

**Property Condition Assessment
Update**

Wabamun Arena
Wabamun, Alberta



Prepared for:

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Project No.: 116542032

August 18, 2016

August 18, 2016

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Executive Summary

INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by the Village of Wabamun (the "Client"), to perform a Property Condition Assessment (PCA) of the Wabamun Arena and the Jubilee Hall / Library properties, located in the village of Wabamun, Alberta (the "sites" or "properties"). A visit to the sites was conducted by Stantec on June 10, 2014. A second visit to the Wabamun Arena was recently conducted on July 28, 2016, for the purpose of updating the PCA, re-establishing conditions and identifying current or emerging issues. Only sections of the report pertaining to the Arena systems have been included in this update report.

The purpose of the PCA is to provide an opinion on the overall physical condition of the structure, building envelope, mechanical and electrical components of the site buildings, to provide opinions of probable costs to address observed "physical deficiencies", and to renew base-building systems and components over a ten (10) year period. A specialist assessment of the Wabamun Arena structure is included in the scope of work. As well, the PCA is to identify safety and public accessibility issues and other issues of concern that might be observed during the site visit. We understand that the Client will use the PCA report to assist with decisions regarding levels of maintenance spending on these buildings in the future. At the request of the Village of Wabamun, assessment of site features, building interiors and the Arena's refrigeration plant was not included in the scope of the 2014 work. Subsequently, a review of the refrigeration equipment was conducted in 2016, and the results are included herein.

The scope of work, methodologies used, and limitations of the PCA are presented in Section 1.0 of this report.

PROPERTY DESCRIPTION

The Wabamun Arena is located on the north side of 52 Avenue, east of a continuation of 49 Street (49 Street does not extend northward through the site which contains the Arena). The municipal address is 4820 – 52 Avenue. The Arena's site is shared with an elementary school, accessed from the site's northern boundary, 54 Avenue. Several residential properties are located randomly around the site, which is otherwise generally grass-covered. The Arena, including two of the change rooms was reportedly developed in approximately 1972, with the refrigeration/operations area added in 1974 and an extension to the change rooms and the concession added in the 1990's.

The Arena has an arch roof with a flat-roofed section on its south side, which houses the ice plant, a drive-through garage, change rooms, a concession and entrance way. The arch roof is covered by a corrugated galvanized steel assembly with a 4" layer of rigid insulation installed

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over existing asphalt shingles, over a tongue and groove wood deck supported by wood trusses. There are two underlying support structures for the low slope roof areas: one, supported by a wood roof deck, in turn supported by glue-laminated wood beams; and the refrigeration/operations area which has a steel roof deck, supported by open-webbed steel joists. The Arena's concrete masonry block exterior walls are painted.

The rink area contains bleacher seating and rink boards with the main surface being concrete, which covers refrigeration piping, extending from header trenches, beyond both ends of the rink. Concrete slabs-on-grade are provided between the rink boards and the exterior walls on the north and south sides of the rink. The flat-roofed section of the Arena has a slab-on-grade throughout.

The building's areas could not be confirmed.

Salient Photographs



Wabamun Arena

ASSESSMENT SUMMARY

Events (i.e., recommended actions) and corresponding opinions of probable costs were developed for the PCA to address observed "physical deficiencies" and to replace major building systems and components that will exceed their expected useful life (EUL) over the next ten (10) years. The event types used for this PCA, and their descriptions, are defined below.

PCA Event Types

Event Type	Description
Immediate Repairs	"Physical deficiencies" that require action within the next year to prevent further deterioration to the component, or to prevent possible injury due to an unsafe condition and/or possible Code violation.
Deferred Maintenance	"Physical deficiencies" observed during the assessment that are not "immediate" in nature, but are considered beyond normal routine maintenance.
Lifecycle Replacements	Components or systems that have already exceeded, or will exceed their EUL over the next ten (10) years and may require replacement to maintain building performance.
Optional Repairs	Actions that may be performed to improve existing components or systems that are not related to age or physical condition.

The following is a summary of events, organized by event type, and their corresponding opinions of probable costs (in current dollar values). Only events that are considered greater than \$3,000 in value have been included in this PCA report; however, events relating to life safety or possible Code violations may also be included, regardless of cost.

Immediate Repairs

Event Year	Event Description	Opinion of Probable Cost
2016	Test for the presence of asbestos in concrete masonry units (CMU's)	\$ 3,000
2016	Provide a review of the building HVAC system to ensure there are no safety hazards and that the desired performance is being achieved	\$ 7,000
2016	Allowance to replace four exterior fire exit doors in Arena.	\$ 8,000
2016	Repair or replace the Arena Ops area sheet metal ducts	\$ 3,000
2016	Replace the Canteen Fire Suppression System	\$ 3,000
2016	Repair or replace emergency lights and battery packs throughout the Arena	\$ 18,000
2016	Repair Chiller/surge drum (Ice Plant)	\$ 3,000

Deferred Maintenance

Event Year	Event Description	Opinion of Probable Cost
2016	Repair floor cracking at Zamboni entrance to rink	\$ 3,000
2016	Seal cracks, waterproof and insulate the sub-grade frost wall along the north end of the building	\$ 18,000

Event Year	Event Description	Opinion of Probable Cost
2016	Repair damaged and missing Arena CMU's and mortar joints	\$ 18,000
2016	Replace weather stripping on all Arena exterior doors including overhead doors; Allow for as-required replacement of door panels	\$ 8,000
2016	Conduct miscellaneous roofing repairs over the Rink and Change Room/Concession area	\$ 5,000
2016 & 2024	Repair both Mycom N6A Compressors (Ice Plant)	\$ 24,000
2016 & periodically thereafter	Periodically clean, repaint or repair Brine mains, headers and floor piping (Ice Plant)	\$ 9,500
2016 & periodically thereafter	Allowance for repairs to Brine System (Ice Plant)	\$ 700
2016	Replace Pipe Insulation (Ice Plant)	\$ 5,000
2016 & 2026	Repair or Replace Condenser sump/pump (Ice Plant)	\$ 6,000

Lifecycle Replacements

Event Year	Event Description	Opinion of Probable Cost
2016	Replace T-12 lighting equipment in the Change Room/Concession	\$ 30,000
2016	Replace C-1/C-2 Oil demisters (Ice Plant)	\$ 10,000
2016 & periodically thereafter	Replace elements of the Relief Valve System (Ice Plant)	\$ 7,000
2017	Allowance for replacement of the wood soffits and fascia on the arena.	\$ 8,000
2017	Allowance for replacement of the Arena's low slope roof system	\$ 50,000
2017	Allowance to remediate the rink slab and piping. Budget costs included for removal and replacement with insulated slab and subsoil heating system. Price excludes upgraded refrigeration system and controls.	\$ 750,000
2017	Replace Control system (Ice Plant)	\$ 60,000
2017	Replace C-2 Mycom N6A Compressor (Ice Plant)	\$ 60,000
2017	Replace C-1 Mycom N6A Compressor (Ice Plant)	\$ 60,000

Event Year	Event Description	Opinion of Probable Cost
2019 & 2024	Repaint the Arena exterior walls	\$ 30,000
2019	Allowance to replace overhead doors and frame parts in Arena,	\$ 20,000
2022	Allowance to replace the Arena furnaces	\$ 12,000
2024	Allowance to replace the Arena hot water tanks	\$ 4,000
2018 & 2023	Replace and maintain Brine Pump (Ice Plant)	\$ 15,000
2020	Replace Chiller / Surge Drum (Ice Plant)	\$ 80,000
2022	Replace BAC VCL-079 Condenser (Ice Plant)	\$ 80,000
2026	Replace Brine pump motor (Ice Plant)	\$ 4,000

Optional Repairs

Event Year	Event Description	Opinion of Probable Cost
N/A	Allowance to upgrade the Arena ventilation system (dependent on results of HVAC review)	\$ 0
2017	Install MCC (Motor Control Centre) (Ice Plant)	\$ 50,000
2016	Insulate the inside surface of the Arena exterior walls and finish with a puck resistant material (Price is for gypsum board)	\$ 125,000

OPINIONS OF PROBABLE COST SUMMARY

The table presented below indicates the total opinion of probable costs (in current dollar values) for the recapitalization of selected major building systems over the next ten (10) years. The table presents opinions of probable costs by event type, as defined previously in this Executive Summary.

Opinions of Probable Cost by Major Building System

Building / Site System	Evaluation Period (Years 0 to 10)			Optional Repairs
	Immediate Repairs	Deferred Maintenance	Lifecycle Replacements	
Building Structure	\$ -	\$ 21,000	\$ 750,000	\$ -
Building Envelope	\$ 11,000	\$ 31,000	\$ 108,000	\$ 125,000
Mechanical Systems	\$ 13,000	\$ -	\$ 16,000	\$ -
Electrical Systems	\$ 18,000	\$ -	\$ 30,000	\$ -
Refrigeration Systems	\$ 3,000	\$ 45,200	\$ 376,000	\$ 50,000
TOTALS	\$ 45,000	\$ 97,200	\$ 1,280,000	\$ 175,000
GRAND TOTAL (excludes Optional Repairs)	\$ 1,422,200			

A complete listing of major building system capital expenditures that are expected over the next ten (10) years is presented in the "Opinions of Probable Costs Table", which is attached to this PCA report as Appendix B.

1.0 PURPOSE, SCOPE AND LIMITATIONS

1.1 PURPOSE

Stantec Consulting Ltd. (Stantec) was retained by the Village of Wabamun (the "Client"), to perform a Property Condition Assessment (PCA) of the Wabamun Arena and the Jubilee Hall/Library, located in Wabamun, Alberta (the "site(s)" or "property(ies)"). A visit to the sites was conducted by Stantec on June 10, 2014. A second visit to the Wabamun Arena was recently conducted on July 28, 2016, for the purpose of updating the PCA, re-establishing conditions and identifying current or emerging issues. Only sections of the report pertaining to the Arena systems have been included in this update report.

The purpose of the PCA is to provide an opinion on the overall physical condition of the structure, building envelope, mechanical and electrical components of the site buildings, to provide opinions of probable costs to address observed "physical deficiencies", and to renew base-building systems and components over a ten (10) year period. A specialist assessment of the Wabamun Arena structure is included in the scope of work. As well, the PCA is to identify safety and public accessibility issues and other issues of concern that might be observed during the site visit. We understand that the Client will use the PCA report to assist with decisions regarding levels of maintenance spending on these buildings in the future.

1.2 SCOPE OF WORK

The PCA was generally based on the American Society for Testing and Materials (ASTM) Standard E2018-15, "Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process", and the scope of services outlined in Stantec's proposal letter dated May 13, 2014 (and the Work Order agreement attached thereto, as executed by the Client on May 21, 2014).

The scope of our work included interviews with site representatives (where available and where provided by the Client), and a visual "walk through" assessment of the following major building systems to observe and document existing physical conditions.

The major building systems observed (where applicable) include:

- Building Structure
- Mechanical Systems
- Building Envelope
- Electrical Systems

At the request of the Village of Wabamun, assessment of site features, building interiors and the Arena's refrigeration plant was not included in the 2014 scope of work. The Arena refrigeration system was evaluated in 2016, and the results are included herein. The information obtained from our visual assessment formed the basis for developing our opinions for recapitalization

requirements over the next ten (10) years. The assessment identified the general condition of major building systems and their components to enable us to provide opinions of renewal timing and probable costs for components at a system level.

The scope of our work performed is summarized as follows:

- Reviewed existing documentation, where available and where provided by the Client. A summary of documentation reviewed is included in this report under Section 6.0.
- Conducted a visual walk-through assessment of the in-scope major building systems to check their general physical condition.
- Conducted interviews with building managers and maintenance staff, where available and where provided by the Client. A listing of personnel interviewed during the assessment is included in this report under Section 6.0.
- Identified and financially quantified our opinions of probable costs (in current dollar values) for recapitalization work that is expected over a ten(10) year period. Opinions of probable costs were also provided to repair major defects in materials or systems that may significantly affect the value of the property or continued operation of the site.
- Recommended further investigations (if required) and corresponding order-of-magnitude costs for work that may be required as a result of these investigations.
- Prepared a PCA report for the site that outlines findings, opinions, and recommendations, complete with photographs of salient observations and other pertinent information obtained during the assessment.

The assessment of the site was based on a visual walk-through review of the visible and accessible components of the property, building(s), and related structures. The roof surface(s), interior and exterior wall finishes, and floor and ceiling finishes of the building(s) were visually assessed to check their condition and to identify "physical deficiencies", where observed. The assessment did not include an intrusive investigation of wall assemblies, ceiling cavities, or any other enclosures/assemblies. No physical tests were conducted and no samples of building materials were collected to substantiate observations made, or for any other reason.

The review of mechanical and electrical systems at the property, including corresponding fire & life safety systems, included discussions with site representatives and a review of pertinent maintenance records that were made available by the Client. A visual walk-through assessment of the mechanical and electrical systems, and corresponding fire & life safety systems, was conducted to determine the type of systems present, age, and aesthetic condition. No physical tests were conducted on these systems.

An evaluation (detailed or otherwise) of the site's compliance with local Building Codes and Fire Codes, or with local ordinances, requirements, etc. (including those related to life safety and fire protection) is not part of the scope of this project. We have assumed that the existing property development was reviewed and approved by the local authorities having jurisdiction at the time

of construction, and during any subsequent additions, renovations, and/or inspections. Compliance with ASTM E2018-15 does not warranty or guarantee Code compliance with any governmental entity, trade standard, or the insurance industry, and this effort should not be considered an in depth code review.

1.3 DEVIATIONS FROM THE GUIDE

The major deviations from ASTM Standard E2018-15 for this project were as follows:

- No reviews of municipal / public records for zoning, building, and/or fire & life safety code / regulatory compliances were conducted.
- Investigation of whether or not the property resides in a flood plain was not performed.
- Verification of the number of parking spaces was not conducted.
- Verification of gross and net usable areas of the site building(s) was not performed.

Deviations from Stantec's proposal letter dated May 13, 2014, were as follows:

- A review of building drawings was not performed as such drawings were not made available by the Client.

1.4 METHODOLOGY

1.4.1 Component Life Expectancy

The major building systems observed during the site visit were broken down into their major components and were assigned a value for their expected useful life (EUL). This value was used to determine an "event" year for renewal, based on the reported age or remaining service life (RSL) of the component. Where this information was unavailable, the age and RSL were estimated based on the component's overall reported or observed physical condition. The values for EUL are based on information provided in manufacturer's literature, industry standards, our observations of the components, and our experience with similar materials and systems. The values for EUL and RSL have been adjusted to suit our site observations.

The EUL of components is a theoretical number that is arrived at with much estimation and is a function of the quality of materials used, manufacturing and installation, as well as the frequency and intensity of service, the degree of maintenance afforded to the component, and local weather conditions. Also, the realization of a component's EUL does not necessarily constitute its replacement. A detailed condition assessment or investigation may be a more prudent approach which may indicate a need for maintenance or refurbishment only, or may indicate adequate physical condition for an extended period.

Some components have been assumed to have "indefinite" life expectancy as compared to the relative life of other components (e.g., building structure, electrical systems, etc.). From time to time, localized repairs may be required due to deterioration or vandalism, which are assumed to be handled as part of ongoing maintenance. In some instances, a provisionary cost has been applied to a component in order to provide for foreseeable future repairs for which an actual cost cannot be applied at this time.

1.4.2 Component Condition Ratings

ASTM defines a "physical deficiency" as a conspicuous defect or significant deferred maintenance of a site's material systems, components, or equipment as observed during the site assessor's walk-through site visit. Included within this definition is material systems, components, or equipment that is approaching, has reached, or has exceeded its typical EUL or whose RSL should not be relied upon in view of actual or effective age, abuse, excessive wear and tear, exposure to the elements, lack of proper or routine maintenance, etc. This definition specifically excludes deficiencies that may be remedied with routine maintenance, miscellaneous minor repairs, normal operating maintenance, etc., and excludes conditions that generally do not constitute a material physical deficiency of the site.

The physical condition of a component / system is dependent on whether a physical deficiency is associated with that component or system. The physical condition of components / systems noted in this report are often described as either "Good", "Fair", "Poor", or "Very Poor".

Definitions for these ratings are provided below:

Component Condition Ratings

Rating	Description
Good	Functioning as intended with minimal deterioration observed. This rating implies that no action is anticipated within the next five (5) years.
Fair	Functioning as intended with normal deterioration and minor distress observed. Some evidence of deferred maintenance may be observed. This rating implies that action is anticipated within the next three (3) to five (5) years.
Poor	Not functioning as intended with significant deterioration as well as distress observed. Evidence of long-term deferred maintenance may be obvious. This rating implies that action is anticipated within the next two (2) years.
Very Poor	The component or system was observed to have failed or is at risk of imminent failure and/or the condition of the component or system presents a potential life safety concern or a possible Code infraction. This rating implies that action is required immediately (i.e., less than one [1] year).

1.4.3 Component Events

Events (i.e., recommended actions) are provided in this PCA report for components or systems where they are found to contain "physical deficiencies" that are considered beyond normal operational maintenance, and to replace major building systems and components that will exceed their EUL over the next ten (10) years.

The event types used for this PCA, and their descriptions, are described in the table below.

PCA Event Types

Event Type	Description
Immediate Repairs	"Physical deficiencies" that require action within the next year to prevent further deterioration to the component, or to prevent possible injury due to an unsafe condition and/or possible Code violation.
Deferred Maintenance	"Physical deficiencies" observed during the assessment that are not "immediate" in nature, but are considered beyond normal routine maintenance.
Lifecycle Replacements	Components or systems that have already exceeded, or will exceed their EUL over the next ten (10) years and may require replacement to maintain building performance.
Optional Repairs	Actions that may be performed to improve existing components or systems that are not related to age or physical condition.

1.4.4 Event Costing

Opinions of probable costs (in current dollar values) have been provided for events that are expected for major systems or components over the next ten (10) years, and are described in this PCA report interchangeably as provisions, budgets or allowances. The costs are based on unit rates published by Means Publishing and/or Marshall & Swift Valuation Service, combined with local experience gained by Stantec, and are inclusive of "soft" costs such as contractor overhead and & profit, contingency allowance, demolition / repair costs, and consulting fees (i.e., design, inspection, testing, etc.), where these are warranted. The quantities associated with each event have been estimated during the walk-through site assessment and do not represent exact measurements or quantities.

Only events with a total cost over \$3,000 have been included in this PCA report. Events below this cost threshold are assumed to be handled under the property's Operations and Maintenance budgets, although they may be mentioned in the report. There may be events that are also currently being managed under the Operations and Maintenance budgets for the site. Events relating to life safety may be included in the PCA report, regardless of cost.

At the time of repair or replacement, specific "scope of work" statements and quotations should be determined and the budgetary allowances revised, where required, to reflect actual expenditures. Preliminary work may also be required in advance of the anticipated timeframe for events recommended in this report, which could also entail additional costs that are above and beyond the events' corresponding opinion of probable costs.

Stantec recommends that all maintenance contracts, operating costs and cost recovery information be reviewed in conjunction with the opinions of probable costs presented in this report. Furthermore, Stantec recommends that a defined set of parameters be agreed upon between the Client and other affected parties that pertain to classifying an event as an operating cost versus a capital expenditure cost, and for future projects. This may include criteria such as a cost threshold, frequency of asset replacement, nature of the work to be performed, asset insurability or mobility, etc.

This report, including its opinions and recommendations, is intended to be used as a reference in performing general capital renewal work and component lifecycle planning at the site, and is not meant to substitute or supersede existing capital plans, funding contributions, scheduled repair events, etc. that may currently exist for the property. The report is also not meant to act as a mandate on the proper renewal of capital assets. Smaller or moveable building components and site improvements have generally been excluded from this assessment, and will require consideration when deciding on the future direction for capital re-investment at the property.

1.5 LIMITING CONDITIONS

Exclusive Use

This report, including its information and opinions, has been prepared for the exclusive and sole use of the Village of Wabamun (the "Client").

Reliance Purposes

This report shall not be relied upon for any purpose other than intended for the Client within the scope of services negotiated between Stantec Consulting Ltd. (Stantec) and the Client without the express prior written consent of Stantec.

Third Party Reliance

This report may not be relied upon by any other person or entity without the express written consent of Stantec and the Client. Any reliance on this report by a third party, any decisions that a third party makes based on this report, or any use at all of this report by a third party without the prior written consent of Stantec is the sole responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions based on this report.

Distribution

No party shall distribute this report, in its final form or in draft form, or any portion or copy thereof without the express written permission of Stantec, except that the Client may make copies of this report as are reasonable for its own use and consistent with the intended purposes of this report.

Cost Opinions

Any opinions of probable costs expressed in this report are partially based on consultation with industry-recognized publications on probable costs for materials and labour. While Stantec uses information available to us combined with our judgment and past experience, the specific rationale and conditions forming the basis of contractors' bids, material or equipment pricing are beyond our knowledge and control. Stantec can therefore not be held responsible if the final costs vary from these opinions of probable costs.

As well, any opinions of probable costs are intended for global budgeting purposes only. The scope of work and the actual costs of the work recommended can only be determined after a detailed examination of the site element in question, understanding of the site restrictions, understanding of the effects on the ongoing operations of the site/buildings, definition of the construction schedule, and preparation of tender documents. Stantec expressly waives any responsibilities for the effects of any action taken as a result of these endeavors unless Stantec is specifically advised of prior to, and participate in the action, at which time, Stantec's responsibility will be negotiated.

Physical Limitations to Scope

The assessment of the buildings and like components was performed using methods and procedures that are consistent with standard commercial and customary practice as outlined in ASTM Standard E2018-15 for PCA assessments. Stantec's work did not include intrusive testing / investigation, destructive testing, testing of life safety systems or quantitative testing. As such, any recommendations and opinions of probable costs associated with these recommendations, as presented in this report, are based on walk-through non-invasive observations of the parts of the building which were readily accessible during a visual review. Conditions may exist that are not as per the general condition of the system being observed and reported in this report.

Opinions of probable costs presented in this report are also based on information received during interviews with site representatives, operations and/or maintenance staff. Stantec cannot be held responsible for incorrect information received during the interview process. Should additional information become available with respect to the condition of the building and/or site elements, Stantec requests that this information be brought to our attention so that Stantec may reassess the conclusions presented herein.

Assessments

No legal surveys, soil tests, environmental assessments, geotechnical assessments, energy assessments, seismic assessments, detailed engineering calculations, or quantity surveying compilations have been made. No responsibility, therefore, is assumed concerning these matters. Stantec did not design or construct the building or related structures and therefore will not be held responsible for the impact of any design or construction defects, whether or not described in this report. No guarantee or warranty, expressed or implied, with respect to the property, building components, building systems, property systems, or any other physical aspect of the property is made.

Standard of Care

The assessment outlined in this report generally captured conditions that existed at the time of the site visit. Stantec's opinions and recommendations presented in this report are rendered in accordance with generally accepted professional standards for like services under like circumstances for similar locales. The opinions and recommendations are not to be construed as a warranty or guarantee regarding existing or future physical conditions or regarding compliance of systems / components and procedures / operations with the various regulating codes, standards, regulations, ordinances, etc.

Project Team
August 18, 2016

Project No.: 116542032

2.0 PROJECT TEAM

The following Stantec personnel were used for the completion of the updated PCA in 2016, and preparation of the PCA report. The qualifications of each Stantec team member are attached to this report in Appendix D.

Jennifer Razzo

Site Assessor
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Christopher Bishop

Technical Reviewer
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The following Stantec personnel were used for the completion of the original PCA in 2014, and preparation of the PCA report. The qualifications of each Stantec team member are attached to this report in Appendix D.

Alan Hocking, C.Tech.

Generalist Assessor
Phone: (403) 781-4111
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Mike Plomske, P.Eng.

Technical Reviewer
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The following Stantec personnel provided an analysis of the structural design of the Wabamun Arena to assist in the completion of the PCA.

Cameron Franchuk, M.Sc., P.Eng.

Structural Assessor
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Robert Bourdages, P.Eng.

Structural Reviewer
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Fax: (780) 917-8588
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The complete deliverable prepared by Mr. Franchuk, in 2014, is included in this report under Appendix A.

3.0 PROPERTY DESCRIPTION

The Wabamun Arena is located on the north side of 52 Avenue, east of a continuation of 49 Street (49 Street does not extend northward through the site which contains the Arena). The municipal address is 4820 – 52 Avenue. The Arena's site is shared with an elementary school, accessed from the site's northern boundary, 54 Avenue. Several residential properties are located randomly around the site, which is otherwise generally grass-covered. The Arena, including two of the change rooms was reportedly developed in approximately 1972, with the refrigeration/operations area added in 1974 and an extension to the change rooms and the concession added in the 1990's.

The rink area has an arch roof with a flat (low slope)-roofed section on its south side, which houses the ice plant, a drive-through garage, change rooms, a concession and entrance way. The arch roof is covered by a corrugated galvanized steel assembly with a 4" layer of rigid insulation installed over existing asphalt shingles, over a tongue and groove wood deck supported by wood trusses. There are two underlying support structures for the low slope roof areas: one, supported by a wood roof deck, in turn supported by glue-laminated wood beams; and the refrigeration/operations area which has a steel roof deck, supported by open-webbed steel joists. The Arena's concrete masonry block exterior walls are painted.

The rink area contains bleacher seating and rink boards with the main surface being concrete, which covers refrigeration piping, extending from header trenches, beyond both ends of the rink. Concrete slabs-on-grade are provided between the rink boards and the exterior walls on the north and south sides of the rink. The flat-roofed section of the Arena has a slab-on-grade throughout. The area of the Wabamun Arena could not be confirmed.

Salient Photographs



Wabamun Arena

4.0 MAJOR BUILDING SYSTEMS ASSESSMENT

The following subsections describe the findings of our visual walk-through assessment of the arena property on June 10, 2014, and July 28, 2016, and our discussions with site representatives. Our events and corresponding opinions of probable costs are summarized and tabulated in the Opinions of Probable Costs (OPC) Table, which is attached to this report as Appendix B.

Access to all areas of the site was made available at the time of the site visit. The Arena roof was visually assessed from a platform lift in 2014. Sections of the metal roof were viewed with binoculars in 2016; however the flat roof was not accessed.

4.1 BUILDING STRUCTURE

4.1.1 Building Foundations

Description

Wabamun Arena

The foundation system for the Arena is unknown. There is an interior concrete slab-on-grade with an in-slab cooling system. Structural drawings were not available for review during the assessment. The exterior concrete masonry unit wall on the north side of the building was constructed on a cast-in-place concrete frost wall, which was partially below grade.

Findings / Recommendations

Wabamun Arena

Minor surface cracking and heaving was noted in the rink slab. More extensive cracking was noted at the Zamboni's entrance to the rink surface. In 2014, Mr. McKinnon indicated that these cracks appear to be getting worse over time. Cracking was still evident during our site review in 2016. It is recommended that the Zamboni entrance floor cracks be repaired as follows:

- Remove all loose slab material by light jackhammering
- Fill the crack with fine sand.
- Provide foam backing rod and flexible sealant to close the crack.

The rink slab indicated heaving in the centre of approximately 4". This was reported to create challenges in ice making and maintenance and also challenges use of the rink in the summer season. Water ponding was observed on the slab surface during our 2016 review.

Stantec was provided with an August, 2012 report which showed that the ground beneath the slab is frozen to a depth of approximately 4 feet. Current standard practice is to provide insulation below rink slabs to prevent the creation of deep frost pockets. Given the age of the building and the above observations, it is likely that there is no insulation below the rink slab.

If remediation of the slab slope is deemed to be necessary, options include the following:

- Thaw the frost below the slab through the insertion of heating loops. These loops could be temporary or permanent and could be installed either vertically through the slab or horizontally drilled from the outside of the building. Although this will reduce the movement in the slab, it is unlikely that the existing heave will be completely eliminated.
- Overlay a bonded concrete topping on the slab to provide a flat surface. This requires careful surface preparation by a qualified contractor to ensure that the topping does not delaminate from the rink slab. Due to the additional slab thickness and therefore increased distance from the glycol loops to the ice, the ability of the ice plant to keep the ice frozen would need to be evaluated.
- Remove and replace the slab. This requires removal of the existing slab followed by thawing of the deep ice pockets through active heating. Once thawed, the subgrade would require moisture conditioning and re-compaction. An upgraded slab assembly including insulation and possibly a permanent heating loop below the insulation would then be provided. It is possible that this work could be completed in a single off-season, but it is recommended that a contractor be contacted to explore this option.

As these methods vary in scope and cost, pricing is not included for all options. For budgeting purposes, a cost allowance has been included for complete removal and replacement of the slab, with upgraded insulation and heating loops.

The floor slabs in the non-ice areas of the arena also showed signs of heaving and settlement, particularly in the southwest corner of the arena. A drop of approximately 4"-5" over a length of 18' was observed at the west end of the bleachers. Cracks and settlement were noted throughout the slabs along the west end of the building.

Dampness and interior paint delamination were noted along the entire length of the north concrete frost wall. Vertical cracks were observed in several locations along the exterior surfaces of the wall, and it is likely that water is entering the wall system. Buckling of the floor tiles was also observed in the team bench areas along the north wall. Funds have been allocated for excavation, waterproofing, and insulating the exterior surface of the north frost wall.

Suspected mold growth was observed on a large area of the arena floor surface, at the west end of the bleachers. It was not confirmed if the suspected mold growth extended below the bleachers, but this should be confirmed during the cleaning process. Additional suspected surface mold was observed in the main mechanical room. We were advised that the room has

been used regularly for empty bottle storage, which may contribute to mold growth. Immediate cleaning and remediation of both areas is recommended as maintenance. The mechanical room should not be used for storage.

The following events have been included in the OPC table.

Event Year(s)	Event Description	Opinion of Probable Cost
2016	Repair floor cracking at Zamboni entrance to rink	\$ 3,000
2017	Allowance to remediate the rink slab. Cost included for full removal and replacement with insulated slab and heating loops	\$ 750,000
2016	Seal cracks, waterproof and insulate the sub-grade north-end frost wall	\$ 18,000

Salient Photographs



Cracked slab at Zamboni entrance to rink



View of cracks in exterior concrete frost wall



Typical longitudinal cracks in ice rink slab



View of suspected mold growth near bleachers

4.1.2 Building Superstructure

Description

Wabamun Arena

The structural system for the rink area is as follows:

- Metal standing seam roofing
- 4" rigid insulation
- Asphalt shingle roofing
- 7" wide tongue and groove S-P-F wood decking
- 2x12 wood joists at 24" on centre
- Glulam bowstring trusses at 19'-4" on centre
- 8" nominal load-bearing concrete masonry block walls with 20"x20" nominal masonry columns at truss bearing points

The single storey section appears to have been constructed in three phases:

- The change room and concession area appears to be original to the building and is constructed of glulam beams on load-bearing concrete masonry unit walls.
- The ice plant and Zamboni room are constructed with a steel deck and open web steel joist roof on load-bearing concrete masonry unit walls.

- The extension on the south of the building, containing portions of the west and east change rooms, concession and office is presumed to be constructed with a steel deck and open web steel joist roof on load-bearing concrete masonry unit walls. The underside of the roof deck was concealed by an interior gypsum board finish.

Findings / RecommendationsWabamun Arena

The load-bearing concrete masonry unit (CMU) walls are in generally fair to good condition. It was reported in 2014 that the Arena was recently sand-blasted then painted and the exterior CMU walls were damaged in the process. Damaged CMU's were observed at the wall base at the southeast corner of the building, and various other locations around the perimeter of the building. It is likely that freeze-thaw cycles have, over time, reduced the strength of the masonry blocks to the point where the sand-blasting operation was able to remove significant portions of the masonry units.

During our 2016 site visit, step cracking observed in several locations around the building, with the most severe cracking located above the southwest arena exit doors. The cracking was observed from both the interior and exterior of the building. This may indicate settlement of the foundation in that area of the building.

It was also observed during our 2016 site visit that there was a separation of the CMU walls between the 1990's addition and the 1974 section of the single storey portion the building at most exterior and interior wall connections. The block work of the 1990's addition appears not to have been mechanically tied into the original building, and gaps ranging from hairline to approximately ½" were observed on interior and exterior walls. Daylight was observed through the east wall connection from within the east change room. Sealing of cracks is recommended as immediate maintenance, as water infiltration has been reported. The wall areas should be monitored for further movement.

A repair program should be put into place as follows:

- Identify degraded masonry units by hitting lightly with a hammer.
- Remove exterior face of degraded units. Do not simultaneously remove units within 2 m of each other.
- Infill the unit with concrete or non-shrink grout suitable for exterior applications. Ensure infill material contains 4-7% entrained air.
- Provide a new CMU face shell over the repair to match the existing wall.
- Clean and patch mortar joint cracks around the perimeter of the building with a cementitious mortar. Repaint repaired areas to seal patches.

The drain at the southeast corner of the building should be extended and a splash pad provided to prevent future degradation of the wall. Where the CMU blocks are not severely degraded, the face shell of the blocks can be replaced for aesthetic purposes, if desired.

Note that the existing corefill material may possess carcinogenic properties and should be tested prior to any work being completed.

These repair events have been included in the Building Envelope section of the OPC table.

4.2 BUILDING ENVELOPE

4.2.1 Exterior Walls

Description

Wabamun Arena

The exterior walls of the Wabamun Arena are constructed with concrete masonry units (CMU's). The walls have painted exterior and interior finishes. It appears that the walls contain an insulating material consistent with Vermiculite, a bead-like product used in the time period when the Arena was constructed, to fill CMU walls.

Findings / Recommendations

Wabamun Arena

The exterior walls of the Arena had been painted a short time prior to Stantec's 2014 site visit. CMU's are typically porous and the paint finish is a critical element in keeping driven moisture out of the wall assembly. The condition of the paint finish, prior to this application is unknown. The paint applied to the concrete block and mortar are most likely trapping moisture and causing damage to the concrete block. Additional funds should be budgeted for future replacement of damaged blocks and repointing. The paint should be removed and a breathable paint of elastomeric coating should be applied. Budget funds should be provided every five to ten years as a maintenance activity for in-house staff to repaint the exterior walls. Exterior surfaces should be prepared for re-painting to maximize its effectiveness. Allowances are provided in the Opinion of Probable Costs (OPC) table for subsequent re-painting.

As noted above, several concrete masonry units were degraded at the time of our previous site visit. These areas of exterior walls have further deteriorated since 2014. Additional cracking and delamination of paint finishes and growth of organic material at the edges of the paint was observed around the perimeter of the building. An open section of the block wall in the Zamboni storage room was filled with a painted piece of expanded polystyrene. The material has begun to degrade, and it is not adequately sealed against the weather. An additional

location with missing block was noted at the west arena wall, at the south corner of the roof line. These spaces should be filled in with concrete masonry units and repainted. It was observed from the inside of the building, that the top row of CMU units at the northwest end had cracked mortar. Repairs should be conducted in the short term.

Assuming the wall assembly is insulated with Vermiculite, there are potentially several problems. This type of insulation typically settles inside wall cavities by about one-third by volume, so it is likely that in cold weather a frost line is visible on the upper portions of the outside walls. As well, Vermiculite can be an asbestos-containing material, so any leakage from wall cavities should be handled with appropriate safety precautions. Vermiculite was noted on the floor of a service room adjacent to the Arena's exterior wall, in the southeast corner. It is recommended that the material be tested to determine the presence of asbestos. Lastly, this material is not an effective insulator and if it has been compromised by moisture from the outside, it will have little remaining insulation value. It is recommended that insulating the inside surface of the exterior walls with high density foam be considered as an optional repair. If this is undertaken, the insulation should be protected with a paneling that is resistant to the impact of hockey pucks, as well as gypsum board. Qualified personnel should be retained to provide options for completion of this work. An allowance for optional repair is provided in the OPC table for this work.

The following events have been included in the OPC table.

Event Year(s)	Event Description	Opinion of Probable Cost
2019 & 2024	Repaint the Arena exterior walls	\$ 30,000
2016	Test for the presence of asbestos in all Arena	\$ 3,000
2016	Repair damaged and missing Arena CMU's and repoint mortar joints (approximately 50% of the exterior)	\$ 18,000
2016	Insulate the inside surface of the Arena exterior walls and finish with a puck resistant material (Optional) (Note: pricing includes gypsum board; an upgrade to a puck resistant material is required)	\$ 125,000

Salient Photographs



Detail of step cracking above southwest arena exit door



Deterioration of Arena CMU's at drainage pipe

View of unsealed wall area at Zamboni bay

4.2.2 Exterior Windows and Doors

Description

Wabamun Arena

The Arena has a pair of partially glazed steel doors set in steel frames to provide entrance to the building from the south side. There are two single steel doors in steel frames which provide staff entrance to the concession and the equipment storage area, respectively. Exiting from the rink is provided by pairs of steel doors in steel frames located at its southwest and southeast corners and single steel doors in steel frames at the northwest and northeast corners of the rink. A pair of windows, which are two, single pane glazing units set in a single steel frame are provided in the Arena office, on the west side of the main entrance.

There are three exterior overhead doors, two on the south side of the building and one at the west end of the rink. The west door appeared to be manually operated. One of the south side doors provides exterior access to the Zamboni bay, and one provides exterior access to the refrigeration equipment. There is also one interior overhead door which provides access from the Zamboni bay to the ice surface. The service area overhead doors were installed with motorized openers.

Findings / Recommendations

Wabamun Arena

Entrance and exit doors serving the Arena appeared to be in fair to poor condition. Their age could not be determined, however, in general they appeared to be providing the function for which they were intended. One of the main entry doors had been recently vandalized and was

out of service. It is presumed to be scheduled for repair within the operations and maintenance budget. The fire exit doors at the northeast and west corners of the arena were difficult to open, had damaged hardware and closers, and present a potential hazard in the event of emergency. It is anticipated that some of the doors receive more wear than others and that the problem with the rink floor may impact the ongoing serviceability of some doors. Some door frames displayed rust and will likely require replacement in the long term of the evaluation period. Weather stripping associated with all doors was in poor condition and needs to be replaced in the short term. An allowance is provided to replace weather stripping and includes miscellaneous replacement of door hardware as may be required in the short term.

The overhead doors appeared to have surpassed their Expected Useful Life but remain in functional, but fair to poor condition. The doors at the east and west ends of the rink do not appear to close properly because of the effect of the frost bulb on parts of the foundation wall. The wood frame at the west overhead door was in poor condition. These two doors have a significant amount of damage to their top panels because of puck impacts. It is assumed that solutions for the frost bulb issues will also address the ability of the rink overhead doors to close effectively, however an allowance is provided for replacement of door panels and weather stripping on all the overhead doors. It was not confirmed if the door opener motors were operational, but based on age, they have surpassed their expected useful life. Funds have been included for replacement of all overhead doors within the scope of the evaluation.

One of the window panes at the office window had been recently vandalized. It is presumed to be planned for repair within the operations and maintenance budget.

The following events for windows and doors have been included in the OPC table.

Event Year(s)	Event Description	Opinion of Probable Cost
2016	Replace weather stripping on all Arena exterior doors including overhead doors; Allow for as-required replacement of door panels	\$ 8,000
2016	Allowance to replace four fire exit doors and frame parts in the arena	\$ 8,000
2019	Allowance to replace overhead door and frame parts , including motors	\$ 20,000

Salient Photographs



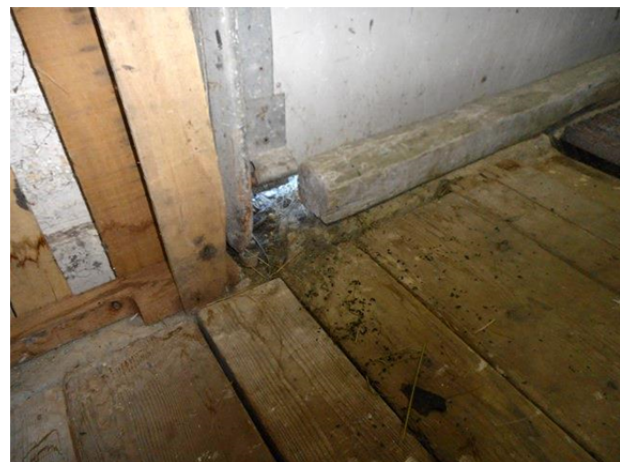
Exit door frame is rusted



Upper portion of overhead door has a significant amount of puck damage



Gap under door is typical of most service doors in the Arena



Gaps observed at base of west overhead door

4.2.3 Roof Assemblies

Description

Wabamun Arena

The Wabamun Arena has a profiled, galvanized steel roof covering the rink portion of the building, with a built-up asphalt membrane roof (BUR) assembly, with gravel ballast which covers the change room, concession and operations portion of the building. Both are assumed to date from the original construction in 1972 and 1974, and are 42 to 44 years old in the current year (2016). The BUR roof installed over the newer extension dates from the early 1990's and is thus approximately 26 years old. Storm water flows off the sloped sides of the rink into a system of metal gutters and downspouts which direct the moisture to ground level on the building's north side and the storm water management system associated with the low slope lower roof, on the south side. Where flashings were missing, the arched metal roof was observed to cover a 4" layer of rigid insulation above asphalt shingles installed on the tongue and groove roof deck.

Findings / Recommendations

Wabamun Arena

The two Arena roof sections were assessed remotely from a platform lift in 2014, and were not viewed directly during the most recent site visit. The steel roof was viewed with binoculars and the BUR roof was not viewed.

The steel Arena portion of the roof is near the end of its EUL but appears to be performing as intended, with no reported leaks. However, in 2014, water damage was observed in the Arena, at one location adjacent to the south side of the building. A section of the lower edge of the metal roofing had become detached from the structure, in the same area as where the water damage was evident. It was reported to have been repaired prior to our review in 2016, but the underlying structure had not been replaced. Given the poor condition of the metal fascia, it is possible that the rim joist has experienced degradation due to water infiltration. It is recommended that the fascia be removed and the rim joist be inspected. Replace the rim joist if required and re-fasten the metal roofing with compatible anchors / lag screws.

Wood fascia and soffit installed on the arena roof showed signs of deterioration, and were in poor condition. The paint finish was poorly adhered to the wood elements. Birds appeared to be nesting in the south west portion of the arena soffit.

Flashings on the east end of the building were missing in several areas and should be replaced. At the time of our review in 2014, the gutter system on the north side of the building appeared to be dirt-filled and should be periodically cleaned to allow for proper roof drainage. The gutter system on the south side of the rink appeared to be missing from the section above the low

slope section of the building. The gutter issues appeared to have been subsequently resolved before our review in 2016.

The low slope BUR roof, at approximately 26 and 44 years of age (2016) has exceeded its EUL and is presumed to remain in poor condition. At the time of our review in 2014, the underlying bitumen flood coat was breaking down due to age and blueberries (small beads of asphalt) were pooling in several areas. As the roof was not assessed directly, it could not be determined whether there is any insulation present and if any of the substrate was water-damaged. The roof structure east of the building entrance is steel and west of the entrance is wood tongue and groove lumber, supported by glue-laminated beams. No evidence of water stains was observed in this area. Water leaks were reported to be occurring at the junction between the 1972 roof, and the 1990's roof. Water staining was evident on the underside of the concrete blocks below that roof area, in the change rooms.

Replacement of the arch-shaped roof on the Arena will not likely be critical within the ten-year evaluation period. Repairs to the low-slope roof are required immediately. The work will include the addition of a gutter along the south side of the rink, to keep some of the storm/melt water from pooling on the low slope roof deck as well as repair of leaks as required. Replacement of the low slope roof in the short term is recommended, and the addition of insulation may be required. Qualified personnel should determine the composition of the roof assembly through cut tests and whether there is any damage to the wood roof deck.

The following events have been included in the OPC table.

Event Year(s)	Event Description	Opinion of Probable Cost
2016	Conduct miscellaneous roofing repairs over the Rink and Change Room/Concession area	\$ 5,000
2017	Allowance for replacement of the wood soffits and fascia on the arena.	\$ 8,000
2017	Allowance for replacement of the low slope roof system of the Arena. No allowance for the addition of insulation is included.	\$ 50,000

Salient Photographs



Arena's arch-frame roof at west end



Low slope, built-up roof over change room/concession area of Arena



Missing fascia and exposed rigid insulation at east end of arena

4.3 INTERIOR ELEMENTS

Assessment of the interior elements of the Wabamun Arena was not part of the scope of the assessment.

4.4 MECHANICAL SYSTEMS

4.4.1 Plumbing

Description

Wabamun Arena

Mechanical site services for the Wabamun Arena include sanitary, natural gas, and domestic water. A 20 mm (¾") domestic cold water line enters the building in the Concession area and includes a water meter. A second source to feed the operations area of the Arena was not observed. No cross-connection control device (i.e., back-flow preventer) was observed on the domestic cold water supply. Where visible, domestic water piping was observed to be copper.

Sanitary sewer piping was not visible during the site visit and could not be visually assessed. Exterior natural gas piping is composed of black iron pipe, and serves roof-mounted air handling units, water heaters, furnaces and a radiant heating system located above the spectator viewing area.

An electric 175 litre water heater manufactured by GSW provides a heated water supply for the concession. Two Bradford White gas water heaters, each with 302 litres of capacity are located in the main mechanical room. Although they were reportedly used for ice resurfacing, it could not be confirmed whether they were the source of hot water for the change room showers.

Plumbing fixtures in the washrooms, change rooms, concession and custodial closet are a variety of standard residential and commercial grade models.

In the Ice Resurfacing Machine bay, there is a drainage pit to accommodate snowmelt from the resurfacing operation. It is assumed the main portion of the snow from resurfacing is dumped outside. The pit has a drain to the sanitary sewer but does not have a heating system.

Findings / Recommendations

Wabamun Arena

Where visible, domestic water distribution piping in the building appeared to be in good condition. Where original, the piping is approximately 44 years old and has reached its EUL. In the short term, a study of the condition of the piping and related devices should be considered to determine the circumstances for replacement. No allowance for the study is provided as this will be required outside the evaluation period.

Generally, back-flow prevention devices are not required for water services outside of Alberta's large municipalities, however the requirements for Wabamun should be confirmed by the Authority Having Jurisdiction. Installation should be considered as a best practice as they prevent cross-contamination between the building and the municipal water supply. As this is optional, no allowance is provided in the OPC table.

Exterior natural gas piping appeared to be in good condition; however identification of the piping, typically done with yellow paint is a Code requirement. The cost for painting of the piping, inside and outside the building is anticipated to be less than the cost threshold for this assessment and no allowance for the work is provided.

The water heaters appeared to be functioning as intended. The age of the two Bradford White units were determined to be 2011, based on the serial numbers, and they are not expected to exceed their EUL within the next ten years, however they have been requiring frequent repairs, so funds have been included for replacement within the evaluation period. The Concession's water heater was manufactured in 2009 and will thus reach its EUL at the end of the Evaluation Period. As the Concession's water heater is only used seasonally, replacement within the next ten years is unlikely.

Plumbing fixtures were of mixed vintage but appeared to be functioning as intended. Replacements of plumbing fixtures will take place as required, and costs are assumed to be less than the threshold for this assessment. Several sink fixtures have been replaced with residential models since the 2014 review.

During the 2016 review, it was reported that there was a leak in the wall behind the west showers along with damaged shower heads and handles. This is expected to be handled as a maintenance item.

The following event has been included in the OPC table.

Event Year(s)	Event Description	Opinion of Probable Cost
2024	Replace two hot water heaters	\$ 4,000

4.4.2 Heating, Ventilation and Air Conditioning

Description

Wabamun Arena

The rink area portion of the building is mainly unheated, however roof-mounted radiant heating units are directed at the spectator viewing area. A wall-mounted exhaust fan is provided at the east end of the building near the roof, for rink ventilation.

The Refrigeration Plant bay has two electric, roof-mounted unit heaters, one of which is disconnected. There is also a small, through-wall exhaust fan on the east wall of this room. Immediately west of the Refrigeration Plant is a bay where the ice resurfacing machine passes through from the rink to the building exterior. A gas-fired ceiling-mounted Lennox garage heater has been installed in this area since the last site visit in 2014.

The Change room/Concession area of the Arena is heated by two "Carrier" natural gas-fired, forced air furnaces, which supply heated air via sheet metal, above-ceiling ducts. Small rooftop exhaust fans serve the change rooms.

The Concession appears to be heated by the furnace system. The Concession also has cooking equipment present and a commercial-sized exhaust hood. The Arena has no air conditioning system.

The equipment storage room, accessed through both the east change room and an exterior door, is heated by a Lennox natural gas-fired furnace, which may have been installed since the last site visit in 2014.

Findings / Recommendations

Wabamun Arena

It was reported that the radiant heating system serving the rink seating areas was installed within the last several years. It is reportedly functional but spectators previously provided feedback that it was ineffective. No further details were available. The installation contractor should be consulted to confirm that the system is working as designed. During the 2016 review, it was reported that the gas line to the heaters was replaced within the past year, and one fan has been repaired.

The age of the two furnaces serving the change rooms and concession was not confirmed but they are estimated to be 10 to 15 years old, based on appearance, equipment EUL and age of the Arena. At that effective age they will reach the end of their EUL at the end of the ten-year evaluation period. An allowance for replacement of the two furnaces is included in the OPC table. The furnace servicing the equipment storage room is presumed to have been installed

after 2014, and is not expected to reach its EUL or require replacement within the evaluation period.

There is a ceiling-mounted sheet metal duct run through the Zamboni Room that is damaged in at least three places. Two of the damaged areas are ineffectively taped as repairs and a rooftop duct, which appears to be part of the same system, has been crushed. It is assumed that this duct system forms a necessary part of the Operations area's ventilation system and the system should be repaired. An allowance is provided for this purpose.

The ceiling-mounted Lennox garage heater, installed in the Zamboni bay, appeared to have been manufactured in 2008, based on the serial number, however, it is presumed to have been installed since the previous review in 2014. It is not expected to reach its EUL or require replacement within the evaluation period.

There does not appear to be a rooftop exhaust fan of an appropriate size, related to the Concession equipment. As well, there was no make-up air equipment observed, to off-set the exhaust that should be provided for the concession, change rooms and washrooms. The Arena ventilation system was reported to be inadequate, and there is no dehumidification system installed. It was reported in 2016, that condensation forms on the Arena ceiling while the ice is being installed, and drips on the ice. The refrigeration room was also reported to be without adequate ventilation.

It is recommended that a Mechanical designer review the HVAC equipment that is in place at the Arena, in entirety. The purpose of this review would be to confirm that all necessary HVAC equipment for a safe operation is in place and that individual components are functioning as they should, and that no products of combustion are being circulated instead of being exhausted.

Consideration should also be given to removing the non-functioning unit heater from the refrigeration bay, however this would be a maintenance activity and no allowance is provided in the OPC table.

The following events have been included in the OPC table.

Event Year(s)	Event Description	Opinion of Probable Cost
2016	Provide a review of the entire building's HVAC to ensure there are no safety hazards and that the desired performance is being achieved	\$ 7,000
2016	Repair or replace the Zamboni bay area sheet metal ducts	\$ 3,000
2022	Allowance to replace the Arena furnaces	\$ 12,000

Salient Photographs



Damaged Arena HVAC duct



Arena furnaces

4.4.3 Fire Protection

Description

Wabamun Arena

The Wabamun Arena is an unsprinklered building and no standpipe system including fire hoses was observed. No fire alarm system is present and no detection devices were observed. Horns as annunciation devices were observed. Protection is provided by hand-held fire extinguishers and a chemical-based fire suppression system, associated with the range hood which is installed in the Concession.

Findings / Recommendations

Wabamun Arena

Several fire extinguishers were observed and the several devices checked had current certification. Another device located in the canteen area was not wall-mounted as required by

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the 2006 Alberta Fire Code. Certification of the Range Hood's fire suppression system was not current. It was reported that the system was no longer chargeable and required replacement. An allowance has been included for replacement of the fire suppression system in the canteen.

It is assumed that the Wabamun Arena was approved for occupancy following original construction and after any subsequent renovations. It is recommended that the Arena be reviewed for fire safety by either the regional or local Authority Having Jurisdiction. As well the fume hood's suppression system should be recertified prior to any further use and the hood itself and exhaust system should be cleaned by qualified personnel, if required.

Additionally there are a number of operational areas that should have storage items cleaned up and organized so that staff evacuation routes are clear should an emergency arise.

It is assumed that most of the noted repair requirements can be completed as maintenance activities, at costs below the threshold for this assessment project.

The following event has been included in the OPC table.

Event Year(s)	Event Description	Opinion of Probable Cost
2016	Allowance for replacement of canteen fire suppression system	\$ 3,000

Salient Photographs



View of fire suppression system in canteen



Nets are blocking fire Exit doors

4.5 ELECTRICAL SYSTEMS

Description

Wabamun Arena

The Wabamun Arena has a 400 Amp, 600 Volt, 3 Phase, 4 wire electrical service, which is fed overhead from a cluster of pole-mounted transformers, located southeast of the Arena. The service includes a main disconnect switch, and a distribution panel which in turn feeds the refrigeration plant and mechanical equipment as well as a transformer which reduces the voltage for plug loads and lighting. Lighting in the building is provided by a low intensity discharge (LED) fixtures in the rink and T-12 fluorescent fixtures in the change room/lobby portion of the building. Exterior lighting is LED flood-light style fixtures.

Emergency lighting is provided by battery-powered wall packs with low voltage light heads. Exit light fixtures have incandescent bulbs.

Findings / Recommendations

Wabamun Arena

The electrical system equipment does not appear to be original although its age could not be confirmed. The transformer is surrounded by storage items, which is a contravention of the Canadian Electrical Code which requires 12 inches (300 mm) of clearance on all sides. The area should be cleaned up as an immediate action item and periodic infrared scans of electrical equipment should be conducted as part of general maintenance to check for loose connections or deterioration.

The LED light fixtures in the arena and on the outside of the building were reported to be installed in 2016. T-12 lighting equipment is no longer commercially available and although partial replacements may be possible, consideration should be given to the replacement of the entire T-12 lighting system with available technology, which would also be more energy efficient. An allowance is provided for this purpose. Some Exit lights appeared to be unlit, and one fixture in the arena was damaged. A number of battery packs were non-operational when tested. All arena battery packs and emergency lights were reported to be non-operational.

The following events have been included in the OPC table.

Event Year(s)	Event Description	Opinion of Probable Cost
2016	Replace T-12 lighting equipment in the Arena Change Rooms/Concession	\$ 30,000
2016	Replace emergency lighting and battery packs throughout the arena	\$ 18,000

Salient Photographs



View of emergency lighting in arena; battery packs reported to be non-functional



View of damaged Exit light in arena

4.6 REFRIGERATION SYSTEMS

Refer to Appendix C for the Wabamun Arena Ice Plant Life Cycle Report and Capital Plan Recommendations, provided by ThermoCarb Ltd, on August 16, 2016. Replacement event details are included therein.

5.0 OPINIONS OF PROBABLE COST

Events and corresponding opinions of probable costs (in current value dollars) that are expected over the next ten (10) years are summarized and tabulated in the Opinions of Probable Costs Table, which is attached to this report as Appendix B. The total opinions of probable costs by event type (as previously defined in this report under Section 1.4.3) are presented in the table below.

Total Opinions of Probable Cost by Event Type

Event Type	Total Opinion of Probable Cost
Immediate Repairs	\$ 45,000
Deferred Maintenance	\$ 97,200
Lifecycle Replacement	\$ 1,280,000
Optional Repairs	\$ 175,000
Grand Total (Excluding Optional Repairs)	\$ 1,422,200

The Grand Total presented above does not include Optional Repairs, Site Improvements or Interior Elements as they were excluded from the scope of work. The Grand Total does include repairs to the floor of the rink, and the most extensive repair method has been suggested to use as budget pricing for planning purposes.

6.0 DOCUMENTS REVIEWED AND INTERVIEWS

6.1 SITE REVIEW

The initial walk-through review of the site was conducted by Stantec on June 10, 2014. The Stantec staff members present during the site visit included Alan Hocking, C. Tech. and Cameron Franchuk, M.Sc., P.Eng. A second visual walk-through of the Arena was conducted by Stantec on July 28, 2016. The Stantec staff member present during the site visit was Jennifer Razzo, Facility Assessor.

The weather at the time of the 2016 assessment was sunny, with the ambient temperature averaging 20 degrees Celsius.

6.2 DOCUMENTATION REVIEW

Stantec requested relevant documentation from the Client that could provide knowledge of the property's physical improvements, extent and type of use, and/or assist in identifying material discrepancies between reported information and observed conditions. Stantec's review of documents provided does not include commenting on the accuracy of such documents or their preparation, methodology, or protocol.

There were no documents available for review with the exception of the following:

Documentation Reviewed

Document Title	Date	Author	Type of Document
ARCA Warranty Ltd.	January 24, 2000	Wade Engineering Ltd.	Roof Warranty
Property Condition Assessment – Wabamun Arena & Jubilee Hall / Library	August 8, 2014	Stantec Consulting Ltd.	Condition Assessment
Wabamun Arena Ice Plant Life Cycle Report and capital Plan Recommendations	August 16, 2016	ThermoCarb Ltd.	Condition Assessment

6.3 INTERVIEWS

The following personnel were interviewed or contributed information that was used in the process of preparing this PCA report:

- Shawn Patience, CAO – Village of Wabamun, AB (2014)
- Craig McKinnon, Building Operator – Village of Wabamun, AB (2014)
- Ian Mitchell, Public Works Foreman – Village of Wabamun, AB (2016)

Closure
August 18, 2016

Project No.: 116542032

7.0 CLOSURE

Stantec has completed a Property Condition Assessment Update of the Wabamun Arena property, in Wabamun, Alberta. The work was performed at the request of the Village of Wabamun, utilizing methods and procedures consistent with customary commercial practice and industry standards. The independent conclusions represent Stantec's professional judgments based on conditions that existed and information and data made available to Stantec during the course of the assessment. Factual information received has been assumed to be correct and complete.

Stantec recommends that this report be reviewed annually so that adjustments may be made to reflect actual costs of work, changes to timing and cost of work expected for coming years.

Should any clarification be required regarding the content or conclusions of this report, please contact the undersigned at the contact information provided below.

Respectfully submitted,

STANTEC CONSULTING LTD.

DRAFT

DRAFT

Jennifer Razzo

Site Assessor

Phone: (403) 569-5383

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Appendix A Wabamun Arena Structural Assessment

Appendix B Opinions of Probable Cost Table

OPINIONS OF PROBABLE COSTS TABLE

Wabamun Arena

Wabamun, Alberta

Item #	Event Description	Event Type	Quantity	Unit	Unit Cost (2016 Dollars)	Event Cost (2016 Dollars)	EVENT COSTS (2016 DOLLARS)										Total Opinion of Probable Cost (10 Years)	
							Immediate 2016	Year 1 2017	Year 2 2018	Year 3 2019	Year 4 2020	Year 5 2021	Year 6 2022	Year 7 2023	Year 8 2024	Year 9 2025		Year 10 2026
4.1 BUILDING STRUCTURE																		
1	Repair floor cracking at Zamboni entrance to rink	Deferred Maintenance	1	Lump Sum	\$ 3,000	\$ 3,000	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,000
2	Allowance to remediate the rink slab and piping. Budget cost included for removal and replacement with insulated slab and subsoil heating system. Price excludes upgraded refrigeration system and controls.	Lifecycle Replacement	1	Lump Sum	\$ 750,000	\$ 750,000	\$ -	\$ 750,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 750,000
3	Seal cracks, waterproof and insulate the sub-grade frost wall along the north end of the building	Deferred Maintenance	1	Lump Sum	\$ 18,000	\$ 18,000	\$ 18,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 18,000
							\$ 21,000	\$ 750,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 771,000
4.2 BUILDING ENVELOPE																		
4	Repaint the Arena exterior walls	Lifecycle Replacement	2	Lump Sum	\$ 15,000	\$ 30,000	\$ -	\$ -	\$ -	\$ 15,000	\$ -	\$ -	\$ -	\$ -	\$ 15,000	\$ -		\$ 30,000
5	Test for the presence of asbestos in concrete masonry units (CMU's)	Immediate Repair	1	Lump Sum	\$ 3,000	\$ 3,000	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,000
6	Repair damaged and missing Arena CMU's and mortar joints	Deferred Maintenance	1	Lump Sum	\$ 18,000	\$ 18,000	\$ 18,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 18,000
7	Insulate the inside surface of the Arena exterior walls and finish with a puck resistant material (Price is for gypsum board)	Optional Repair	1	Lump Sum	\$ 125,000	\$ 125,000	\$ 125,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 125,000
8	Replace weather stripping on all Arena exterior doors including overhead doors; Allow for as-required replacement of door panels	Deferred Maintenance	1	Lump Sum	\$ 8,000	\$ 8,000	\$ 8,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,000
9	Allowance to replace overhead door and frame parts in Arena.	Lifecycle Replacement	1	Lump Sum	\$ 20,000	\$ 20,000	\$ -	\$ -	\$ -	\$ 20,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 20,000
10	Allowance to replace four exterior fire exit doors in Arena.	Immediate Repair	1	Lump Sum	\$ 8,000	\$ 8,000	\$ 8,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,000
11	Conduct miscellaneous roof system repairs over the Rink and Change Room / Concession area	Deferred Maintenance	1	Lump Sum	\$ 5,000	\$ 5,000	\$ 5,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,000
12	Allowance to replace wood fascia and soffit on the arena roof	Lifecycle Replacement	1	Lump Sum	\$ 8,000	\$ 8,000	\$ -	\$ 8,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,000
13	Allowance for replacement of the Arena's low slope roof system (No allowance for the addition of insulation is provided)	Lifecycle Replacement	1	Lump Sum	\$ 50,000	\$ 50,000	\$ -	\$ 50,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 50,000
							\$ 167,000	\$ 58,000	\$ -	\$ 35,000	\$ -	\$ -	\$ -	\$ -	\$ 15,000	\$ -	\$ -	\$ 275,000
4.3 INTERIOR ELEMENTS Interior Elements are not in scope for this project																		

OPINIONS OF PROBABLE COSTS TABLE

Wabamun Arena

Wabamun, Alberta

Item #	Event Description	Event Type	Quantity	Unit	Unit Cost (2016 Dollars)	Event Cost (2016 Dollars)	EVENT COSTS (2016 DOLLARS)											Total Opinion of Probable Cost (10 Years)
							Immediate 2016	Year 1 2017	Year 2 2018	Year 3 2019	Year 4 2020	Year 5 2021	Year 6 2022	Year 7 2023	Year 8 2024	Year 9 2025	Year 10 2026	
4.4 MECHANICAL SYSTEMS																		
14	Allowance to replace the Arena hot water tanks	Lifecycle Replacement	1	Lump Sum	\$ 4,000	\$ 4,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,000	\$ -		\$ 4,000
15	Provide a review of the entire HVAC system to ensure there are no safety hazards and that the desired performance is being achieved	Immediate Repair	1	Lump Sum	\$ 7,000	\$ 7,000	\$ 7,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 7,000
16	Repair or replace the Arena Ops area sheet metal ducts	Immediate Repair	1	Lump Sum	\$ 3,000	\$ 3,000	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,000
17	Allowance to replace the Arena furnaces	Lifecycle Replacement	1	Lump Sum	\$ 12,000	\$ 12,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 12,000	\$ -	\$ -	\$ -	\$ -	\$ 12,000
18	Allowance to upgrade the Arena ventilation system (dependent on results of HVAC review)	Optional Repair	1	Lump Sum	N/A	N/A	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
19	Replace the Canteen Fire Suppression System	Immediate Repair	1	Lump Sum	\$ 3,000	\$ 3,000	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,000
							\$ 13,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 12,000	\$ -	\$ 4,000	\$ -	\$ -	\$ 29,000
4.5 ELECTRICAL SYSTEMS																		
20	Replace T-12 lighting equipment in the Change Rooms / Concession	Lifecycle Replacement	1	Lump Sum	\$ 30,000	\$ 30,000	\$ 30,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 30,000
21	Repair or Replace emergency lights and battery packs throughout the Arena	Immediate Repair	1	Lump Sum	\$ 18,000	\$ 18,000	\$ 18,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 18,000
							\$ 48,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 48,000
4.5 REFRIGERATION SYSTEMS																		
22	Mycom N6A Compressors - Repairs	Deferred Maintenance	1	Lump Sum	\$ 24,000	\$ 24,000	\$ 4,000	\$ -	\$ -	\$ -	\$ 10,000	\$ -	\$ -	\$ -	\$ 10,000	\$ -	\$ -	\$ 24,000
23	Replace C-1 Mycom N6A Compressor	Lifecycle Replacement	1	Lump Sum	\$ 60,000	\$ 60,000	\$ -	\$ 60,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ 60,000
24	Replace C-1 60 hp motor	Lifecycle Replacement	1	Lump Sum	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
25	Replace C-2 Mycom N6A Compressor	Lifecycle Replacement	1	Lump Sum	\$ 60,000	\$ 60,000	\$ -	\$ 60,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ 60,000
26	Replace C-2 60 hp motor	Immediate Repair	1	Lump Sum	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
27	Replace C-1/C-2 Oil demisters	Lifecycle Replacement	1	Lump Sum	\$ 10,000	\$ 10,000	\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,000
28	Replace BAC VCL-079 Condenser	Lifecycle Replacement	1	Lump Sum	\$ 80,000	\$ 80,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 80,000	\$ -	\$ -	\$ -	\$ -	\$ 80,000
29	Repair Condenser sump/pump	Deferred Maintenance	1	Lump Sum	\$ 6,000	\$ 6,000	\$ 1,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,000	\$ 6,000
30	Repair Chiller/surge drum	Immediate Repair	1	Lump Sum	\$ 3,000	\$ 3,000	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,000
31	Replace Chiller/surge drum	Lifecycle Replacement	1	Lump Sum	\$ 80,000	\$ 80,000	\$ -	\$ -	\$ -	\$ -	\$ 80,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 80,000
32	Replace Brine pump	Lifecycle Replacement	1	Lump Sum	\$ 15,000	\$ 15,000	\$ -	\$ -	\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$ 5,000	\$ -	\$ -	\$ -	\$ 15,000
33	Replace Brine pump motor	Lifecycle Replacement	1	Lump Sum	\$ 4,000	\$ 4,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,000	\$ 4,000
34	Allowance for repairs to Brine System	Deferred Maintenance	1	Lump Sum	\$ 700	\$ 700	\$ 100	\$ -	\$ 100	\$ -	\$ -	\$ -	\$ 250	\$ -	\$ -	\$ -	\$ 250	\$ 700
35	Replace Control system	Lifecycle Replacement	1	Lump Sum	\$ 60,000	\$ 60,000	\$ -	\$ 60,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 60,000
36	Allowance to install MCC (Motor Control Centre)	Optional Repair	1	Lump Sum	\$ 50,000	\$ 50,000	\$ -	\$ 50,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 50,000

OPINIONS OF PROBABLE COSTS TABLE

Wabamun Arena
Wabamun, Alberta

Item #	Event Description	Event Type	Quantity	Unit	Unit Cost	Event Cost	EVENT COSTS (2016 DOLLARS)											Total Opinion of Probable Cost (10 Years)
					(2016 Dollars)	(2016 Dollars)	Immediate 2016	Year 1 2017	Year 2 2018	Year 3 2019	Year 4 2020	Year 5 2021	Year 6 2022	Year 7 2023	Year 8 2024	Year 9 2025	Year 10 2026	
37	Ammonia Piping system	Lifecycle Replacement	1	Lump Sum	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
38	Repairs to Brine mains, headers and floor piping	Deferred Maintenance	1	Lump Sum	\$ 9,500	\$ 9,500	\$ 2,000	\$ -	\$ 1,500	\$ -	\$ 1,500	\$ -	\$ 1,500		\$ 1,500	\$ -	\$ 1,500	\$ 9,500
39	Replace Pipe Insulation	Deferred Maintenance	1	Lump Sum	\$ 5,000	\$ 5,000	\$ 5,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,000
40	Replace Relief Valve System	Lifecycle Replacement	1	Lump Sum	\$ 7,000	\$ 7,000	\$ 1,000	\$ -	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$ 3,000	\$ -	\$ -	\$ -	\$ 7,000
							\$ 26,100	\$ 230,000	\$ 14,600	\$ -	\$ 91,500	\$ -	\$ 81,750	\$ 8,000	\$ 11,500	\$ -	\$ 10,750	\$ 474,200

Opinions of Probable Cost presented herein are to be read in conjunction with the Property Condition Assessment report and the limitations contained therein, and are based on our understanding and observation of the system(s) that are currently in place at the properties. There may be additional future repair or upgrade work necessary to satisfy requirements for Authorities Having Jurisdiction, and to maintain building performance.

	Immediate 2016	Year 1 2017	Year 2 2018	Year 3 2019	Year 4 2020	Year 5 2021	Year 6 2022	Year 7 2023	Year 8 2024	Year 9 2025	Year 10 2026	Total Cost (10 Years)
Immediate Repair	\$ 45,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 45,000
Deferred Maintenance	\$ 64,100	\$ -	\$ 1,600	\$ -	\$ 11,500	\$ -	\$ 1,750	\$ -	\$ 11,500	\$ -	\$ 6,750	\$ 97,200
Lifecycle Replacement	\$ 41,000	\$ 988,000	\$ 13,000	\$ 35,000	\$ 80,000	\$ -	\$ 92,000	\$ 8,000	\$ 19,000	\$ -	\$ 4,000	\$ 1,280,000
Optional Repair	\$ 125,000	\$ 50,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 175,000
TOTAL ANNUAL EXPENDITURE (2016 DOLLARS)	\$ 275,100	\$ 1,038,000	\$ 14,600	\$ 35,000	\$ 91,500	\$ -	\$ 93,750	\$ 8,000	\$ 30,500	\$ -	\$ 10,750	\$ 1,597,200

Appendix C Wabamun Arena Ice Plant Report



Wabamun Arena Ice Plant
Life Cycle Report and Capital Plan
Recommendations

THERMOCARB LTD.



REV.0

August 16, 2016

TITLE PAGE

REQUEST FOR PROPOSAL SUBMISSION

CLIENT:	Stantec Consulting Ltd.
REVISION NO:	0
CONSULTANT:	THERMOCARB LTD.
RE:	Wabamun Arena Ice Plant Life Cycle Report and Capital Plan Recommendations
ATTENTION:	David Farkas, C.E.T. Senior Associate
SUBMISSION DATE:	August 16, 2016

CONSULTANT INFORMATION

CONTACT:	ThermoCarb Ltd. 200, 1204 Kensington Road Calgary, Alberta, Canada T2N 3P5
CHIEF CONTACT:	Craig Weller Ph: (403) 262-1051 Cell: (587) 435-3125 Email: craig.weller@thermocarb.ca

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Wabamun Arena Ice Plant
Life Cycle Report and Capital Plan
Recommendations

THERMOCARB LTD.



REV.0

August 16, 2016

LETTER OF
INTRODUCTION

August 16, 2016

Stantec Consulting Ltd.
Phone: (403) 781-5463
Cell: (403) 542-6293
Fax: (403) 716-8049
david.farkas@stantec.com

ATTENTION: David Farkas C.E.T.
Senior Associate

RE: Wabamun Arena
Life Cycle Report and Capital Plan Recommendations

Dear David,

Included is a review of the Wabamun Arena refrigeration and brine piping system based on a visual inspection on July 28th, 2016, document review, and conversation with yourself and facility representative Ian Mitchell. Budget cost estimates have been provided to replace equipment at the end of its life cycle and for plant improvement recommendations.

Yours truly,

Craig Weller





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SYSTEM OVERVIEW

The Wabamun Arena is a single sheet arena with a skid mounted ammonia refrigeration system providing 70 TR cooling capacity. The facility was originally constructed in the early 1970s. The early history of the refrigeration plant is undocumented, however it is believed the existing skid mounted plant was purchased used from Stony Plain. The system uses calcium chloride brine as a secondary cooling fluid which is circulated through the cement slab via a header distribution system. Currently the facility operates from mid September to April and the capacity of the system causes the facility to struggle during times of high ambient temperatures. The system does not include an underfloor heat system which is required to operate a facility year round.

This report is based solely on the visual inspection conducted July 28, 2016, document review and discussions with facility operations. The plant was not operational at the time of the visit. No testing of any kind was conducted. There was a moderate ammonia smell present in the refrigeration room and adjoining mechanical area. The current service provider for the facility is Gateway refrigeration.

EQUIPMENT REVIEW

Compressors: The system uses two Mycom NW6A compressors with belt drive 60 hp motors at 1200 rpm. The compressors are cooled by a glycol loop in the condenser. Oil carry over is controlled by CIMCO oil trap demisters stamped with a date of 1973. Operations provided information that the compressors vibrate excessively when in operation which has led to fittings vibrating loose on the oil separators and causing up to 5 ammonia leaks over the last operating season resulting in approx. \$15,000 in service and ammonia expenses. Gateway has recommended a vibration analysis of the compressors. Angle iron has also been used to brace the oil separators in an attempt to reduce the vibration damage. The compressor bases should be filled with high pressure grout to add mass to the base which should reduce the vibration. The motor on compressor one has recently been replaced although it has had warranty issues since.

Both compressors have reached the end of their usable life and should be considered for replacement. Budget \$120,000 for two new reciprocating compressor packages of similar capacity.

Condenser: The system uses a single BAC model VCL-079 evaporative with a base heat rejection of 1161 MBH. The condenser built in 1997 and is undersized for the September start ups with high ambient temperatures. Overall the condenser appears to be in decent condition with moderate scaling of the coil, but it is approaching the end of it's expected life cycle of 25 years and should be considered for replacement within the next 5 years. Budget \$80,000 for a new condenser of similar capacity.

Condenser Sump: The condenser has a remote sump located in the refrigeration room. The pump was recently replaced and is in good working order. The make up water system float is not operating properly and frequently fails with the valve in the open position causing the tank to overflow. It is recommended that a new float and valve assembly is installed prior to the next operating season in order to minimize water waste.

Condenser Pump: The condenser pump was replaced in 2014 and is in good operating condition. The pump should be considered for replacement in 10 years.

Chiller: The shell and tube cold brine chiller and surge drum is made by Docal and was built in 1997. The chiller is 14 ft x 18 in OD 2 pass chiller. The chiller is insulated with an foam type insulation with no jacket. With proper brine management the expected life cycle of a shell and tube chiller is 20-25 years. The chiller should therefor be considered for replacement in the next 5 years. Budget \$80,000 for a new chiller and surge drum of similar capacity.

The chiller level control system uses a Phillips high side float and pilot actuated valve assembly. The system is not working correctly and operations has been using the bypass to feed the chiller, resulting in inefficient conditions. The float is mounted directly on the condenser drain piping which results in quick level changes within the pipe, the valve actuating more frequently and increased wear on the parts. The float and valve assembly should be repaired and power checked and a float column considered to help reduce the wear on the seals.

Cold Brine Pump: The cold brine pump does not have a nameplate and is of unknown age, make and capacity. It is powered by a 25 hp motor. There is moderate to excessive corrosion on the exterior of the pump body. Corrosion on the exterior of brine pumps is more common on facilities that operate seasonally. The pump body should be cleaned and repainted during shutdown to help reduce future corrosion. The typical life span of a pump is 15 years. The pump should be budgeted for replacement within the next 2-5 years.

Control System: The plant is controlled by a dated electro-mechanical switches control system which should be considered for immediate replacement. Energy savings and safety

improvements can be made with the upgrade of a PLC controls system. Budget \$60,000 for a new PLC control system.

The high voltage motor starters are currently located within the common control panel and not isolated from the 120 V wiring. This creates an unsafe condition when servicing the panel and starters. A motor control center is recommended to isolate each starter in its own cabinet with individual disconnects to allow easier service without shutdown. Budget \$50,000 for a new MCC.

Ammonia Piping: The ammonia piping is in overall good condition. There is paint missing and rust formation on the exterior piping to and from the condenser as well as portions of the interior piping. Each compressor shares a common suction line off the chiller surge drum. Line labeling of the piping is incomplete as required by code. Piping must be labeled as high-side or low-side and whether it is normally in the liquid or vapour state. We recommend a consistent color coding of piping be implemented to help quickly identify process piping.

Brine Piping: The brine mains piping is 6" steel and is in poor condition with peeling paint and surface corrosion. None of the cold brine piping is insulated which reduces the efficiency of the system and causes ice buildup on the piping. This is contributing to the exterior rust on the brine pump. The piping should be cleaned and painted to help reduce future corrosion and 50 mm Styrofoam insulation with a PVC jacket considered to help increase the efficiency of the system and reduce the corrosion issue.

The brine headers are 6" steel and are in poor condition with corrosion and peeling paint. It appears a section of the headers have been replaced. The headers should be budgeted for replacement within the next 10 years. Budget \$40,000 for new headers.

The floor piping is made up of plastic 1" rink pipe. The circuits are connected the header nipples with clamps. There is an accessible return bend trench which allows individual circuits to be accessed if required.

Brine: The brine system is maintained by a filtration system. No brine analysis was available. With proper maintenance brine can last indefinitely.

Relief System: The condenser does not have an up to date relief valve installed which is a code deficiency and safety concern. A new relief valve should be sized and installed on the condenser prior to the start of the next operating season. The remaining relief system valves were replaced in 2013 and are good for 5 years. They will need to be replaced in 2018.

Ammonia Detection: There is one ammonia detection head visible in the room, appropriately located above the chiller. The detector head is connected to the detection display panel on the inside of the refrigeration room. The unit was calibrated in January of 2016, however the panel was displaying fault and not reading any ammonia concentration, despite there being a moderate ammonia smell present. Operations believes the unit was hit with high levels of ammonia concentrations as many as 4 times since calibration. The unit should be recalibrated before the start of the operating season.

Code Compliancy: The system was reviewed for B52-13 refrigeration code compliancy;

- Required signage for the system is not posted.
- The refrigeration system does not have a switch to shut down the system from outside the room in case of an emergency which is required. The switch is to be located immediately outside the door.
- The ventilation system does not appear to meet code for air flow based on the size of the unit. No switch, (on a breaker separate to refrigeration system), to manually start the ventilation system from outside the room was observed which is required.
- Heaters have been added to maintain the room temperature. No surfaces above 800F are permitted in the room.
- The room envelope does not appear to be fire stopped at all pipe penetrations.
- The room does not have a vestibule where it accesses the indoor space.
- As stated in the piping review, line labels are incomplete and should be brought up to the described standard.

LIFE CYCLE/BUDGET ESTIMATE

Life cycle budget estimates are based on industry knowledge and are to be used for budgetary purposes only. Actual costs may vary from estimates. See Appendix 2 for complete equipment break down.



Wabamun Arena Ice Plant
Life Cycle Report and Capital Plan
Recommendations

THERMOCARB LTD.



REV.0

August 16, 2016

APPENDIX 1

APPENDIX 1: SITE PHOTOS



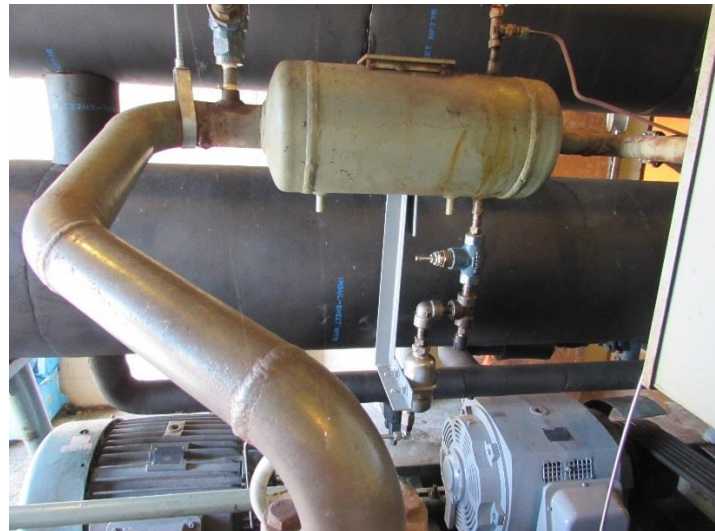
1. Skid mounted system



2. Original Mycom NW6A compressor



3. Mycom NW6A nameplate



4. CIMCO oil separators with bracing to reduce vibration of liquid drainer.



5. CIMCO gas detector showing fault



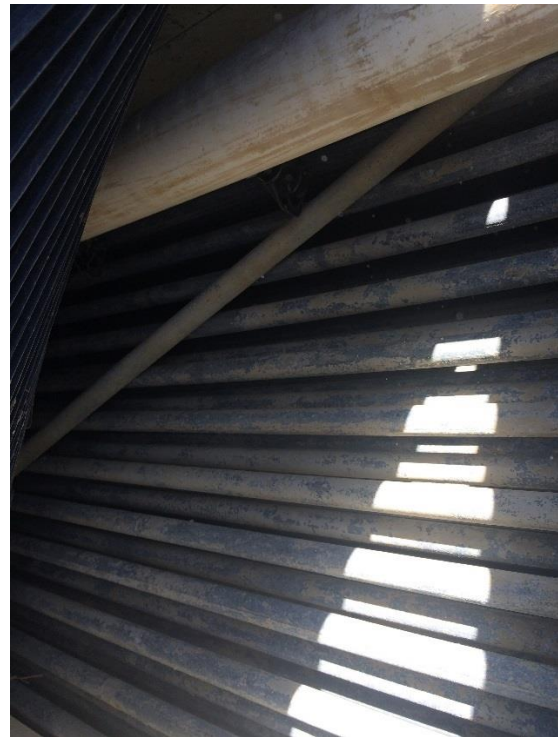
6. Outdated control system



7. Undersized BAC evaporative condenser.



8. Condenser piping showing missing relief valve.



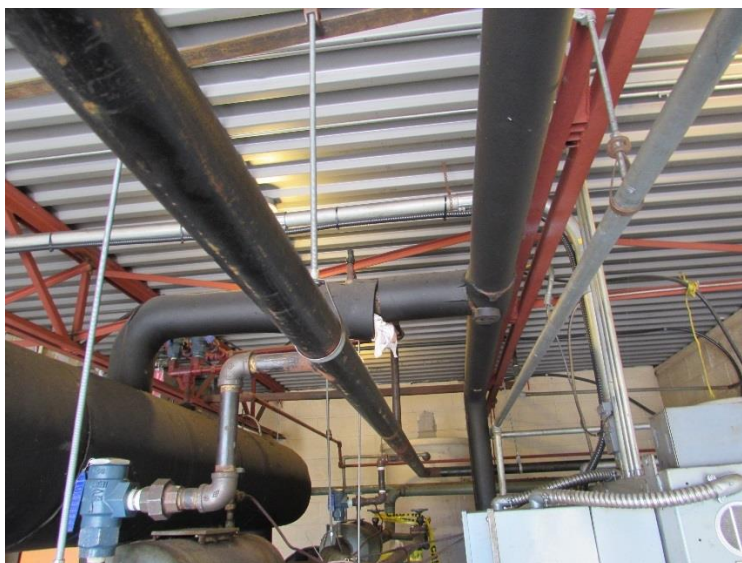
9. Condenser coil showing scaling.4. CIMCO oil separators with bracing to reduce vibration of liquid drainer.



10. Condenser sump and pump.



11. Brine piping showing corrosion and no insulation.



12. Suction piping showing damaged insulation.



13. Return bend trench and floor piping.



14. Headers and header trench showing corrosion, repaired header area at top, and header trench full of water and paint.



15. Docal chiller and surge drum.



16. Cold glycol pump showing corrosion.



17. Chiller level controls and bypass.



18. Relief valves with Oct. 2013 installation date.



Wabamun Arena Ice Plant
Life Cycle Report and Capital Plan
Recommendations

THERMOCARB LTD.



REV.0

August 16, 2016

APPENDIX 2

APPENDIX 2: LIFE CYCLE/BUDGET ESTIMATE

Equipment	Year Installed	Expected Life (Years)	Remaining Life (Years)	Condition	Recommendations / Comments	2016	2017	2018	2019	2020	2021-2025	2026-2030	2031-2035	2036-2040
• C-1 Mycom N6A Compressor	Unknown	50	0	• Due for replacement	• Backfill the compressor bases to try and reduce the vibration. • Compressors should be overhauled approx every 8000-10000 hrs. (3-4 years)	\$2,000	\$60,000			\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
• C-1 60 hp motor	2014	25	23	• Very Good	• Will not need replacement in foreseeable future									
• C-2 Mycom N6A Compressor	Unknown	50	0	• Due for replacement	• Backfill the compressor bases to try and reduce the vibration. • Compressors should be overhauled approx every 8000-10000 hrs. (3-4 years)	\$2,000	\$60,000		\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
• C-2 60 hp motor	Unknown	25	0	• Due for replacement	• Consider replacement in the next 5 years. (included in \$60,000 for compressor replacement)								\$4,000	
• C-1/C-2 Oil demisters	1973	15	0	• Due for replacement	• If no oil carryover problems are experienced the units will not need to be replaced, however they have exceeded their life expectancy and should be budgeted for immediate replacement	\$10,000					\$10,000			
• BAC VCL-079 Condenser	1997	25	6	• Good	• The condenser is undersized for high ambient conditions during early September and late April which limits the operating season. • The unit should be budgeted for replacement in the next 6 years or sooner and replaced with a larger unit					\$80,000				
• Condenser sump/pump	1997	25	6	• Good	• The condenser sump float is not operating correctly and should be repaired. The pump was recently replaced and should not need replacement for at least 10 years	\$1,000		\$10,000				\$5,000		
• Chiller/surge drum	1997	25	6	• Good	• The chiller should be budgeted for replacement in the next 5 years	\$3,000				\$80,000				
• Brine pump	Unknown	15	0	• Moderate	• The level control system should be repaired immediately						\$5,000		\$4,000	
• Brine pump motor	Unknown	20	0	• Moderate	• Continue to monitor and maintain the pump									
• Brine	Unknown	50	0	• Unknown	• Should be budgeted for replacement in the next 2-5 years						\$250	\$250	\$250	\$250
• Control system	Unknown	25	0	• Fair	• Budget for replacement in the next 2-5 years	\$100		\$100				\$4,000		
• MCC	NA			• NA	• Will not need replacement in foreseeable future if properly maintained. • Monitor and treat brine as required.		\$60,000							
• Ammonia Piping system	Unknown	40	10	• Good	• The system is outdated and should be considered for immediate replacement with a PLC control system		\$50,000							
• Brine mains, headers and floor piping	Unknown	40	10	• Fair	• A motor control center should be considered for immediate installation with a PLC to improve the safety and efficiency of the system • The piping appears to be in good condition except for some missing paint. It should be cleaned, inspected and repainted.	\$2,000		\$1,500		\$1,500	\$3,000	\$3,000	\$3,000	\$3,000
• Pipe Insulation	Unknown	30	0	• Poor	• Brine piping mains and floor piping appear to be in good to fair condition. The steel mains are corroding and the paint is peeling. The mains should be cleaned and repainted. The headers should be cleaned and repainted and the header trench should be cleaned and drained of water. • There is no insulation on the cold brine piping. Insulation should be budgeted to help improve the efficiency of the system.	\$5,000								\$5,000
• Relief System	2013	5	2	• Good	• The insulation on the chiller and suction piping is a armaflex foam type insulation. It should be budgeted to have a vapor barrier and PVC jacket installed to help protect the insulation. • The relief valves were replaced in 2013. Continue to replace relief valves every 5 years. • The condenser does not have an up to date relief valve. Size and install a new relief valve prior to the next operating season.	\$1,000		\$3,000			\$3,000	\$3,000	\$3,000	\$3,000
TOTAL						\$26,100	\$230,000	\$14,600	\$0	\$91,500	\$101,250	\$35,250	\$24,250	\$21,250

Appendix D Assessor Qualifications

Jennifer Razzo is a Facility Assessor at Stantec in Calgary, Alberta, working in the Facility Assessments service line of Buildings Engineering. Ms. Razzo has over 8 years of experience in the area of building condition assessments and capital replacement reserve planning. Past projects have included the review of residential, commercial, recreational and municipal buildings for the purpose of capital planning and renewal. Ms. Razzo has physically assessed over 200 properties located in Alberta, British Columbia, Northwest Territories, Indiana, and Illinois. As part of the Facility Assessment Team at Stantec, her main focus is the physical assessment of architectural and structural elements in residential, commercial, institutional and industrial properties for property owners/managers, government related entities, and other clients.

EDUCATION

Diploma, Southern Alberta Institute of Technology,
Calgary, Alberta, 2000

CERTIFICATIONS AND TRAINING

Oil Sands Safety Training Association (OSSA): Fall
Protection, Calgary, Alberta, 2016

MEMBERSHIPS

Member, Alberta Building Envelope Council South

Professional Member, Canadian Condominium
Institute, South Alberta Chapter

PROJECT EXPERIENCE

Building Condition Assessments

Regency Consolidated Residential LLC, Property
Condition Assessments, Indiana, Illinois (Field
Assessor)

Completed a property condition assessment of 14 rental properties, containing almost 3000 housing units, located in Illinois and Indiana. Visual reviews of the properties, which included a sampling of interior finishes of units, common area elements, and site amenities, were completed. A Facility Condition Index rating was then calculated for each property based on estimating the building's replacement value and our opinion of costs for repairs and lifecycle costing. A report was prepared, presenting the overall condition rating for each property, costs summaries for both short-term and long-term capital renewal, broken down by each major component. The client's intended use of our findings was to assist with capital planning/forecasting and investment decision making purposes. Ms. Razzo completed the roles of facility assessor and report writer.

The Salvation Army Facility Condition Assessments
(2016), (Field Assessor)

Stantec was retained in 2016 by The Salvation Army's Alberta and Northern Territories Division to prepare Facility Condition Assessment reports for 106 buildings that were spread out over municipalities located within Alberta, Yukon Territory, and the Northwest Territories. The portfolio included buildings ranging from single-family dwellings to retail thrift stores, as well as multi-family residential structures, churches, and community services buildings, totaling nearly 1,000,000 ft² in floor area. The collection of site visit information, and the reporting of findings, was completed using portable iPad devices containing iAssessTM assessment software that was later uploaded into an iPlanTM software database program, both of which were developed by 4tellTM Solutions.

homeEd Portfolio Condition and Capital Plan
Assessment, Edmonton, Alberta (2015) (Field
Assessor)

Stantec was retained by homeEd (The City of Edmonton Non-Profit Housing Corporation) to assess the adequacy of their current capital planning process, and to provide a Facility Condition Index rating for the overall portfolio. The assessment included high-level property condition review of their 19 properties. Through a process of evaluating their current capital renewal plans and maintenance histories and then calculating replacement values and taking into consideration our site observations, we determined the degree of deferred maintenance at each site. A Facility Condition Index rating was calculated for each property, results were combined, and recommendations for actions to address deferred maintenance were provided in a comprehensive written report.

Jennifer N Razzo

Facility Assessor

Alberta Infrastructure Facility Evaluations (Project Year: 2015-2016) (Field Assessor)

Stantec has been retained by Alberta Infrastructure annually since 2004 to act as a Prime Consultant for their facility evaluation program, which includes the assessment of various government-owned and operated properties located across Alberta for capital planning purposes. Facility Evaluation reports were prepared using VFA Auditor from 2015 onward. Ms. Razzo assumes a role of site assessor for the annual evaluation program.

Community Association Capital Renewal Plans*, Calgary, Alberta (Project Manager, Field Assessor)

Prepared Capital Renewal Plans for community association buildings, arenas and recreational facilities, neighborhood services buildings, and site assets. The projects were undertaken for the purpose of determining the conditions of the architectural, structural and building envelope elements and their associated replacement costs and years of renewal. The reports served to assist the community groups and the City to understand the condition of their assets, and to prioritize renewal projects that were eligible for funding through the City of Calgary's Capital Conservation Grant Program. Ms. Razzo provided the primary point of contact for the City of Calgary and the community groups, and assumed the role of project manager, facility assessor, and report writer.

Capital Replacement Reserve Fund Studies*, Alberta and British Columbia (Project Manager, Field Assessor, Technical Reviewer)

Completed Capital Replacement Reserve Fund Studies at the direction of property management firms, housing co-operatives, Condominium and Strata Corporations and private companies based throughout southern Alberta and British Columbia. Projects included multi-family complexes, commercial properties, recreational properties and bareland condominium site amenities. Recommendations for improved funding of existing reserve funds were provided to offset anticipated capital costs over a given evaluation period, while taking into account the effects of interest and inflation. Ms. Razzo assumed a role of project manager, facility assessor, report writer and technical reviewer.

Panorama Mountain Village Capital Replacement Reserve Fund Studies*, Invermere, British Columbia (Project Manager, Field Assessor)

Completed Capital Replacement Reserve Fund Studies for eight strata corporations located within Panorama Mountain Village Ski Resort. The projects were an assortment of multi-story apartment-style buildings and townhouses. Reports were prepared outlining capital building element conditions, associated life cycle costs and years of renewal. These reports were used by the clients to determine required funding levels for the property's capital replacement reserve fund for capital planning purposes, taking into account the effects of interest and inflation. Ms. Razzo assumed a role of project manager, facility assessor, and report writer.

River Park Glen Condominiums Capital Replacement Reserve Fund Study*, Fort McMurray, Alberta (Project Manager, Field Assessor)

Completed building condition assessments and Capital Replacement Reserve Fund Study for a multi-family, 496 unit condominium complex located in Fort McMurray, Alberta. Included in the assessments were two high-rise towers, one low-rise building, several townhouses, a multi-level parking structure, a recreation centre and site amenities. The assessments and reserve fund study were conducted for planning purposes and to establish the current condition of building components and site improvements currently in place. Recommendations for improved funding of existing facility reserve funds were provided to offset anticipated capital replacements over a given evaluation period, while taking into account the effects of interest and inflation.

Social Housing Physical Condition Reviews, Canada Mortgage and Housing Corporation*, Calgary, Alberta (Field Assessor)

Completed structural, architectural, building envelope, mechanical, electrical and site improvement assessments of 16 social housing properties in Calgary, Alberta, for capital planning purposes. Reviews included a sampling of interior finishes of occupied units, in addition to the common area elements. Reports were prepared with the CMHC's proprietary Physical Condition Review software program.

* denotes projects completed with other firms

I am a building engineer and member of the Professional Engineers of Ontario. I have twenty years of experience in facility assessments related to various residential, commercial, and industrial properties. A large portion the building assessments relate to senior living and nursing facilities. I have also experience in project management for capital projects of retirement and nursing home facilities. More recently I have been involved in cost consulting services for new developments and remediation of existing buildings. The cost consulting services include the preparation of project budgets and the control of the project budget over the duration of the project. I have also been involved in parking structure evaluation and restoration, roof assessment and renewal, and cladding investigations.

EDUCATION

Bachelor of Engineering, Concordia University /
Building Engineering, Montreal, Quebec, 1994

REGISTRATIONS

Professional Engineer #90507989, Professional
Engineers Ontario

PROJECT EXPERIENCE

Seniors Living

Retirement and Nursing Home Assessments and
Due Diligence Services*, various, Ontario and
Quebec (Building Assessment)

Part of building inspection team that evaluated and assessed existing retirement or nursing home facilities for potential purchase by our client. The work included the inspection of all building systems and components and the preparation of cost tables to correct building defects that would be identified during the site visits.

Project and Cost Controls

Lac Mirabel Commercial Centre*, Mirabel, Quebec
(Project Cost Controller)

As part of complete project management services to a new mixed-use development, my role to prepare project budgets for the construction of a shopping center, hotels, and recreation facilities. In addition, It was my responsibility to track all project costs and provide monthly report on the status of the project budgets and request for funding from the financing company for all hard and soft costs for the project.

Workplace/Office

Rio Tinto - Deloitte Tower Tenant Improvements*,
Montreal, Quebec (Cost Consultant)

Provided cost consulting services for the evaluation of developer proposals for new offices for Rio Tinto in Montreal. In addition, project budgets were prepared for the fit-up and move-in for the new offices of Rio Tinto. The project budget included project soft costs, hard construction cost, FF&E costs, moving costs and other costs related to fit-up of the new office space.

* denotes projects completed with other firms