REPORT FOR:

Pan Am Indoor Pool
25 Poseidon Bay, Winnipeg MB
Structural Condition and Building Envelope Assessment

Submitted to:	City of Winnipeg Planning, Property, and Development Department Accommodation Services
Attention:	Mr. Lou Chubenko
Date:	February 15th, 2022
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Our File No.	2021-0268

Crosier Kilgour & Partners Ltd.™

CONSULTING STRUCTURAL ENGINEERS

Table of Contents

Executive Summary

At the request of the City of Winnipeg Planning Property & Development Department, a structural and building envelope assessment of the Pan Am Indoor Pool was completed by Crosier Kilgour & Partners.

The investigation served to provide an opinion as to the current condition of the structure, cladding, windows and roofing to provide repair or replacement recommendations complete with Class 4 estimates.

Recommended repairs and associated Class 4 (-30% to +60%) estimates of probable construction costs are summarized in the table below and are provided based on our review of the existing material, the site conditions, and our experience. The total Class 4 remediation recommendations for the Pan Am Indoor Pool become approximately $7.2 Million Dollars, based on the scope of work described throughout this report.

Category	Estimate
Total Required Repairs (within 3 months)	$85,000
Total Short Term Recommendations (within 1 year)	$2,075,000
Total Medium Term Recommendations (Year 1 to 5)	$2,997,000
Total Long Term Recommendations (Year 5 to 10)	$1,000,000
Long Term Considerations/Recommended Improvements (not time critical)	$1,033,000
Maintenance (ongoing) – Repairs required to address ongoing, or routine maintenance.	$9,500
Total of All Recommendations	**$7,190,500**

1. Introduction

At the request of the City of Winnipeg (COW) Planning Property & Development Department, a structural and building envelope assessment of the Pan Am Indoor Pool was completed by Crosier Kilgour & Partners personnel. The purpose of the investigation was to provide an opinion as to the current condition of the structure, cladding, windows and roofing, identify areas of distress, and provide recommendations aimed at extending the service life of the structure and building envelope components.

The following report details the review methods utilized, problem background and provides a summary of our observations and findings, as well as opinions regarding the condition of the structure and building envelope. Recommended repairs and estimates of budget construction costs are also provided where appropriate.

1.1 Limitations

Our assessment is based on a visual examination of representative portions of the building under review which were easily visible, exposed and could be examined. We cannot warrant any different conditions that may exist, but which are covered by finishes, or other materials, or not accessible at the time of the site visit. It should be further acknowledged that our foundation evaluation is based on the present condition only and that we cannot guarantee that future foundation movements will not occur due to movements in the subsoil.

A firestopping review is beyond the scope of this assessment. As such the costs of completing this architectural code review and the work associated with any subsequent findings, have not been accounted for in the Class 4 budgets provided herein.

This report has been prepared for the sole benefit of City of Winnipeg. The report may not be reviewed, referred to, or relied upon by any other person or entity without the prior written permission of Crosier Kilgour & Partners Ltd. and City of Winnipeg.

1.2 Scope of Investigation

The intent of this project is to complete a non-destructive condition assessment of the structure and building envelope, and provide recommendations for immediate, short and long-term repairs.

The investigation included, a review of available documentation such as original construction drawings, engineering reports, roofing reports, maintenance reports, and discussions with personnel familiar with the structures.

A visual review of representative portions of the building structure, envelope, and roof(s) which were exposed and readily accessible including common public areas such as entrance foyer, corridors, stairwells, and representative non-public areas such as accessible crawlspaces and mechanical rooms.

The results of our investigation are summarized in this final report including recommendations, and a Class 4 (-30% to +60%) estimate of probable construction costs for the property.

1.3 Priority of Recommendations

All recommendations for building systems or components identified in the following sections have been assigned a priority based on the following criteria for the purposes of scheduling and budgeting in accordance with the following:

- Required Repairs (within 3 months) – Repairs necessary to address specific safety issues. Repairs required within 3 months.
- Short Term Recommendations (within 1 year) – High priority for repairs/maintenance including code and regulatory issues.
- Medium Term (Year 1 to 5) – Repairs required to address ongoing or low-risk deterioration, replacement of end of service-life building components.
- Long Term (Year 5 to 10) – Repairs required to address ongoing or low-risk deterioration, replacement of end of service-life building components.
- Long Term Considerations/Recommended Improvements (not time critical) – Optional work including recommended improvements presented for future consideration and planning.
- Maintenance (ongoing) – Repairs required to address ongoing, or routine maintenance.

1.4 Opinion of Probable Construction Costs

Accurate estimation of construction costs for remediation projects is difficult to provide because of the inherent number of variables associated with working on an existing structure. Hidden conditions inevitably exist which can result in increases in the overall cost of repairs. Based on the level of investigation and available information, the budget is considered a Class 4 (-30% to +60%) estimate in accordance with the City of Winnipeg cost estimate classification system. The cost estimate is a preliminary estimate used in developing long term capital plans and for preliminary discussion of proposed capital projects.

2. Property Description

The following description is based on a review of the existing architectural and structural drawings, and visual observations made during the site reviews. A satellite image of the site is shown in Figure 1 below.

The following drawings for the original building construction were available for review:

- Structural drawings S01 to S16 by Smith Carter Searle Associates and dated March 28, 1966.

The following drawings for the 1994 building addition were available for review:

- Structural drawings S-1 to S-12 by ARC + CADD dated June 1, 1993.

The following drawings for the 2009 Pan Am Pool Building Envelope Retrofit Phase 1 Project were available for review:

- Architectural drawings A0.1 to A5.1 by Neil Cooper Architect Inc.
- Structural drawings S1.1 by Crosier Kilgour & Partners Ltd.

The following drawings for the 2010 Pan Am Pool Building Envelope Retrofit Phase 2 Project were available for review:

- Architectural drawings A0.1 to A4.4 by Neil Cooper Architect Inc.
- Structural drawings S1.1 by Crosier Kilgour & Partners Ltd.

The following drawings for the 2016 - 2018 Aquatic Hall of Fame Museum Royal Gallery Space Restoration project were available for review:

- Architectural drawings A1.0 to A5.0 by City of Winnipeg Planning, Property and Development Department dated November 28, 2016.
- Electrical drawings E1 to E7 by City of Winnipeg Planning, Property and Development Department dated November 28, 2016
- Mechanical drawings M1 to M4 by City of Winnipeg Planning, Property and Development Department dated September 12, 2016

The following drawings for the 2013 roof replacement project were available for review:

- Roof Plan drawing R1 and typical parapet construction detail by Agassiz Consulting Group Ltd.

Figure 1 – Site Plan

2.1 General

The Pan Am Indoor Pool is located at 25 Poseidon Bay, Winnipeg, Manitoba. The existing building on this site was originally constructed in 1967 for the 1967 Pan Am Games. Separate building additions have been added to the existing structure over the past years, such as the lap pool addition in 1994 on the building east side and a multi-purpose building addition added to the existing structure in 1998-1999 on the building west side. The Pan Am Pool is a two-storey building housing recreational facilities, with a total floor area of approximately 163,000 square feet.

2.2 Building Structure

The building and pool structures are supported/sitting on precast concrete piles throughout. The perimeter foundation is reinforced cast-in-place concrete walls/beams and main floor superstructure appears to be a reinforced concrete slab supported on cast-in-place concrete columns and beams. Exterior walls supporting the roof superstructures consists of reinforced concrete and concrete masonry units

The primary roof structure consists of steel roof trusses, comprised of structural steel members, that span the building north-south direction and support the steel roof deck. Trusses are all painted. East building addition has as concrete roof deck supported on exterior load bearing walls.

2.3 Building Envelope and Cladding

Since the original construction date this building has undergone various exterior modifications. Exterior walls are primarily finished with exposed aggregate pre-cast concrete, fluted pre-cast concrete and pre-finished corrugated and flat metal panels.

Building fenestration consists of aluminum framed punched windows with sealed insulated glass units (IGU) and aluminum storefront and stick-framed curtain wall systems with IGU's. Majority of the fenestration is located at the building addition area completed on the west and east side of the original building. Aluminum framed entry doors, with sealed IGU's, are located at multiple locations and serve as the main building exit/entry points to the facility.

North building wall of the original building was retrofitted with new steel studs, insulation, AVB membrane and interior acrylic finish on concrete board during 2009 building envelope retrofit phase 1 project. The same retrofit was completed at the south building wall of the original building during the Phase 2 building envelope retrofit project in 2010.

New aluminum framed curtain wall systems were installed with triple glazed IGU's at the second floor west and east original building elevation as part of the 2010 building envelope retrofit phase 2 project.

Sealant at pre-cast concrete cladding panel joints was replaced with new at selected exterior building south elevations as part of the 2010 envelope retrofit project.

A significant project of the aquatic hall of fame museum royal gallery space restoration, which is located in the 1998 building addition section on the west side, was completed in 2017-2018. The project work included the installation of acrylic acoustical ceiling panels and a complete renovation/mediazation of the interio space with the addition of two new universal washrooms, lighting, flooring, mechanical and electrical work.

2.4 Roofing

Existing roof assembly across all roof facets is an insulated 2-Ply SBS Modified Bitumen Membrane roof system over a steel roof or concrete roof deck, which is structural sloped. This current roof system is not the original system installed on the original building structure and all completed building addition. Existing building drawings and documents of past completed roof projects indicate installation of a conventional 4-ply built-up roof system; felt paper integrally bonded with hot asphalt and protected with gravel ballast. Therefore, all existing roof systems have been replaced since original building construction and appear to be in service ranging from approximately 5 to 19 years. Roof facets and areas are divided into the following three facets:

- East roof: 2,700 square meters total area
- Main pool roof: 4,700 square meters total area
- West roof: 600 square meters total area

3. Observations and Findings

The following sections summarizes the significant findings, recommendations, and estimates of probable construction costs.

3.1 Site

3.1.1 Exterior Stairs, Podiums, and Structures

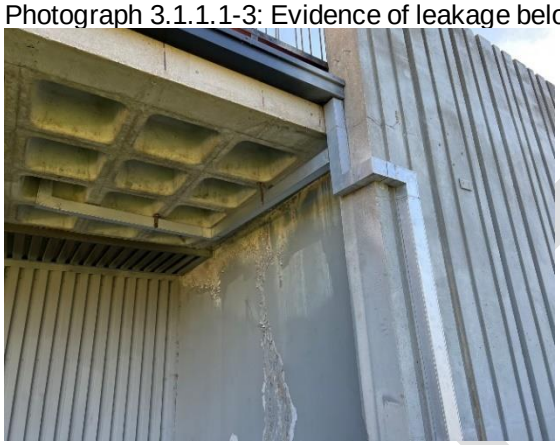
.1 Above-grade structural podiums are located on northwest and southwest corners of the Main Building (Photographs 3.1.1.1-1, 2). Original structural and architectural drawings that show the construction in this area were not available. Based on the available information and visual observations it appears that the podium cross-section consists of precast concrete paving over insulation and waterproofing. The structure consists of a cast-in-place concrete waffle slab an is exposed on the north elevation (Photograph 3.1.1.2-1). The south elevation podium is finished with a metal soffit and not able to be viewed. The type, age, and condition of any existing waterproofing membrane could not be determined. Further investigation would be required to determine the condition and timing for replacement.

Photograph 3.1.1.1-1: Podium at northwest corner.

Photograph 3.1.1.1-2: Partial view of podium at southwest corner.

Evidence of leakage was observed at the west end of the podium (Photograph 3.1.1.1-3). The source of the leakage could not be determined. A drain line and rainwater leader is located along the wall which may be the source of the leakage. Further investigation is required to determine the source of the apparent leakage

Photograph 3.1.1.1-3: Evidence of leakage below northwest podium.



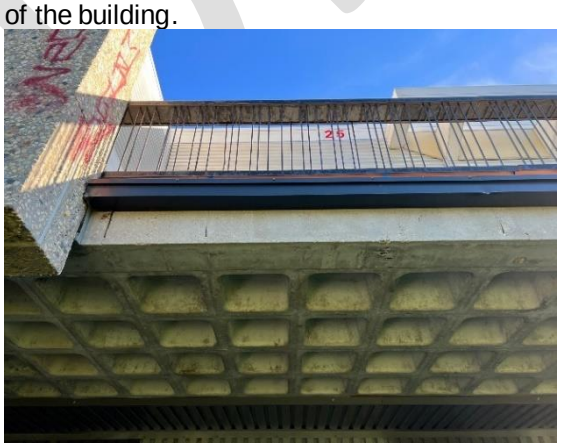
Recommendation 3.1.1.1-1: Investigate condition of the podium waterproofing. The proposed investigation would include removal of an area of the existing precast pavers and insulation on the north and south podiums to confirm cross-section and assess the condition of the existing waterproofing membrane. A flood test is also recommended to determine the source of leakage at the north podium.

Estimated Cost: $10,000

Priority: Short Term, recommended within 1 year.

.2 The concrete waffle slab supporting the podium at the northwest corner of the building is in fair to good condition. Exposed reinforcing steel was observed along the north face of the spandrel beam due to a lack of cover over the reinforcement. The conditions are related to an original construction. Repairs are recommended.

Photograph 3.1.1.2-1: concrete waffle slab supporting the podium at the northwest corner of the building.



Recommendation 3.1.1.2-1: Localized concrete repairs are recommended to address delamination and a lack of cover over the existing reinforcing steel. Repairs would include removal of all loose and delaminated concrete to expose and reposition the reinforcing steel and patching with a suitable concrete repair mortar. Materials and methods would be chosen to help match the existing finish.

Estimated Cost: $10,000

Priority: Short Term, recommended within 1 year.

.3 The metal guard rails at the northwest and southwest podiums appears to be original to the building. Although a formal review was not completed, visual observations indicate that the guardrails are not code compliant with respect to pick spacing and climability. Note that the guards are considered an existing condition and upgrading to meet current building codes would not be required. The guards exhibit minor to moderate surface corrosion and repainting is required in the short term.

Photograph 3.1.1.3-1: Partial view of guardrail at northwest podium.

Photograph 3.1.1.3-2: Partial view of guardrail at southwest podium.

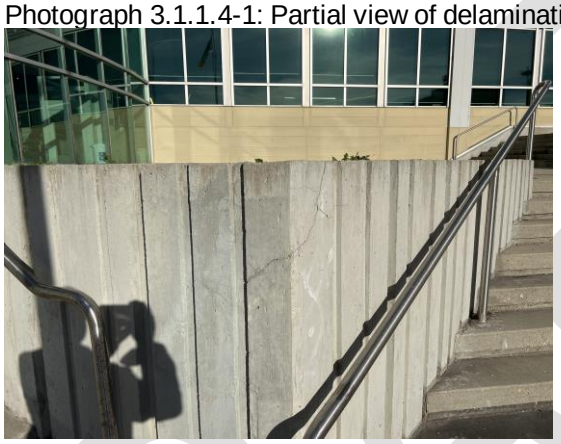
Recommendation 3.1.1.3-1: Repaint existing podium guardrails. Painting would include sandblasting to remove the existing coating and application of a high-performance steel coating.

Estimated Cost: $20,000

Priority: Short Term, recommended within 1 year.

.4 The concrete stairs, landings, and ramps at the west end entrance constructed as part of the Aquatic Hall of Fame addition are in fair to good condition. Minor cracking and delamination was visible on one planter wall.

Photograph 3.1.1.4-1: Partial view of delamination at concrete planter.



Recommendation 3.1.1.4-1: Localized concrete repairs are required in the short term and will consist of removing the loose concrete down to a sound substrate, preparation of the substrate and infilling with a proprietary repair material or ready-mix concrete.

Estimated Cost: $3,000

Priority: Short Term, recommended within 1 year.

.5 An existing handrail stops short on the accessible ramp at the northwest corner of the property resulting in an unprotected edge (Photograph 3.1.1.5-1). The fall height appears to be less than 24 inches (600 mm) and guard is therefore not required by code. However, the conditions represent a potential a safety hazard for pedestrians.

Photograph 3.1.1.5-1: Partial view of accessible ramp.

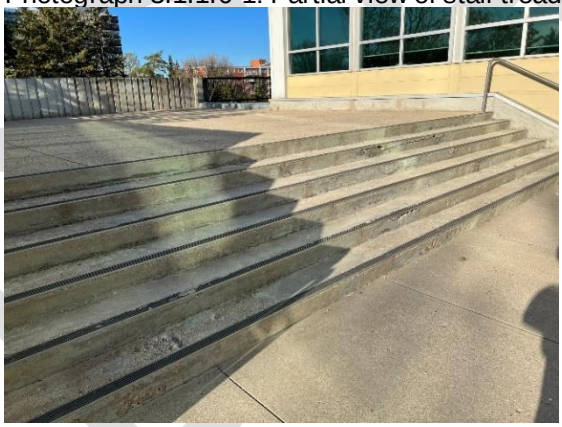
Recommendation 3.1.1.5-1: Install guardrail along ramp edge.

Estimated Cost: $3,000

Priority: Long Term Considerations/Recommended Improvement, not time critical

.6 Delamination of the stair treads between the lower and upper podiums on the west end of the building was observed on both sides of the building (Photographs 3.1.1.6-1, 2). Repair of the stair treads is required.

Photograph 3.1.1.6-1: Partial view of stair tread to northwest podium



Photograph 3.1.1.6-2: Partial view of stair tread to southwest podium

Recommendation 3.1.1.6-1: Repair delaminated and deteriorated stair treads. Repairs will include removal of the deteriorated concrete and infilling with a concrete repair material and new concrete nosing with detectable warning strip.

Estimated Cost: $80,000

Priority: Short Term, recommended within 1 year.

.7 The surface of the upper podium concrete exhibits minor to moderate scaling (Photograph 3.1.1.7-1). Chain drag sounding do not indicate that the scaling is progressing beyond what already exists. Localized delamination was observed on the southwest corner due to lack of concrete cover over the top steel (Photograph 3.1.1.7-2).

Photograph 3.1.1.7-1: Partial view of podium concrete scaling.

Photograph 3.1.1.7-2: Delamination of podium concrete.

Recommendation 3.1.1.7-1: Complete localized top surface concrete repairs in areas of delamination.

Estimated Cost: $15,000

Priority: Short Term, recommended within 1 year.

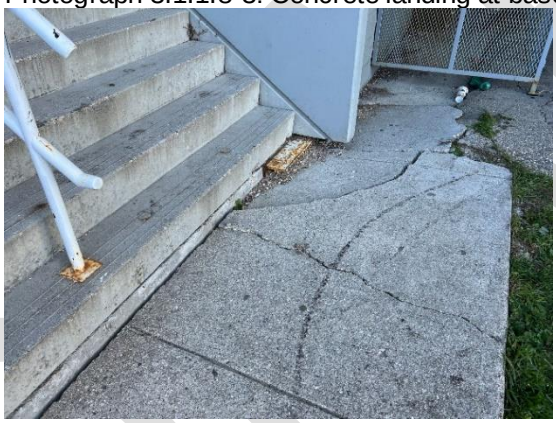
.8 The precast stair and landing at the north end of the lap pool (Photograph 3.1.1.8-1). The joints are open and unsealed allowing water seepage through the joints and corrosion of the precast connections (Photograph 3.1.1.8-2). Sealing of the joints and cleaning and painting of the steel connections is recommended. The slab-on-grade landing at the bottom of the stairs has sunk creating a higher step and a potential tripping hazard. Replacement of the landing or jacking back into place is recommended.

Photograph 3.1.1.8-1: Partial view of precast stair and landing on north elevation.

Photograph 3.1.1.8-2: Corrosion of connections.

The slab-on-grade landing at the bottom of the stairs has sunk creating a higher step and a potential tripping hazard. Replacement of the landing or jacking back into place is recommended.

Photograph 3.1.1.8-3: Concrete landing at base of precast stair.



Recommendation 3.1.1.8-1: Seal precast joints with an elastomeric joint sealant. Clean and paint precast connections.

Estimated Cost: $5,000

Priority: Short Term, recommended within 1 year.

Recommendation 3.1.1.8-2: Replace existing concrete landing.

Estimated Cost: $6,000

Priority: Short Term, recommended within 1 year.

.9 The exposed cast-in-place concrete foundation walls on the north and south elevations are 10" thick with 16" x 26" pilasters 20'-0" on-centre and a corrugated architectural profile. The concrete wall along the south elevation is largely uncoated and incorporates a cant

bead of sealant at the base. The sealant was found to be largely intact, though crazed and hardened in localized areas. The wall along the north elevation was coated with an unknown material which was delaminating at the base of wall. The base of wall did not incorporate a sealant cant bead. Localized cracking and spalling of the concrete was observed. To protect the repairs and provide a consistent finish, consideration may be given to the application of a coating over the exposed concrete. Coating options are discussed in further detail in Recommendation 3.3.1.4-1.

Photograph 3.1.1.9-1: Partial view of cast-in-place 10" thick corrugated concrete wall along south elevation.

Photograph 3.1.1.9-2: Partial view of cast-in-place 10" thick corrugated concrete wall along north elevation.

Recommendation 3.1.1.9-1: Complete localized concrete repairs in areas of delamination and freeze-thaw deterioration.

Estimated Cost: $10,000

Priority: Short Term, recommended within 1 year.

.10 A concrete retaining wall on the north elevation is severely cracked and deteriorated. The cause of cracking appears to be related to movement of the retaining wall. Site personnel indicated that during landscaping work it was confirmed there are no piles below the retaining wall. As a result, the cracking is likely caused by expansion or shrinkage of the subgrade due to changes in moisture content. Conceptual repairs would include repair of the damage concrete and installation of a joint capable of accommodating differential movement.

Photograph 3.1.1.10-1: Cracked and damaged retaining wall.

Recommendation 3.1.1.10-1: Repair existing retain wall and install new expansion joint.

Estimated Cost: $20,000

Priority: Short Term, recommended within 1 year.

3.1.2 Grading and Pavements

.1 Pavement on the south parking lot in fair to good condition. No capital repairs are anticipated to be required within the timeframe considered in this report. Normal maintenance such as crack sealing and filling potholes will be required throughout the life of the structure. Budget pricing has not been provided for this work.

Photograph 3.1.2.1-1: Partial view of south elevation parking lot.

.2 Landscaping around the east end of the building typically consists of sod and soil, or soft planting beds. A visual review suggests that surfaces are graded to direct water away from the foundation walls.

Photograph 3.1.2.2-1: Partial view of grading at east end of building.

.3 Asphalt paving on north side of the building is in poor condition. Sections appear to have been trenched for mechanical repairs. The area is not within a path of travel and repairs are considered non mandatory.

Photograph 3.1.2.3-1: Partial view of asphalt paving on north elevation.

Recommendation 3.1.2.3-1: Repair/replace existing asphalt paving on north elevation.

Estimated Cost: $20,000

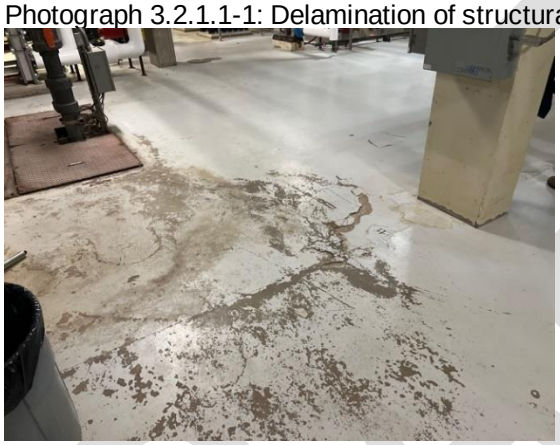
Priority: Long Term Considerations/Recommended Improvement, not time critical.

3.2 Structural

3.2.1 Main Pool (1966 Building) - Basement/Crawlspace

.1 The basement below the Main Pool (1966 Building) is primary service space with a mechanical room located at the west end of the basement (Photograph 3.2.1.1-1). The existing floor slab has been painting and the paint is in good to fair conditions with areas of peeling. An area of delamination was observed that requires repair. Drawings indicate that the concrete floor is a 6" thick structurally reinforced, two-way spanning slab on 6" void form. A vapour barrier has been provided below the slab according to original drawings.

Photograph 3.2.1.1-1: Delamination of structural floor slab



Recommendation 3.2.1.1-1: Complete top surface concrete repairs including repainting to match existing.

Estimated Cost: $25,000

Priority: Short Term, recommended within 1 year.

.2 A service tunnel is located around the perimeter of the main pool tank on the south, east, and north elevations (Photograph 3.2.1.2-1) and is contiguous with the mechanical room, Chlorination room, and other service areas at the west end of the basement. The service tunnel is located directly below the pool deck and finished with a concrete floor that is sloped down from the east end to the west mechanical room. Drawings indicate that the concrete floor is 3" thick, grade-supported, and placed directly over fill. A vapour barrier has not been provided below the slab according to original drawings. The concrete floors within the service tunnels are in fair to poor condition. Cracking and heaving of the floor slabs was observed within the north and south tunnels and is consistent with movement in the underlying soil (Photographs 3.2.1.2-1, 2). Localized areas of delamination were also observed that could create a tripping hazard (Photograph 3.2.1.2.-3). Localized repairs are recommended to address potential tripping hazards. Leveling the floor slab by adding new concrete or replacing the slab-on-grade is considered discretionary given its use and restricted access.

Photograph 3.2.1.2-1: South service tunnel. Cracking heaving of floor slab visible.

Photograph 3.2.1.2-2: North service tunnel. Cracking heaving and delamination of floor slab visible.

Photograph 3.2.1.2-3: Delamination of floor slab.

Recommendation 3.2.1.2-1: Complete localized delamination repairs.

Estimated Cost: $5,000

Priority: Short Term, recommended within 1 year.

Recommendation 3.2.1.2-2: Resurface or replace existing concrete tunnel slabs.

Estimated Cost: $175,000

Priority: Non-mandatory Long Term Consideration/Recommended Improvement, not time critical.

.3 A raised structural slab within the Chlorination Room (Elevation 88'-6") is located between the west end (deep end) of the pool tank and the depressed slab within the mechanical room (Elevation 84'-6"). An opening has been cut through the raised structural slab adjacent to the chlorination tank (Photograph 3.2.1.3-1). The purpose of the opening could not be determined but may be related to a mechanical repair. Site personnel reported standing water would collect within the hole. Infilling the opening is recommended if it is no longer required.

Photograph 3.2.1.3-1: Raised structural slab within the Chlorination Room.

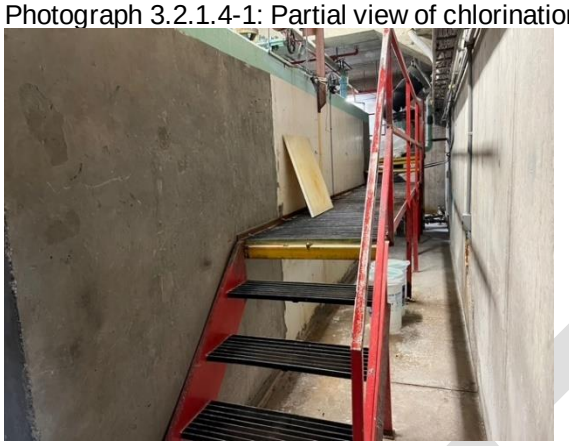
Recommendation 3.2.1.3-1: Infill existing opening.

Estimated Cost: $3,000

Priority: Short Term, recommended within 1 year.

.4 A steel access platform is provided around the chlorination tank. The access platform is in poor condition with severe corrosion full-depth section loss on some posts. Evidence of previous repairs were observed. Localized repairs are required in the short term. Replacement of the platform is recommended within the medium term.

Photograph 3.2.1.4-1: Partial view of chlorination tank access platform.



Photograph 3.2.1.4-2: Severe corrosion and full depth section loss of support.

Recommendation 3.2.1.4-1: Complete localized repairs to address severe corrosion and safety concerns.

Estimated Cost: $5,000

Priority: Required Repairs (within 3 months).

Recommendation 3.2.1.4-2: Replace existing access platform.

Estimated Cost: $40,000

Priority: Medium Term, recommended in 1 to 5 years.

.5 Top surface delamination was observed in the Chlorination Room floor. Top surface concrete repairs are required. The delamination is directly related to exposure to chlorine which will hasten corrosion of the reinforcing steel. Consideration should be given to the application of a chemically resistant coating.

Photograph 3.2.1.5-1: Delamination of Chlorination Room floor slab.

Recommendation 3.2.1.5-1: Complete top surface concrete repairs.

Estimated Cost: $10,000

Priority: Short Term, recommended within 1 year.

Recommendation 3.2.1.5-2: Install chemical resistant coating.

Estimated Cost: $30,000

Priority: Short Term, recommended within 1 year.

.6 Access to basement from northwest and southwest. Southwest the steel access stair in good condition

3.2.2 Lap Pool (1993 Addition) - Basement/Crawlspace

.1 The basement below the Lap Pool building (1993 addition) includes a service space for mechanical and electrical equipment at the southwest corner of the building (Photograph 3.2.2.2-1). An unfinished crawlspace is located around the perimeter of the Lap and Wading Pools. Access to the crawlspace is provided by man doors off the mechanical/electrical room. Evidence of a polyethylene vapour barrier was observed but is discontinuous and in poor condition (Photographs 3.2.2.2-2,). The condition of the exposed grade appeared to be mostly dry. The main floor framing that is visible appears to be in good condition.

Photograph 3.2.2.1-1: Partial view of Lap Pool mechanical/electrical room.

Photograph 3.2.2.1-2: Access to crawlspace between Lap Pool and Wading Pool.

Photograph 3.2.2.1-3: Crawlspace between Lap Pool and Wading Pool

Photograph 3.2.2.1-4: Crawlspace on west side of the Lap Pool accessible.

Photograph 3.2.2.1-5: Crawlspace on west side of the Lap Pool. Discontinuous vapour visible.

Recommendation 3.2.2.1-1: The crawlspace does not have a functioning vapour barrier. The absence of effective vapour barrier can lead to elevated humidity levels, corrosion of mechanical electrical services, corrosion of embedded reinforcing steel, and poor air-quality within occupied space. Remediation of the crawlspace is recommended including grading of the existing soil to direct water away from structural members, installation of a new drainage system and sump pits, and installation of a vapour retarder and sand cover. Installation of new sub-surface drainage, vapour barrier, and sand cover is recommended within 5 years.

Estimated Cost: $320,000

Priority: Medium Term, recommended in 1 to 5 years

.2 The exposed structure (piles, beams, slabs and hollowcore) are in good condition with no obvious evidence of deterioration or distress.

.3 Access to the Lap Pool mechanical room is by steel stairs on the north and south sides. The stairs have recently been painted and are in good condition.

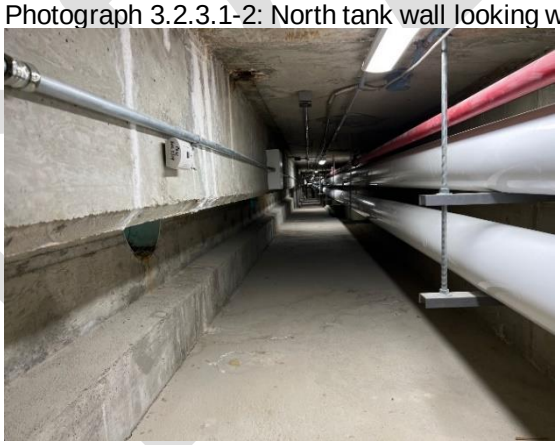
.4 The structural concrete floor slab within the mechanical/electrical space is in good condition.

3.2.3 Main Pool Tank and Pool Deck

.1 The pool tank walls are exposed on all elevations. Shrinkage cracking in the pool tank walls with evidence of leakage and efflorescence was visible in numerous areas (Photographs 3.2.3.1-1 to 4). Attempts to address leakage by injecting the cracks with a urethane or epoxy resin were visible in some areas (Photographs 3.2.3.1-2, 3). No active leaks were observed or reported by site personnel.

Photograph 3.2.3.1-1: Partial view of south pool wall via service tunnel looking east. Injected crack visible.

Photograph 3.2.3.1-2: North tank wall looking west from east end.



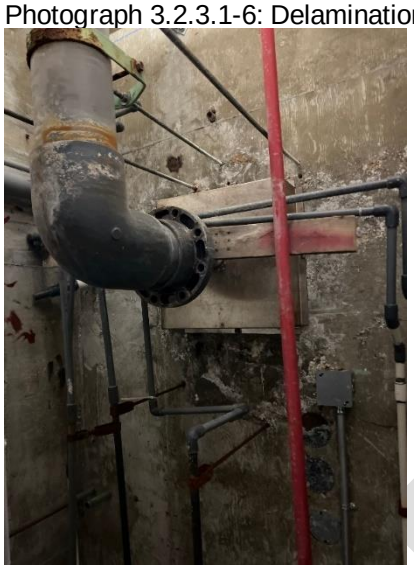
Photograph 3.2.3.1-3: North Tank Wall - Evidence of past leakage at construction joint.

Photograph 3.2.3.1-4: West pool wall showing leakage and delamination.

Localized areas of concrete delamination was observed on the bottom of the tank walls and is directly related to moisture seepage and exposure to chlorides from the chlorinated water.

Photograph 3.2.3.1-5: Localized delamination at base of wall.

Photograph 3.2.3.1-6: Delamination visible on west tank wall around fill line.



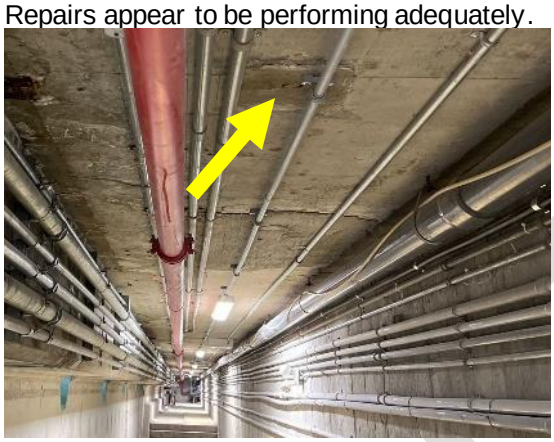
Evidence of leakage was observed around most of the porthole windows (Photograph 3.2.3.1-7). It is our understanding that the windows had included lights which have been removed and are no longer needed. Infilling the portholes windows would be feasible and could be completed as part of a tile replacement project. At some locations, delamination was also observed in areas of leakage and is a direct result of exposure to chlorinated water.

Photograph 3.2.3.1-7: Past leakage and urethane injection around porthole window.

The pool decks on the north, south, and east side of the pool tank are structurally supported one-way spanning concrete slabs that are partially located over the service tunnels. The pool decks immediately adjacent to the pool tank is 6" thick and spans between the tank walls and the foundation wall of the service tunnel. The slab continues beyond the tunnel foundation wall and consists of either a 5" or 6" thick slab on void-form with no crawlspace below. The slab is supported on its outside edge by a cast-in-place concrete wall that supports the concourse bleachers on the north and south elevation and a concrete wall that was the exterior wall, on the east elevation. Records indicate that structural concrete repairs were completed above the service tunnels in 2018 to address

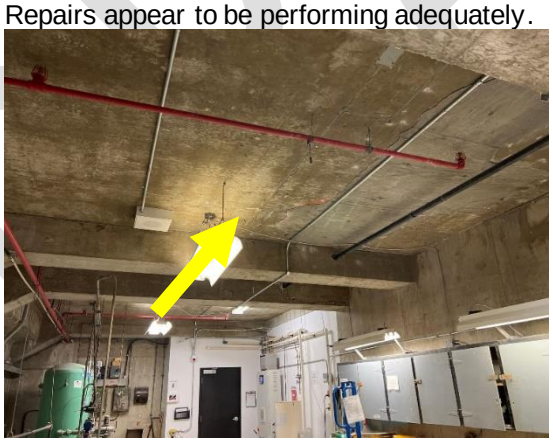
delamination of the slab soffit. Repairs appear to be performing as intended (3.2.3.1-8). No delamination was observed.

Photograph 3.2.3.1-8: Underside of south pool deck. Repairs completed previously. Repairs appear to be performing adequately.

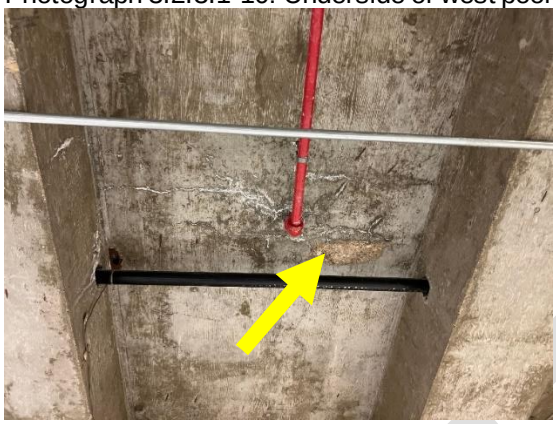


The pool deck on the west side (deep end) of the pool is located over the Chlorinator Room and service space and is constructed of 7" thick concrete slabs that span in the north-south direction and are supported on 18" x 22" concrete beams. Records indicate that structural concrete repairs were completed above the service tunnels in 2018 to address delamination of the slab soffit. Repairs were visible and appear to be performing as intended (Photograph 3.2.3.1.-9). A localized area of soffit delamination was visible (Photograph 3.2.3.1-10).

Photograph 3.2.3.1-9: Underside of west pool deck. Repairs completed previously. Repairs appear to be performing adequately.



Photograph 3.2.3.1-10: Underside of west pool deck showing area of active delamination.



A visual inspection with localized soundings was completed on the top surface of the pool decks. Localized areas of debonded tile were detected. The existing tile appears to be original to the building and therefore over 55 years old.

In 2020, a sounding survey was completed on the pool tank bottom and walls while it was empty for service. The tank walls are approximately 12" thick and the concrete pool floor varies in thickness from 6" to 10" thick. The pool tank walls are coated with an epoxy based, waterproofing membrane and the floor is tiled.

The sounding survey revealed localized areas of deterioration along joints and where there was insufficient cover over the reinforcing steel. It is our understanding that repairs were completed prior to recoating the pool walls.

Overall, the leakage and deterioration of the concrete pool decks and tanks is directly related to water seepage primarily through mechanical penetrations and indicates that the existing tile is not providing an effective waterproof barrier.

Recommendation 3.2.3.1-1: Complete localized structural concrete repairs to the pool tank walls and pool decks.

Estimated Cost: $50,000

Priority: Short Term, recommended within 1 year.

Recommendation 3.2.3.1-2: Localized water seepage through the pool tank and decks indicates that the existing tile is nearing the end of its useful service-life. Although localized areas of leakage may be perceived as only a nuisance, there is a greater concern that the intrusion of chlorinated water into the concrete will hasten corrosion of the reinforcing steel. Although the existing tile and waterproofing will likely provide adequate service for some period of time, its performance will continue to deteriorate, and greater instances of leakage will occur over the short term and accelerate over the long term. Addressing the root cause of the leakage will require removal of the existing tile followed by installation of a new waterproofing membrane and tile finish. Based on the age of tile and presence of leakage, replacement of the tile flooring is recommended in the medium term.

Estimated Cost: $1,200,000

Priority: Medium Term, recommended with 5 to 10 years.

Recommendation 3.2.3.1-3: Infill porthole windows during tile replacement.

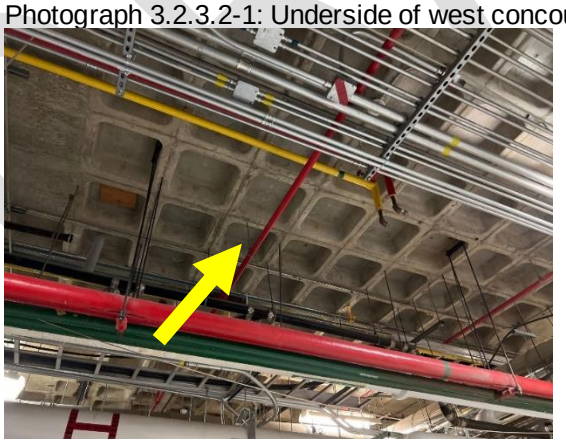
Estimated Cost: $35,000

Priority: Non-mandatory Long Term Consideration/Recommended Improvement, not time critical.*

*Coordinate work with tile replacement, Recommendation 3.2.3.1-2.

.2 The main floor concourse floor structure above the west mechanical room is a two-way spanning 10" thick waffle slab supported directly on the cast-in-place concrete column (Photograph 3.2.3.2-1). The structure appears to be in good condition with no evidence of deterioration.

Photograph 3.2.3.2-1: Underside of west concourse from mechanical room.



.3 Cast-in-place concrete benches built into the concrete walls are provided on the north and south sides of the pool deck. Delamination was observed on the benches at the southwest and northwest corners. The second bench from the west on the north side is in very poor condition with delamination along the full length of the bench. The delamination is generally concentrated along the outside edge. Concrete repairs are required to address delamination.

Photograph 3.2.3.3-1: Concrete bench delamination.

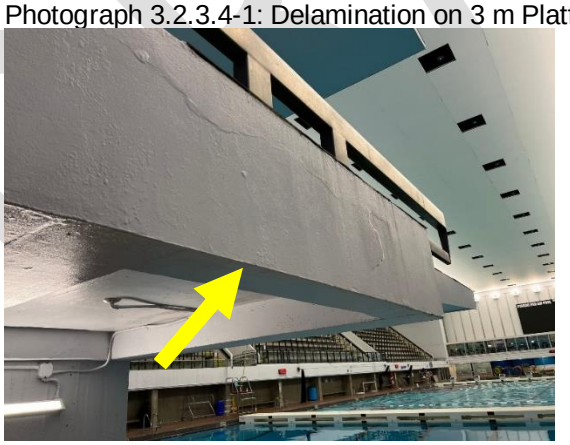
Recommendation 3.2.3.3-1: Complete concrete repairs concrete pool benches.

Estimated Cost: $35,000

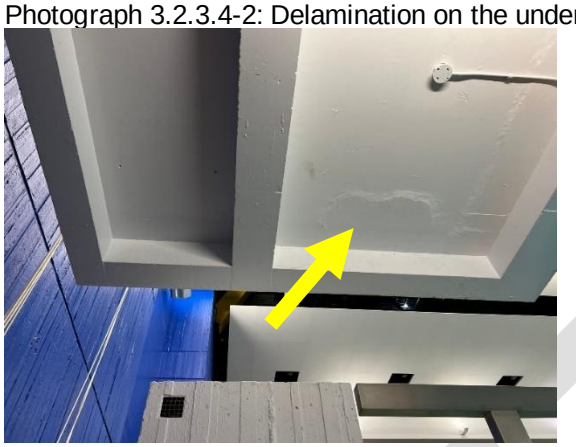
Priority: Short Term, recommended within 1 year.

.4 The main diving platform is constructed of cast-in-place concrete and has undergone repairs and been painted since original construction. Delamination was observed on the side of the 3 metre platform (Photograph 3.2.3.4-1), and the underside of the 5 (Photograph 3.2.3.4-2), 7-1/2 and 10 metre platforms, and walls of the internal staircase (Photograph 3.2.3.4-3). Evidence of previous repairs were also visible. Note that due to the harsh environment, periodic repairs will be required throughout the life of the structure and is considered normal maintenance.

Photograph 3.2.3.4-1: Delamination on 3 m Platform.



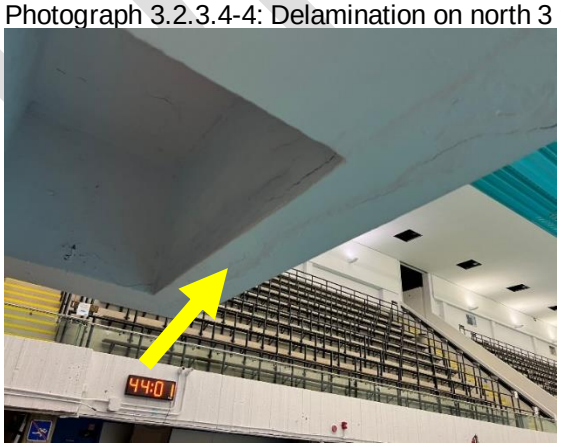
Photograph 3.2.3.4-2: Delamination on the underside of the 5 m Platform.



Photograph 3.2.3.4-3: Delamination on internal stairwell walls.

Delamination was also observed on the sides of the north 3 metre springboard platform (Photographs 3.2.3.4-4). Localized repairs are recommended.

Photograph 3.2.3.4-4: Delamination on north 3 m springboard platform.



Recommendation 3.2.3.4-1: Complete localized structural concrete repairs to diving platforms.

Estimated Cost: $150,000

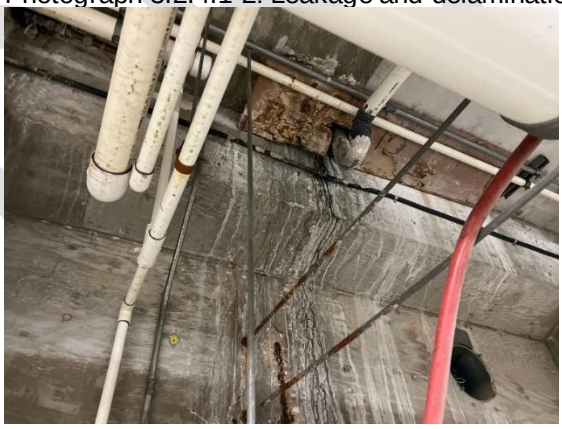
Priority: Short Term, recommended within 1 year.

3.2.4 Lap Pool Tank and Pool Deck

.1 The pool tank walls are exposed on all elevations. Evidence of active leakage was observed on the west wall and appears to be related to mechanical penetrations (Photographs 3.2.4.1-1, 2). At one location, delamination was also observed in areas of leakage and is direct result of exposure to chlorinated water (Photograph 3.2.4.1-2).

Photograph 3.2.4.1-1: Partial view of west tank wall. Evidence of leakage visible.

Photograph 3.2.4.1-2: Leakage and delamination at mechanical penetration.



Recommendation 3.2.4.1-1: The source of leakage appears to be related to the existing mechanical penetrations. A formal review of mechanical systems was beyond the scope of this investigation. Further investigation will be required by a mechanical consultant to determine the source of leakage.

Estimated Cost: $3,000

Priority: Short Term, recommended within 1 year.

Recommendation 3.2.4.1-2: Complete localized repairs to mechanical penetrations and surrounding concrete.

Estimated Cost: $25,000*

Priority: Short Term, recommended within 1 year.

*Note: Final scope of work will depend on the findings of the mechanical investigation. Costs presented are for concrete repairs only.

.2 The pool decks surrounding the Lap Pool are constructed of 7" thick one-way spanning concrete slabs that span from the tank walls to the foundation walls or concrete beam. No evidence of leakage or deterioration of the structural slabs, beams, or walls was observed.

.3 The pool decks surrounding the Wading Pool are constructed of 8" precast hollowcore floor panels. The hollowcore panels typically span in the east-west direction between the tank walls and exterior grade beam. No evidence of leakage or deterioration was observed.

.4 A visual inspection with localized soundings was completed on the top surface of the pool decks. One localized area of debonded tile was detected at the north end of the Lap Pool. The existing tile appears to be original to the building and is therefore nearing 30 years old. In 2020, a sounding survey was completed on the Lap Pool tank bottom and walls while it was empty for service. No deterioration was detected on the lap pool walls. Debonding of the tile on the tank floor was observed and appeared to be concentrated along existing construction joints. Replacement of the tile is not anticipated to be required within the timeframe considered in this report.

3.2.5 Main Floor, Concourse, and Common Areas

.1 With the exception of the concourse on the west end of the building which resides over the west mechanical room, the main floor structure is constructed over unexcavated space. As a result, the condition of the structure could not be determined. A visual inspection with localized soundings was completed from the top surface within the men's and women's locker rooms. Chain drag soundings indicate that a large percentage of the tile is debonded. The existing tile appears to be original to the building and therefore over 55 years old at beyond its expected service-life.

Recommendation 3.2.5.1-1: Debonding of the tile flooring within the men's and women's locker rooms indicate that the tile is no longer providing adequate protection for the structural floor slabs below. Based on the age and condition, replacement of the tile flooring is recommended in the medium term.

Estimated Cost: $480,000

Priority: Medium Term, recommended with 5 to 10 years.

Recommendation 3.2.5.1-2: Exposure to moisture and chlorides will hasten corrosion and delamination of the underlying structural slab. An allowance for repairs is recommended during tile replacement. For the purposes of budgeting and planning, an allowance for top surface repairs over 5% of the surface areas is recommended. Work under this recommendation would coincide with the tile replacement in Recommendation 3.2.5.1-1.

Estimated Cost: $80,000

Priority: Medium Term, recommended with 5 to 10 years.

Recommendation 3.2.5.1-3: Further investigation is recommended to assess the condition of the structural floor slabs below the tile flooring. Investigation would include removal of the tile floor in strategic areas to allow visual investigation and testing of the concrete. It is recommended that the investigation be completed in the short term to aid in future planning.

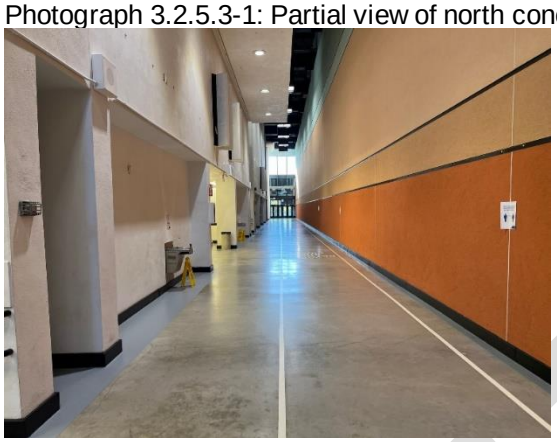
Estimated Cost: $20,000

Priority: Short Term, recommended with 1 year.

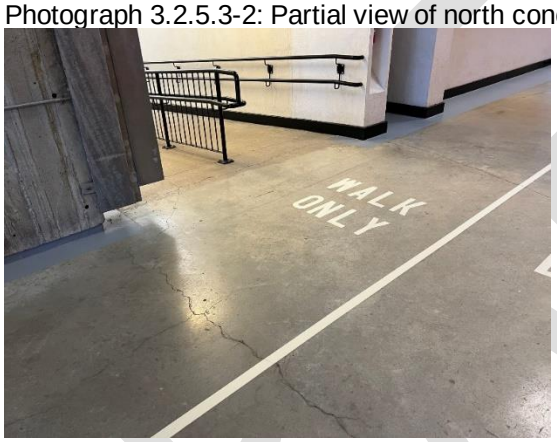
.2 The exposed cast-in-place concrete framing visible within the men's and women's locker room are in good condition with no evidence of deterioration.

.3 The concourse level also serves as a running track and is constructed of 5" thick, one-way spanning concrete slabs supported on 16" x 26" cast-in-place concrete beams. The concourse floor is exposed concrete and the floor appears to be in good overall condition. Some cracking was observed throughout the slab and is not indicative of a structural problem and is likely related to drying shrinkage. Sealing of shrinkage cracks with a semi-rigid joint filler is recommended protect the crack edges from spalling and prevent ingress of water and dirt from normal cleaning processes into the crack.

Photograph 3.2.5.3-1: Partial view of north concourse looking west.

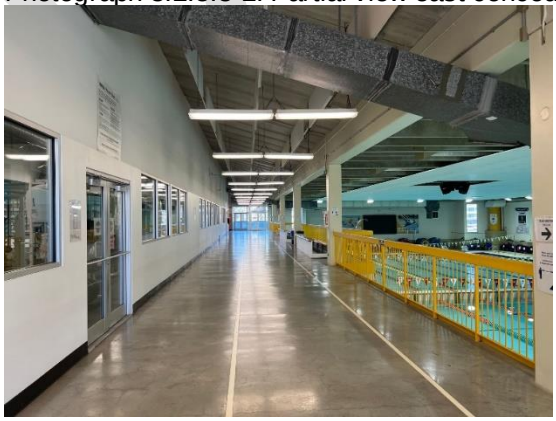


Photograph 3.2.5.3-2: Partial view of north concourse.

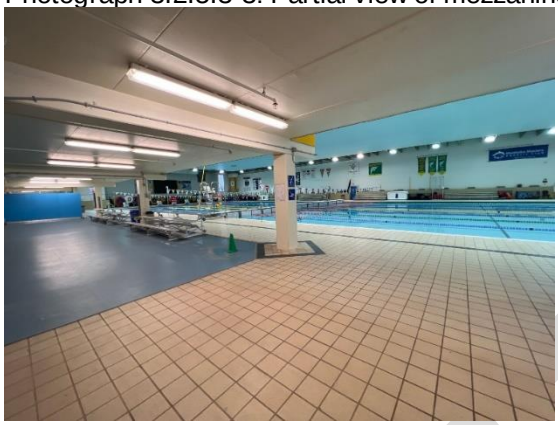


The east end of the running track is located within a mezzanine structure in the Lap Pool building. The structure in this area consists of 8" precast hollowcore floor panels supported on precast concrete beams. The exposed structural framing (hollowcore, beams, guards) below mezzanine are in good condition with no evidence of deterioration (Photographs 3.2.5.3-2, 3)

Photograph 3.2.5.3-2: Partial view east concourse within the Lap Pool mezzanine.



Photograph 3.2.5.3-3: Partial view of mezzanine framing.



Recommendation 3.2.5.3-1: Rout and seal shrinkage cracks with a semi-rigid joint filler.

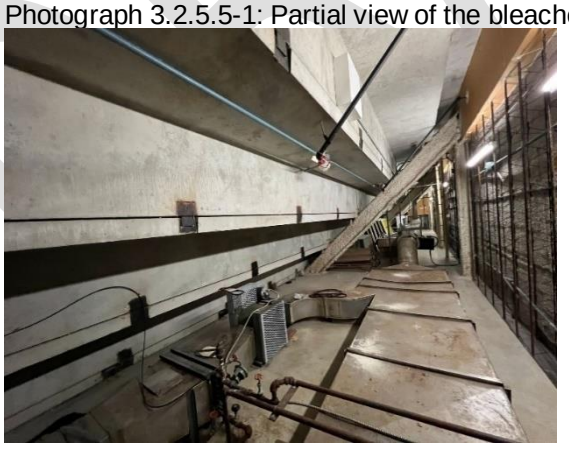
Estimated Cost: $15,000

Priority: Short Term, recommended within 1 year

.4 The exposed architectural concrete walls are in good condition with no evidence of deterioration.

.5 The bleachers on the north and south side of the pool are constructed of precast concrete floor panels supported on steel framing. The steel framing has been protected with a spray-applied fire proofing material (Photographs 3.2.5.5-1). The fireproofing material was missing or damaged in a large portion of the areas. The precast concrete floor panels are in good condition with only some minor surface corrosion visible on the weld plates.

Photograph 3.2.5.5-1: Partial view of the bleacher framing.



Photograph 3.2.5.5-2: Partial view of bleacher framing showing areas of missing fireproofing.

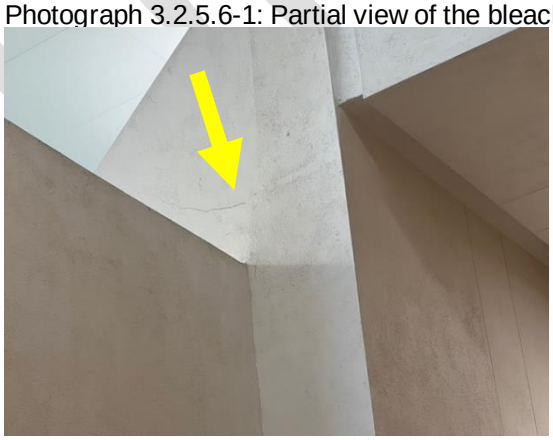
Recommendation 3.2.5.5-1: The damaged and missing fire proofing material has adversely affected the design fire-rating for the structure. Based on the condition of the material, removal and replacement of the fire-proofing material is required. Fire-rating is a life-safety issue and therefore a required repair.

Estimated Cost: $80,000

Priority: Required Repairs (within 3 months).

.6 Cracking in the plaster finish was observed along the bleachers at one vomitory on the southwest corner. The cause of the cracking could not be determined but does not appear to be related to an underlying structural problem. Repair of the plaster finish can be completed.

Photograph 3.2.5.6-1: Partial view of the bleacher framing.



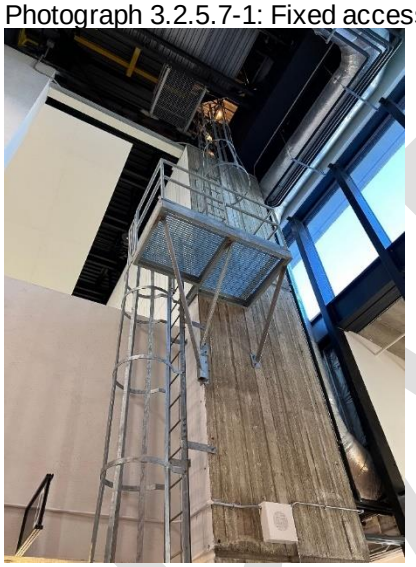
Recommendation 3.2.5.6-1: Repair cracked plaster finish. Repairs are considered normal maintenance.

Estimated Cost: $3,000

Priority: Maintenance Consideration.

.7 Galvanized steel fixed access ladders and platforms have been installed at the southeast and northeast corners of the main building to provide access to the catwalks within the roof framing. The framing is in good condition.

Photograph 3.2.5.7-1: Fixed access ladder at southeast corner.



.8 The existing guardrails and handrails within the vomitories and bleachers were upgraded to meet current building codes. The guardrails and handrails are in good condition.

.9 Cracking in the drywall finish was observed within the weight room in the Lap Pool mezzanine (Photograph 3.2.5.9-1). The cracking appears to be related to the bulkhead and wall framing. No evidence of an underlying structural problem was observed. Repairing the drywall finishes can be completed.

Photograph 3.2.5.9-1: Cracking in drywall finish in weight room.

Recommendation 3.2.5.9-1: Repair cracked drywall. Install control joints in the drywall as necessary. Repairs are considered normal maintenance.

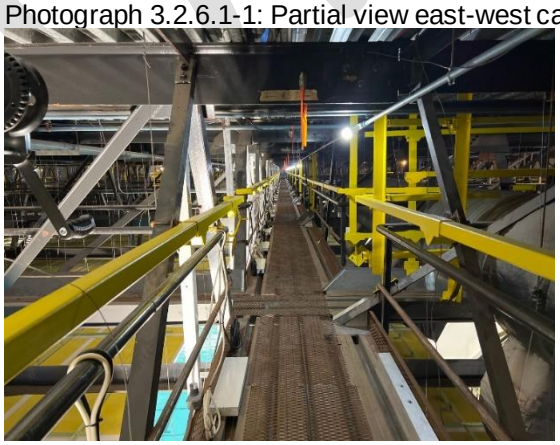
Estimated Cost: $5,000

Priority: Maintenance Consideration.

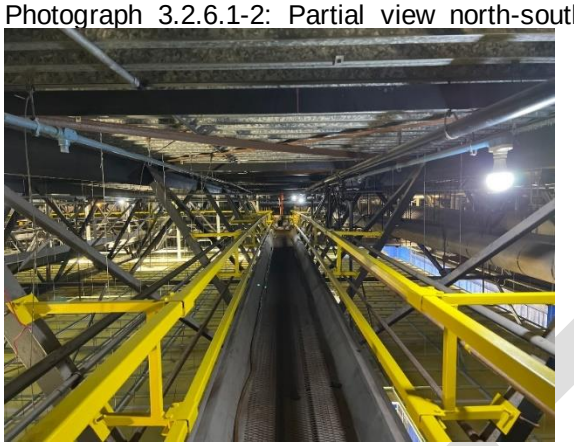
3.2.6 Building Superstructure

.1 The roof structure over the Main Pool consists of 2" galvanized steel roof deck supported on triangular trusses that span in the north-south direction. The trusses are fabricated from conventional steel angles, tees, and wide flange beams. The steel framing is in good overall condition with only minor surface corrosion visible on some of horizontal top chord bracing (Photograph 3.2.6.1-1 to 3). The steel roof deck was also in good condition with no areas of corrosion observed. Periodic repainting of the structural steel will be required and is considered normal maintenance. No repairs are required.

Photograph 3.2.6.1-1: Partial view east-west catwalk. Guardrail upgrades visible.



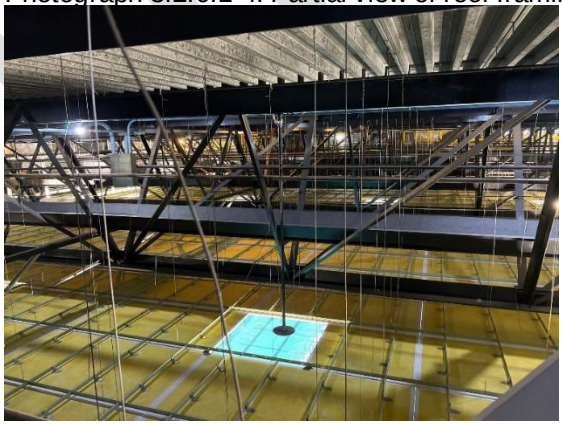
Photograph 3.2.6.1-2: Partial view north-south catwalk. Guardrail upgrades visible.



Photograph 3.2.6.1-3: Partial view of mezzanine framing.

The suspended ceiling panels over the main pool are suspend from the steel roof deck. The support cables and roof framing appeared to be in good condition.

Photograph 3.2.6.1-4: Partial view of roof framing and suspended ceiling supports.



.2 Catwalks are typically located within the centre of each triangular roof truss in the north-south direction and are connected to two main catwalks that run in the east-west direction

of the building. The structural framing for the catwalks is in good condition. The catwalks were undergoing safety upgrades at the time of the site visit. The upgrades included new handrails and enclosing the sides. Guardrails had been installed on the main east-west catwalks and select north-south catwalks.

.3 Fall arrest tie off points have been installed in several of the truss top chords (Photograph 3.2.6.3-1). It was not determined if the anchors are permanent or installed as part of the catwalk upgrades. Manitoba Regulation 217/2006 (MR217) requires that all permanently installed fall arrest anchor systems be visually inspected by a registered professional engineer, or their delegate, at intervals not exceeding 12 months. In the absence of certification records, the anchors should be tagged "OUT OF SERVICE, DO NOT USE" or removed. If the anchors are temporary, they should be removed after completion of the project.

Photograph 3.2.6.3-1: Fall arrest anchor.

Recommendation 3.2.6.3-1: Remove fall arrest anchors if not required.

Estimated Cost: No costs provided.

Priority: Short Term, required within 1 year.

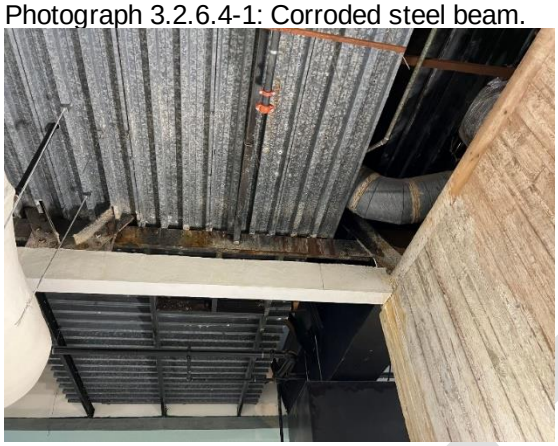
Recommendation 3.2.6.3-2: Complete a visual inspection, load testing, and certification of existing fall arrest anchors.

Estimated Cost: $8,000

Priority: Short Term, required within 1 year.

.4 Surface corrosion was observed on the truss framing at the mechanical room at the northwest corner of the Main Pool building and is reported to be from a glycol leak that has been addressed. Cleaning and painting the steel is recommended.

Photograph 3.2.6.4-1: Corroded steel beam.



Recommendation 3.2.6.4-1: Clean and paint corroded steel beam.

Estimated Cost: $3,000

Priority: Short Term, required within 1 year.

.5 Access to roof catwalk system is provided by a steel stair at the northwest corner of the building. The steel access stair in good condition.

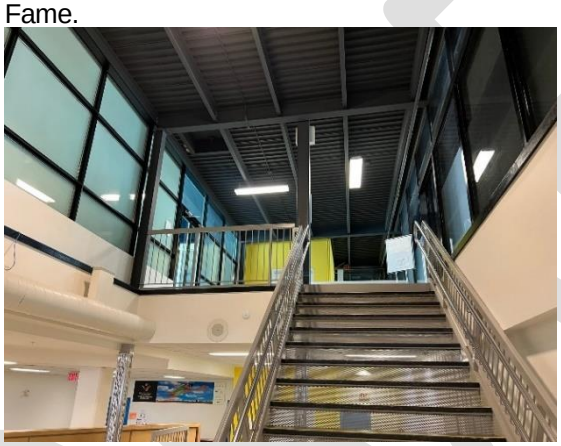
.6 The roof framing over the Lap Pool consists of precast double-tees. The double-tees are only partially visible at each end and appear to be in good condition with no obvious evidence of cracking that could be indicative of corrosion of the embedded reinforcing steel or steel prestressing strands (Photographs 3.2.6.6-1).

Photograph 3.2.6.6-1: Partial view of Lap Pool roof.

.7 The exposed steel framing in the Aquatic Hall of Fame is in good condition with no obvious signs of deterioration or distress observed.

Photograph 3.2.6.7-1: Partial view of Aquatic Hall of Fame roof framing.

Photograph 3.2.6.7-2: Partial view of stair and mezzanine entrance to Aquatic Hall of Fame.



.8 Surfaces within the main floor lobby, multipurpose room, aerobic studio, offices, and concession area are generally covered with finishes. No obvious signs of deterioration or distress visible.

Photograph 3.2.6.8-1: Delamination of structural floor slab.

3.3 Building Envelope

3.3.1 Walls and Cladding

.1 Original Pool Building - pre-cast exposed aggregate panels: The original pool building is primarily clad in pre-cast exposed aggregate panels, including the facia. The panels themselves are in overall good condition with minimal signs of displacement with the exception of two notable locations on the south elevation: above the main pool entrance, where the panels are no longer in plane and appear to have displaced vertically as evidenced by a torn vertical sealant joint; and another panel joint at the east end of the south elevation above the maintenance yard.

Note that it was not possible to take the arial lift along the landscaping of the north elevation to review these panels at arms length and thus our visual review was conducted from grade.

Some localized staining as a result of corrosion of iron ore inclusions in the exposed aggregate was observed throughout and though aesthetically not desirable is not considered a structural concern.

Five small cores were observed at lower panel on the east end of the south elevation adjacent the electrical conduit. The purpose of the cores is unknown.

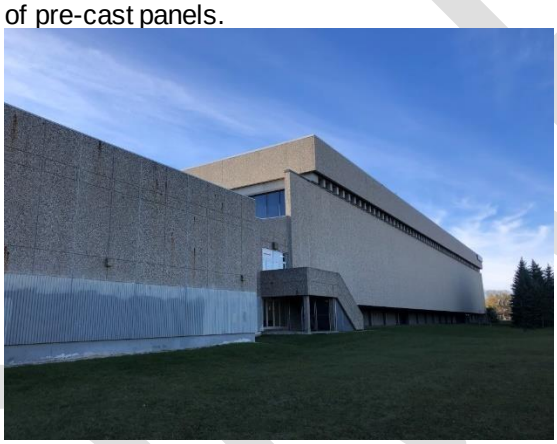
Panels near the west end of the south elevation exhibit slightly different colouring than adjacent panels. It is not known if remediation or replacement of panels had previously occurred.

Vertical sealant panel joints were found to be degraded throughout exhibiting cracking, hardening, tearing, and discontinuities. Horizontal reveals in certain locations had been filled with sealant, and appear to be implemented as a remediation measure to seal underlying cracks in the panel. According to record drawings, the joint sealant was replaced under the Phase 1 and Phase 2 building envelope retrofits, undertaken circa 2009 and 2010, respectively. As such, the sealant is 12-13 years old and at the end of its expected service life.

Base of wall transitions from pre-cast panel to flashing at with wing walls adjacent both entrances on the west elevation (either side of the Aquatic Hall of Fame) were found to be severely degraded. Evidence of multiple differing sealant applications and large discontinuities were observed.

Photograph 3.3.1.1-1: Overview of south elevation, facing east, showing overall condition of pre-cast panels. Note panels near the west end exhibit slightly different colouring than adjacent panels.

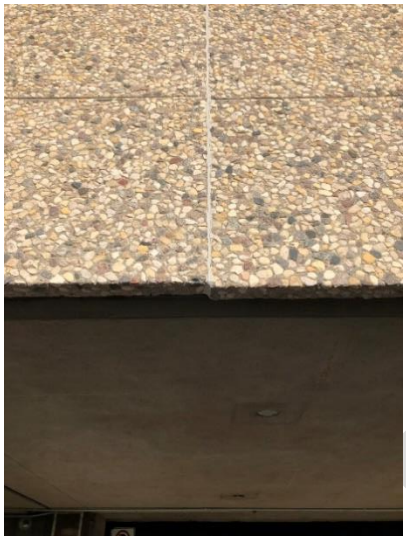
Photograph 3.3.1.1-2: Overview of north elevation, facing east, showing overall condition of pre-cast panels.



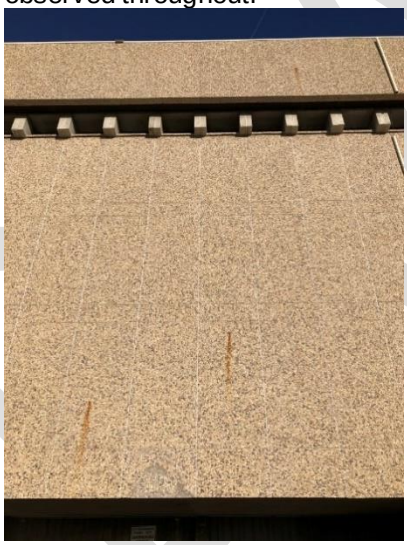
Photograph 3.3.1.1-3: Displacement of panels above the main pool entrance on the south elevation taken from below and showing displacement out of plane.

Photograph 3.3.1.1-4: Displacement of panels above the main pool entrance on the south elevation taken from the arial lift and showing vertical displacement as evidenced by torn sealant joint.

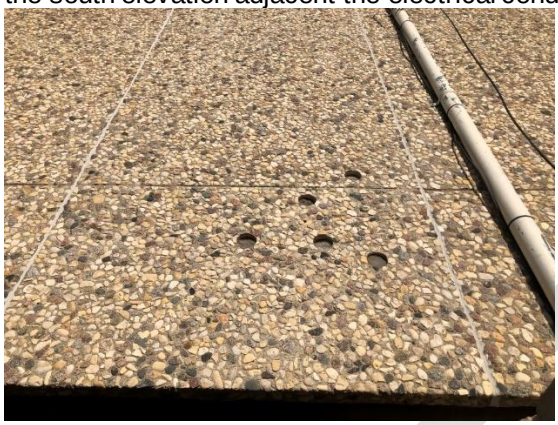
Photograph 3.3.1.1-5: Displacement of panels above maintenance yard on the south elevation taken from below and showing vertical displacement.



Photograph 3.3.1.1-6: Typical example of localized staining as a result of corrosion of iron ore inclusions in the exposed aggregate. Photo taken on south elevation but condition observed throughout.

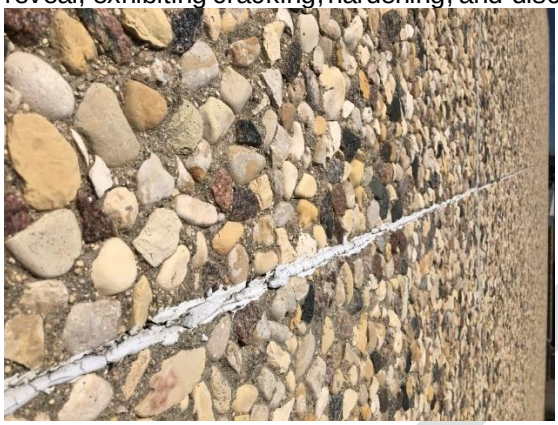


Photograph 3.3.1.1-7: Five small cores were observed at lower panel on the east end of the south elevation adjacent the electrical conduit.



Photograph 3.3.1.1-8: Typical example of degraded vertical sealant joint exhibiting cracking, hardening, and discontinuities. Note also horizontal reveal to the left of the joint and horizontal reveal filled with sealant to the right.

Photograph 3.3.1.1-9: Typical example of degraded horizontal sealant joint in horizontal reveal, exhibiting cracking, hardening, and discontinuities.



Photograph 3.3.1.1-10: Base of wall transitions from pre-cast panel to flashing at with wing walls adjacent the entrance on the west elevation were found to be severely degraded. Entrance on south side of Aquatic Hall of Fame shown.

Recommendation 3.3.1.1-1: It is recommended that the cause of the pre-cast panel displacement be investigated further to assess the condition of the underlying anchorage. We recommend investigating the panels located above the main pool entrance on the south elevation as a starting point. The scale of the investigation, including access and selective demolition is outside the scope of this report.

Estimated Cost: $TBD

Priority: Short Term, recommended within 1 year.

Recommendation 3.3.1.1-2: Repair five small cores at lower panel on the east end of the south elevation adjacent the electrical conduit.

Estimated Cost: $1,500

Priority: Short Term, recommended within 1 year.

Recommendation 3.3.1.1-3: Remove and replace sealant at vertical panel joints complete with new foam backer rod to suit size of joint.

Estimated Cost: $120,000

Priority: Medium Term Recommendations (Year 1 to 5)

Recommendation 3.3.1.1-4: Remove and replace all sealants and damaged flashings at base of wall transitions from pre-cast panel at with wing walls adjacent the entrance on the west elevation. Detail to prevent and mitigate bulk water infiltration to avoid degradation due to freeze/thaw.

Estimated Cost: $120,000

Priority: Short Term, recommended within 1 year.

.2 Original Pool Building - Corrugated metal cladding on the south elevation: With the exception of a localized depression/dent between the service door and glazed entrance, the corrugated metal cladding on the main level and partial soffit of the south elevation was found to be in good overall condition, including associated trims, flashings, and fasteners.

Photograph 3.3.1.2-1: Partial view of corrugated metal panel on the south elevation.

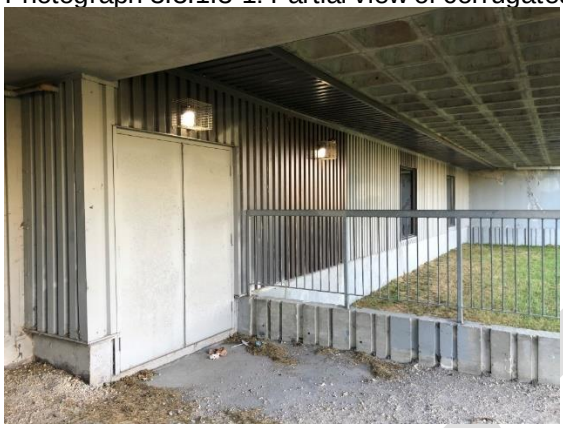
Recommendation 3.3.1.2-1: No remedial action required at this time.

Estimated Cost: N/A

Priority: N/A

.3 Original Pool Building - Corrugated metal cladding on the north elevation and below terrace of the Aquatic Hall of Fame: Corrugated metal cladding on the main level and partial soffit of the north elevation below the original building (brown cladding) and below the terrace of the Aquatic Hall of Fame (grey cladding) was found to be in good overall condition, including associated trims, flashings, and fasteners.

Photograph 3.3.1.3-1: Partial view of corrugated metal panel on the north elevation.



Recommendation 3.3.1.3-1: No remedial action required at this time.

Estimated Cost: N/A

Priority: N/A

.4 Original Pool Building - Cast-in-place 10" thick corrugated concrete wall: The corrugated concrete wall along the south elevation is largely uncoated and incorporates a cant bead of sealant at the base. The sealant was found to be largely intact, though crazed and hardened in localized areas. The wall along the north elevation was coated with an unknown material which was delaminating at the base of wall and throughout. The base of wall did not incorporate a sealant cant bead. Localized rust staining was typical on both elevations, emanating from behind the mesh vented and appeared to align with mechanical exhaust ducts, though this could not be confirmed on available drawings. Localised cracking and spalling was also observed.

Photograph 3.3.1.4-1: Partial view of cast-in-place 10" thick corrugated concrete wall along south elevation.

Photograph 3.3.1.4-2: Partial view of cast-in-place 10" thick corrugated concrete wall along north elevation.

Photograph 3.3.1.4-3: Typical example of delaminating coating and missing sealant at base of wall. Photo taken on north elevation.

Photograph 3.3.1.4-4: Typical example of water staining and rust marks originating from within the mesh soffit, appeared to align with mechanical exhaust ducts. Photo taken on south elevation.

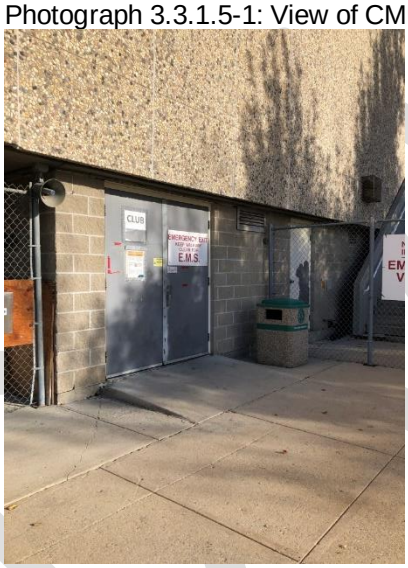
Recommendation 3.3.1.4-1: The condition of the 10" thick corrugated concrete walls along the north and south elevations are largely aesthetic in nature from a building envelope perspective. Since the type of the existing coating, presumably applied to conceal vandalism, is unknown, and since it is largely delaminating and in poor condition, thorough removal as required via pressure washing is recommended to better assess the condition of localized cracks in preparation for repairs as outlined in Recommendation 3.1.1.9-1. It is recommended that the existing cant bead sealant at the base of wall is removed and replaced along the south elevation and implemented along the north elevation to better protect this interface from bulk water infiltration.

Estimated Cost: $15,000

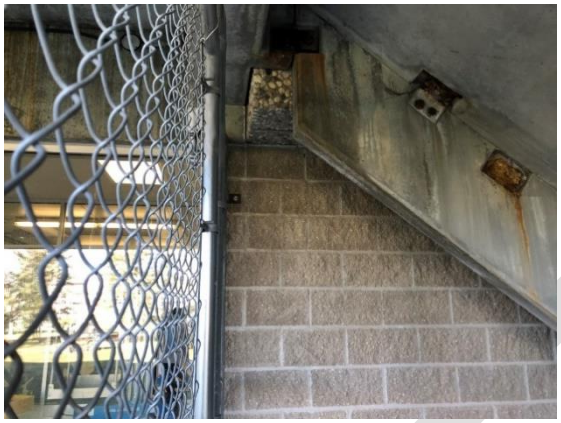
Priority: Short Term, recommended within 1 year.

.5 Original Pool Building - Concrete masonry walls (CMU): The CMU walls on the original pool building, at maintenance yard on south elevation and adjacent north stairwell exit, are both in good condition, including the mortar joints.

Photograph 3.3.1.5-1: View of CMU wall in maintenance yard on the south elevation.



Photograph 3.3.1.5-2: Partial view of CMU wall below stair to second level entrance on the north elevation.



Recommendation 3.3.1.5-1: No remedial action required at this time.

Estimated Cost: N/A

Priority: N/A

.6 Original Pool Building - clerestory windows: The clerestory windows along the north and south elevations of the original building have been enclosed from the interior as part of the 2009 and 2010 building envelop retrofit and no longer serve to provide visible light to the facility. The interior lite was painted black and insulation was added to the cavity between the window and the new interior wall assembly comprising the envelope retrofit. From the exterior these windows are flanked by pre-cast concrete features at the jambs, a pre-cast exposed aggregate sloped sill, and a stucco clad soffit over wood framing.

The windows themselves are in poor condition. Frost point testing was conducted on 19 windows, with failing results at 11 (58%), indicating failure of the insulated glazing unit and loss of thermal resistance. Refer to Section 3.3.2.1 for further discussion. Glazing sealant is severely degraded between the glass and metal frames resulting in significant discontinuities. Similarly, sealant beads at frame perimeter to adjacent soffit, pre-cast concrete features at jambs, and pre-cast exposed aggregate sloped sills is severely degraded or missing entirely, exhibiting cracking and stiffening, and large discontinuities observed along the length of the perimeter sealant bead.

The stucco clad soffits are in very poor condition throughout with the majority having displaced from underlying wood framing, and evidence of corrosion of metal corner and lath. Underlying wood framing was dry at time of visit but exhibited evidence of prior wetting. Water staining on the window frame head below the soffit, emanating from the soffit above, is suggestive of condensation within the unconditioned and ventilated soffit. Air leakage is plausible given the interior condition at facia/soffit level; the interior envelope retrofit angles up below roof structure to meet the original wall assembly which is penetrated by steel structure. This observation is further evidenced by the thermographic imagery of the upper soffit and clerestory windows, showing brighter and warmer temperatures at each bay and localized concentrated patterns suggestive of air leakage.

The pre-cast exposed aggregate sloped sills are in fair condition, though missing or degraded joint sealant was typical at base of sill to top of pre-cast panel below and at sill to jamb interfaces.

The pre-cast concrete features at jambs/between window bays exhibited localized deterioration, cracking and spalling. The joint sealants were found to be degraded throughout exhibiting cracking, hardening, tearing, and discontinuities.

Note that it was not possible to take the arial lift along the landscaping of the north elevation to review these clerestory windows at arms length along that elevation. Based on the retrofit drawings, we expect that the north elevation clerestory windows are in similar condition to those on the south elevation.

Photograph 3.3.1.6-1: Partial view, looking west, of multiple bays of clerestory windows, complete with pre-cast concrete features at the jambs, pre-cast exposed aggregate sloped sills, stucco clad soffits, and wire mesh closures.

Photograph 3.3.1.6-2: Typical example of stucco clad soffits showing displacement from underlying wood framing, evidence of corrosion of metal corners and lath, and evidence of prior wetting of underlying wood framing.

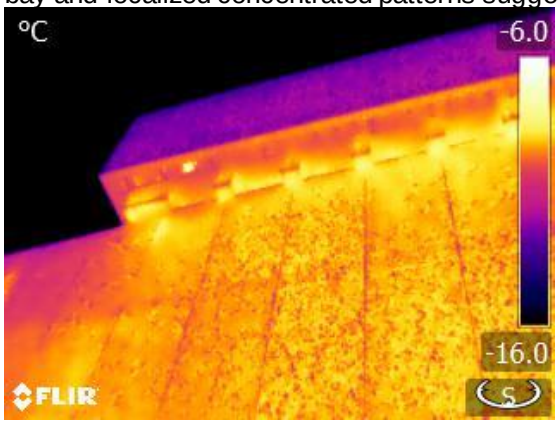
Photograph 3.3.1.6-3: Typical example of pre-cast exposed aggregate sloped sill showing missing or degraded joint sealant at base of sill to top of pre-cast panel below and at sill to jamb interface.

Photograph 3.3.1.6-4: Typical example of degraded and/or missing glazing sealant and sealant beads at frame perimeter to adjacent soffit, pre-cast concrete features at jambs, and pre-cast exposed aggregate sloped sills.

Photograph 3.3.1.6-5: Typical example of water staining on the window frame head below the soffit, emanating from the soffit above, suggestive of condensation within the unconditioned and ventilated soffit. Note also corrosion of metal stucco corners and degraded and missing sealants.

Photograph 3.3.1.6-6: Example of localised damage of a pre-cast concrete feature at jambs/between window bays exhibiting localized deterioration, cracking and spalling.

Photograph 3.3.1.6-7: Thermographic image of the upper soffit and clerestory windows at the west end of the south elevation, showing brighter and warmer temperatures at each bay and localized concentrated patterns suggestive of air leakage



Photograph 3.3.1.6-8: Image taken from interior south elevation showing angled top of interior envelope retrofit (green) meeting original wall assembly which is penetrated by steel structure.

Recommendation 3.3.1.6-1: The clerestory windows on both the south and north elevations are in need of significant remediation. At a minimum, all soffits and mesh require removal and replacement, all sealants must be re-instated, and repairs must be undertaken to the pre-cast concrete features at jambs. Due to the thermally inefficient nature of the window frames themselves, and the extent of repairs to adjacent surfaces, removal of existing windows and replacement with a more thermally efficient and air-tight opaque wall assembly is recommended. Should the COW wish to maintain a similar visual aesthetic as the original construction, the windows could be replaced with more thermally efficient units rather than an opaque wall assembly. All other remediation described herein would need to be undertaken simultaneously. Window replacement estimates are provided in Section 3.3.2.1 for glazing replacement only and the estimated costs outlined below would need to be adjusted accordingly to account for this design approach. The extent of this remediation, including tie-ins to underlying assemblies, material selection, and finishes is highly variable and the estimates below serve as a placeholder for planning purposes and are subject to final remediation scope and design.

Estimated Cost: $500,000

Priority: Short Term, recommended within 1 year.

.7 Original Pool Building - stuccoed soffits: According to record drawings, the stuccoed soffits along the north and south elevations of the original pool building were partially removed at beam locations to facilitate application of rigid foam insulation to the exterior of the concrete beams. This entailed opening the soffit either side of the control joint below the beam and repairing the stucco following completion of work. Other localized patch repairs and stains were observed at discrete locations throughout. The soffit itself is in generally good condition, with minimal localized repairs required, most notably at the west end of the south soffit, at the underside outside corner where the stucco has cracked and the corner does not appear to be reinforced with mesh.

Photograph 3.3.1.7-1: Partial view showing typical condition of stuccoed soffit along south elevation (looking east) including joints either side of concrete beam above.

Photograph 3.3.1.7-2: Localized repairs required at the west end of the south soffit, at the underside outside corner where the stucco has cracked and the corner does not appear to be reinforced with mesh.

Photograph 3.3.1.7-3: Partial view showing typical condition of stuccoed soffit along north elevation (looking west) showing typical example of localized patch repair/painting and stains.

Recommendation 3.3.1.7-1: The soffit itself is in generally good condition, with minimal localized repairs required, most notably at the west end of the south soffit, at the underside outside corner where the stucco has cracked and the corner does not appear to be reinforced with mesh. Repair is recommended to prevent bulk water infiltration during driving rain and to mitigate continual degradation of the corner.

Estimated Cost: $2,000

Priority: Short Term, recommended within 1 year

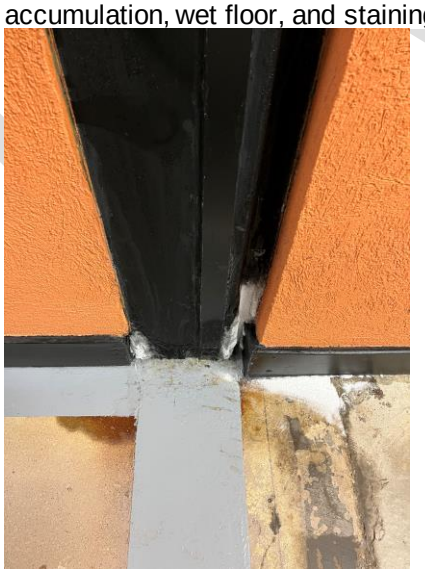
Recommendation 3.3.1.7-2: Though primarily an aesthetic preference, consideration could be given to cleaning via pressure washing and refreshing the stucco with a highly permeable stucco paint to conceal repair work and staining.

Estimated Cost: $100,000

Priority: Long Term Recommendations (Year 5 to 10)

.8 Original Pool Building – steel columns of original structure: At two points along the south side of the track, at the east and west ends, steel columns of the original structure have been left exposed through 2009/2010 interior envelope retrofit. Air leakage could be felt at the interface between the columns and adjacent wall assemblies with condensation observed on the column surface near this joint. The joint sealant at this interface was observed be to de degraded, exhibiting hardening, crazing, and discontinuities. At both locations, ice and frost accumulation was observed at the column base and at the base of wall to floor interface. Staining of the slab and reports from COW personnel suggest that this has been a reoccurring issue since 2009/2010 interior envelope retrofit project completion.

Photograph 3.3.1.8-1: Partial view of west column base showing ice and frost accumulation, wet floor, and staining of slab.



Photograph 3.3.1.8-2:Typical condition of degraded joint sealant at the interface between the columns and adjacent wall assembly, showing discontinuities and condensation.

Photograph 3.3.1.8-3: Partial view of east column base showing ice and frost accumulation. Note also ice accumulation at base of wall.

Recommendation 3.3.1.8-1: Air leakage is evident at these column locations and along the base of wall, suggesting that the air barrier implemented as part of the interior building envelope retrofits in 2009/2010 is discontinuous. Further investigation, including removal of interior finishes and exterior grilles along the soffit edge to provide visual access to the underlying assembly is required to determine the extent of the discontinuity and to prepare appropriate remediation details. Though no evidence of condensation was observed at time of visit, the investigation should be completed along the north elevation as well, to determine if that assembly is affected similarly. The extent of this remediation, including tie-ins to underlying assemblies, material selection, and finishes is highly variable and the estimates below serve as a placeholder for planning purposes and are subject to final

remediation scope and design. It has been assumed for the purposes of this report that removal and re-instatement of the bottom 2' of the wall assembly, is required. Investigation costs have not been included in this estimate.

Estimated Cost: $210,000

Priority: Short Term, recommended within 1 year.

.9 Lap pool, youth pool (1993 Swim Manitoba Addition) - Pre-cast exposed aggregate panels: The lap pool and youth pool addition to the original pool building is primarily clad in pre-cast exposed aggregate panels above painted pre-cast fluted panels. It is not clear how the transition between panels is sealed as no sealant joint was observed at this interface and it does not incorporate a drip flashing. Vertical sealant panel joints were found to be in good overall condition.

Note that it was not possible to take the arial lift along the landscaping of the north elevation to review these panels at arms length and thus our visual review was conducted from grade.

Some localized staining as a result of corrosion of iron ore inclusions in the exposed aggregate was observed throughout and though aesthetically not desirable is not considered a structural concern.

Photograph 3.3.1.9-1: Overall view of youth pool exterior showing condition of pre-cast exposed aggregate panels.

Photograph 3.3.1.9-2: Typical example of vertical sealant joint in pre-cast exposed aggregate concrete panel.

Photograph 3.3.1.9-3: Overall view of north elevation of lap pool exterior showing condition of pre-cast exposed aggregate panels and pre-cast fluted panels.

Recommendation 3.3.1.9-1: No remedial action required at this time.

Estimated Cost: N/A

Priority: N/A

.10 Lap pool, youth pool (1993 Swim Manitoba Addition) - Pre-cast fluted concrete panels: The lap pool and youth pool (1993 Swim Manitoba Addition) to the original pool building is primarily clad in pre-cast exposed aggregate panels above painted pre-cast fluted panels. The pre-cast fluted panels have appear to be in good overall condition in terms of condition of material. Evidence of stain (graffiti) removal is present with portions of the coating appearing lighter with overspray debris accumulating on the pre-cast aggregate

panels above. Similar to the pre-cast exposed aggregate to fluted panel joint, the transition to foundation wall does not incorporate a drip flashing.

Water staining and efflorescence at the underside of the panel, emanating from behind the panel, on the foundation wall, is suggestive of prior condensation and possible air leakage. This is further evidenced by the thermographic imagery of the interface, which shows a concentrated line of relatively warmer surface below the panel. Though partially attributed to lack of insulation on the foundation wall, this concentrated heat signature could also be indicative of air leakage.

It is not clear how the transition between panels is sealed as no sealant joint was observed at this interface and it does not incorporate a drip flashing. Vertical sealant panel joints were found to be in good overall condition.

Photograph 3.3.1.10-1: Partial view of the pre-cast fluted concrete panel to foundation wall showing water staining and efflorescence at the underside of the panel, on the foundation wall, suggestive of prior condensation and possible air leakage

Photograph 3.3.1.10-2: Evidence of stain (graffiti) removal is present with portions of the coating appearing lighter with overspray debris accumulating on the pre-cast aggregate panels above.

Photograph 3.3.1.10-3: Typical example of vertical sealant joint in pre-cast fluted concrete panel.

Recommendation 3.3.1.10-1: Though primarily an aesthetic preference, consideration could be given to cleaning via pressure washing and refreshing the pre-cast fluted panels with a highly permeable coating to conceal repair work, staining, and graffiti/vandalism.

Estimated Cost: $50,000

Priority: Long Term Recommendations (Year 5 to 10)

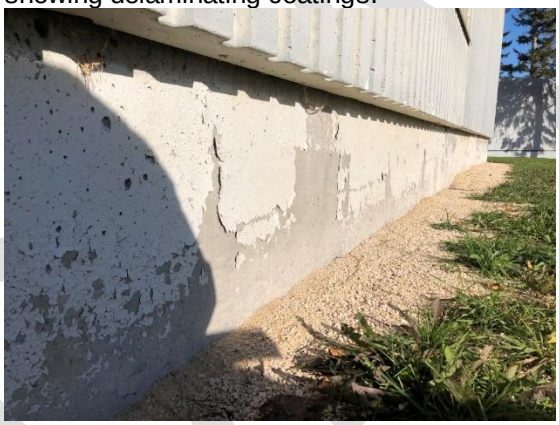
Recommendation 3.3.1.10-2: To improve the overall building energy performance, consideration could be given to addressing air leakage at the pre-cast panel to foundation wall in conjunction with the addition of insulation to the foundation wall to improve thermal resistance. An interior retrofit of this nature could be undertaken simultaneously with pool deck repairs and/or tile removal and replacement as access to the base of wall would be required. The extent of this remediation, including tie-ins to underlying assemblies, material selection, and finishes is highly variable and the estimates below serve as a placeholder for planning purposes and are subject to final remediation scope and design. It has been assumed for the purposes of this report that removal and re-instatement of the bottom 2' of the exterior wall assembly, from the interior, is required. Investigation costs have not been included in this estimate.

Estimated Cost: $800,000

Priority: Long Term Recommendations (Year 5 to 10)

.11 Lap pool, youth pool (1993 Swim Manitoba Addition) – foundation wall: The insulated foundation wall around the perimeter of the lap pool and youth pool (1993 Swim Manitoba Addition) was found to be in good overall condition. Previously applied coatings were delaminating throughout.

Photograph 3.3.1.11-1: Partial view of the 1993 Swim Manitoba Addition foundation wall showing delaminating coatings.



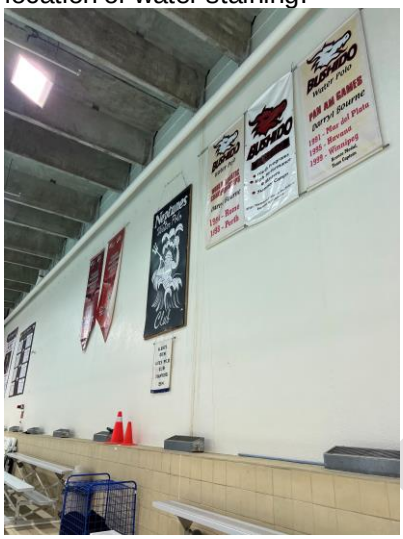
Recommendation 3.3.1.11-1: Insulating of the foundation wall is addressed in Section 3.3.1.10 above. Though primarily an aesthetic preference, consideration could be given to cleaning via pressure washing and refreshing the foundation wall with parging conceal repair work, staining, and graffiti/vandalism.

Estimated Cost: $50,000

Priority: Long Term Recommendations (Year 5 to 10)

.12 Lap Pool, youth pool (1993 Swim Manitoba Addition) – water staining was observed along the east elevation of the lap pool, appearing to originate from the roof/wall interface. No active water infiltration was occurring at time of visit and no obvious sources were observed. Though the most likely source is infiltration from roof or parapet level, the exterior review did not reveal any notable issues.

Photograph 3.3.1.12-1: Partial interior review of the east elevation of the lap pool showing location of water staining.



Photograph 3.3.1.12-2: Close up of roof/wall interface showing water staining appearing to originate from the roof/wall interface.

Recommendation 3.3.1.12-1: As the timing of the water infiltration is unknown and was not active at time of visit, it is recommended that the area be monitored as part of the ongoing roof maintenance program, specifically during wind driven rain events, to assess the conditions under which infiltration occurs and to correlate with the condition of the roof/parapet.

Estimated Cost: N/A

Priority: Maintenance (ongoing) – Repairs required to address ongoing, or routine maintenance

.13 Aquatic Hall of Fame –cladding, flashings, and trims:

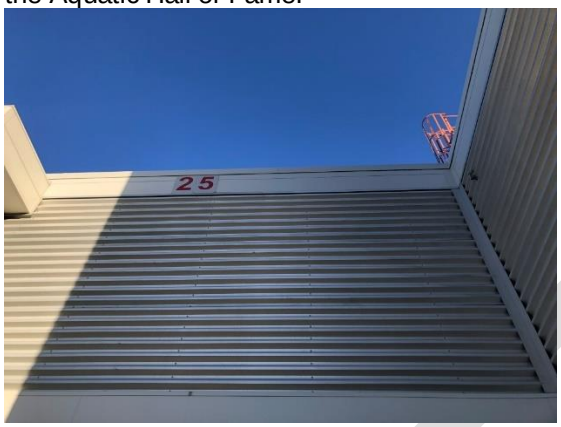
The cladding on the Aquatic Hall of fame consists primarily of various types of metal cladding, including horizontally corrugated metal cladding on the upper portions above the punched curtain wall glazing, horizontal metal cladding on the lower portions below the punched curtain wall, and various metal cladding trims and flashings at both vertical and horizontal transitions between roof, foundation, cladding, and glazing elements. Refer to an overview of the cladding, flashing, and trim elements in Photograph 3.3.1.13-1 below.

Photograph 3.3.1.13-1: View of the west elevation of the Aquatic Hall of Fame showing prow feature.

The condition of the cladding on the Aquatic Hall of Fame, coupled with the findings of the Curtainwall Leakage Review by Pinchin dated January 10th, 2020, which included selective demolition to review the condition of underlying envelope elements, warrants a comprehensive report on this part of the facility. The following is a summary of our non-destructive visual assessment. Note that no apparent repairs were completed since the issuance of the Pinchin report.

Horizontally corrugated metal cladding: The upper portions of the Aquatic Hall of Fame, above the punched curtain wall glazing, are clad in horizontally corrugated metal cladding. The cladding itself was observed to be in fair condition, with some visible denting of corrugations (cause unknown), no notably excessive signs of corrosion or missing fasteners. However, water staining and streaking was observed between pre-finished trim elements, specially at outrigger locations, and through wall flashings with drip edges were not incorporated at horizontal transitions above and below the corrugated cladding.

Photograph 3.3.1.13-2: Typical condition of corrugated metal cladding on upper portion of the Aquatic Hall of Fame.



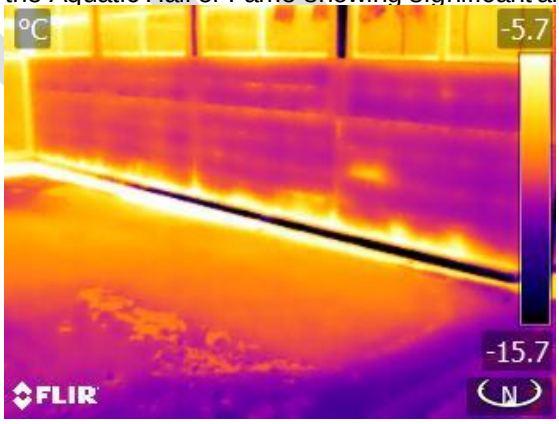
Horizontal metal cladding: The lower portions of the Aquatic Hall of Fame, below the punched curtain wall glazing, are clad in horizontal lap style pre-finished metal cladding. The cladding is in poor condition, exhibiting signs of corrosion and delaminating finish at multiple locations throughout. Review of drawing 2/A2.2 in the Phase 2 envelope retrofit package, dated 2010, indicates that an air barrier is not continuous with curb. Though our review consisted solely of non-invasive visual assessment, these findings are consistent with those of the 2020 Pinchin report which outlines significant deficiencies in the air barrier detailing of the Aquatic Hall of Fame. Similarly, our thermographic scan showed significant air leakage at the wall base.

Photograph 3.3.1.13-3: Partial view of west elevation of the of the Aquatic Hall of Fame showing typical condition of horizontal metal cladding.

Photograph 3.3.1.13-4: Typical example of corrosion observed on horizontal metal cladding.

Photograph 3.3.1.13-5: Typical example of delaminating coating observed on horizontal metal cladding.

Photograph 3.3.1.13-6: Thermographic image of base of wall along the west elevation of the Aquatic Hall of Fame showing significant air leakage at curb.



Metal cladding trims and flashings and sealants: Metal cladding trims and flashings were observed to be in fair to poor condition throughout, with notable discrete impact damages, discontinuities in joints, and installation not keeping with industry best practice, such as corner, termination, and lap joint detailing, in addition to maintenance of positive slope away from vertical cladding elements. Closure sealants were in poor condition, with evidence of prior repair work, most notably at curb flashing terminations adjacent to entrance doors. Without completing selective demolition, it could not be confirmed that through wall flashings were tied back to the underlying sheathing and air barrier, though the Pinchin report suggests that they are not, which is exacerbating the stresses on the building envelope through bulk water infiltration through the assemblies.

Photograph 3.3.1.13-7: View of base of wall curb flashing showing typical discontinuity at flashing joints.

Photograph 3.3.1.13-8: View of sealant repair completed at curb next to entrance.

Recommendation 3.3.1.13-1: The observed condition of the cladding on the Aquatic Hall of Fame in conjunction with the findings of our thermographic scan and those of the Curtainwall Leakage Review by Pinchin dated January 10th, 2020, indicates that significant building envelope continuity issues are present, including water-shedding capabilities, air and vapour barrier continuity, and thermal resistance capacity.

The interconnectedness of the elements and complexity of the form lead us to recommend a full exterior envelope upgrade to the Aquatic Hall of Fame to fully address the persistent issues and mitigate further degradation of underlying structural components. The extent of the upgrade should include consideration of curtain wall remediation, which has been addressed separately under items 3.3.2.4-1 and 3.3.2.4-2 below. The extent of material options creates large variability in the costing of such an upgrade. At a minimum, the retrofit should incorporate rainscreen design practices consisting of an exterior air/vapour/water barrier supported by moisture resistant sheathing, outboard insulation to an effective thermal resistance appropriate to mitigate condensation potential within the assembly to protect steel sub-structures, and cladding materials appropriate for a pool assembly.

Estimated Cost: $500,000

Priority: Medium Term, recommended in 1 to 5 years.

.14 East end of main pool: During pre-investigation correspondence with COW personnel, it was brought to CKP attention that condensation concerns persist at the east end of the main pool, where acoustical panels have been installed over the pre-existing wall and glazing assemblies.

Selective demolition to remove an acoustical panel at this location, and partial removal of the interior drywall beneath the panel, was proposed to be undertaken to provide visual access of the structural and envelope elements beyond. Jilmark Construction completed the original installation and was retained to complete the selective demolition due to this previous experience and familiarity with the assembly. Prior to undertaking the investigation, COW personnel indicated that the area could be accessed via the interior gymnasium ceiling, though scaffolding would be required to reach the upper portions of the panels.

Jillmark Construction indicated that the acoustical panels are installed in an overlapping fashion, meaning that upper panels stack over the installation railing of the lower panels, necessitating top down removal. Upon site review with Jilmark Construction and COW personnel, it was concluded that the intended selective demolition could not be completed without significant disruption to the pool facility, as scaffolding would need to be erected from pool deck level to the bulkhead over the topmost acoustical panel, over 16m of height. Furthermore, the scaffolding would need to be tied back to structural columns between panel bays, which are concealed beneath decorative metal trim, the removal of which would be necessary.

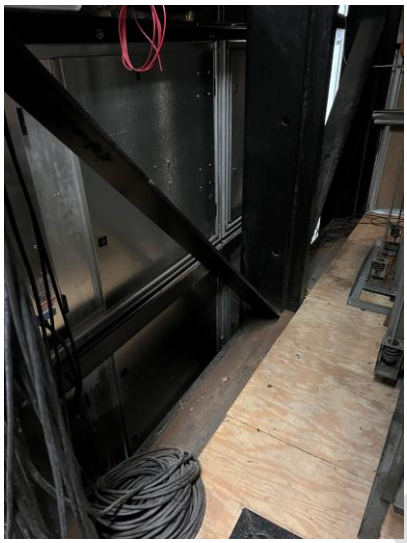
At time of site visits, no visible signs of condensation were observed on the pool side of the acoustical panels. Efforts were made to access the back-side of this assembly, through the gymnasium ceiling; however, the access was limited to the area behind the scoreboard.

Though the acoustical panel wall assembly was not accessible, some water staining was observed on the structural steel elements behind the scoreboard, and on the back-side of the scoreboard itself, from overhead, though the point of origin was not visually accessible. Minor corrosion was observed on the inverted steel C-channel at platform floor level. As no active condensation or leakage was observed at time of visit, we cannot say for certain where or how the moisture is being deposited, though, it is our understanding that these structural elements were re-coated in 2019, and it therefore stands to reason that the observed water staining would have occurred in the interim.

Photograph 3.3.1.14-1: View of water staining observed on columns behind scoreboard, originating from overhead.

Photograph 3.3.1.14-2: View of water staining observed on back side of scoreboard, originating from overhead.

Photograph 3.3.1.14-3: Structural steel behind scoreboard showing inverted c-channel with minor corrosion.



Recommendation 3.3.1.14-1: As no active condensation or leakage was observed at time of visit, and no visible signs of condensation were observed on the pool side of the acoustical panels, it is difficult to ascertain where or how the reported condensation events occurred, and therefore potential remediation measures cannot be recommended at this time.

It is therefore recommended that the east end of the pool be monitored for further condensation issues over the course of the winter and spring 2022. Should a situation arise, CKP will attend site to review the active issue. If further investigation is deemed necessary, including the removal of acoustical panels and the scaffold access as described above, it is recommended that these activities coincide with scheduled pool maintenance, to limit disturbance to patrons. Remediation recommendations would then be based on the findings of the subsequent investigations. The scope and costs associated with subsequent investigations will be provided under separate cover at COW request.

Estimated Cost: TBD

Priority: Short Term, recommended within 1 year.

3.3.2 Glazing

.1 Clerestory windows - Original 1967 Building: The majority of glazing on the original 1967 building is made up by the clerestory aluminum framed windows (dual pane insulated glazing units) on the north and south elevations. The units appear to be original, though manufacturer date stamps could not be identified. Assuming these units are original, they are 55 years old, or 220% of their expected service life. Each elevation contains 62 units, separated by pre-cast concrete features. 10 of the units on the south elevation were enclosed by mesh and not accessible. Due to access constraints, the north elevation units could not be reviewed though the condition of these units is expected to be similar to those on the south elevation. Units on the south elevation appear to have been painted over on

the interior pane, providing no light to the interior space and making a visual review of the IGU's (gaskets, spacer, visible moisture) impractical. Frost point testing was conducted on a sample size of windows to determine failures of IGU's.

IGU's and framing on the south elevation were observed to be poor condition. Aluminum framing was noted to be corroded, especially at sill framing where bird droppings have built up. Sealant at frame perimeter (rough opening) as well as between the frame and the IGU was noted to be heavily deteriorated, missing, contaminated by biological growth or a combination. Multiple IGU's were noted to be cracked or perforated (cause unknown) and categorized as a visual failure.

Frost point testing was conducted at 19 IGU's which makes up approximately 15% of clerestory windows (north and south). 11 of 19 (58%) showed some level of frost or condensation.

Photograph 3.3.2.1-1: Typical example of clerestory windows during frost point testing. Note the deteriorated/missing sealant and corroded frame.

Recommendation 3.3.2.1-1: The reviewed clerestory areas are showing significant deterioration of the frames, IGU's and sealants. Given the height of these units, their condition is likely contributing to a significant amount of air leakage. It is highly recommended that these units be replaced with high performance glazing units suitable for high humidity applications to increase thermal performance and occupant comfort.

Estimated Cost: $124,000

Priority: Short Term, recommended within 1 year.

Recommendation 3.3.2.1-2: Should recommendations 3.3.2.1-1 not be desirable, and a non-glazed system be preferred (based on the original units being painted over), an insulated infill panel can be installed in place of the original windows. The thermal performance of an insulated panel infill can be significantly higher than a glazing unit. Refer to Section 3.3.1.6-1 for discussion of this option.

Estimated Cost: Refer to Section 3.3.1.6-1

Priority: Short Term, recommended within 1 year.

.2 East and west low roof curtain wall - Original 1967 Building: Glazing on the east and west low roof areas of the original 1967 buildings were observed to be newer, replaced in a 2010 remediation project. This glazing is aluminum curtain wall with insulated glazing units (IGU's). The curtain wall is continuous on both elevation with the exception of one vent grille installed in the curtain wall system on the west elevation. There are 37 IGU's on the west elevation and 38 IGU's on the east elevation with 30 of the units enclosed on the interior (not accessible).

While the curtain wall framing and IGU's appeared to be in good condition and are still within their estimated life expectancy (12 years or 48%), the sealant used during installation is past it's estimated life expectancy (12 years or 120%). Minor discontinuities in the curtain wall framing gaskets were also noted.

Frost point testing was not completed at these areas as access was not practical with the necessary equipment.

Photograph 3.3.2.2-1: Overview of West low roof curtain walls.

Photograph 3.3.2.2-2: Example of older sealant at curtain wall jamb and displaced seal at curtain wall sill cap.

Recommendation 3.3.2.2-1: While the curtain wall system on the west and south low roof areas are in good overall condition, deteriorated and/or discontinuous sealant and seals can contribute to air leakage (loss in thermal performance) and water infiltration. Replacement of sealant and selective replacement of curtain wall gaskets is recommended to improve thermal performance and prevent premature deterioration of the curtain wall system and the adjacent structure.

Estimated Cost: $40,000

Priority: Medium Term, recommended within 1 to 5 years.

.3 Curtain wall – 1994 east addition: Glazing at the 1994 east addition (lap pool and youth area) was primarily made up by the curtain wall on the south elevation with 48 IGU's. These IGU's were noted to be triple glazed and date stamped 2008 which indicates the original units were replaced approximately 14 years ago. Frames in this area appear to be original. Two (2) punch style curtain wall units were observed on the north elevation of this addition. Due to their height from grade, review of their components and age were not possible.

While the curtain wall framing and IGU's appeared to be in generally good condition and are still within their estimated life expectancy (14 years or 56%), the age of the sealant at these curtain walls is unknown. The age of the most recent remediation would mean the age of the sealant is conservatively estimated at 14 years or 140% of it's life expectancy. Deterioration, discontinuities and missing curtain wall gaskets were noted as well as a damaged component of the curtain wall framing on the east jamb of the south assembly.

Frost point testing was conducted at 6 IGU's which makes up approximately 12% of curtain wall IGU's on the east addition (2 on north elevation, 48 on south elevation). 0 of 6 (0%) showed any level of frost or condensation. In addition, one visual failure was noted.

Photograph 3.3.2.3-1: View of main glazed are at the east addition.

Photograph 3.3.2.3-2: Example of curtain wall seal peeling away from frame.

Recommendation 3.3.2.3-1: While the curtain wall system on the south elevation is in good overall condition, deteriorated and/or discontinuous sealant and seals can contribute to air leakage (loss in thermal performance) and water infiltration. Replacement of sealant, curtain wall gaskets, damaged curtain wall frame components and the visually failed IGU is recommended to improve thermal performance and prevent premature deterioration of the curtain wall system and the adjacent structure. Further review of the two punch style curtain walls on the north elevation would be required, though similar recommendations are likely to be made.

Estimated Cost: $51,000

Priority: Medium Term, recommended within 1 to 5 years.

.4 Curtain wall – 1999 west addition: Glazing at the 1999 west addition (aquatic hall of fame) primarily made up by the curtain wall on the prow as well as the west, north and south second floor areas with 190 IGU's. These IGU's were noted to be double glazed and date stamped 1999 indicating that these are original and approximately 23 years old. Frames in this area appear to be original. Curtain wall on south elevation (ground level) next to the main entrance contains 7 IGU's date stamped 2001 (19 years old). Two (2) punch style curtain wall units were observed on the north elevation (ground level) and were noted to have a black spacer bar and no visible date stamp indicating this IGU is newer.

Curtain wall framing appeared to be in generally good condition at the prow section of the west addition. IGU's at this section were noted to be failing rapidly with multiple visual failures and a 50% failure rate in frost point testing (see below). Sealant and curtain wall gaskets were also noted to be deteriorated, missing and generally at the end of their service life. Gaps were noted in curtain wall framing and the presence of towels inside the occupied area suggest that significant water infiltration is occurring, likely due to failing sealant and general detailing issues around curtain wall joints/rough opening.

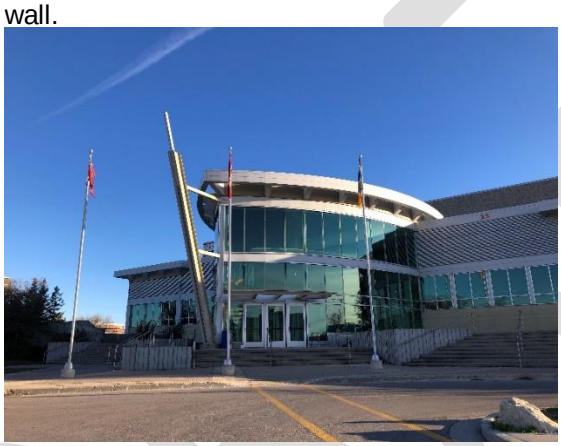
Curtain wall framing and IGU's appeared to be in generally good condition at the second level north, west and south elevations, though IGU's are nearing the end of their estimated

life expectancy (23 years or 92%). Sealant in these areas was noted to be somewhat deteriorated and curtain wall gaskets were noted to be displaced or missing in some areas. Though the condition of this area appears to be better than the adjacent prow, many of the components are at or near the end of their service life.

Punch style curtain walls on the north as well as the curtain wall on the ground level of the south elevation were noted to be in relatively good condition. Sealant at these locations was noted to be somewhat deteriorate.

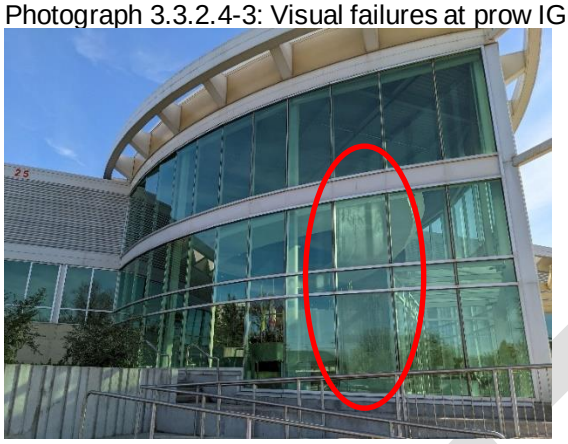
Frost point testing was conducted at 31 IGU's which makes up approximately 16% of curtain wall IGU's on the west addition (144 on west elevation, 23 on north elevation and 31 on south elevation). 8 of 31 (26%) showed some level of frost or condensation. In addition, six visual failures were noted. Note: 7 of the 8 recorded failures and all recorded visual failures were at the prow.

Photograph 3.3.2.4-1: Overall view of the prow and west elevation second level curtain wall.

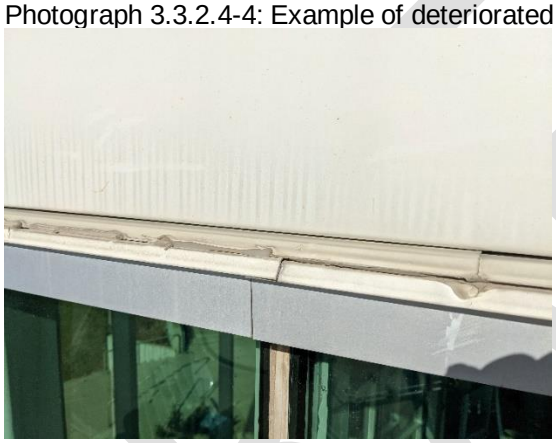


Photograph 3.3.2.4-2: Deteriorated SSG sealant at vertical joints (prow).

Photograph 3.3.2.4-3: Visual failures at prow IGUs.



Photograph 3.3.2.4-4: Example of deteriorated sealant at curtain wall head flashing.



Recommendation 3.3.2.4-1: The curtain wall system on the "prow" section of the west elevation of the west addition was noted to be where the majority of the significant issues were noted. Due to the significant amount of failed IGU's, deteriorated sealant and gaskets as well as the noted water infiltration and general detailing issues, a full curtain wall refurbishment is recommended, though replacement or modification may be required should proper air/vapour barrier membrane tie in of the existing system prove impractical. Refurbishment of the system is recommended to improve overall thermal performance, eliminate water infiltration and problematic existing detailing as well as prevent premature deterioration of the adjacent structure(s).

Estimated Cost: $280,000

Priority: Short Term, recommended within 1 year.

Recommendation 3.3.2.4-2: While the curtain wall system on "prow" section of the west addition was noted to be in poor condition, the remaining curtain wall systems and punch style curtain walls were noted to be in relatively good overall condition. Due to the age of the IGU's, it is still recommended that the curtain wall system be refurbished and IGU's be replaced, though it is not required as immediately as recommendation 3.3.2.4.1. The noted punch windows on the north elevation as well as the ground level south curtain wall

are included in this recommendation. Refurbishment of the system is recommended to improve overall thermal performance, as well as prevent premature deterioration of the adjacent structure(s).

Estimated Cost: $220,000

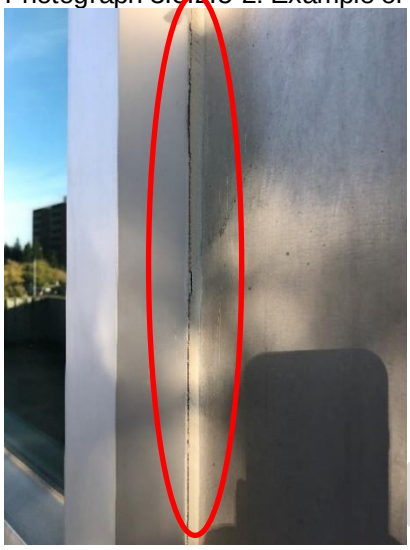
Priority: Short Term, recommended within 1 year.

.5 Aluminum frame doors: The original 1967 building is serviced by 4 curtain wall doors (date stamped 2006/2018), the west addition is serviced by 13 curtain wall doors (date stamped 1998) and the east addition is serviced by 12 curtain wall doors (date stamped 1993).

Generally, the frames for all curtain wall doors appear to be in good condition. Sealant and frame seals at these units were noted to be deteriorated (cracked, peeling) and past their useful service life. Although IGU's in these areas appeared to be in good condition, the majority are at or near the end of their expected service life (29-24 years old at most locations). Fixed IGU's at punch style doors (not prow area) are included in the door assessments.

Photograph 3.3.2.5-1: Example of curtain wall doors on the second level west addition.

Photograph 3.3.2.5-2: Example of sealant condition at curtain wall door framing.



Recommendation 3.3.2.5-1: The curtain wall style doors were noted to be in relatively good overall condition. Due to the age of the IGU's, it is recommended that the curtain wall doors be refurbished including IGU's be replaced, sweeps/seals being replaced, and perimeter sealant being removed and replaced. Refurbishment of the curtain wall doors is recommended to improve overall thermal performance, as well as prevent premature deterioration of the adjacent structure(s).

Estimated Cost: $116,000

Priority: Medium Term, recommended within 1 to 5 years.

.6 Service doors: The original 1967 building is serviced by 17 standard hollow metal doors (One single door, two sets of 2 and two sets of 6) and the east addition is serviced by 1 standard hollow metal door. Though these styles of doors do not have date stamps, they appear to be original to their respective buildings (1967 at original building, 1994 east addition).

Generally, frames and door slabs appear to be fair condition though the majority of sealant was noted to be deteriorated or missing. Door seals were not reviewed, though they are expected to be deteriorated and generally past their useful service life.

Photograph 3.3.2.6-1: General condition of sealant at hollow metal service doors (where installed).

Recommendation 3.3.2.6-1: The majority of doors were noted to have deteriorated or missing perimeter sealant. Replacement or installation of perimeter sealant is recommended to eliminate potential water and air infiltration, preventing premature deterioration of the adjacent structure(s). Replacement or installation of door seals and sweeps is recommended as part of a regular maintenance program.

Estimated Cost: $5,000

Priority: Medium Term, recommended within 1 to 5 years.

3.3.3 Roofing

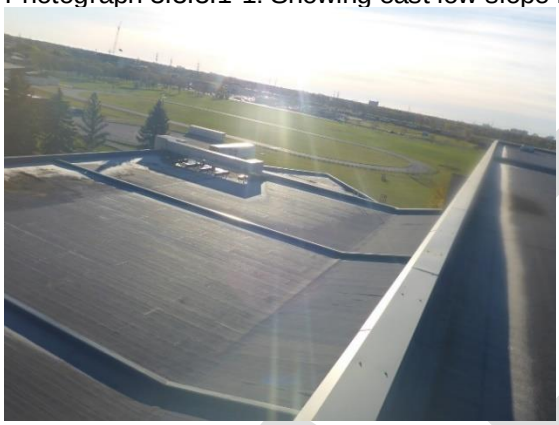
.1 The east building roof facet is in overall fair condition, including southeast roof facet. The east roof is divided in 2 types of roof systems based on the geometry of the existing structure. The low slope roof Photograph 3.3.3.1-1 consists of 2-ply SBS vapor barrier on existing concrete deck, followed with 2 layers 38mm polyisocyanurate insulation panels, ¼" asphaltic board, all above layers are adhered with hot asphalt, heat welded SBS modified bitumen base and granulated cap membrane. The steep roof Photograph 3.3.3.1-2 consists of original 2-ply felt vapor barrier, 70mm polyisocyanurate insulation, 13mm fiberboard panel, all above are adhered with hot asphalt, SBS modified bitumen base membrane adhered with asphalt and heat welded SBS modified bitumen granulated cap membrane. The above mentioned system is existing and according to provided records the steep slope roof facet was recovered with a heat welded SBS modified bitumen granulated cap membrane. Overall, the condition is fair and future maintenance and small repairs are required. Blisters and wrinkles were observed throughout the roof cover, due to the asphalt sliding and asphaltic board movement underlying the SBS roof cover membrane. Refer to photograph 3.3.3.1-3 and 3.3.3.1-4

Recommendation 3.3.3.1-1: Repair as necessary to provide roof cover continuity.

Estimated Cost: $45,000

Priority: Medium Term, recommended within 1 to 5 years.

Photograph 3.3.3.1-1: Showing east low slope roof facet.



Photograph 3.3.3.1-2: Showing east steep slope roof facet.

Photograph 3.3.3.1-3: Showing typical buckling in roof cover, east roof facet.

Photograph 3.3.3.1-4: Showing typical wrinkle at membrane seam, east roof facet.

.2 On the building west roof facet, the existing system is relatively new and in very good condition and performing as intended. No deficiencies or concerns were observed. Based on the age of the installed roofing system, the existing systems should still be under warranty with the membrane manufacturer as well as the roofing contractor. Drainage on the roof is satisfactory and sloped adequately throughout. Photograph 3.3.3.1-5.

Photograph 3.3.3.2-1: Showing West roof facet

Recommendation 3.3.3.2-1: Annual roof maintenance required.

Estimated Cost: N/A – Non-capital expense. $1,500/year

Priority: Short Term, recommended within 1 year then Maintenance (ongoing) – Repairs required to address ongoing, or routine maintenance.

.3 Main pool roof facet is in overall good condition. The main pool roof photograph 3.3.3.1-6 consists of a 2-ply SBS modified bitumen vapor barrier on 13mm glass reinforced moisture resistant support panel over the existing steel deck, followed by 2 layers of 50mm polyisocyanurate insulation panels and adhered with a low-rise foam adhesive. The SBS modified bitumen base membrane is adhered directly to the top layer of glass faced polyisocyanurate panel, followed by a heat welded SBS modified bitumen traffic

granulated cap membrane. Overall, the roof cover throughout the roof field is in good condition and general maintenance will be required. We observed minor deficiencies on the SBS cap flashing mainly at the roof control joints. According to site personnel leaks have occurred at the northwest units on the roof. We observed minor openings at the SBS flashing membrane and metal flashing/membrane joints. Photograph 3.3.3.3-1 and 3.3.3.3-3. We recommend that these deficiencies be addressed in the short term to prevent further water infiltration into the building. We recommend during annual maintenance the drain assemblies be reviewed, cleaned and repaired as necessary.

Photograph 3.3.3.3-1: Showing main pool roof facet.

Photograph 3.3.3.3-2: Showing typical deficiency at mechanical unit and flashing membrane

Photograph 3.3.3.3-3: Showing typical loose flashing membrane

Recommendation 3.3.3.3-1: Repair as necessary to provide waterproofing, re-seal flashing membranes.

Estimated Cost: $40,000

Priority: Short Term, recommended within 1 year.

4. Estimates of Probable Construction Costs

The following table summarizes our estimate of probable construction costs by category. All costs presented are in 2022 dollars and are before taxes, contingencies, and consulting fees.

Table 4.1 – Required Repairs

Category	Section	Recommendation	Description	Estimate
Required Repairs	3.2 Structural	3.2.1.4-1	Chlorination Room access platform repairs.	$5,000
		3.2.5.5-1	Bleacher fire-proofing replacement.	$80,000
Total Required Repairs (within 3 months)				**$85,000**

Table 4.2 – Short Term Recommendations

Category	Section	Recommendation	Description	Estimate
Short Term	3.1 Site	3.1.1.1-1	Podium investigation.	$10,000
		3.1.1.2-1	Northwest podium concrete repairs.	$10,000
		3.1.1.3-1	Repaint podium guardrails.	$20,000
		3.1.1.4-1	Planter wall concrete repairs.	$3,000
		3.1.1.6-1	West entrance stair tread repairs.	$80,000
		3.1.1.7-1	Podium top surface concrete repairs.	$15,000
		3.1.1.8-1	North elevation precast stair joint sealing.	$5,000

		3.1.1.8-2	North elevation precast stair landing replacement.	$6,000
		3.1.1.9-1	North and south exterior wall repairs.	$10,000
		3.1.1.10-1	Retaining wall repair.	$20,000
	3.2 Structural	3.2.1.1-1	Mechanical room floor slab concrete repairs.	$25,000
		3.2.1.2-1	Service tunnel floor slab concrete repairs.	$5,000
		3.2.1.3-1	Infill floor opening.	$3,000
		3.2.1.5-1	Chlorination Room concrete repairs.	$10,000
		3.2.1.5-2	Chlorination Room floor coating.	$30,000
		3.2.3.1-1	Main Pool tank wall concrete repairs.	$50,000
		3.2.3.3-1	Main Pool concrete bench repairs.	$35,000
		3.2.3.4-1	Diving platform concrete repairs.	$150,000
		3.2.4.1-1	Lap Pool mechanical review.	$3,000
		3.2.4.1-2	Lap Pool tank wall concrete repairs.	$25,000
		3.2.5.1-3	Locker room floor slab investigation.	$20,000
		3.2.5.3-1	Concourse crack sealing.	$15,000
		3.2.6.3-1	Remove fall arrest anchors.	$0
		3.2.6.3-2	Certify fall arrest anchors.	$8,000
		3.2.6.4-1	Repaint corroded steel beam.	$3,000
	3.3 Building Envelope	3.3.1.1-1	Investigate pre-cast panel displacement	TBD
		3.3.1.1-2	Repair five small cores at lower panel.	$1,500
		3.3.1.1-4	Remove and replace all sealants and damaged flashings at base of wall transitions.	$120,000
		3.3.1.4-1	Pressure wash concrete walls, remove and replace base/implement base of wall sealant.	$15,000
		3.3.1.6-1	Clerestory window and associated adjacent assembly remediation.	$500,000
		3.3.1.7-1	South soffit repair.	$2,000
		3.3.1.8-1	Remediation of air leakage at columns and interior air sealing of wall assembly.	$210,000
		3.3.1.14-1	Monitor east end of pool.	$TBD
		3.3.2.1-1	Replace clerestory IGUs.	$124,000
		3.3.2.1-2	Replace IGUs with insulated infill panel.	Refer 3.3.1.6-1
		3.3.2.4-1	Curtain wall – 1999 west addition – refurbish prow curtain wall.	$280,000
		3.3.2.4-2	Curtain wall – 1999 west addition – refurbish punched curtain wall.	$220,000
		3.3.3.2-1	Building west roof facet annual maintenance.	$1,500/year
		3.3.3.3-1	Repair as necessary to provide waterproofing, re-seal flashing membranes.	$40,000

Total Short Term Recommendations (within 1 year)	**$2,075,000**

Table 4.3 – Medium Term Recommendations

Category	Section	Recommendation	Description	Estimate
Medium Term	3.2 Structural	3.2.1.4-2	Chlorination Room access platform replacement.	$40,000
		3.2.2.1-1	Lap Pool crawlspace remediation.	$320,000
		3.2.3.1-2	Main Pool tile replacement.	$1,200,000
		3.2.5.1-1	Locker room tile replacement.	$480,000
		3.2.5.1-2	Locker room slab repairs.	$80,000
	3.3 Building Envelope	3.3.1.1-3	Remove and replace sealant at vertical panel joints.	$120,000
		3.3.1.13-1	Exterior envelope upgrade.	$500,000
		3.3.2.2-1	East and west low roof curtain wall - Original 1967 Building curtain wall remediation.	$40,000
		3.3.2.3-1	1994 east addition curtain wall remediation	$51,000
		3.3.2.5-1	Refurbish curtain wall doors.	$116,000
		3.3.2.6-1	Install/replace perimeter sealant at service doors.	$5,000
		3.3.3.1-1	Repair as necessary to provide roof cover continuity.	$45,000
Total Medium-Term Recommendations (Year 1 to 5)				**$2,997,000**

Table 4.4 – Long Term Recommendations

Category	Section	Recommendation	Description	Estimate
Long Term	3.3 Building Envelope	3.3.1.7-2	Soffit cleaning via pressure washing and application of permeable stucco paint.	$100,000
		3.3.1.10-1	Panel cleaning via pressure washing and application of a highly permeable coating.	$50,000
		3.3.1.10-2	Adress air leakage at the pre-cast panel to foundation, add insulation to foundation.	$800,000
		3.3.1.11-1	Insulate foundation wall.	$50,000
Total Long-Term Recommendations (Year 5 to 10)				**$1,000,000**

Table 4.5 - Long Term Considerations / Recommended Improvements

Category	Section	Recommendation	Description	Estimate
Long Term Considerations/ Recommended Improvement	3.1 Site	3.1.1.5-1	Upgrade guardrail at accessible ramp.	$3,000
		3.1.2.3-1	Repair/replace existing asphalt paving on north elevation.	$20,000
		3.2.1.2-2	Resurface or replace existing concrete tunnel slabs	$175,000
		3.2.3.1-3	Main Pool infill porthole window. To be completed with recommendation 3.2.3.1-2.	$35,000
	3.3 Building Envelope	3.3.1.10-2	Adress air leakage at the pre-cast panel to foundation, add insulation to foundation.	$800,000
Total Long Considerations / Recommended Improvements				**$1,033,000**

Table 4.6 – Maintenance

Category	Section	Recommendation	Description	Estimate
Maintenance	3.2 Structural	3.2.5.6-1	Repair bleacher plaster finish.	$3,000
		3.2.5.9-1	Repair drywall finish in weight room.	$5,000
	3.3 Building Envelope	3.3.3.2-1	Building west roof facet annual maintenance.	$1,500.00/year
Total Maintenance				**$9,500**

Table 4.7 – Summary of all Recommendations

Category	Estimate
Total Required Repairs (within 3 months)	$85,000
Total Short Term Recommendations (within 1 year)	$2,075,000
Total Medium Term Recommendations (Year 1 to 5)	$2,997,000
Total Long Term Recommendations (Year 5 to 10)	$1,000,000
Long Term Considerations/Recommended Improvements (not time critical)	$1,033,000
Maintenance (ongoing) – Repairs required to address ongoing, or routine maintenance.	$9,500
Total of All Recommendations	**$7,190,500**

5. Closure

At the request of the City of Winnipeg Planning Property & Development Department, a structural and building envelope assessment of the Pan Am Indoor Pool was completed by Crosier Kilgour & Partners personnel. The purpose of the investigation was to provide an opinion as to the current condition of the structure, cladding, windows and roofing, identify areas of distress, and provide recommendations for immediate, short and long-term repairs.

We trust that this report provides the information you require. Upon your review, please contact our office at your convenience to discuss this report in further detail.

Structural Seal
CROSIER KILGOUR & PARTNERS LTD.

Derek J. Mizak, P.Eng.

Building Envelope Seal
CROSIER KILGOUR & PARTNERS LTD.

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Appendix A

Thermographic Report