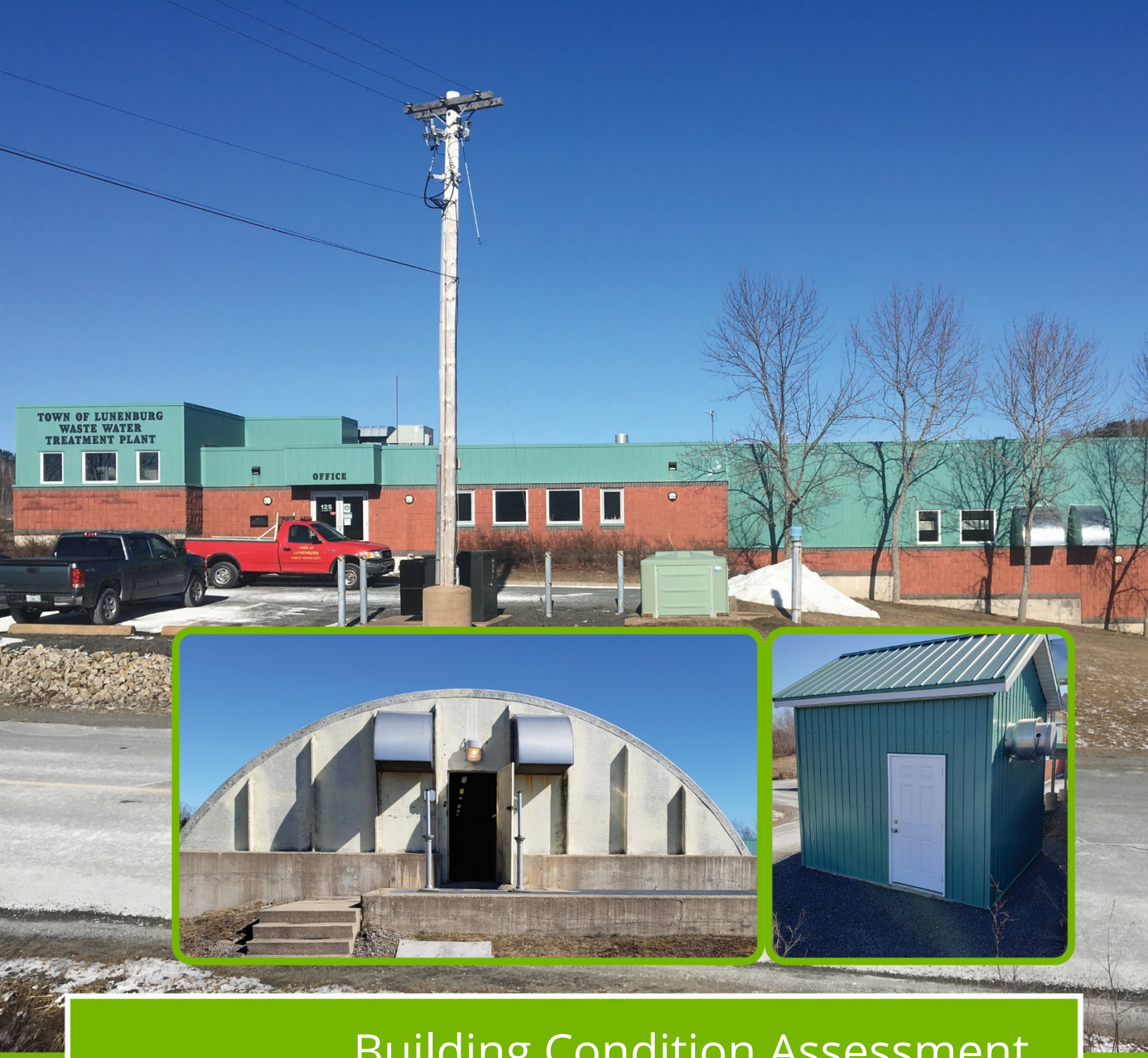

Building Condition Assessment

Town of Lunenburg

Wastewater Treatment Plant

Final Report

CBCL

TOWN of LUNENBURG
A World Heritage Site

210803.01• May 2021

002	Final Report	Sarah Ensslin	2021/05/31	Steve Eisan
001	Draft Report	Sarah Ensslin	2021/03/26	Steve Eisan
Issue or Revision		**Reviewed By:**	**Date**	**Issued By:**

Report 210803.01

CBCL
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May 31, 2021

Ian Tillard, P.Eng.
Town of Lunenburg
119 Cumberland Street
Lunenburg, NS B0J 2C0

Dear Mr. Tillard:

RE: Building Condition Assessment – Town of Lunenburg Wastewater Treatment Plant – Final Report

Attached is the CBCL Limited Final Building Condition Assessment Report for the Town of Lunenburg Wastewater Treatment Plant, 125 Starr Street, Lunenburg, Nova Scotia B0J 2C0.

Please contact us if you have any questions or comments. Thank you.

Yours very truly,

CBCL Limited

Prepared by:
Steve Eisan, P.Eng.
Senior Structural Engineer
Direct: 902-492-6746
E-Mail: seisan@cbcl.ca

Reviewed by:
Sarah Ensslin, P. Eng.
Process Engineer

Project No: 210803.01

Contents

Appendices

Executive Summary

1. Background

CBCL Limited (CBCL) conducted a building condition assessment of the Town of Lunenburg's wastewater treatment plant, at 125 Starr Street, Lunenburg, Nova Scotia.

A building condition assessment is intended to identify physical material deficiencies with building and siteworks systems and elements. A building condition assessment is not a Building Code compliance review.

This building condition assessment report indicates recommended building system and siteworks repairs for five-year intervals between zero and twenty-five years, complete with Class D opinions of probable cost for implementation. The building condition assessment consisted of a multi-disciplined architectural and engineering review of the building and the surrounding siteworks. The building siteworks, and architectural, structural, HVAC, plumbing & heating, fire protection, and electrical building systems and elements were assessed. The assessment report identifies system and element deficiencies, recommends remedial repair measures and provides an opinion of probable costs to implement the recommendations, based on operating the facility in an acceptable condition state for the next 25 years.

The assessment followed the methodology outlined in ASTM E 2018, *Standard Guide for Property Condition Assessments*. The assessment consisted of review of existing documentation, operator interviews and walkthrough surveys to view existing conditions. To provide the industry-standard level of detail in the data collection and reporting process, CBCL addressed Level 3 Individual Elements as defined by ASTM E1557-09 (2015), *Standard Classification for Building Elements and Related Sitework – UNIFORMAT II*.

2. Assessment Summary

Process Building

The main Process Building is the largest building on the site. It was constructed in 2003. It is a 1−2 storey industrial wastewater treatment facility, owned and operated by the Town of Lunenburg. The headworks are located at the west end of the building. The headworks area of the building is comprised of cast-in-place (CIP) concrete foundations and tanks, concrete masonry unit (CMU) block walls, and precast concrete (PC) roof planks. The middle section of the building houses the operations office, laboratory, chemical storage, blower room, electrical room, washrooms, storage, etc. The process area of the building is at the east end; it is an open two-storey area. It houses process tanks, channels, equipment, etc. The office and process areas of the building are similarly constructed, with

CIP concrete footings, foundations and floors, steel columns, beams, open web steel joists (OWSJ) and metal roof decking, and infill CMU exterior walls (between columns) and interior partitions. The exterior CMU walls terminate and transition to uninsulated metal-clad walls above the second-storey level.

Minor cracks in concrete walls in the hallway leading to the process area should be repaired with epoxy-injection in 0-5 years. Minor erosion and surficial floor scaling in the process and headworks areas should be rectified in 0-5 years, and operational changes should be implemented to mitigate future damage. The process equipment frame in the headworks area is corroded as well, but it is not a building structural element, and it is understood that the equipment will be replaced when the screens are replaced at this location.

The roofing appears to be original; it is a two-ply modified bitumen roofing membrane system. The exterior building walls are finished with split-face ashlar concrete masonry blocks (below) and prefinished metal cladding (above). The interior surfaces of the CMU walls and partitions are painted. There is an aluminum entrance system, painted exterior steel doors, sectional overhead doors, and aluminum framed windows. There are exposed concrete floors in the headwords and process areas, as well as in storage and utility rooms. There is sheet vinyl flooring in the common areas, offices, and laboratory. There is ceramic flooring in the washroom. The ceiling in the headworks area is exposed PC planks. There are exposed OWSJs and metal roof decking in the process area and in the storage and utility rooms. There is a suspended ceiling in the common areas, washroom, offices, and laboratory. The interior Stairs are comprised of CIP concrete. The roofing and other architectural components are in fair to good condition. It is understood from the operators that there have been past roof leaks; the roofing is quickly approaching the end of its service life and it should be replaced within 5 years. There is some rusting of interior and exterior doors and hardware. There is a minor delamination of sheet vinyl flooring and cracked ceramic tiles. There are several areas where there are random cracks and step-cracks in the mortar joints of the CMU walls. Some of the ceiling tiles in Office 109 are stained from a previous leak.

The original mechanical systems installed in 2003 are generally in fair condition, without any serious deficiencies or operational concerns. Mechanical systems include a variety of roof mounted or inline exhaust fans, air handling equipment, electric unit heaters, plumbing fixtures, domestic water piping, and basic controls. The equipment installed is generally commercial grade, but all equipment appears to be serviceable and operational. The one obvious exception is the small rooftop air conditioning unit in service to the Administration areas which has been plagued by several control issues, primarily the defrost cycle, which continues to go undiagnosed despite numerous service visits. The air handler is nearing the end of its reliable service life and should be replaced.

There are some newer systems in operation such as the large capacity HRV added in 2016 in the Process Area. This equipment and associated ductwork are of stainless steel construction and in very good condition.
The electrical service consists of a 600/347V, 800A, 3-phase, 4-wire switchboard with 600A main breaker, located in the Electrical Room adjacent to the Blower Room. A 75kVA transformer feeds the 120/208V building loads. Except for the Process area, the electrical distribution equipment appears to be in good condition.

Saltwater flooding in the Process area has caused significant corrosion on many of the electrical enclosures, particularly the equipment that was part of the original construction which has NEMA 1 enclosures. The newer equipment has NEMA 4X stainless steel enclosures and is in very good condition with no signs of corrosion. It is recommended that the corroded equipment be replaced with NEMA 4X equipment soon.

The exterior lighting is currently running 24/7 due to an issue with the photocell/contactor. This has caused many fixtures to develop holes in the lens from overheating. The building operator has indicated that they are in the process of having an electrician troubleshoot the issues with the exterior lighting controls. Once the controls issues are corrected, it is suggested that the exterior wall packs be replaced with high efficiency LED fixtures.

Bioreactor Building

The Bioreactor Building is the second largest building on site. It was also constructed in 2003. It is essentially a series of tanks within a perimeter building foundation and covered with a curved fibreglass dome roof/shell. The building foundation and tank walls are comprised of CIP concrete. There structure is in good condition. There are minor foundation cracks that could be repaired using epoxy-injection in 0-5 years, and again in 15-20 years. The fibreglass roof is dirty and discoloured. It could be due for replacement in 20+ years, but the Town should investigate pressure-wash cleaning and painting the roof in 0-5 years to maximize its service life; a cost has been included for cleaning and painting the roof in 0-5 years. We have included an optional item for replacement of the steel walkways and railings with FRP materials and stainless-steel fasteners in 5-10 years; this would be in lieu of ongoing maintenance of these items due to corrosion.

There are no architectural elements of note in this building.

There are no motorized mechanical systems in service other than the stainless-steel ductwork, manual damper, and grilles providing for ventilation. There is a modest amount of corrosion on some components, installed in 2003, but generally the mechanical system is considered in fair condition and fit for purpose.

The Bioreactor Building is fed at 120/208V from a 60A,3P breaker in panel A (Process Building). A small distribution panel with NEMA 4X stainless steel enclosure is located on the exterior of the bioreactor building. Inside the building there is a small junction box

which is supported by zip ties and the conductors. This should be properly supported as soon as possible. The lighting consists of fluorescent vapour type fixtures. It is recommended that these be replaced with LED fixtures once the ballasts begin to fail. The galvanized stairs and railings at the east end of the building have extensive surface rust, and this should be addressed in 0-5 years to mitigate accelerated corrosion. The amount is not included in the cost summary, but if the Town would prefer to replace the stair assembly with an FRP with stainless-steel hardware, in lieu of carrying out ongoing maintenance to mitigate corrosion of the stair assembly and railing, an additional $25,000 should be included in the budget.

Biofilter Fan Building

The Biofilter Fan Building was constructed in 2017. It is a small conventional timber-framed structure on an engineered concrete floor slab (foundation). Other than the top surface of the engineered floor slab, the building structure was not visible for assessment. The building is in near-new condition and no structural distress, deformation or settlement were observed.

The interior is finished with plywood and the exterior walls and roof are covered with prefinished metal cladding. The door is pressed steel. All architectural elements are in near-new condition.

The mechanical systems in service are limited to an exhaust fan and associated ductwork, all in excellent condition, installed in 2018.

The Biofilter Fan building is fed from panel A in the Process Building. All the electrical equipment in this small structure is rated for hazardous locations and appears to be in very good condition. It is not anticipated that any of this equipment will require replacement soon.

Building Siteworks

There are paved access roads and parking lots on site. They are in fair to good condition. We have included projected costs for immediate crack-sealing and settlement repairs, plus longer-term costs for repaving. The paved parking lots and roadways will require normal maintenance at different intervals over the next 25 years. Costs for immediate issues and planned resurfacing have been included in years 0-10 and 15-20, respectively.

The exterior CIP concrete stairs and landings and hot-dipped galvanized (HDG) metal stairs, landings and railings are all in good condition, except for the HDG stair assembly at the east end of the Bioreactor Building. Those HDG stairs are corroded and will require preparation and recoating, as noted above, and a cost was included in years 0-5.

The retaining walls, lawns and plantings all seem to be in good condition, other than minor maintenance requirements.

A description of building components including those recommended to be repaired or replaced over the next 25 years is detailed in the elemental breakdown sheets provided in Appendix A. The following table provides a summary of the costs to implement the recommendations from this report, for the next 25 years. Opinions of probable cost are expressed in 2021 dollars with no allowance for interest, inflation, or Covid-19 effects.

BUILDING CONDITION ASSESSMENT
LUNENBURG WWTP
OPINION OF PROBABLE COSTS
SUMMARY

Date:	28-May-2021
Project. No.:	210803.01
Prepared by:	SE
Budget Class:	Class D

ITEM NO.	DESCRIPTION	RECAPITALIZATION PERIOD & COST				
		0-5	5-10	10-15	15-20	20-25
1	BUILDING SITEWORK	$10,000	$16,500	$0	$69,300	$0
2	ARCHITECTURAL	$120,200	$4,000	$0	$42,800	$13,000
3	STRUCTURAL	$3,500	$125,000	$0	$2,500	$200,000
4	HVAC	$36,300	$0	$0	$0	$162,000
5	PLUMBING & HEATING	$1,500	$22,500	$0	$10,000	$0
6	FIRE PROTECTION	$0	$0	$0	$800	$0
7	ELECTRICAL	$8,500	$33,500	$31,500	$20,000	$0
8	DESIGN DEVELOPMENT CONTINGENCY 20%	$36,000	$40,300	$6,300	$29,080	$75,000
	TOTAL DIRECT COSTS (not incl. HST)	**$216,000**	**$241,800**	**$37,800**	**$174,480**	**$450,000**
9	GENERAL CONDITONS & FEES 12%	$25,900	$29,000	$4,500	$20,900	$54,000
	TOTAL DIRECT & INDIRECT COSTS	**$241,900**	**$270,800**	**$42,300**	**$195,380**	**$504,000**
10	CONSTRUCTION CONTINGENCY 10%	$24,200	$27,100	$4,200	$19,500	$50,400
	TOTAL CONSTRUCTION COSTS	**$266,100**	**$297,900**	**$46,500**	**$214,880**	**$554,400**
	ENGINEERING FEES and EXPENSES					
11	ENGINEERING & DESIGN 10%	$26,600	$29,800	$4,700	$21,500	$55,400
	ENGINEERING COSTS	**$26,600**	**$29,800**	**$4,700**	**$21,500**	**$55,400**
	OTHER PROJECT COSTS					
12	ESCALATION (NOT INCLUDED)					
13	LOCATION FACTOR (NOT INCLUDED)					
	OTHER COSTS					
	TOTAL PROJECT COSTS (not incl. HST)	**$292,700**	**$327,700**	**$51,200**	**$236,380**	**$609,800**

THIS PRELIMINARY OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE. QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES. SUDDEN MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, SIGNIFICANT UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF CBCL LIMITED AND AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED

Note 1	A Design Development Cont. is to allow so that necessary design changes can be made as the design is developed
Note 2	A Construction Cont. is to allow for cost of additional work over and above the Original Contract Award Amount
Note 3	The Escalation/Inflation allowance is for increases in construction costs from time the budget to Tender Call
Note 4	The Location Factor is for variances between construction costs at location of the project & historical costs data

CBCL Form 036.0 Rev 2

Chapter 1 Cost Estimate

An opinion of probable costs for implementation of the recommendation included in this report are summarized in the attached tables. The costs are separated by building, building system/discipline and they are separated into the following periods: 0 – 5 years, 5 – 10 years, 10 – 15 years, 15 – 20 years, 20 – 25 years. Costs associated with routine or normal preventative maintenance are not included in these costs. Expenditures beyond the 25-year horizon are not included in the scope of this report.

The probable cost to replace / repair all the identified building component deficiencies over the next 25 years is as follows:

0 – 5 years: $292,700
5 – 10 years: $327,700
10 – 15 years: $51,200
15 – 20 years: $236,380
20 – 25 years: $609,800

Opinions of probable cost are expressed in 2021 dollars and do not include HST or any allowance for interest, inflation, or Covid-19 effects.

The probable construction cost budgets presented herein have a relatively low level of confidence based on the level of engineering effort and the limited information available. As such, the opinions of probable cost are intended for global budget purposes only. It is advisable to carry out additional engineering design prior to developing a project budget that is not to be exceeded.

Prepared by:
Steve Eisan, P.Eng.
Senior Structural Engineer

Reviewed by:
Sarah Ensslin, P. Eng.
Process Engineer

APPENDIX A

Building Elements Breakdown with Class D Opinion of Probable Costs

Building Sitework	Type/Age	Condition	U/S	POOR	FAIR	GOOD	NEW	Recapitalization Period & Cost				
								0-5	5-10	10-15	15-20	20-25
PROCESS BUILDING												
Roadways	Asphalt pavement and concrete high-back curbs (2003)	The paved roadways on site are generally in fair to good condition. The access road to the Bioreactor Building is rutted and cracked; it should be resurfaced in 5-10 years. The access road to the garage door and rear of the Process Building is in good condition except for random cracks and a localized area of base settlement; it should be resurfaced in 15-20 years, except the area of localized settlement, which should be addressed in 0-5 years. The concrete curbs are in good condition except for apparent snowplow impact damage; damaged sections should be replaced when roads and parking lots are resurfaced/repaved.			X			$5,000	$16,500		$50,800	
Parking Lots	Asphalt pavement, precast curbs and painted parking stalls (2003)	The paved parking lot and precast concrete curb sections are generally in good condition. There are localized cracks in the pavement. Two of the precast concrete curb sections have been dislodged from apparent snowplow impact. The parking stall line painting is in good condition. The parking lot should be resurfaced/repaved in 15-20 years. Areas of localized cracking and reinstallation of the precast curbs should be addressed in 0-5 years.				X		$2,500			$18,500	
Exterior Steps	Cast-in-place concrete and hot-dipped galvanized (HDG) steel stairs, railings and landings (2003)	The concrete elements are lightly weathered but overall they are in good condition.The HDG steel stairs, landings and rails are in good condition with minor deterioration of the HDG coating. With minor periodic maintenance, the exterior stair assemblies could remain in serviceable condition for 25+ years.				X						

Site Development	Steel gates, pipe bollards, modular block retaining walls and rip-rap (rock) slope protection (2003)	There are HDG steel security gates located at the entrance to both access roads. There are HDG pipe bollards protecting pad-mounted equipment near the parking lot, and at the edges of the three overhead garage door openiings. There are two modular/stackable precast concrete retaining walls located along the east and west edges of lawn area between the Bioreactor Building access road and the Process Building rear access road. There is granite rock rip-rap slope protection on slope next to the parking lot. All of these elements are in good condition. With minor periodic maintenance, they could remain in serviceable condition for 25+ years.				X						
Landscaping	Lawns and plantings (2003)	There are lawns, trees, and shrubs around the perimeter of the building. The plantings are generally dormant in winter. However, they appear to be in good condition. With minor seasonal maintenance, they could remain in acceptable condition for 25+ years.				X						
							SUB-TOTALS	$7,500	$16,500	$0	$69,300	$0
BIOREACTOR BUILDING												
Exterior Steps	Cast-in-place concrete stairs and hot-dipped galvanized steel stairs and railings (2003)	There are cast-in-place concrete stairs at the west end of the building, and a combination of cast-in-place concrete and HDG stair assemblies at the east end of the building. The exterior stairs are in fair to good condition. There is minor damage, weathering and cracking of the concrete stairs and landings, and extensive surface rust on the HDG steel stair assembly and railings (the nearby ventilation exhaust could be contributing to the corrosion). The HDG elements should be prepared and recoated between 0-5 years. The concrete deficiencies are minor and can be addressed with maintenance repairs.			X			$2,500				
							SUB-TOTALS	$2,500	$0	$0	$0	$0

BIOFILTER FAN BUILDING												
N/A												
SUB-TOTALS								$0	$0	$0	$0	$0

Notes:
1. The sitework systems and elements are generally in good condition.
2. The roadways and parking lots will need repaving at various intervals in the next 25 years.
3. Crack-sealing of the paved areas and repair of localized area of settlement in the east access road could be addressed in 0-5 years.
4. The exterior HDG metal stairs, landings and railings at the east end of the Bioreactor Building should be prepared and recoated with cold galvanizing. Alternatively, they could be replaced with a system that is less susceptible to corrosion, i.e. FRP components and stainless steel fasteners (say $25,000).

Building Sitework Deficiencies

Bioreactor building access road - rutted and cracked. Repave in 5-10 years.

Access road to overhead garage door and rear of Process Building - localized settlement. Remove unsuitable base and reconstruct/patch roadway in 0-5 years.

Precast curb sections dislodged from pins/dowels by apparent snowplow impact damage; it appears that the curb sections are undamaged and could be reinstalled.

Impact-damaged high-back concrete curb. Replace damaged curb sections

Missing retaining wall coping/cap section.

Bioreactor Building stairs; damaged corner.

Bioreactor Building: surface rust on HDG stair assembly and railings.

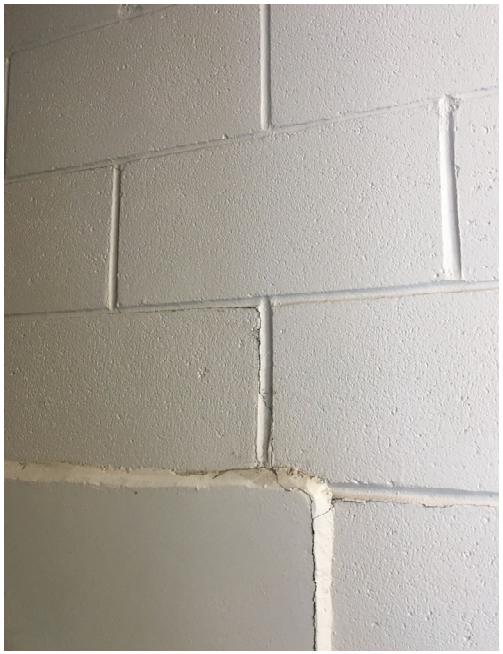
Architectural Systems	Type/Age	Condition	U/S	POOR	FAIR	GOOD	NEW	Recap Period				
								0-5	5-10	10-15	15-20	20-25
PROCESS BUILDING												
Roofing	Original 2 Ply Modified Bitumen roof installed in 2003.	General condition of the roof is fair. It was noticed in the office that there had been a leak from above the tiles. It was determined that the leak probably came from the mechanical curb on the roof. One piece of loose metal cap flashing. Roof is at the end of it's service life and should be replaced soon.			X			$170,200				
Exterior Walls	Exterior walls consist of prefinished metal siding and Split Ashlar concrete block. Original construction in 2003.	Prefinished metal siding is in good shape other than some staining/ rust under a couple mechanical ducts. There are minor masonry cracks in a few masonry joints that should be repaired.				X		$500				
Exterior Doors	Aluminum entrance System, 2003	Doors and hardware good condition. No action is required at present time.				X						
Exterior Doors	Sectional Overhead Doors, 2003	Overhead doors are in fair shape but components are rusted and worn, 1998. Replacement of components suggested.		X				$5,000				
Exterior Doors	Painted exterior steel doors, Aluminum entrance system, 2003	2 Doors, Double doors (D1) in Headworks RM 102 and a single man door in Dumpster Rm 101 have seen large amounts of mositure on the interior side of the door and the hardware is rusting. Replacement of these doors and hardware is sugggested. The rest of the exterior doors are in good shape. Aluminum Entrance system is in good shape.		X				$9,500				
Windows	Aluminum Windows, 2003	Windows are in good shape. Caulking is good. Replacement of windows not required at this time.				X						
Floor Finishes	Concrete floor slabs, 2003	Slabs are in good shape but require cleaning. Some slight cracking in Process Room 112. Floors should be degreased and cleaned.				X		$1,000				
Floor Finishes	Sheet Vinyl, 2003	Sheet Vinyl in Entry 108 is delaminating from the concrete floor under.Recommend replacement of vinyl in Entry 108. The sheet vinyl in the other areas of the building is in fair condition and should be replaced later.		X	X			$1,500				
Floor Finishes	Ceramic Tile, 2003	The ceramic in the Washroom Area 107 is in fair shape. A couple tiles have cracked arounf toilet. Recommend replacement of those tiles now.		X	X			$300				

Interior Walls	Painted concrete block walls, Painted gypsum board, 2003	General wall condition very good shape, generally. Some cracking of mortar joints near stairs up to Headworks, 102. Cracking of joints and block by door into Process Rm 112. Paint flaking on drywall in Washroom 107. recommend cracking be repaired and flaking paint scraped and repainted.		X		X						
Interior Doors	Painted pressed steel doors, 2003	Doors and hardware very good condition. Door from Headworks 102 to Cooridor 111 is rusting. Recommend replacement of door and hardware.		X		X		$1,400				
Borrowed Lites	Borrowed Lites, 2003	Borrowed lite between Entry 108 and Office 109 is in good shape. Borrowed Lite between Lab 110 and Process Rm is in good shape. 1998				X						
Ceiling	Suspended Ceiling System, 2003	Some acoustical tiles in Office 109 are stained from a previuos leak above. Recommend replacement of stained tiles. All other areas with tile are in good shape.		X		X		$800				
Ceiling	Exposed Concrete plank, 2003	Exposed concrete planks are in good shape, 1998				X						
Ceiling	Exposed Steel decking, 2003	Exposed steel deck in Process Area 112 appears to be in good shape.				X						
Interior Stairs	Concrete Stairs, 2003	Rubber nosing in Corridor 111 on stairs by door to Processs Room 112 is torn and is a safety issue. Recommend repair to those nosings. Stairs to Headworks 102 and Blower Rm 103 in good condition.		X		X		$500				
						SUB-TOTALS		$190,700	$0	$0	$0	$0
BIOFILTER FAN BUILDING												
Exterior Siding	Prefinished metal siding, 2018	Metal siding is in good condition. No action required.				X						
Roofing	Prefinished metal roofing and trim, 2018	Metal roof and siding is in good condition. No action required.				X						
Doors	Pressed steel door and hardware, 2018	Door and hardware are in good shape. No action required.				X						
						SUB-TOTALS		$0	$0	$0	$0	
Notes: Overall from an Architectural standpoint the building is in good shape.												

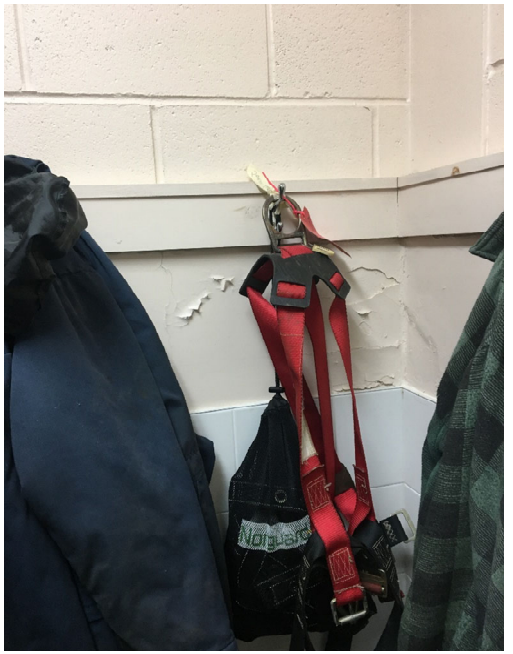
Architectural Deficiencies

Vinyl Flooring in Entry 108

Acoustic tile in Office 109



Block mortar cracking in Cooridor 111



Peeling Paint in Washroom 107

Cracked floor tile in Washroom 107

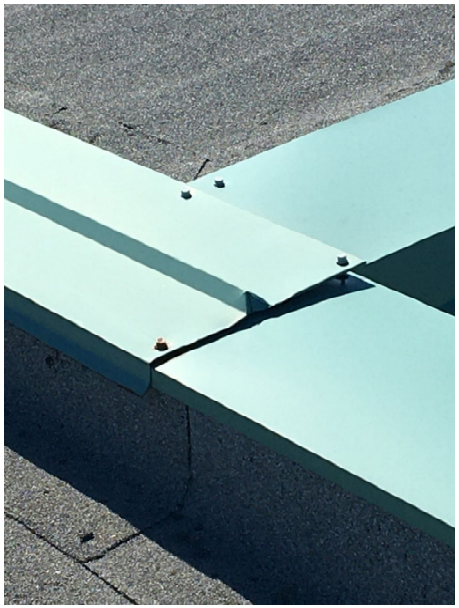
Torn nosing on stairs in Cooridor 111

Floor slab in Process Room 112

Rust on pressed steel door

Cracks in floor slab of Process Room 112

Rusty Door hardware on exterior door in Headworks 102



Loose cap flashing

Staining and rust on metal siding under mech vent.

Loose corner block , North East corner of Process building

Biofilter Fan Building

Structural Systems	Type/Age	Condition	U/S	POOR	FAIR	GOOD	NEW	Recapitalization Period & Cost				
								0-5	5-10	10-15	15-20	20-25
PROCESS BUILDING												
Foundation	The footings and buried foundation walls are not visible for assessment, but it is apparent from exposed basement walls that they are conventional cast-in-place reinforced concrete. (2003)	The buried foundation walls and footings are not visible for assessment. There are minor concrete cracks in visible concrete and masonry, but there is no evidence of substantial structural distress, deformation or settlement. This indicates that the building foundation appears to be stable and structurally sound, and in good condition.				X						
Basement Walls	The basement walls are the exposed visible continuation of the buried foundation walls. They are comprised of conventional cast-in-place reinforced concrete. (2003)	The exposed basement walls are generally in good condition, stable and structurally sufficient. There are a few random minor vertical temperature and shrinkage cracks that appear to be static (not worsening). There are two wide vertical cracks, one on each side of the main hallway, at the entrance to the process area; they extend from floor level to the top of the basement walls, and they propogate into the concrete masonry block walls/partitions above. There are corresponding narrow horizontal cracks in the joints between the top of the basement walls and the bottom of of the concrete masonry block walls. The vertical cracks appear to coincide with a step/transition in the buried foundations. It is not uncommon to see stress cracks at these types of transitions due to the change in cross-section and/or due to minor differential settlement. The wide cracks should be repaired using epoxy-injection and the narrow horizontal cracks should be sealed with a flexible and paintable sealant.				X		$1,000				
Floor Construction	The floors are comprised of conventional cast-in-place reinforced concrete. It is assumed that they are slab-on-grade. The floors common areas, laboratory and office are covered with floor finishes, the chemical storage room floor is coated/painted, but all other concrete floors are plain/exposed. (2003)	The floors are generally in good condition. There are random minor temperature and shrinkage cracks in the process and headworks areas, and in the blower and chemical storage rooms that appear to be static (not worsening). There are localized areas of surface scaling and erosion in the headworks and process areas, which we understand to be from spillage of aggressive substances and cleaning chemicals. The surficial damage could be remedied by patching (and it is including in the Class D costs), but to mitigate a recurring problem will require operational changes.				X		$5,000				

Roof Construction	The roof in the headworks area of the building is comprised of precast concrete elements (planks). The roof in the remainder of the building consists of open web steel joists (OWSJ) or steel roof trusses spanning between load-bearing walls, and structural metal roof decking. (2003)	The roof structure appears to be in good condition, stable and structurally sufficient. The painted steel structures should be periodically monitored for corrosion and recoated as a preventive maintenance measure, when needed.				X							
Exterior Walls	The exterior walls of the headworks area of the building are comprised of structural masonry concrete blocks. The exterior walls in the remainder of the building are comprised of steel columns, beams and bracing, and masonry concrete block infills between the columns. The exterior cladding is a combination of split-faced concrete unit block masonry below and prefinished metal cladding above. (2003)	The exterior walls appear to be in good condition, stable and structurally sufficient. There are random hairline, narrow and/or step cracks in the mortar joints of the concrete masonry unit block walls. The cracks appear to be minor and static (not worsening). The cracks are cosmetic and could be sealed with flexible and paintable sealant. The cost is an incidental to painting, whenever painting is considered.				X							
Partitions	The interior partitions are comprised of masonry concrete blocks. (2003)	The partitions appear to be in good condition, stable and structurally sufficient. There are random hairline, narrow and/or step cracks in the mortar joints of the concrete masonry unit block partitions. The cracks appear to be minor and static (not worsening). The cracks are cosmetic and could be sealed with flexible and paintable sealant. The cost is an incidental to painting, whenever painting is considered.				X							
Stair Construction	The stairs at both ends of the main hallway, in the headworks area, and in the blower room are constructed of conventional reinforced concrete. The stairs in the process area of the building are comprised of hot-dipped galvanized steel. (2003)	The stair assemblies appear to be in good condition, stable and structurally sufficient. The hot-dipped galvanized metal stair assembly in the process area should be periodically monitored for corrosion and recoated as a preventive maintenance measure, when needed.				X							
Process Area Stairs and Elevated Walkways	The elevated walkways and stairs are primarily comprised of hot-dipped galvanized steel elements, gratings and railings. There is an adjacent painted structural steel frame and elevated timber deck that is nearly completed. (Elevated walkways and stairs, 2003; Steel and timber frame 2021)	The walkways, stairs, frame and platforms appear to be in good condition, stable and structurally sufficient. The hot-dipped galvanized metal and painted steel structures should be periodically monitored for corrosion and recoated as a preventive maintenance measure, when needed.				X							
							SUB-TOTALS	$6,000	$0	$0	$0	$0	

BIOREACTOR BUILDING												
Foundation	The footings and buried foundation walls are not visible for assessment, but it is apparent from exposed perimeter and interior tank walls that they are conventional cast-in-place reinforced concrete. (2003)	The buried foundation walls and footings are not visible for assessment. There are minor concrete cracks in visible concrete, but there is no evidence of substantial structural distress, deformation or settlement. This indicates that the building foundation appears to be stable and structurally sound, and in fair condition.			X							
Concrete Walls	The perimeter and interior concrete tank walls are the exposed visible continuation of the buried foundation walls. They are comprised of conventional cast-in-place reinforced concrete. (2003)	The exposed concrete walls are generally in fair condition, stable and structurally sufficient. There are a few random minor vertical temperature and shrinkage cracks that appear to be static (not worsening); non-structural eopoxy-injection crack repairs should be done within 0-5 years and then in approximately 15-20 years. The operators reported that the wet surfaces of the concrete tanks are deteriorated/eroded, which is understandable given the harsh exposure conditions. The tanks should be periodically emptied and visually inspected.			X			$2,500			$2,500	
Roof/Exterior Wall Construction	The roof is comprised of a curved/semi-round proprietary fiberglass shell anchored to the top of the permimeter concrete walls. (2003)	The roof shell and connections appear to be in good condition, stable and structurally sufficient. However, the surface is dirty and seems to be discoloured. CBCL has allowed for pressure-wash cleaning and coating/painting in 0-5 years and replacement is projected for 20-25 years.				X		$35,000				$200,000
Suspended Walkways	The suspended walkways and railings are primarily comprised of hot-dipped galvanized steel elements, beams, gratings and railings. (2003)	The condition of walkways and railings varies from poor to good due to corrosion. The railings tend to corrode over time at welded splices/connections. Exposure conditions are harsh for ferrous metal structures. It appears that TOL undertakes routine maintenance repairs of the walkways and railings. Replacing the existing system with a fiberglass reinforced plastic walkway and railing system could be considered in 5-10 years.			X				$125,000			
						SUB-TOTALS		$37,500	$125,000	$0	$2,500	$200,000

BIOFILTER FAN BUILDING												
Foundation/Slab on Grade	The buried elements of the foundation/footings are not visible. It appears that the building is constructed on an engineered slab-on-grade. (2018)	The slab-on-grade (floor) is broom-finished and in near-new condition.					X					
Roof Construction	The roof structure is concealed by interior and exterior finishes. Based on the roof shape it is comprised of engineered timber roof trusses and plywood/OSB sheathing. (2018)	The roof is stable and in near-new condition, with no evidence of deformation or structural distress.					X					
Exterior Walls	The exterior wall structure is concealed by interior and exterior finishes. It appears that the walls are conventional timber stud wall construction with plywood/OSB sheathing. (2018)	The exterior walls are stable and in near-new condition, with no evidence of deformation or structural distress.					X					
						SUB-TOTALS		$0	$0	$0	$0	$0

Notes:
1. The structural systems and elements for all three buildings are generally in good condition.
2. Epoxy-injection of minor structural cracks in the Process Building foundation walls are recommended in 0-5 years.
3. Epoxy-injection of minor non-structural cracks in the Bioreactor Building Foundation walls are recommended in 0-5 and they are projected to be required again in 15-20 years.
4. The fiberglass roof of the Bioreactor Building is projected to require cleaning and coating in 0-5 years and replacement in 20-25 years.
5. Optional: the HDG metal walways and railings in the Bioreactor Building could be replaced with an FRP and stainless steel system.

Structural Deficiencies:

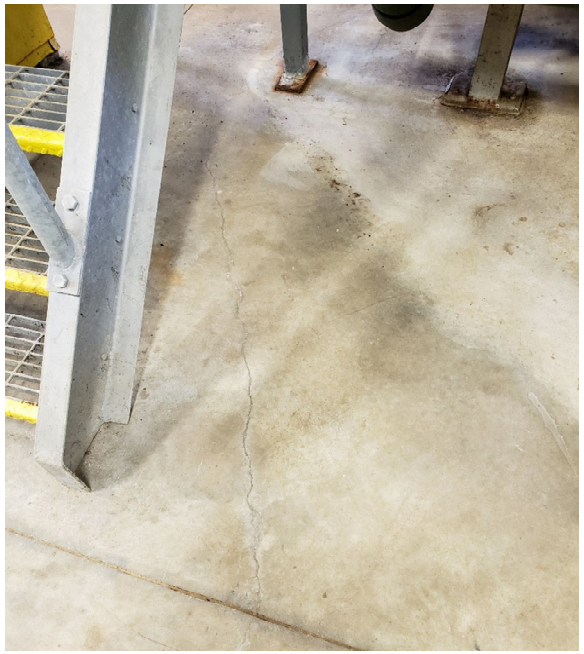
Minor temperature & shrinkage cracks in concrete foundation wall.

Crack in basement/foundation wall, near entrance to process area (north side of hallway).

Crack in basement/foundation wall, near entrance to process

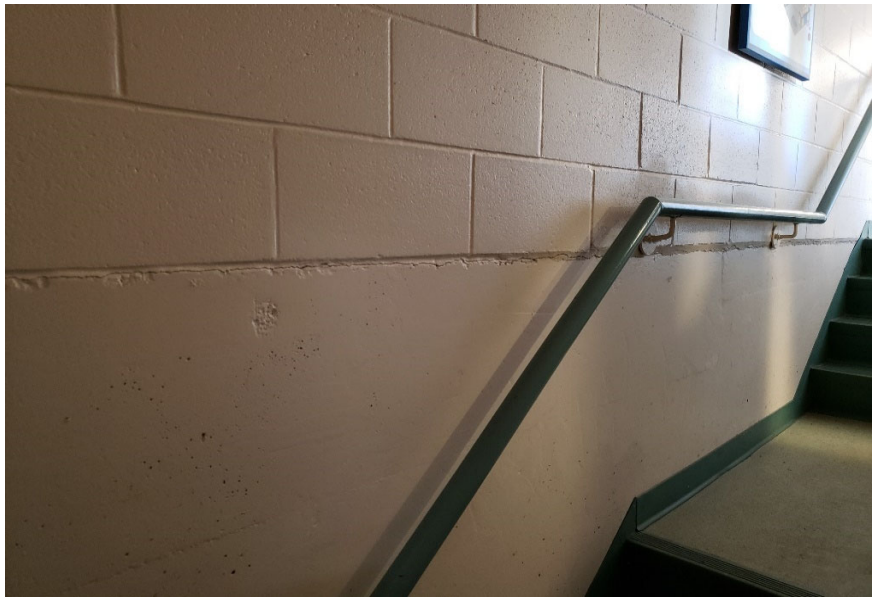
Surface erosion of concrete in the process area. Processes must change to prevent reccurence.

Surface scaling of concrete in the headworks area. Note: corroded steel is not building structure - it is process equipment that could be replaced during future screen replacement. Processes must change to prevent recurrence.



Typical minor temperature & shrinkage crack in the process area of the Process Building

Typical step-crack at a re-entrant coner of masonry construction; headworks area door opening.



Minor crack in the mortar bed between foundation wall and masonry partition in main hallway of Process Building.

South side elevation of the Bioreactor Building; note efflorescence and random minor

Close-up view of temperature and shrinkage cracks in the perimeter concrete walls of the Bioreactor Building

North elevation of the Biofilter Fan Building; note near-new condition

Ventilation and Air Conditioning	Type (Age)	Condition	U/S	POOR	FAIR	GOOD	NEW	Recapitalization Period & Cost				
								0-5	5-10	10-15	15-20	20-25
PROCESS BUILDING												
AHU	Packaged rooftop air handling unit complete with DX cooling, electric heat, and economizer. (2003)	Refrigerant top-up is required annually so small leaks are present in the DX piping. Other failures have been reported. Unit is approaching the end of its reliable service life and should be replaced with a modern equivalent.		X				$17,500				
HRV	Packaged heat recovery ventilator with electric heating. (2016)	HRV installed in the Process area is in excellent condition. Filter section was accessed and minor corrosion noted along with damaged filters. Note: Cost is for HRV replacement.				X						$60,000
Ductwork/Diffusers/Grills	Galvanized steel/aluminum grilles and diffusers (2003)	Ductwork was largely concealed above ceilings in the Office and Lab, but what was observed above the corridor ceiling appears to be in good condition. Note: Cost is for replacement of distribution ductwork and ancillaries throughout Admin. areas.				X						$5,000
Ductwork/Diffusers/Grills	Stainless steel ductwork and grilles (2016)	The 304 stainless steel ductwork was completely exposed throughout the Process Room and is in good physical condition. Note: Cost is for replacement of SS ductwork and ancillaries in Process areas.				X						$75,000
Insulation	Fibreglass duct wrap (2003)	Insulation on the supply air ductwork from rooftop AHU was observed avove ceiling and is in good condition. Note: Cost is for replacement of duct insulation in Admin areas.				X						$1,000
Controls	Programmable thermostat (age unknown)	Digital programmable thermostat controls the rooftop AHU and includes nighttime set back for energy savings. Note: Thermostat would be replaced with any new rooftop AHU.				X		$250				

Fans	Rooftop centrifugal exhaust fan for general ventilation (2003)	Exhaust fan EF-3 in service to the Chemical Room was in fair condition without any noise or vibration. Equipment is nearing the end of its reliable service life and should be replaced. Note: EF-1 and EF-2 in the Process Room were removed in 2016 when the new HRV/ ventilation system was installed.			X			$2,500				
Fans	Inline centrifugal, above ceilings (2003)	Exhaust fans EF-4, EF-5, and EF-6 are concealed above the ceilings but the manual fans were quiet in operation providing general exhaust to the Washroom, Janitor's closet, and Lab. Equipment is approaching 20 years in service and their replacement should be considered in the next few years to ensure reliability.			X			$7,500				
Fans	Rooftop supply fan to Blower Room (2003)	Supply fan SF-1 is in good physical condition without any noise or vibration; however, the mesh screens at the intake hood are damaged and should be replaced. Equipment is approaching the end of its reliable service life and a replacement should be considered in the next few years. Note: This room suffers from elevated temperatures in the summer (up to 35°C) which causes the compressor equipment to trip out. A split system cooling unit is recommended.			X			$3,500				
Fans	Wall mounted centrifugal exhaust fan for general ventilation (2018)	Exhaust fan EF-7 in service to the Aeration building is fairly new and in excellent condition without any noise or vibration.				X						$4,500
						SUB-TOTALS		$31,250	$0	$0	$0	$145,500

BIOREACTOR BUILDING												
Ductwork, Grills	Stainless steel ductwork and damper (2003)	The 304 stainless steel ductwork, including manual dampers and mesh screens, were in fair condition with a moderate amount of surface corrosion. Despite the appearance, the intake and exhaust air duct sections function as intended. Note: Cost is for replacement of ductwork in the Bioreactor.			X			$5,000				
							SUB-TOTALS	$5,000	$0	$0	$0	$0
BIOFILTER FAN BUILDING												
Fans	Wall mounted centrifugal exhaust fan for general ventilation (2018)	Exhaust fan EF-7 in service to the Aeration building is fairly new and in excellent condition without any noise or vibration. Note: Cost is for the replacement of EF-7				X						$4,000
Ductwork, Grills	Stainless steel louver and motorized damper (2018)	The 304 stainless steel louver and motorized damper are fairly new and in excellent condition. Note: cost is for the replacement of the louver and damper in the Biofilter building.				X						$2,500
Ductwork/Diffusers/Grills	Stainless steel ductwork and grilles (2018)	The 304 stainless steel ductwork between the Bioreactor Building and the Biofilter Building was partially exposed and in good physical condition. Note: cost is for the replacement of ductwork in the Biofilter building.				X						$10,000
							SUB-TOTALS	$0	$0	$0	$0	$16,500
Notes:												

Ventilation and Air Conditioning Deficiencies:

AHU serving office/lab to be replaced.

Supply Fan # 1 intake screens damaged and should be replaced.

Typical original equipment exhaust fan on roof nearing end of reliable service life (EF-3 shown).

Intake and exhaust air ductwork (to the *Biofilter Fan Building beyond*) in fair condition.

Mechanical Systems												
Plumbing / Heating	Type/Age	Condition	U/S	POOR	FAIR	GOOD	NEW	Recapitalization Period & Cost				
								0-5	5-10	10-15	15-20	20-25
PROCESS BUILDING												
Domestic Water Piping (Office Areas)	Copper / Plastic (2003)	Much of the domestic water piping is concealed but what was visible in the washrooms and under the sinks was in good physical condition. Note: Cost is to replace piping in the Admin areas.				X						$20,000
Domestic Water Piping (Process Areas)	Copper / Plastic (2003)	Some of the copper piping routed in the process areas is in poor condition due to corrosion. Piping has been coated in the past to extend the life of the material. The piping in the Headworks has frozen and split on occasion as the space is unheated. Plastic piping to the sinks was also noted in some areas and it was all in good condition. Note: Cost is to replace piping in the Process areas.		X				$15,000				
Plumbing Fixtures	Vitreous china toilets/lavatories/janitor's sink. Stainless steel counter sinks. (2003)	Plumbing fixtures were noted to be operational, with adequate water pressure, and all in fair to good condition. The shower provided is rarely used and in good condition. Note: Cost is to replace plumbing fixtures.				X					$7,500	
Plumbing Fixture - Emergency Shower / Eyewash	Packaged Shower / Eyewash Station (age unknown)	The emergency fixture was in good condition. It was noted that the fixture is plumbing only with cold water which may have satisfied the code of the day but does not meet the current ANSI standard. Staff noted the equipment has never been used. Any future replacement should include a hot water supply and tempering valve. Note: cost is to replace eyewash.				X					$3,500	
Sanitary Waste and Vent Piping	Plastic PVC / ABS. (2003)	Sanitary waste and vent piping is largely concealed in walls but where visible under the sinks the material was plastic. Piping appeared in good condition without any reports of drainage issues. Note: This excludes piping under slab. Cost is to replace accessible or exposed piping.				X						$20,000

Mechanical Systems												
Plumbing / Heating	Type/Age	Condition	U/S	POOR	FAIR	GOOD	NEW	Recapitalization Period & Cost				
								0-5	5-10	10-15	15-20	20-25
DHW Storage Tank	Electric, 40 gallon (2002)	The water heater is a light commercial grade unit and well beyond its reliable service life. Equipment remains operational without issue but should be replaced soon to ensure reliability and performance.		X				$1,500				
Unit Heaters	Electric, fan forced (2003)	There are several electric unit heaters throughout the process areas of the facility, all in fair condition with some minor corrosion on the casings. Equipment should be scheduled for replacement within the next few years to ensure reliability. Note: An electric heater should be installed in the Headworks area to prevent freezing of the pipes.			X				$12,500			
Heating Convectors	Electric, cabinet type, wall hung (2003)	Perimeter radiation is located in the Office, Lab, and Washroom. The cabinets area all in fair condition.			X				$10,000			
Controls	Manual Thermostats (2003)	Space temperature is controlled manually for all electric baseboard and unit heaters. All noted were functional and in fair condition with no issues reported. Note: Cost is to replace manual thermostats.				X					$10,000	
							SUB-TOTALS	$16,500	$22,500	$0	$21,000	$40,000

Notes:

1. There were no plumbing or heating systems in the Bioreactor or Biofilter buildings.

Plumbing & Heating Deficiencies:

Typical corrosion and blistering paint on copper piping.

Electric water beyond its reliable service life.

Emergency fixture plumbing only with cold water.

Fire Protection	Type/Age	Condition	U/S	POOR	FAIR	GOOD	NEW	Recapitalization Period & Cost				
								0-5	5-10	10-15	15-20	20-25
Sprinklers	N/A											
Piping	N/A											
Valves	N/A											
Standpipes	N/A											
Fire Extinguishers (Interior)	Mulit-purpose dry chemical Age 5 - 10 yrs	Fire extinguishers properly mounted near exits. Note: Cost is to replace fire extinguishers.				X					$750	
Fire Hose Cabinets	N/A											
Foam Extinguishing Agent	N/A											
							SUB-TOTALS	$0	$0	$0	$750	$0

Notes:
1.

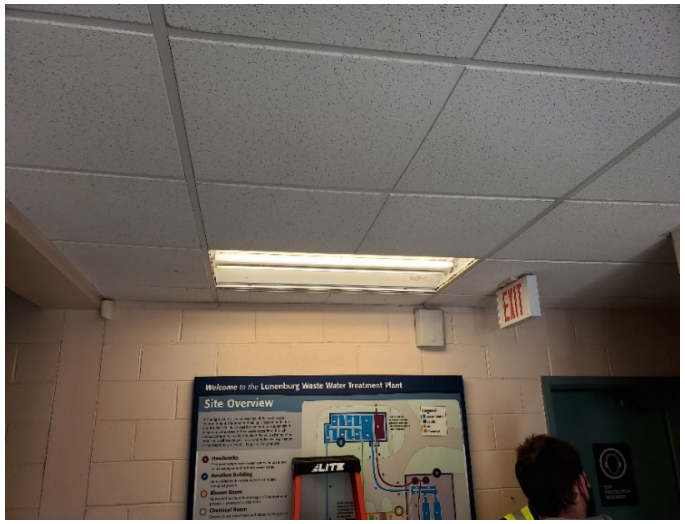
Electrical Systems	Type/Age	Condition	U/S	POOR	FAIR	GOOD	NEW	Recapitalization Period & Cost				
								0-5	5-10	10-15	15-20	20-25
PROCESS BUILDING												
Service Entrance Switchboard	Siemens FCRS, 347/600V 3P4W 800A (2003)	Located in a dry, heated environment. No signs of corrosion. The switchboard appears to be in good condition. CBCL does not recommend replacement at this time.				X						
Transformers	Siemens 75kVA (2003) Marcus 15kVA (x2) (2003)	Located in a dry, heated environment. No signs of corrosion. Transformers appear to be in good condition. CBCL does not recommend replacement at this time.				X						
Panelboards - General	Siemens S3 panels (x2) (2003)	Located in a dry, heated environment. No signs of corrosion. Panelboards appear to be in good condition. CBCL does not recommend replacement at this time.				X						
Panelboards - Process Area	Siemens P1 panel (2003)	Panelboards in the process area show significant signs of corrosion on panel enclosures, likely due to flooding in Fall 2019. Recommend replacing these panels in 5-10 years.		X					$5,500.00			
Disconnect Switches - General	Siemens NEMA 1 (2003) Eaton NEMA 4X (2006)	Generally, disconnect switches appear to be in good condition. No signs of corrosion. CBCL does not recommend replacement at this time.				X						
Disconnect Switches - Process Area	Siemens NEMA 1 (2003) Eaton NEMA 4X (2006)	The NEMA 1 disconnect switches in the process area show significant corrosion, likely due to flooding in Fall 2019. Recommend replacing with new NEMA 4X stainless steel disconnects in 5-10 years. The existing NEMA 4X switches that were added as part of the building addition are in good condition and are not expected to need replacement for 25+ years.		X					$10,000.00			
Conduit - General	EMT/RPVC (2003 & 2006)	Generally in good condition. CBCL does not recommend replacement at this time.				X						

Conduit - Process Area	EMT/RPVC (2003 & 2006)	EMT in the process area shows signs of corrosion. CBCL recommends replacing this conduit with PVC in 5-10 years. PVC conduit in the process area appears to be in good condition. However, it was noted by the building operator that they have found water in some of the conduit, likely due to flooding. Recommend replacing corroded EMT and cleaning out flooded conduits.		X					$5,000.00			
Surge Protection	On main switchboard (2003)	Replace as necessary, or in accordance with manufacturer's recommendations. This should be monitored regularly and replaced in the event of a power surge.				X				$2,500.00		
Interior Lighting	Fluorescent, occupancy sensors	Fluorescent fixtures are in fair condition. CBCL recommends replacing with higher efficiency LED in 10-15 years, or when ballasts begin failing.			X					$25,000.00		
Exterior Lighting	HPS wall packs controlled by photo cell	Exterior lights are in very poor condition. These lights are on 24/7, likely due to issue with photocell/contactor. Several fixtures have holes melted through the lens due to heat. Recommend replacing luminaires with higher efficiency LED fixtures within 5 years.		X				$7,500.00				
Emergency Lights	Battery units with remote heads; combination exit sign battery units	Generally appear to be in good condition. Should all be tested regularly to ensure min. 30 minute run time. Recommend replacing in 10-15 years, or when batteries begin to fail.				X				$2,500.00		
Exit Lights	Red Exit (English)	Exit lights appear to be in good condition. Should all be tested regularly to ensure min. 30 minute run time. Recommend replacing in 10-15 years, or when batteries begin to fail.				X				$1,500.00		
Fire Alarm	No fire alarm system; standalone smoke alarms	Generally appear to be in good condition. Smoke alarms should be replaced every ~10 years.				X			$1,000.00			
Devices	Various - typically 15-20 years old.	Generally in good condition and do not need to be replaced. Operator indicated that one receptacle in the process area trips the breaker when used. This should be investigated/replaced. May be related to conduit flooding.				X		$500.00				

Gas detection system	Honeywell	Generally in good condition. CBCL does not recommend replacement at this time.				X						
Telecommunications	Fibre backbone, small router in main electrical room.	Generally in good condition. CBCL does not recommend replacement at this time.				X						
Intrusion Alarm	Motion sensors, keypad.	Generally in good condition. CBCL does not recommend replacement at this time.				X						
							SUB-TOTALS	$8,000.00	$21,500.00	$31,500.00	$0.00	$0.00
BIOREACTOR BUILDING												
Electrical distribution	Located in locked stainless steel enclosure on exterior of building.	The distribution on the building exterior appears to be in good condition. CBCL does not recommend replacing the distribution equipment at this time. Inside, there is a junction box hanging from conductors and zip ties which should be resupported in accordance with CEC as soon as possible.				X		$500.00				
Wiring	Teck cable.	The cables appear to be in fair condition. Some corrosion/oxidaton on the steel connectors. Recommend replacing with new Teck cable w/ stainless steel hardware in 15-20 years.			X						$20,000.00	
Lighting	Fluorescent vaportite fixtures.	Fixtures appear to be in fair condition. Signs of corrosion/oxidation on the fixture supports. CBCL recommends replacing these with higher efficiency LED fixtures with stainless steel hardware in 5-10 years.			X				$12,000.00			
Lighting Controls	On/off switch at both end of building.	Lighting controls appear to be in good condition and do not need to be replaced at this time. Note: the operator indicated that they have plans to revise the lighting controls in this building in the coming weeks.				X						
							SUB-TOTALS	$500.00	$12,000.00	$0.00	$20,000.00	$0.00
BIOFILTER FAN BUILDING												
Electrical distribution	Explosion proof devices, TECK90 cable.	Equipment and cabling appears to be in good condition. Replacement not recommended at this time.				X						
							SUB-TOTALS	$0.00	$0.00	$0.00	$0.00	$0.00

Electrical Deficiencies:

Panelboard in process area is very corroded.



Suggest replacing existing fluorescent lighting with more efficient LED.

Suggest replacing red exit signs with newer green running man.

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