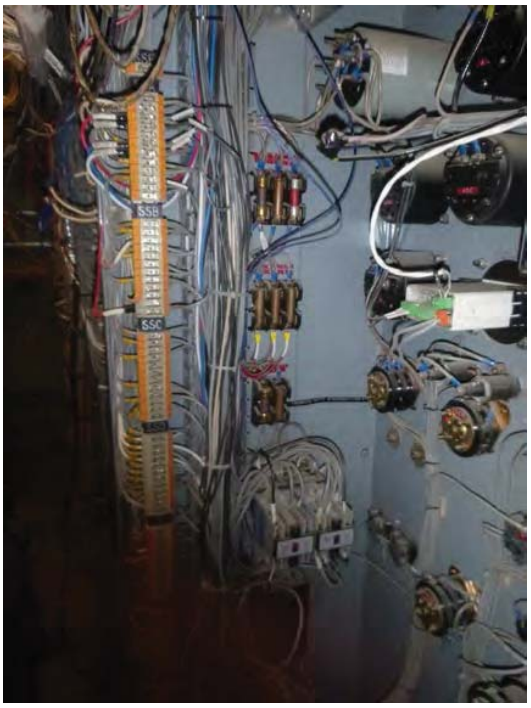
Facility Photograph E-3 – MV Armoured Cabling



Facility Photograph E-4 – AH3 Area Distribution Panel, Insufficient Labelling



Facility Photograph E-5 – AH3 Area Distribution Panel, Insufficient Labelling



Facility Photograph E-6 – Control Room Panel (note copper pipe in lieu of fuses)



Facility Photograph E-7 – Phone at Surge Chamber



Facility Photograph E-8 – AH1 Generator in Good Condition



Facility Photograph E-9 – Top of Generator Switchgear on Turbine Level



Facility Photograph E-10 – Residential Style Charger (Faulted) at Intake Structure



Facility Photograph E-11 – Distribution Panel at Intake Structure



Facility Photograph E-12 – Carson Wireless Communication Module at Intake Structure



Facility Photograph E-13 – Electrical Enclosure at Canyon Lake



Facility Photograph E-14 – Level Sensor at Canyon Lake



Facility Photograph E-15 – Other Incomplete Electrical at Canyon Lake



Facility Photograph E-16 – New Switchgear in Switchgear Building



Facility Photograph E-17 – New DC Equipment in Switchgear Building



Facility Photograph E-18 – Remote Control Panel for New Switchgear



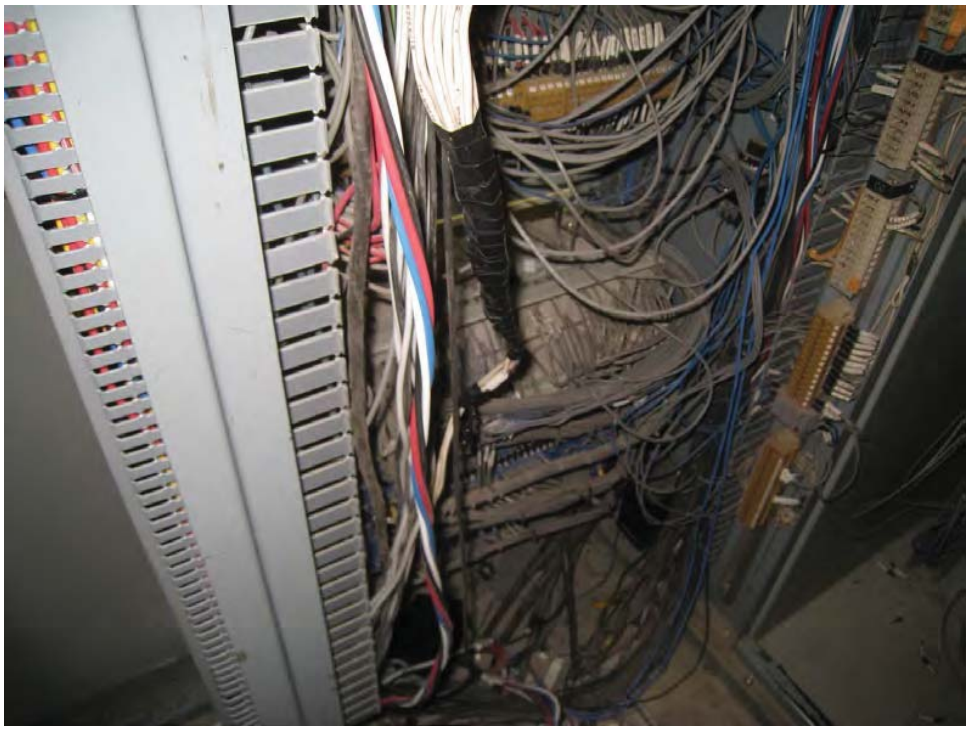
Facility Photograph E-19 – Distribution in New Building Extension



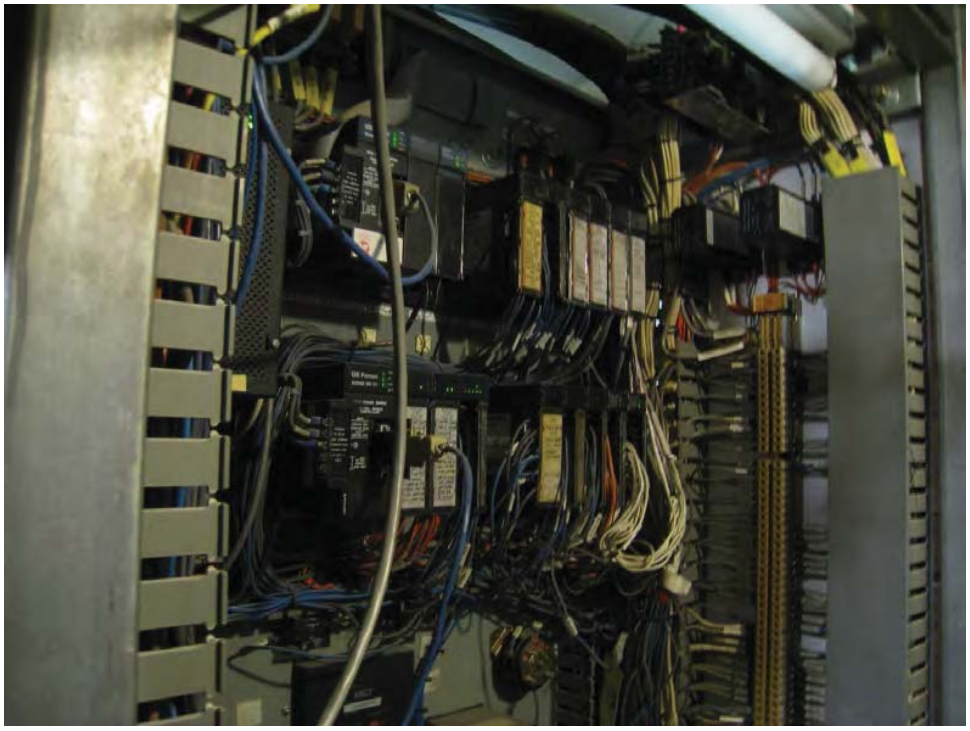
Facility Photograph E-20 – AH1 Control panel in Control Room and Metering



Facility Photograph E-21 – AH1 Control panel in Control Room



Facility Photograph E-22 – Cabling Issues inside Control Panels



Facility Photograph E-23 – Plant GE PLC



Facility Photograph E-24 – AH1 / AH2 Protections



Facility Photograph E-25 – Feeder Protections



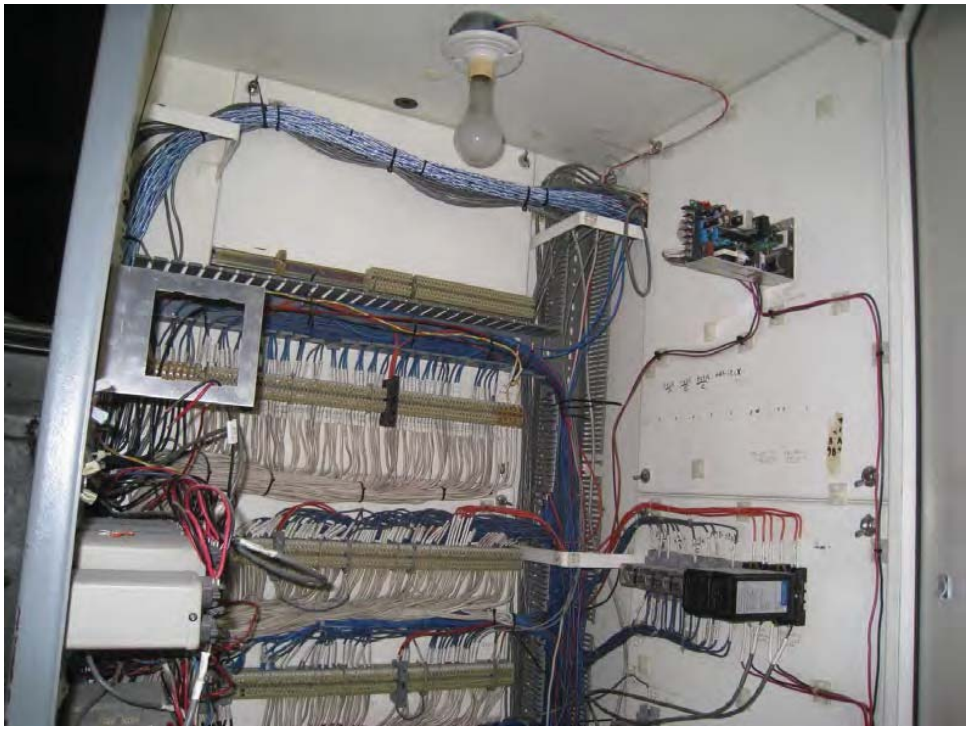
Facility Photograph E-26 – Transformer Protections



Facility Photograph E-27 – Main Control Board



Facility Photograph E-28 – HVAC Controls



Facility Photograph E-29 – SCADA Marshalling Cabinet



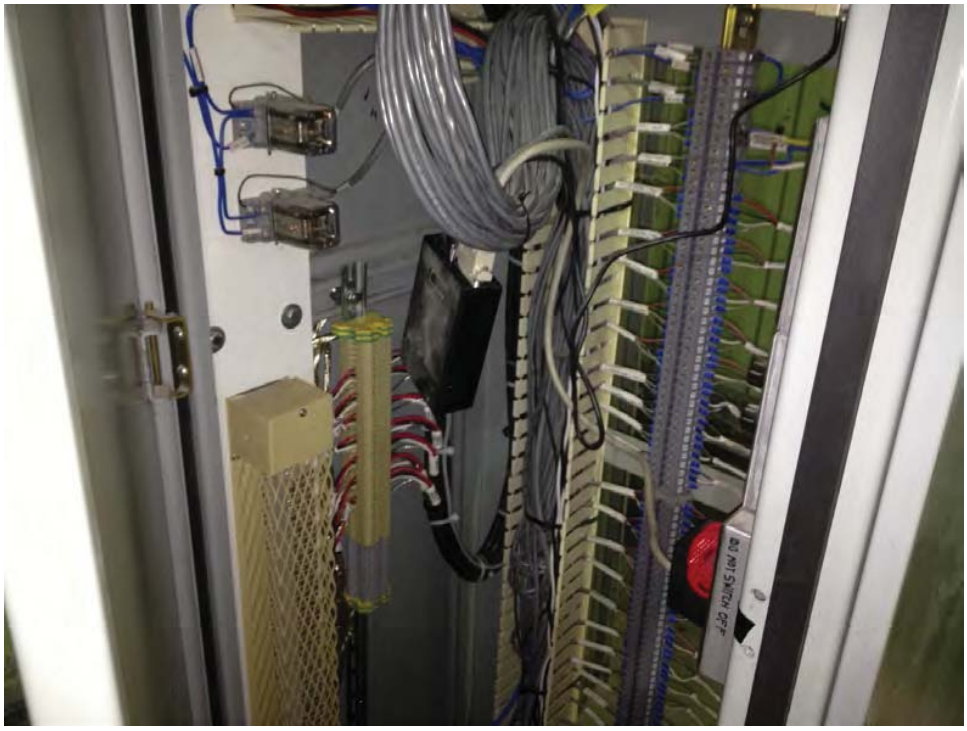
Facility Photograph E-30 – Surveillant SCADA



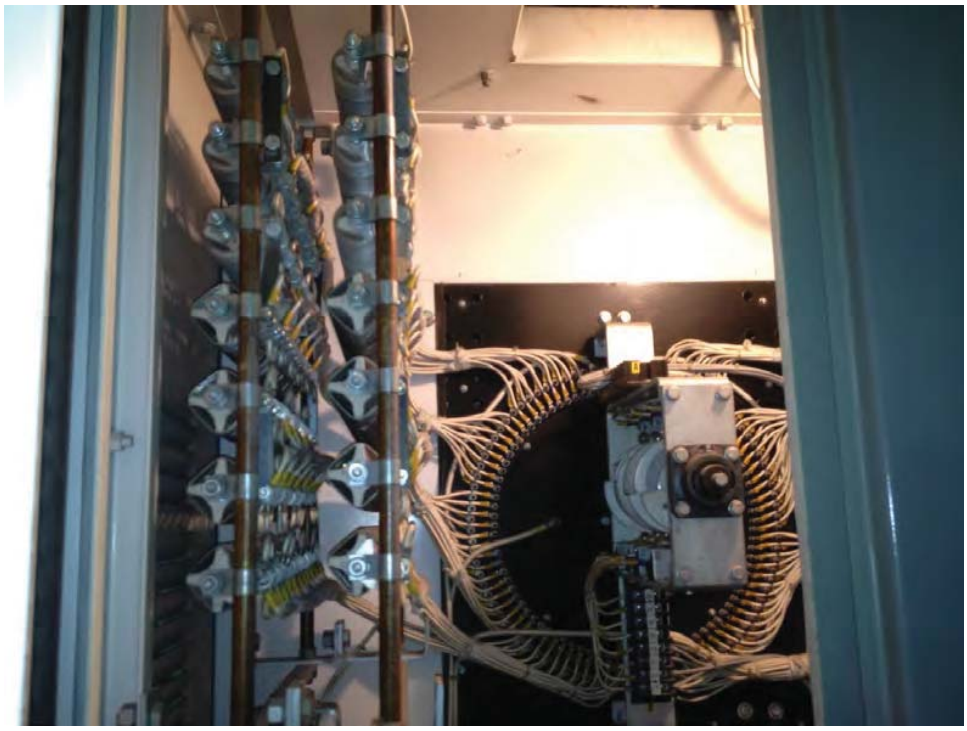
Facility Photograph E-31 – Plant Fire Alarm Panel



Facility Photograph E-32 – Bentley Nevada Rear View



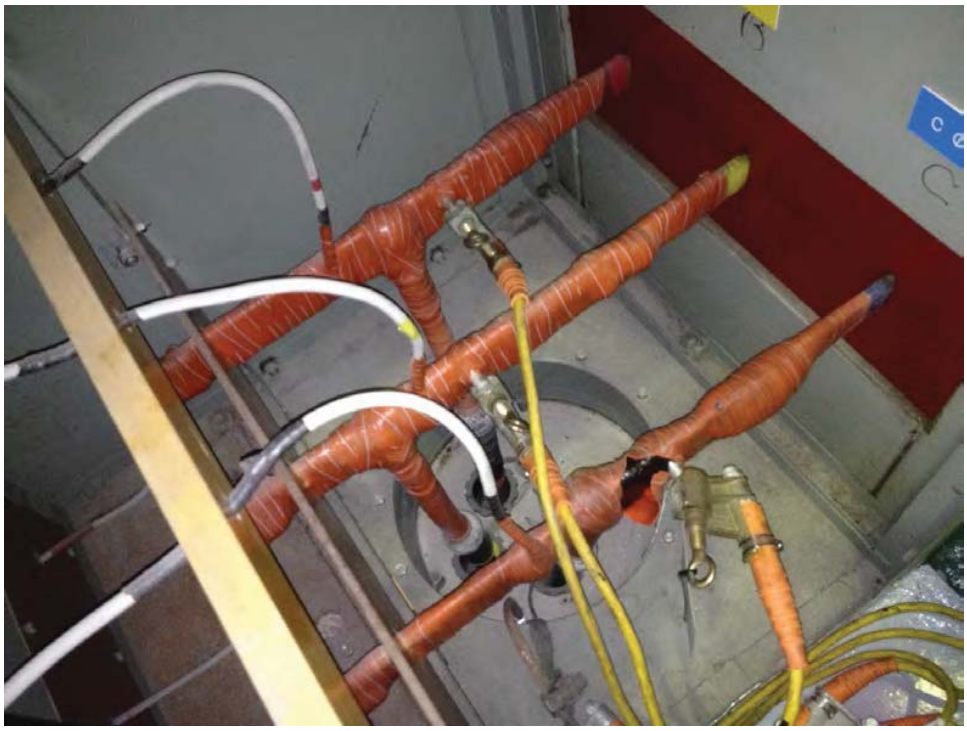
Facility Photograph E-33 – Bentley Nevada Terminal Strips



Facility Photograph E-34 – AH2 Exciter Rheostat, No Longer in Use



Facility Photograph E-35 – AH1 Local Control Cabinet



Facility Photograph E-36 – AH1 Ground Ball Stud Connection, Note Damaged Tape



Facility Photograph E-37 – Distribution Panel C – Missing Cover Plates



Facility Photograph E-38 – Permanent Magnet for Shunt DC Exciter



Facility Photograph E-39 – AH3 Penstock Flow Meter



Facility Photograph E-40 – Main DC Battery and Old SCADA in Background



Facility Photograph E-41 – Main Plant Telecommunications



Facility Photograph E-42 – MCC 4 – Emergency Power



Facility Photograph E-43 – Temperature Monitoring HMI



Facility Photograph E-44 – AH1 – Rewind Nameplate



Facility Photograph E-45 – AH2 – Rewind Nameplate



Facility Photograph E-46 – Powerhouse Sump Diesel Generator



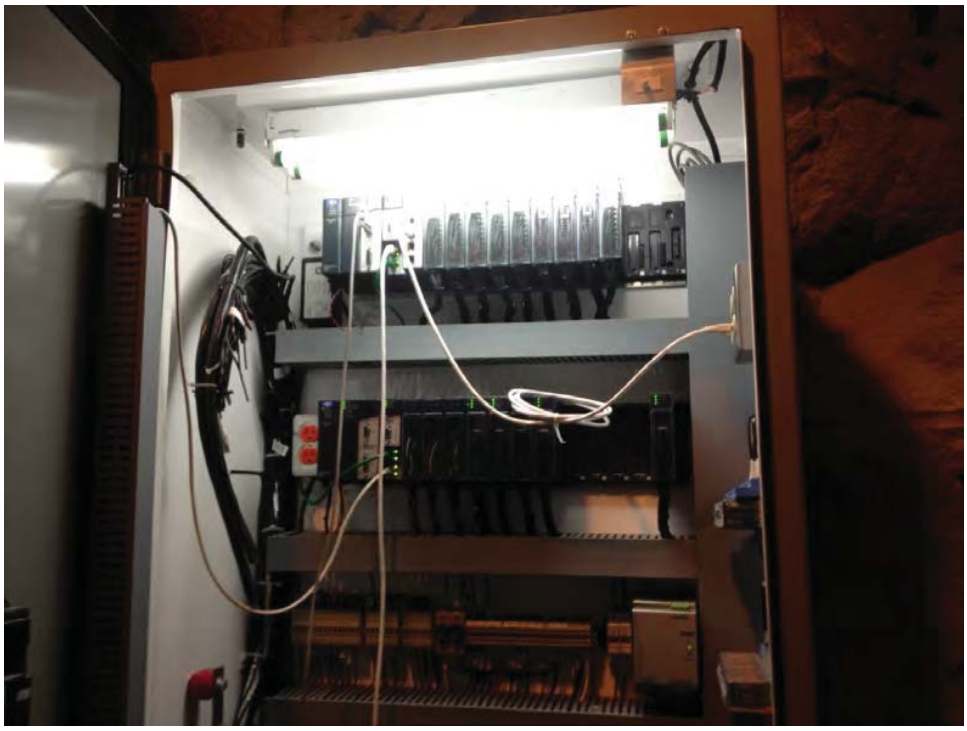
Facility Photograph E-47 – MCC#1 – Significant Corrosion



Facility Photograph E-48 – Generator Switchgear Control Cable Exits



Facility Photograph E-49 – Generator Switchgear with AH3 Digital Meter



Facility Photograph E-50 – AH3 PLC Panel



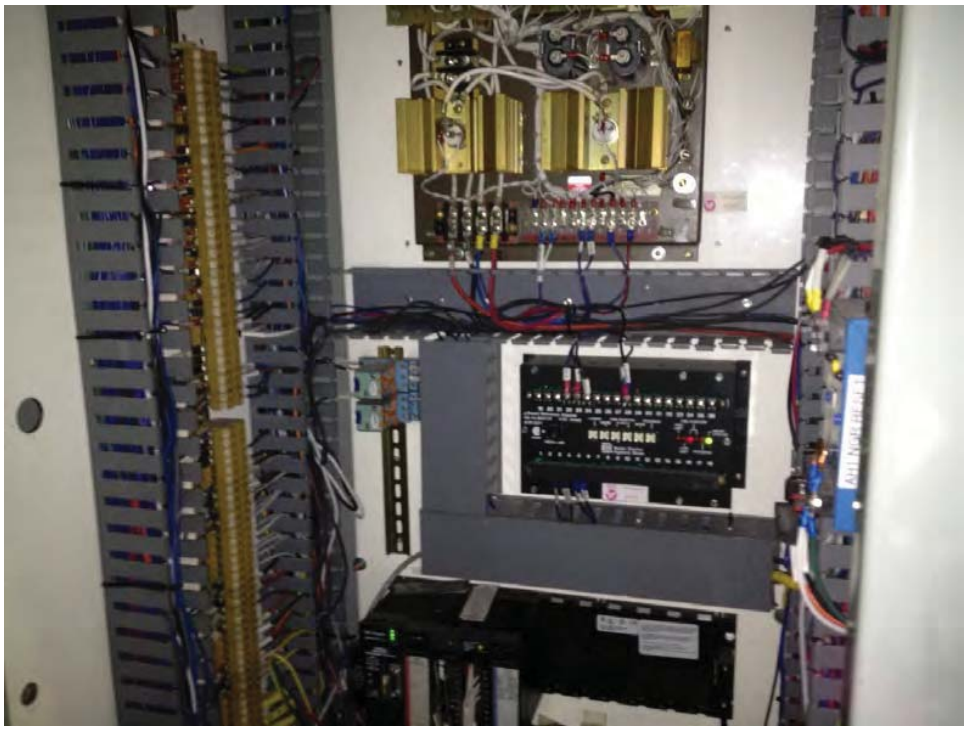
Facility Photograph E-51 – AH2 TIV Control Panel



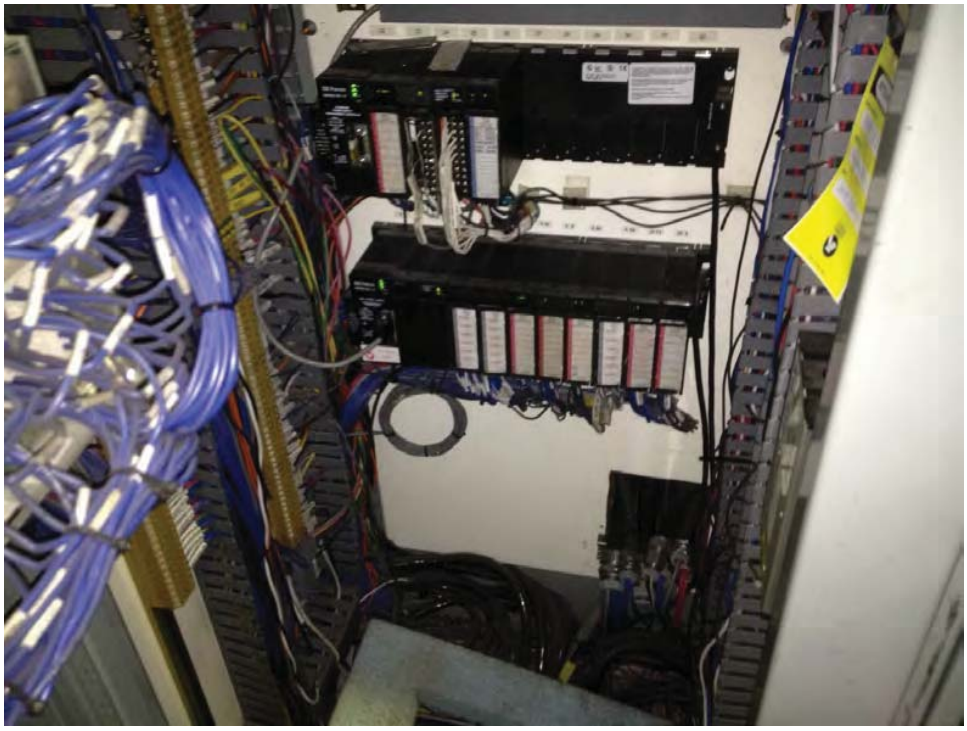
Facility Photograph E-52 – Turbine Control Panel with Creep Detection Relay



Facility Photograph E-53 – Station Service Transformer



Facility Photograph E-54 – AH1 Control Cubicle



Facility Photograph E-55 – AH1 Control Cubicle



Facility Photograph E-56 – AH1 Control Cubicle



Facility Photograph E-57 – Station Service Breaker Out for Repair



Facility Photograph E-58 – Switchyard Cabling



Facility Photograph E-59 – Spare MV Generator Breaker



Facility Photograph E-60 – AH3 Station Service Equipment



Facility Photograph E-61 – Switchyard Minimum Oil Circuit Breakers



Facility Photograph E-62 – Fan Wall Control Panel



Facility Photograph E-63 – AH3 Governor Controls



Facility Photograph E-64 – AH3 LPU Controls – No Disconnect or Source Label



Facility Photograph E-65 – AH3 HPU Controls



Facility Photograph E-66 – T1 Nameplate 30/40MVA Transformer



Facility Photograph E-67 – T2 Nameplate 30/40MVA Transformer



Facility Photograph E-68 – Cordex Station DC Battery Charger



Facility Photograph E-69 – RIC Station DC Battery Charger



Facility Photograph G-1 – Right Abutment Embankment Fill – Upstream Slope Riprap Protection



Facility Photograph G-2 – Left Abutment Embankment Fill – Upstream Slope Riprap Protection



Facility Photograph G-3 – Right Abutment Embankment Fill – Downstream Slope



Facility Photograph G-4 – Left Abutment Embankment Fill – Downstream Slope



Facility Photograph G-5 – Right Abutment Downstream Embankment Fill – Wingwall Rockfill Riprap Protection



Facility Photograph G-6 – Right Abutment – Upstream Wingwall with Minor Movement



Facility Photograph G-7 – Left Abutment – Upstream Wingwall / Fishway with Movement



Facility Photograph G-8 – Vegetation on the Upstream Slope of the Dyke (looking upstream)



Facility Photograph G-9 – Section of the Canal around a bend lined with Riprap (looking downstream)



Facility Photograph G-10 – Excessive Rutting and Vegetation Encroachment on the Tailrace Access Road



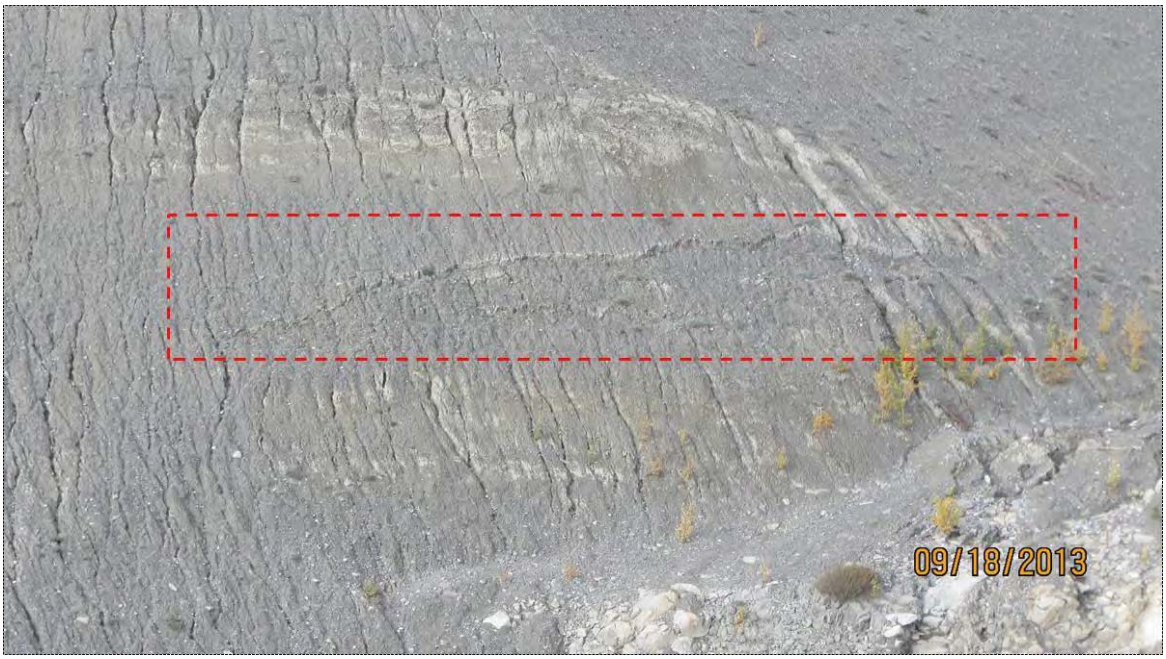
Facility Photograph G-11 – Dislodged (unstable) rock on cut slope along the Tailrace Access Road



Facility Photograph G-12 – Example of dislodged boulder encountered along the Tailrace Access Road



Facility Photograph G-13 – Example of Erosion Gullies on the side slopes along the Tailrace Channel



Facility Photograph G-14 – Example of Tension Cracks observed on Tailrace Cut Slope



Facility Photograph G-15 – Overgrown Vegetation along the Tailrace Channel (looking downstream)

APPENDIX A

APPLICABLE CODES

NFPA 30 – Flammable and Combustible Liquids Code – 2012 Edition:

1. Chapter 21 (Storage of Liquids in Tanks – Requirements for All Storage Tanks), Section 21.7 (Operation of Storage Tanks), Subsection 21.7.2 (Identification and Security), Sub-subsection 21.7.2.1 (Identification for Emergency Responders) states that "A sign or marking that meets the requirements of NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response, or another approved system, shall be applied to storage tanks containing liquids. The marking shall be located where it can be seen, such as on the side of the tank, the shoulder of an accessway or walkway to the tank or tanks, or on the piping outside the diked area. If more than one tank is involved, the markings shall be so located that each tank can be identified." To satisfy this code requirement, diesel fuel hazard warning placards should be adhered to the tank.

2. Chapter 22 (Storage of Liquids in Tanks – Aboveground Storage Tanks), Section 22.11 (Control of Spills from Aboveground Storage Tanks) states the "Every tank that contains a Class I, Class II or Class IIIA liquid (diesel fuel) shall be provided with means to prevent an accidental release of liquid from endangering important facilities and adjoining property or from reaching waterways. Such means shall meet the requirements of 22.11.1, 22.11.2, 22.11.3 or 22.11.4, whichever is applicable." Subsection 22.11.4 (Secondary Containment-Type Aboveground Storage Tanks) is applicable to the tank installation at Aishihik and the following Sub-subsections are important:

    a. Sub-Subsection 22.11.4.2 states that "All piping connections to the tank shall be made above the maximum liquid level." Currently, the tank outlet connection is from a bottom level connection. To satisfy this code requirement, the outlet piping must be re-routed to the top of the tank. This will then also require the installation of a pump to feed the diesel fuel to the diesel heaters and backup diesel generator.

    b. Sub-Subsection 22.11.4.3 states that "Means shall be provided to prevent the release of liquid from the tank by siphon flow." The fuel inlet line is equipped with a check valve, but the outlet is not with the current arrangement. Siphon flow would be prevented if and when the outlet line is relocated to the top of the tank.

    c. Sub-Subsection 22.11.4.7 states that "The tank shall be capable of resisting the damage from the impact of a motor vehicle, or collision barriers shall be provided." A similar comment is also brought up in CSA Standard B139-09 below. To satisfy these codes, protective barriers should be installed to protect the tank and distribution piping from collisions and damage.

CSA Standard B139-09 – Installation Code for Oil-Burning Equipment:

1. Chapter 9.3 (Piping and Tubing), Subsection 9.3.1.5 states that "Piping and tubing shall be supported and protected against physical damage, such as foot traffic, vehicle traffic, grass cutting, and snow and ice damage." Again, to satisfy this code, protective barriers should be installed to protect the tank and distribution piping.

2. CSA Standard B139-09 (Installation Code for Oil-Burning Equipment), Chapter 9.3 (Piping and Tubing), Subsection 9.3.1.6 states that "Piping and tubing shall be run as

directly as practicable and provisions shall be made for expansion, contraction, jarring, vibration, and settling." To satisfy this code requirement, expansion and contraction joints should be installed in the distribution piping.

3. CSA Standard B139-09 (Installation Code for Oil-Burning Equipment), Chapter 9.3 (Piping and Tubing), Section 9.3.2 (Underground Piping or Tubing), Subsection 9.3.2.1.2 states that "Underground piping or tubing shall be (a) installed with secondary containment; and (b) equipped with a means of detecting a leak from the primary pipe or tube." Furthermore, Subsection 9.3.2.1.4 states that "To facilitate the detection and removal of fuel oil due to piping or tubing leaks in a double-walled system, a containment sump shall be located at the lowest level of the piping or tubing run. The sump shall be designed for access at the ground level." To satisfy this code requirement, a double walled piping system equipped with a containment sump must be installed for the fuel oil distribution system.

4. Annex C (Tanks for Central Oil Distribution Systems), Section C.4 states that "When the distribution main is connected below the liquid level of an aboveground tank, a readily accessible internal or external shut-off valve shall be installed in the main as close as practical to the tank. If external, the shut-off valve and its tank connections shall be made of steel. Connections between the tank(s) and the distribution main shall be (a) made with double-swing joints or flexible connections; or (b) otherwise arranged to permit the tank(s) to settle without damaging the system. Such connections, when aboveground, shall be located within the secondary containment area." To comply with this code, a secondary containment system would need to be installed under the shut-off valve unless the system is re-routed to the top of the tank.

5. Chapter 11.5 (Valves), Subsection 11.5.2 states that "A certified device shall be provided on each oil service pipeline to automatically shut off the oil supply if the supply line between this device and the appliance leaks. This device shall be (a) located on the appliance side of the manual shut-off valve required by Clause 11.5.1; (b) not more than 1 m (3 ft) from the entry of the oil service pipe into the structure or from the takeoff point from an oil distribution service main; (c) installed in accordance with its certification; and (d) solidly supported and protected from damage." To satisfy this code requirement, an automatic shutoff valve should be installed.

6. Chapter 11.5 (Valves), Subsection 11.5.7 states that "A main shut-off valve shall (a) be installed on the building distribution main pipe before it branches to the individual units; (b) be located outside the building; (c) be protected from physical damage; and (d) have a permanent sign to identify it, which shall (i) be attached to the building above the snow level; (ii) be at least 75 mm (3 in) wide; (iii) be white with 10 mm (3/8 in) high blue lettering; and (iv) have a blue arrow pointing to the valve". To satisfy this code requirement, all points (a) through (d) should be installed.