Strathcona Pool Assessment

October 07, 2009

The City of Edmonton Capital Construction

Burgess Bredo Architect Ltd.

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Strathcona High School was constructed in 1953 by the Edmonton Public School Board. A small addition was added to the north west corner of the school in 1957 to house a swimming pool. A portion of the basement of the school was used to accommodate the change rooms, washrooms and showers for the pool. The main public entrance for the pool is shared with an entrance and stair for the school on the west side of the school. Area calculations include:

+ 1953 School Building floor plate (main): 8,211.25 m^2
+ 1957 Swimming Pool Addition: 686.5 m^2
+ Maximum floor plate (main): 8,897.75 m^2
+ Swimming Pool leased area in basement of School: 648.2 m^2
+ Shared access to exit: 123.2 m^2
+ Area of swimming pool tank: 287.0 m^2

The primary focus of this study is to assess existing conditions within Strathcona pool, determine which components require repair, replacement or upgrading (events). These events are then costed and assigned to a point in time. The bulk of the facility evaluation is contained in the Facility Assessment Spreadsheet Section.

We have taken the approach that Strathcona Pool is a tenant of Edmonton Public Schools are there are certain issues that are more aptly treated as tenant concerns. These items have been referred to as “School Issues”. These school issues can become particularly troublesome in the area of basic mechanical and electrical services that are shared between the Pool and the School which will need replacement in the near future. Obviously, questions of cost sharing between the School and the Pool are beyond the scope of this study.

Any standard Facility Evaluation should address eight systems. For Strathcona Pool, we have deleted the system dealing with the Site but have expanded the Special Construction section to include Aquatic systems.

STRUCTURAL

W & R Foundation Specialists Ltd. reviewed the existing walls and provided a report which is appended to this section. In summary, a brickline survey by W & R indicated significant differential movement in the foundations with a maximum differential movement of 91 mm midway along the north wall. It is their opinion that the movement is related to the desiccation of soil under the shallow spread footings. The most effective method of stabilizing the foundations is by means of under-pinning with hydraulically jacked steel pipe piles. The cost of this work would be in the order of $350,000.00 including re-landscaping and possible re-finishing of architectural finishes.

There is severe cracking in the exterior brickwork which is caused primarily by movement of the foundations. The foundations are shallow spread footings which are sensitive to changes in soil moisture content.

The cracking can be stopped by underpinning the foundations. Underpinning may also be used to somewhat improve the current out-of-plumbness and bulging of the masonry walls.

We did not undertake a structural analysis of the structural steel frame and precast beam roof. However a visual review of these structural elements did not reveal any serious deformations, cracking or material loss. There is considerable peeling paint on much of the steel.

ENVELOPE

In the fifty years since this building was constructed the theory and practice of exterior wall design has advanced considerably. It is now recognized that the prevention of uncontrolled air leakage from the high humidity interior of the building to the exterior is essential to preventing condensation accumulation within the wall. This is accomplished by providing a continuous air barrier. In order to achieve continuity the most effective location of the air barrier is on the exterior of the structural portion of the wall. The air barrier must also be continuous with the roofing system and penetrating elements such as windows. Most air barrier materials are bituminous in nature and therefore also have significant resistance to water vapour diffusion and are therefore often referred to as “air/vapour barriers”.

Currently it is it generally recognized that the provision of a properly drained cavity provides protection against moisture penetration and venting the cavity encourages drying. Finally it is recognized that the optimum location for the insulation is on the exterior of the inner wythe of the wall held tight to the air barrier. These findings have led to the “insulated cavity wall” design that virtually all modern commercial and institutional buildings utilize.

The exterior brick is seriously deteriorated, with extensive spalling of the brick particularly near the top of the walls. The cause of the spalling is freeze-thaw damage caused by the condensation of humid air leaking through defects in the wall. This damage will continue and may even accelerate as the number of freeze-thaw cycles accumulate, unless remedial repairs are made to the envelope.

There are numerous cracks in the brick ranging in width from hairline to extremely wide. The masonry is out of plumb and bulging in some locations. We believe these defects are much more likely related to movement of the foundations than to condensation within the walls. Our comments regarding this problem are therefore contained in the Structural section of the report.

The windows and curtainwall glazing are not thermally broken, resulting in severe surface condensation during cold weather. The condensation causes sealed unit failures and could be responsible for mold or other organic growth on wet surfaces.

Runoff from the condensation on the windows does not yet appear to have penetrated the interior tile and plaster layer and affected the metal lath or furring inside the wall.

The roofs are approximately eighteen years old and exhibit defects such as blisters, insufficient drains and wet insulation. Some defects may be related to condensation within the parapets however more detailed investigations are required to determine the exact cause.

At the time these wall repairs are made the existing low performance window, doors and curtainwall systems should be replaced with modern high performance glazing systems that include high condensation resistance, high thermal resistance and proper drainage. Typically such systems utilize aluminum curtainwall tube sections with large thermal breaks and incorporate sealed glazing units with thermally efficient spacer bars and low emissivity glass coatings. These systems can be effectively connected to the air/vapour barrier membrane to eliminate air leakage around the windows.

The roofs should also be replaced at this time. The new roofing system would likely be similar in principle to the existing roofing system however the details at the perimeters would be carried out to prevent condensation and water penetration. The insulation thickness could be increased to meet life cycle costing or LEEDS requirements. Additional drains would also be added.

INTERIOR

Interior systems within the building are a mix of old and new, good condition, marginal condition and poor condition. Interior partitions are typically hollow clay tile and need additional fire stopping to conform to current codes. Fire doors do not comply to current codes and should be replaced. Lockers are relatively new and in good condition. Toilet cubicles are a mix of old and newer but the floor supported metal type do not comply to City standards for swimming pools.

Floor finishes include ceramic tile, ceramic mosaic tile, carpet and painted concrete. Tile finishes around the pool deck are newer and in better condition than the balance of floor finishes. Ceramic mosaic tiles in the shower rooms are marginal but should be replaced as part of a code upgrade to improve the floor slopes. Carpet is not an appropriate floor finish in a swimming pool and should be replaced. Painted concrete flooring in the change room is a maintenance concern especially where the floor does not slope to drain and has to be cleaned up at the end of each day.

Ceilings in the change rooms are generally acceptable but it is recommended that the acoustic ceiling in the pool area be replaced. This ceiling is in pool condition and humid air is condensing on the top side. This moisture fosters the growth of mould. We would recommend removing the ceiling and painting the exposed concrete deck above. Acoustic concerns would be addressed with the addition of hanging moisture resistant panels.

MECHANICAL

General review of existing mechanical systems determined many components of the facility are in poor condition and have exceeded their expected service life. Failed components have been replaced as required to maintain operation of the mechanical systems.

Domestic water piping distribution is not insulated. Water closet urinals and related flush valves are original. Lavatories have been recently replaced with on/off brass. Showers have been updated to infrared sensor. No barrier free water closet and lavatory provided. Change room and shower room drainage inadequate. Plumbing fixtures are high water consumption. Recommend shower and change room drainage be improved and low consumption fixtures installed.

Heating system equipment and system components have reached expected service life, are energy inefficient, maintenance costs are high, no standby. Recommend steam boiler and piping be removed and new hot water heating plant be installed. Install dedicated boilers for heating and dedicated boilers for domestic hot water and pool be installed.

Pool ventilation is provide by a dedicated air system. Unable to determine how air system maintains temperature and humidity levels. During site review pool area was very warm and humid. Air system equipment and components are original and exceed expected service life. Building pressurization difficult to maintain.

Locker room ventilation is provided by a dedicated air system. Several rooms were noted to have no supply air. Several rooms were cooled via window type A/C units. Air system equipment and components are original and exceed expected service life. Building pressurization difficult to maintain. Recommend air systems, distribution ductwork be replaced as part of a comprehensive ventilation upgrade. Install variable frequency drives on the supply and return fans to maintain constant differential to meet building pressurization requirements.

Pneumatic controls provided. Recently installed simplex control compressor does not provide standby. Refrigerated air dryer not installed which could result in moisture migration to pneumatic components and failure of components. Controls are obsolete and exceed expected service life. Recommend pneumatic controls be removed and digital control system installed.

ELECTRICAL

The electrical systems are in good working order, clean and well maintained. The power and fire alarm systems are shared with the School Board. There are no critical electrical items that required immediate action. Typically, electrical upgrades will be triggered by other work, for example, the pool lighting should be upgraded when the acoustic panels

are addressed and the motor controls, some of which are old, would be addressed as part of the boiler and/or ventilation upgrades.

SPECIAL CONSTRUCTION - AQUATIC

The site review of the Scona Pool and the follow up evaluations reveal a swimming facility that was well designed and constructed with leading edge concepts in 1957 well before they became traditional approaches. The facility has been maintained with an excellent attention to mechanical operational details and updates to safety requirements. There have been modifications to improve the attraction value of the venue with programs and recreational features. This report will discuss the mechanical items needed to keep this facility in a safe and code compliant, what service repairs will be required to keep the pool operational and finally address perhaps the greatest challenge, how does this facility rate in terms of what consumers expect from a multi-purpose aquatic center.

SPECIAL CONSTRUCTION - HAZARDOUS COMPONENTS

Between August 26 and 27, 2009 Ecomark assessed and sampled the Strathcona Pool site for lead, polychlorinated biphenyls (PCB), mercury, asbestos and mould in accordance with the sampling plan prepared on August 24, 2009. Significant findings included the presence of lead paint, lead solder, various asbestos-containing materials (ACMs) and PCB-containing light ballasts throughout the building. Ecomark's recommendations include immediate action for a power transformer leaking PCBs and the implementation of a comprehensive special operations and maintenance (O&M) program for managing all hazards for future occupants and facility managers (Section 5). The ACMs do not require attention until they are disturbed. The only building material requiring immediate attention is the presence of mould in the mechanical room and on the window plaster on the pool deck.

The asbestos-containing materials that can be disturbed during construction are pipe elbows, pipe insulation wrap, and insulation board. A special O&M program should be implemented and communicated within the 1-3 year window. Removal for ACMs is estimated at $2,500 to $5,000 per location where asbestos would be disturbed by construction. Such removal falls into the 5-10 year window. Removal of all occurrences of asbestos-containing materials should be completed by the 20-25 year window. The leaked PCB's originating from the 6T-2D2 power transformer must be remediated at an estimated cost of $5,000, within the 1-3 year window, and the transformer should be replaced (See electrician estimate for transformer replacement). As light ballasts, light tubes, and metal halide bulbs expire, or if renovation involves replacement of luminaries, the PCBs must be disposed of properly. This should be completed by the 5-10 year window. Mould remediation and further investigation to determine preventative controls should be completed within the 1-3 year window. This would cost an estimated $3,000 to clean specific. Plaster walls harboring mould and investigate sources and measures for prevention in the mechanical room. Refer to section C3010.01 of the Uniformat Overall FacilitCondition Assessment Report for replacement/upgrade of interior walls. Concerning hazardous chemicals primarily used for water treatment at the pool, a special O&M program should be developed within the 1-3 year window with emphasis on training and chemical storage. This would cost approximately $1,700 to develop. The numerous chemicals should be stored in purpose-built room which should be constructed within the 5-10 year window or in conjunction with upgrades to the chlorine gas room. Alternative safer pool water treatment methods should be investigated and implemented by the 20-25 year window. Lead-painted materials are found throughout Strathcona Pool and should be managed in a similar manner to the asbestos-containing materials. Lead will require removal if construction will disturb the material at an estimated cost of $2,000 to $4,000 per location of disturbance.

FUNCTIONAL

A detailed analysis of the functional issues at Strathcona Pool including leisure pool activities, family dressing rooms, steam rooms, hot tubs and staff areas are beyond the scope of this facility assessment. However, the pool gets very poor marks for Barrier Free Accessibility. Virtually all areas of the pool and support spaces would require significant changes as well as the addition of an elevator.

All costs have been marked up to cover contractor overhead and profit (10%), construction contingencies (15%), consultant fees (10%), project management (8%) and GST (5%). Costs have not been marked up to account for inflation and are indicated in Fall 2009 dollars.

Costs for the three windows of events have been summarized by system and time windows in the following table. Please note that costs for the three windows are cumulative. For example; if a decision is made to keep the Pool open for another 10 years an estimated $ 8,413,330 should be spent in capital costs over the next 10 years. Similarly, if the pool is to remain open for at least 25 years, an estimated $ 9,980,140 should be spent in capital costs over the next 25 years.

System		1-3 years	5-10 years	20-25 years
S1	Structural	$ 360,530.	$ 10,000.	$ 20,000.
S2	Envelope	$ 1,116,430.	$ 14,000.	$ 10,430.
S3	Interior	$ 58,110.	$ 200,270.	$ 123,580.
S4	Mechanical	$ 466,300.	$ 2,014,500.	$ 0.
S5	Electrical	$ 34,000.	$ 205,000.	$ 0.
S6A	Aquatics	$ 289,300.	$ 206,770.	$ 620,000.
S6B	Special	$ 13,700.	$ 25,570.	$ 50,000.
S7	Site (N/A)	$ 0.	$ 0.	$ 0.
S8	Functional	$ 92,820.	$ 576,920.	$ 163,200.
	sub-totals	$ 2,431,190.	$ 3,253.480.	$ 987,210.
	mark-ups	$ 1,166,980.	$ 1,561,680.	$ 579,600.
	sub-totals	**$ 3,598,170.**	**$ 4,815,160.**	**$ 1,566,810.**
				$ 9,980,140.

As you can see from the previous table, there are significant Envelope issues which should be addressed in the near future. The yellow colour bricks used on the school were not fired as long as the red coloured bricks in 1953 and so they are more susceptible to damage. Water vapour penetrating the envelope will condense within the walls assembly and then freeze. This freezing action will cause the face of the bricks to separate and fall off. The falling bricks may be small but definitely would pose a serious hazard to pedestrians walking below.

A number of photographs have been included as a general depiction of the existing building but also to illustrate building issues.

A key question in the facility evaluation revolves around code upgrades to existing buildings. Strathcona School legally complied to the building code at the time of construction and there is no compelling reason to make any upgrades to comply to current code unless it can be shown that the building is undergoing a change in use or there is an existing unsafe condition.

Strathcona School is not about to undergo a change in use nor are there any glaring unsafe conditions that would require the building to be upgraded to current codes. However, there are a few provisos to that stipulation. Strathcona School may undergo a major code upgrade and be required to add sprinklers to the building. In that event, it would be necessary to add sprinklers to the swimming pool portions of the building as well since partially sprinklered buildings are no longer acceptable. We would also argue that it may be prudent to upgrade certain items that will increase the life safety within the school. We feel that the following issues should be addressed as part of the 25 year plan for Strathcona Pool:

- $ control the spread of fire within floor areas
- $ safeguard a means of egress from the building
- $ upgrade barrier free access

In assigning the timing of code upgrades, we have generally assigned items that improve the spread of fire or egress from the building as a 1-3 year event. We have assigned barrier free upgrade to the 5-10 year window but the City may feel that this apparent delay is not in keeping with current Barrier Free Policies.

A LEED checklist provides an initial assessment as to the potential for Strathcona School to become LEED Silver shadow/certified for events in the 20-25 year window. The LEED checklist is a tool to provide a comparative based assessment between the performance of the existing building and it's improved performance after modifications. Steps taken in the 1-3 year and 5-10 year window will dramatically improve the energy performance of the building but it is unclear how a building upgraded over 25 years would be assessed in the year 2035.

Strathcona High School was constructed in 1953 by the Edmonton Public School Board. A small addition was added to the north west corner of the school in 1957 to house a swimming pool. A portion of the basement of the school was used to accommodate the change rooms, washrooms and showers for the pool. The main public entrance for the pool is shared with an entrance and stair for the school on the west side of the school. Area calculations include:

- 1953 School Building floor plate (main): 8,211.25 m^2
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- Swimming Pool leased area in basement of School: 648.2 m^2
- Shared access to exit: 123.2 m^2
- Area of swimming pool tank: 287.0 m^2

The study team was assembled by Building Design and Construction Branch of the City of Edmonton with Burgess Bredo Architect Ltd. As the Prime Consultant. Brandel Rock P.Eng. was the primary City contact and the balance of the team included:

Burgess Bredo Architect Ltd.	Architect
Building Science Engineering	Building Envelope
Hukalo Oberg Engineering Ltd.	Mechanical
Vision engineering Ltd.	Electrical
Water Technology Inc.	Aquatics
EcoMark Ltd.	Hazardous Materials
W & R Foundation Specialists Ltd.	Foundations

The study team had access to a limited number of original drawings for the swimming pool and no access to original drawings for the Strathcona High School. CAD plans of the high school were made available by Edmonton Public Schools. Other resources made available to the study team included:

Canadian Leak Detection Report dated August 8, 2009
IVIS Video of Storm and Sanitary Lines
Re-roofing specification by BUR Roofing Consultants

The primary focus of this study is to assess existing conditions within Strathcona pool, determine which components require repair, replacement or upgrading (events). These events are then costed and assigned to a point in time. The bulk of the facility evaluation is contained in the spreadsheet in Section 3. Wherever possible, life spans of certain components have been indicated and corresponding events for replacement have been slotted into appropriate time windows. A rating system of 1 (critical), 2 (poor), 3 (marginal), 4 (acceptable), 5 (good) and 6 (excellent) has been used for all components. The ratings help us to measure the condition of a component but they also point to the time line for replacement. Ordinarily anything with a 1 or 2 should be repaired or replaced in 1-3 years. Anything with a 3 should be repaired or replaced in the 1-3 year or 5-10 year window at your discretion. Anything with a 4, 5 or 6 should be repaired or replaced in the 5-10 or 20-25 window when the end of their lifecycle occurs. Important to note that costs for the three windows are cumulative. For example; if City Council decides to keep the Pool open for another 10 years an estimated $ 8,415,160. should be spent in capital costs over the next 10 years. Similarly, if the pool is to remain open for at least 25 years, an estimated $ 9,980,140. should be spent in capital costs over the next 25 years. Level of accuracy for all costs is +/- 25%.

We have taken the approach that Strathcona Pool is a tenant of Edmonton Public Schools are there are certain issues that are more aptly treated as tenant concerns. These items have been referred to as “School Issues”. These school issues can become particularly troublesome in the area of basic mechanical and electrical services that are shared between the Pool and the School which will need replacement in the near future. Obviously, questions of cost sharing between the School and the Pool are beyond the scope of this study.

Any standard Facility Evaluation should address eight systems. For Strathcona Pool, we have deleted the system dealing with the Site but have expanded the special construction section to include Aquatic systems.

S1 STRUCTURAL
S2 ENVELOPE
S3 INTERIOR
S4 MECHANICAL
S5 ELECTRICAL
S6A SPECIAL CONSTRUCTION - AQUATICS
S6B SPECIAL CONSTRUCTION - EQUIPMENT AND HAZARDOUS COMPONENTS
S8 FUNCTIONAL

Wherever possible, a basis of estimate has been provided in the Facility Assessment Spreadsheet portion of the report. Typically, this is in the form of an area and unit rate. These cost estimates have been developed through a combination of consultant experience, contractor input and published documents including but not limited to the following:

Hanscomb Yardsticks for Costing 2009
Alberta Infrastructure Cost Data Source 2009

All costs have been marked up to cover contractor overhead and profit (10%), construction contingencies (15%), consultant fees (10%), project management (8%) and GST (5%). Costs for the three windows of events have been summarized by system and time windows

in the following table. Please note that costs for the three windows are cummulative. For example; if a decision is made to keep the Pool open for another 10 years an estimated $ 4,405,240 should be spent in capital costs over the next 10 years. Similarly, if the pool is to remain open for at least 25 years, an estimated $ 9,972,050 should be spent in capital costs over the next 25 years.
A key question in the facility evaluation revolves around code upgrades to existing buildings. Strathcona School legally complied to the building code at the time of construction and there is no compelling reason to make any upgrades to comply to current code unless it can be shown that the building is undergoing a change in use or there is an existing unsafe condition.

Strathcona School is not about to undergo a change in use nor are there any glaring unsafe conditions that would require the building to be upgraded to current codes. However, there are a few provisos to that stipulation.

Strathcona School may undergo a major code upgrade and be required to add sprinklers to the building. In that event, it would be necessary to add sprinklers to the swimming pool portions of the building as well since partially sprinklered buildings are no longer acceptable. We would also argue that it may be prudent to upgrade certain items that will increase the life safety within the school. We feel that the following issues should be addressed as part of the 25 year plan for Strathcona Pool:

- control the spread of fire within floor areas
- safeguard a means of egress from the building
- upgrade barrier free access

In assigning the timing of code upgrades, we have generally assigned items that improve the spread of fire or egress from the building as a 1-3 year event. We have assigned barrier free upgrade to the 5-10 year window but the City may feel that this apparent delay is not in keeping with current Barrier Free Policies.

A LEED checklist provides an initial assessment as to the potential for Strathcona School to become LEED Silver shadow/certified for events in the 20-25 year window. The LEED checklist is a tool to provide a comparative based assessment between the performance of the existing building and it's improved performance after modifications. Steps taken in the 1-3 year and 5-10 year window will dramatically improve the energy performance of the building but it is unclear how a building upgraded over 25 years would be assessed in the year 2035.

CAD drawings have been supplied by Edmonton Public Schools. Corrections have been made wherever possible to reflect current layouts.

The following section entitled Facility Assessment Spreadsheet is intended to depict additional information in a structured and detailed format. This section includes reports from the consultants in more of a discussion mode.

3.1 STRUCTURE

3.1.1 Scope of Work

Building Science Engineering Ltd's (BSE) assessment of the Scona Pool Structure was based on the following:

A review of all available structural drawings. A field investigation of the building including:

- A general visual review of the interior and exterior of the structural systems.
- Close up review of the roof-wall junction on the interior and the underside of the roof deck, from a man-lift.
- Selective plumb-bob, string line and tape measurements of the exterior walls.
- Hand excavation of one spread footing at the northwest corner of the building.
-

Our review did not include a structural analysis of the structural system. Such an undertaking would require field measurements of all the structural components and further investigations to determine material and component properties.

3.1.2 Review of Original Structural Drawings

Unfortunately there was only one structural drawing available for review. This was a foundation drawing by *C.C. Parker & Associates Ltd*., numbered *S-1*, entitled *Footing & Foundation Plan. First Floor Framing Ramp Framing & Details* and dated *24/8/56*.

The foundation drawing shows that the columns are supported on shallow concrete spread footings. The exterior walls are supported on reinforced concrete grade beams which span from column footing to column footing. The pool deck is a reinforced concrete slab-on-grade. The perimeter of the slab rests on a ledge formed in the grade beam.
There was no geotechnical information on the drawing and we therefore are unable to comment on the adequacy of the foundation design. We do note that the depth of the footings is only approximately 2 ½ to 3 ½ feet below finished grade. Shallow footings are generally more susceptible to movement due to frost or changes in soil moisture content than deep foundations.

3.1.3 Field Investigation

The structural system of the pool building consists of wide flange steel columns which bear on reinforced concrete footings. The columns support long span steel trusses which in turn support shallow precast concrete beams forming the roof deck. The walls are non-load bearing masonry consisting of face brick and two wythes of hollow clay tile. The walls are supported on reinforced concrete grade beams.

Most of the steel structure is exposed to view on the interior of the building. We did not observe any significant deformations in the steel or significant loss of section due to corrosion. There is some peeling paint and minor surface rust on some members particularly near the roof where humidity is likely the highest. Photo B1020.01-1 and B1020.01-2. There is also some heavier corrosion on the flanges of some columns right at the pool deck level. However the amount of material loss does not appear to be sufficient to significantly affect the capacity of the columns.

Using a manlift on the interior of the building we observed that the column in the northwest corner was out of plumb, leaning approximately 1½ inches to the north. Photo B1020.01-1. The west elevation wall plaster finish had displaced outward approximately 1 inch in relation to the perimeter truss located in the first bay south of this column. These movements were consistent with movements evident in the exterior brick.

We also used the manlift to check the underside of the precast concrete roof beams in a few locations. We did not see any significant deterioration or movement of the precast beams. Photo B1020.01-3.

We used a plumb-bob on the exterior to determine that the masonry was out of plumb as much as 3 ½ inches in some locations. Also, by using a string line we found that the top of the north and west walls bulged outwards as much as 1 ½ inches in some locations.

We also dug a hole at the northwest column and found that the top of the spread footing was 35 inches below grade level. This is consistent with the depths shown on drawing S1.

In addition to spalling brick there are numerous cracks in the brickwork. These range from hairline width to a crack more than 2 ½ inches wide on the north elevation. There are at least four very wide cracks which run vertically from the grade beam to the parapet. There are also many other significant cracks, some vertical, some horizontal and many sloped at roughly forty-five degrees to the vertical. Photos B2010.02.03-8 through B2010.02.03-13.

We consider the extent and severity of the cracking to be a serious concern. It is not likely that such cracking is caused by freeze-thaw action, it is much more likely that it is related to foundation movements. Since the main roof over the pool has experienced buckled stripping and deformed flashings, at least some of the movement has occurred since the last re-roof in 1991. We engaged a geotechnical engineering firm specializing in foundation problems to provide a second opinion as to the cause of the cracking.

3.1.4 Geotechnical Review

W & R Foundation Specialists Ltd. reviewed the existing walls and provided a report which is appended to this section. In summary, a brickline survey by W & R indicated significant differential movement in the foundations with a maximum differential movement of 91 mm midway along the north wall. It is their opinion that the movement is related to the desiccation of soil under the shallow spread footings. The most effective method of stabilizing the foundations is by means of under-pinning with hydraulically jacked steel pipe piles. The cost of this work would be in the order of $350,000.00 including re-landscaping and possible re-finishing of architectural finishes.

3.1.5 Conclusions

There is severe cracking in the exterior brickwork which is caused primarily by movement of the foundations. The foundations are shallow spread footings which are sensitive to changes in soil moisture content.

The cracking can be stopped by underpinning the foundations. Underpinning may also be used to somewhat improve the current out-of-plumbness and bulging of the masonry walls.

We did not undertake a structural analysis of the structural steel frame and precast beam roof. However a visual review of these structural elements did not reveal any serious deformations, cracking or material loss. There is considerable peeling paint on much of the steel.

3.1.6 Recommendations

Recommendations for specific structural repairs, the priority for the repairs and the associated costs are summarized in the Tables attached to this report. Regarding the major structural items in the Tables our comments are as follows.

The foundations of the building should be stabilized prior to undertaking any repairs to the building envelope. This is best accomplished by underpinning the footings.
The structural steel should be re-painted.

3.2 BUILDING ENVELOPE

The building envelope is defined as the portion of the building that separates dissimilar environments. In the case of the Strathcona Pool the roof, walls and windows would constitute the building envelope.

3.2.1 Scope of Work

Building Science Engineering Ltd's (BSE) assessment of the building envelope was based on the following:

- An interview of maintenance staff, specifically Mr. Roger Ayotte.
- A review of the original architectural drawings by Rule Wynn Architects dated Aug 8, 1956 and a re-roofing specification by BUR Roofing Consultants dated June 19, 1991.
- A field investigation of the building including:
- A general visual review of the interior and exterior surfaces of the building envelope.
- Close up review of the roof-wall junction on the interior and the underside of the roof deck, from a man-lift.
- A review and expansion of a test opening in the masonry on the north wall from a man-lift.
- Selective plumb-bob, string line and tape measurements of the exterior masonry.
- A review of three test openings made in the tile and plaster on the interior of the north wall.
- Some qualitative smoke tests in order to identify air leakage paths through the exterior walls.
- Removal of some glazing stops on the south curtainwall windows.
- Measurement of air temperature and relative humidity in the pool area by data loggers.
- One test cut in the main roof over the pool.

3.2.2 Interview

We spoke with Mr. Roger Ayotte of the City of Edmonton who is familiar with the maintenance of the building. Mr. Ayotte provided the following information:

There is significant condensation on the windows during cold weather.
There is no significant condensation on the wall surfaces during cold weather.
There are no significant rain penetration problems through the walls.
There have been a number of sealed glazing units replaced in the last few years.
About four years ago loose brick fragments were removed from the walls in the interest of public safety.
A test opening was made in the masonry on the north side of the building in order to assess the condition of the wall.
Some roofs on the east side of the building are poorly drained.

3.2.3 Review of Original Architectural Drawings

Walls
The architectural drawings show the exterior walls, starting from the exterior, to be:
4 inch clay brick
8 inch single wythe hollow clay tile,
2 inch thick glass fibre insulation
¾ inch thick plaster on metal lath
Ceramic tile (lower portion of wall only)

Based on our field review, the masonry walls are actually constructed as follows:

4 inch clay brick with a rowlock every six courses
Two wythes of hollow clay tile, each 4 inches wide
Air space
2 inch thick glass fibre insulation with asphalt impregnated paper backing
¾ inch thick plaster on metal lath
Ceramic tile (lower portion of wall only)

This as-built construction was in general conformance with the original architectural drawings except that there were two layers of 4 inch clay tile rather than one layer of 8 inch tile as shown on the drawings. This was no doubt in order to facilitate the brick rowlock course which connects the exterior brick wythe to the clay tile. The air space that we found between the insulation and the clay tile was likely not intentional, we believe it to be a result of post-construction building movement.

We believe that the design of the wall was typical of many commercial and institutional buildings of this era (circa 1956). The wall is insulated on the interior, there is no drainage cavity and there is no attention paid to providing air tightness in the design.

In the fifty years since this building was constructed the theory and practice of exterior wall design has advanced considerably. It is now recognized that the prevention of uncontrolled air leakage from the high humidity interior of the building to the exterior is essential to preventing condensation accumulation within the wall. This is accomplished by providing a continuous air barrier. In order to achieve continuity the most effective location of the air barrier is on the exterior of the structural portion of the wall. The air barrier must also be continuous with the roofing system and penetrating elements such as windows. Most air barrier materials are bituminous in nature and therefore also have significant resistance to water vapour diffusion and are therefore often referred to as “air/vapour barriers”.

Currently it is it generally recognized that the provision of a properly drained cavity provides protection against moisture penetration and venting the cavity encourages drying. Finally it is recognized that the optimum location for the insulation is on the exterior of the inner wythe of the wall held tight to the air barrier. These findings have led to the “insulated cavity wall” design that virtually all modern commercial and institutional buildings utilize.

For example a typical modern exterior wall design would be:

Exterior cladding (brick, metal cladding, etc.).
Drained air space (1 inch minimum).
Rigid insulation (2 to 3 inches).
Air/vapour barrier membrane
Structural wythe (concrete block or steel studs and drywall).
Interior finishes.

Note that the Strathcona Pool wall design does not follow these design principles:

There is no continuous air barrier, resulting in uncontrolled air leakage through the wall. We expect air leakage to be worse near the top of the building where air pressure differences are greatest and where there is likely a discontinuity between the wall and the roof air barrier.
The insulation is on the interior of the structural wythe (clay tile) which keeps the clay tile cold.
There is no provision for the drainage of rain or condensation which accumulates in the wall and the lack of a vented cavity does not promote drying.

Roof
The original roofing system is shown on the drawings to be:

Built-up roofing membrane
2 inches rigid insulation (likely wood fibreboard)
Vapour barrier
Precast concrete deck

The roof was replaced most recently in 1991. The new system was specified as follows:

2-ply SBS modified membrane
1 inch wood fibreboard
Type 1 polystyrene insulation tapered 1% to drain
Vapour barrier (existing to remain?)
Precast concrete deck.

It is our feeling that the roof specified in 1991 would provide satisfactory performance for the building provided it was properly detailed and constructed at the perimeters. Unfortunately there is insufficient drawing information to speculate as to what the as-built perimeter details actually were.

Windows
The building contains punched windows along the north and west elevations and an aluminum and glass “curtainwall” system on the south elevation.

The original windows were shown on the architectural drawings as two fixed centre lites with operable awnings at the top and bottom. The frames may have been steel. These original windows have been replaced with fixed non-thermally broken aluminum frames.

The glazed curtainwall was shown on the drawings as a very early Kawneer curtainwall box section. The sections are only 2.5 inches deep and are shown supported by concrete filled round hollow structural sections. The existing system is actually a 4 inch deep frame that is structurally self supporting. The system does not have exterior glazing gaskets or a thermal break. Although the existing system is somewhat primitive we suspect it replaced the original system shown on the drawings twenty or thirty years ago.

Our conclusion regarding the design of the windows is that both the original and the replacement windows are inferior to modern high performance windows, particularly in the context of a high humidity environment.

3.2.4 Field Investigation

Walls
The exterior walls of the pool building display signs of significant distress. There are numerous spalled bricks particularly near the top of the building. Wafers of brick and various other fragments can be seen projecting from the walls and collecting on roofs below the walls. A few of these fragments could fall and possibly injure someone walking below. Photos B2010.02.03-1 through B2010.02.03-7. The cause of the spalling is freeze-thaw action. When the bricks become saturated with water and are then subjected to freezing the water in the pores of the brick turns to ice which expands and produces large forces in the brick. After many cycles of freezing and thawing the accumulated damage causes the bricks to delaminate or “spall”.

It is our opinion that the source of the water which saturates the bricks is condensation caused by interior humid air leaking through the walls. The data loggers we installed over a three day period showed that the relative humidity in the pool building averaged about 50% relative humidity and 30 ^{o}C air temperature. This represents a very high concentration of water vapour and a much higher dewpoint temperature compared to the air in typical institutional buildings. Since there is layer of insulation on the inside of the masonry, the masonry temperature is closer to the outside air temperature than to the interior temperature. During cold winter weather the temperature of the masonry will be much less than the dewpoint of the exfiltrating interior air. Water vapour encountering these cold surfaces will condense into liquid water, which in sufficient quantities can saturate the brick.

The air pressure difference which drives the air through the wall is a combination of three factors, wind pressure, pressure caused by the buildings mechanical system and the pressure caused by inside-outside temperature difference (the so-called “chimney effect”). It is not possible to say what the net air pressure across the wall has been throughout the life of the building. Suffice it to say that very little pressure is required to transport large volumes of air across the building envelope during a typical heating season.

We confirmed that air leakage was occurring at the northwest corner of the building by the use of a smoke generator. Smoke was sprayed along a vertical joint in the plaster while an observer watched on the exterior. Smoke was observed exiting various cracks and voids in the masonry. Photo B2010.02.03-2.

In addition to this direct confirmation of air leakage we also observed indirect evidence of air leakage. For example glass fibre insulation removed at the roof-wall junction was saturated with dirt, almost certainly filtered out of air passing through the insulation over the years. The test opening made in the north elevation also showed that the backup wythes of tile were honey combed with many possible air leakage paths.

In addition to spalling brick there are numerous cracks in the brick. These range from hairline width to a crack more than 2.5 inches wide at the top of the north elevation. We also noticed that the masonry was out of plumb as much as 3.5 inches in some locations and the top of the north and west walls bulged as much as 2 inches in spots. We believe that this severe cracking and bulging is more likely related to foundation movements than to freeze-thaw damage and we have therefore discussed this problem in the Structural section. Photos B2010.02.03-8.JPG through B2010.02.03-13.JPG

Windows
There are five window openings on the north elevation and five window openings on the west. The windows on the west are about 7 ft x 10.5 ft and have a centre mullion and the windows on the north elevation are 7 ft. x 5 ft. All these windows appear to be replacements of the original windows. Despite being replacements these windows are considered low performance windows by today’s standards. The aluminum frames do not contain thermal breaks and the frames have no provision for drainage. The glazing gaskets are deteriorating, some sealed units have failed and moisture has entered the units causing vision obstruction. Photo B2020.01.01.02-2 and B2020.01.01.02-3.

Since our review took place in the summer we could not observe any condensation on the window surfaces. However we noted numerous stains and peeling of paint from the adjacent plaster. Streaks of black material on the window sill and black spots under the peeling paint are suggestive of mold, however this should be confirmed by a qualified expert. Photo B2020.01.01.02-1 and B2020.01.01.02-4. We also noted a green growth

on the window sills that might be algae. Photo B2020.01.01.02-1. Again, this should be confirmed by an expert. These observations lead us to believe that there is a large amount of condensation on the windows over a long period of time during the year. Fortunately the water originating from this condensation appears to be draining over the tiles on the lower portion of the wall and does not appear to be penetrating the interior of the wall to a great extent. We confirmed this by making three test openings through the tiles to review the condition of the metal lath and furring channels behind the plaster. We did not observe any significant deterioration within these test openings. Photo B2020.01.01.02-5.

The curtainwall on the south elevation is approximately 20 feet high and 30 feet wide. The bottom of the curtainwall contains sliding glass doors. All the doors need new hardware and weather-stripping and some of the sealed units have failed. The curtainwall system above the doors is a drained system however it is not thermally broken and there is no provision for exterior gaskets. There is evidence of condensation on the curtainwall system however not to the same extent as the punched windows. Photo B2020.03-1.JPG to B2020.03-2.JPG.

Roofs
The roofs appear to have been replaced in 1991, more or less consistent with the specification that we were provided with. See Roof Plan on page 30 of the Table. Regarding the drains, there is only one drain on Roof R2 so any clogging of the drain can result in ponding of water. Roof R3 has two 4 inch diameter drains however they are at the bottom of a steep slope and are difficult to maintain. Currently there is a great deal of debris collecting around them. The drain on Roof R4 over the mechanical room is very much undersized, i.e. only 2 inch diameter compared to the norm of 4 inches diameter. Photo B3010.04.04-1 to B3010.04.04-4.

The large main roof over the pool, Roof R1, has a few blisters and some minor ridging. We made a test cut in the southeast corner of Roof R1. The roof composition was as follows:

2-ply SBS modified bitumen waterproofing membrane
1 inch thick wood fibreboard (wet)
2 inch thick Type 1 polystyrene insulation
2-ply asphalt mopped vapour barrier
Concrete deck

We expect that the composition of the other roofs is similar. The cause of the wet fibreboard was not obvious, there were no apparent defects in the membrane in the vicinity of the test cut. It is possible that condensation occurring in the parapet at the perimeter of the roof has migrated into the roofing system. Further detailed investigations would be required to confirm the exact cause and the extent of the wet fibreboard. In time the fibreboard will disintegrate and the performance of the waterproofing membrane will be compromised. Photo B3010.04.04-6 to B3010.04.04-8.

Roof R1 also has buckles in the membrane stripping on the parapets particularly near the corners of the roof. We believe these buckles may be related to building movements. See Structural section. Photo B3010.04.04-2.

Roof R2 has numerous blisters in the membrane and some minor ridging. The blisters appear to be inter-ply. Blisters and sharp ridges should be repaired. The membrane on the other smaller roofs appears to be in satisfactory condition. Photo B3010.04.04-5. We estimate that the useful remaining service life of the roofs taken as a whole to be five to ten years.

3.2.5 Conclusions

The exterior brick is seriously deteriorated, with extensive spalling of the brick particularly near the top of the walls. The cause of the spalling is freeze-thaw damage caused by the condensation of humid air leaking through defects in the wall. This damage will continue and may even accelerate as the number of freeze-thaw cycles accumulate, unless remedial repairs are made to the envelope.

There are numerous cracks in the brick ranging in width from hairline to extremely wide. The masonry is out of plumb and bulging in some locations. We believe these defects are much more likely related to movement of the foundations than to condensation within the walls. Our comments regarding this problem are therefore contained in the Structural section of the report.

The windows and curtainwall glazing are not thermally broken, resulting in severe surface condensation during cold weather. The condensation causes sealed unit failures and could be responsible for mold or other organic growth on wet surfaces. Runoff from the condensation on the windows does not yet appear to have penetrated the interior tile and plaster layer and affected the metal lath or furring inside the wall.

The roofs are approximately eighteen years old and exhibit defects such as blisters, insufficient drains and wet insulation. Some defects may be related to condensation within the parapets however more detailed investigations are required to determine the exact cause.

3.2.6 Recommendations

Recommendations for specific building envelope repairs, the priority for repairs and the associated costs are summarized in the Tables attached to this report. Regarding the major items in the Tables our comments are as follows.

If the foundations of the building are stabilized (see Structural section) then we recommend that the ongoing deterioration of the building envelope be addressed by carrying out the following repairs. The sequence of the construction would be:

- Repair all badly deteriorated brick including structural repairs to stabilize the walls
- Create a smooth wall surface either by parging or by fastening a suitable panel product to the brick
- Adhere a continuous thermo-fusible bituminous membrane to the prepared walls. This will functions as the air and vapour barrier of the new wall system
- Extend this membrane over top of the parapet and seal it to the roof air/vapour barrier located on the deck of the roof. In this way there will be air barrier continuity between the roof and the walls.
- Mechanically fasten a layer of rigid insulation over the membrane including all vertical wall surfaces and also up and over the parapet. The thickness of the insulation would be sufficient to ensure that no condensation would occur inside the plane of the air/vapour barrier.
- Install exterior cladding such as profiled metal or brick veneer
- Include a drained cavity behind the cladding.

At the time these wall repairs are made the existing low performance window, doors and curtainwall systems should be replaced with modern high performance glazing systems that include high condensation resistance, high thermal resistance and proper drainage. Typically such systems utilize aluminum curtainwall tube sections with large thermal breaks and incorporate sealed glazing units with thermally efficient spacer bars and low emissivity glass coatings. These systems can be effectively connected to the air/vapour barrier membrane to eliminate air leakage around the windows.

The roofs should also be replaced at this time. The new roofing system would likely be similar in principle to the existing roofing system however the details at the perimeters would be carried out to prevent condensation and water penetration. The insulation thickness could be increased to meet life cycle costing or LEEDS requirements. Additional drains would also be added.

3.3. INTERIOR

Interior systems within the building are a mix of old and new, good condition, marginal condition and poor condition. Interior partitions are typically hollow clay tile and need additional fire stopping to conform to current codes. Fire doors do not comply to current codes and should be replaced. Lockers are relatively new and in good condition. Toilet partitions are a mix of old and new but metal floor supported types do not comply to current City standards for pools.

Floor finishes include ceramic tile, ceramic mosaic tile, carpet and painted concrete. Tile finishes around the pool deck are newer and in better condition than the balance of floor finishes. Ceramic mosaic tiles in the shower rooms are marginal but should be replaced as part of a code upgrade to improve the floor slopes. Carpet is not an appropriate floor finish in a swimming pool and should be replaced. Painted concrete flooring in the change room is a maintenance concern especially where the floor does not slope to drain and has to be cleaned up at the end of each day.

Ceilings in the change rooms are generally acceptable but it is recommended that the acoustic ceiling in the pool area be replaced. This ceiling is in pool condition and humid air is condensing on the top side. This moisture fosters the growth of mould. We would recommend removing the ceiling and painting the exposed concrete deck above. Acoustic concerns would be addressed with the addition of hanging moisture resistant panels.

3.4 MECHANICAL

General review of existing mechanical systems determined many components of the facility are in poor condition and have exceeded their expected service life. Failed components have been replaced as required to maintain operation of the mechanical systems. For example original steam boiler burner was replaced in 2004; domestic hot water insert heat exchanger replaced in 2007; Simplex control compressor replaced in 2006.

3.4.1 Plumbing System

Domestic water distribution is copper. Sanitary and storm sewer piping is cast iron and copper. Domestic water piping distribution is not insulated. Water closet urinals and related flush valves are original. Lavatories have been recently replaced with on/off brass. Showers have been updated to infrared sensor. No barrier free water closet and lavatory provided. Change room and shower room drainage inadequate. Plumbing fixtures are high water consumption. Recommend shower and change room drainage be improved and low consumption fixtures installed.

3.4.2 Heating System

Single gas fired low pressure steam piping boiler provides heating media via supply and condensate piping for pool heat exchanger, pool transfer heating units, domestic hot water heat exchanger, part of the school, heating coils in two air systems. Equipment and system components have reached expected service life, are energy inefficient, maintenance costs are high, no standby. Recommend steam boiler and piping be removed and new hot water heating plant be installed. Install dedicated boilers for heating and dedicated boilers for domestic hot water and pool be installed.

3.4.3 Ventilation

Pool ventilation is provide by a dedicated air system consisting of motorized fresh,

return, exhaust air dampers, steam heating coils, supply fan, return fan, exhaust fan. Unable to determine how air system maintains temperature and humidity levels. During site review pool area was very warm and humid. Air system equipment and components are original and exceed expected service life. Building pressurization difficult to maintain.

Locker room ventilation is provided by a dedicated air system consisting of motorized fresh, return, exhaust air dampers, steam heating coils, supply fan, return fan, exhaust fan. Several rooms were noted to have no supply air. Several rooms were cooled via window type A/C units. Air system equipment and components are original and exceed expected service life. Building pressurization difficult to maintain.

Recommend air systems, distribution ductwork be replaced as part of a comprehensive ventilation upgrade. Install variable frequency drives on the supply and return fans to maintain constant differential to meet building pressurization requirements.

3.4.4 Controls

Pneumatic controls provided for air handling units, heat exchangers, terminal heat transfer units. Recently installed simplex control compressor does not provide standby. Refrigerated air dryer not installed which could result in moisture migration to pneumatic components and failure of components. Controls are obsolete and exceed expected service life. Recommend pneumatic controls be removed and digital control system installed.

3.5 ELECTRICAL

The electrical systems are in good working order, clean and well maintained. The power and fire alarm systems are shared with the School Board. There are no critical electrical items that required immediate action. Typically, electrical upgrades will be triggered by other work, for example, the pool lighting should be upgraded when the acoustic panels are addressed and the motor controls, some of which are old, would be addressed as part of the boiler and/or ventilation upgrades.

3.6 AQUATICS

The site review of the Scona Pool and the follow up evaluations reveal a swimming facility that was well designed and constructed with leading edge concepts in 1957 well before they became traditional approaches. The facility has been maintained with an excellent attention to mechanical operational details and updates to safety requirements. There have been modifications to improve the attraction value of the venue with programs and recreational features. This summary will discuss the mechanical items needed to keep this facility in a safe and code compliant, what service repairs will be required to keep the pool operational and finally address perhaps the greatest challenge, how does this facility rate in terms of what consumers expect from a multi-purpose aquatic center.

3.6.1 Swimming Pool Circulation, Filtration, Heating and Sanitation Systems

The mechanical systems have been well maintained by a well trained staff that operates to prevent problems and avoid mechanical malfunctions. The periodic maintenance to the pumps, valves and controls has been excellent. The unlined filter vessel is beginning to exhibit the rigors of constant submersion in chlorinated water. To extend the life of this containment vessel it will require lining with an impervious surface that will bond to the existing concrete. The vacuum Diatomeous Earth filter provides excellent water quality at a low cost of operation. Water Technology recommends the addition of a fall safe automated shut off valve that will keep the open filter tank form overflowing g in the event of a power outage. The heat exchanger is at the end of its service life and should be replaced with a more energy efficient exchanger. The current sanitation system uses gas chlorine which is the most cost efficient method to sanitize the pool water but does have substantial risk when considering a catastrophic event, i.e. major gas cylinder failure. While this is a rare occurrence, the proximity to a school and outdoor fields present a risk that most communities are concerned about. We recommend that there is system wide consistency with the sanitation methodology and that this system is ether updated to current industry standards or modified to a different sanitizer that has less risk but will have greater operational expense. The current chlorination room venting and emergency action needs immediate attention.

3.6.2 Swimming Pool Structure, Interior Surfaces, Shell Fixtures and Accessibility

When reviewing the all ceramic tile concrete pool structure it appears to be in good functional condition with some periodic maintenance requirements that need to be accomplished. The pools structure appears to be in good condition for a pool of this age. There has been some effort to remedy water loss through the expansion joints in the deep end and the middle of the 25 yard course. This has been a source of investigation and numerous repair efforts. Currently the latest caulking repairs to these joints have been reported to maintain the water integrity of the pool vessel. If water loss begins again the drainage tile water should be analyzed to determine if this water is leaking into the drainage tile system. The pool tile grout needs to be re-epoxy grouted to help keep the tile bonded to the concrete. The Provincial Health Regulations have adapted the Virginia Graeme Baker Act that was enacted into law in the USA. This act prevents some of the risks for accidents such as entrapment, entanglement and potentially evisceration. The

main drain sumps will require evaluation and modification with grating to be compliant with this requirement. The changing and wash rooms currently are not accessible as required by the Alberta building code or the CDA. The pool also does not meet the accessibility requirements. Consideration should be given to uphold these requirements.

3.6.3 Multi-purpose Aquatic Center Attraction Value Considerations

The Scona facility has attempted to transform the existing pool into a facility that has as much attraction value for programs and recreation. Two of the biggest obstacles are water depths and water temperatures. The original pool design was based on a community school learn to swim pool with competitive swimming and training. The venue has transformed of the years to a neighborhood swim center that has struggled to maintain a broad range appeal. Current aquatic centre's have found that to engage as many people as possible the must have intergenerational appeal.

3.6.4 Intergenerational Aquatic Use

Play /pleɪ/ :to engage in *(a game, pastime, etc.)*
Play is a dynamic process that develops and changes as humans grow and evolve. The simple act of play actually becomes increasingly more varied and complex. It is an essential and integral part of a child's development and physical growth. The demands on today's children are much different from previous generations and consequently there is less play time in their lives. It is our responsibility as "professionals of fun" to understand this important lifelong skill and how to integrate play into our designs, facilities, and programming.

3.6.5 Youth at Risk

Watch the news. "Studies show early signs of heart disease found in US children. One in seven school aged children has three or more risk factors predisposing them to deadly cardiovascular conditions. 65% of all children 10 to 18 years cannot pass a minimum standard of fitness. One out of every four teenagers is dangerously overweight!" Additionally, drowning remains the second-leading cause of unintentional injury-related death for children ages 1 to 14 years.. This is largely due to a lack of access to recreational water activities.

We continuously preach exercise, but how do we "force" children to exercise? Perhaps we simply make it more fun. Humans have a natural affinity to water and it is associated with fun in many instances; bubble baths, open fire hydrants on a hot day, running through the sprinkler, and spending time at the lake or the ocean. This may account for census results that have proven swimming is only second to walking over all other recreation activities.

In order to understand what aquatic trends will become popular and how to design for multi-generational programming we must first look at the fundamentals and benefits of play, what motivates an individual to participate, and how each age group plays in the water.

3.6.6 Physical development

Swimming can improve strength, balance and improve flexibility. It provides an aerobic benefit that is relatively injury free in comparison to other sports. "The water's unique properties allow the pool to provide an environment for people of all abilities" states the Aquatic Exercise Association. "Buoyancy creates a reduced impact exercise alternative that is easy on the joints, while the water's resistance challenges all the muscles. Water lends itself to a well-balanced workout that improves all major components of physical fitness- aerobic training, muscular strength and endurance, flexibility and body composition." It is also a sport that can be a lifetime activity; participants may be 1 or 101 years old.

3.6.7 Social development

Through social play children, and adults, learn to cooperate and appreciate the importance of taking others' needs and feelings into account. Playing together fosters awareness and understanding of a variety of values and attitudes. These great strides in development all happen while the person is laughing and establishing friendships; while they are having fun. Water is a safe sport for children of all ages and proficiency levels. Learn to swim and aqua classes can be socially enjoyable while at the same time provide fitness benefits.

3.7.8 Psychological and emotional development

A water sport promotes fitness and cultivates a positive attitude. An accomplishment of finally mastering the back float or competing in a swim meet can help to increase self esteem. Spend some time at a pool and count the times you hear *"Watch me mom!"* Playing in the water promotes increased energy levels and promotes children to strive for physical achievement.

Water is iconic to stress relief; soothing waterfalls, gentle rains, calm waters. Swimming forces you to regulate breathing and allows more oxygen to flow into muscles. The warm water of a wellness pool or whirlpool can help to calm nerves, stimulate cardiovascular circulation, soothe the mind and body.

3.6.9 Age Groups – How They Play

Each age group plays and responds differently to areas of the pool and its amenities. An accomplished aquatic designer understands the "play needs" of each generation

and translates this into their pool designs. This ensures that there are multiple options for everyone to engage users at the pool.

Understanding the needs for multiple programming spaces is another design consideration often overlooked by an inexperienced team. Knowing what areas can double as teaching spaces, training areas and recreational swim/buy outs and rentals, while still meeting guest's needs is an acquired skill. For example, current channels or lazy rivers can be used for resistance or assistive walking classes during one time of the day and can then be used as a recreational river to serve another group. A warm water wellness pool provides a place for therapy and rehabilitation but also presents adequate and appropriate depth and temperature for learn-to-swim lessons.

Ultimately, it is important to provide a safe environment for any type of play, especially in the water. Supervision is imperative in any type of design. Understanding how these facilities operate help the design team to properly place offices, observation and seating areas for easy maintenance and safety.

3.6.10 Newborn to Three Years

Concentrating on their own needs, infants play alone while toddlers will play side by side. They engage in activities that stimulate their senses. Playing involves physical activity and it is closely related to the development and refinement of a child's motor skills and coordination process. Infants intuitively prefer high contrast edges and patterns and respond best to primary colors. The interactive play structures available today address to this theory and are popular within this age group. Modest sized water spray features initiate the quest for interacting with water in motion and stimulates rudimentary fantasy play. Infants respond visually and smaller toddlers will approach and interact.

Many babies learn to swim before they walk because of the buoyancy they encounter in the water. Infant and toddler swim classes are also often the first social experience outside of the home. The zero depth edge of the pool presents a gradual, non-threatening entrance into warm water. Aquatic classes in the leisure and shallow water pools such as splash time and parent and tot classes are popular amongst this age group.

3.6.11 Three to Five Years

This age group plays in small groups, uses props, pretend plays and does it passionately with no absolute goals in mind. Blissful. Individually they are building confidence and socially they are learning to share and cooperate. In the water they respond to interactive play including small dumping buckets, floatables and children's slides. Slides that accommodate several children at once are timeless. The 3-year-old initially rides with the assistance of a parent, as they become more daring they go down in pairs holding hands, and eventually they are racing their peers down the same slide.

Aquatic lessons should be fun and kept to smaller numbers, say five children per class. In the pre-school level skills will range from kicking their feet at the edge of the pool to swimming up to 25 yards on their front and back.

3.6.12 Five to Eight Years

At this age kids begin to play formal and informal games with their peers. There may be a winner, per se, or just the common goal of accomplishing a task (e.g. hopscotch). This play helps them to refine their social skills and understand cooperation, teamwork and competition. Role playing is popular amongst this age group and imitating their role models is a popular pastime (playing house). Providing a multi-level play structures with props such as ropes, ladders, cubby spaces, and interactive play will encourage their imagination.

It is imperative to a child of this age to be challenged and be provided the opportunity to demonstrate their talents and abilities *("Watch me dad!").* The leisure, activity pools and lazy rivers facilitate this type of play. It takes courage to ride the flume slide for the first time, engage in a game of water basketball, or hold your best friend's hand down the adventure channel and navigate an inflatable obstacle course.

Aquatic programming begins to take the form of children's masters and diving classes. Students begin to build upon their learned abilities moving onto the next level in their swimming abilities. It is still important to continue to offer learn-to-swim classes, especially in underserved populations where children have not had the benefit of aquatic recreation.

3.6.13 Eight to Thirteen Years

At this age we become more organized and structured. Achievement becomes more important and we are starting to set goals and milestones for ourselves. The activity pool, with deeper water, provides the challenging environment. Flume slides, mat racer slides, activity pools, floatables, net walks, water basketball, aqua climbing walls, surf simulators, rope swings, etc. The more exciting and challenging the more appealing the activity becomes. Studies also show that playing can enhance the learning process - the more physical the play– moving, stretching, and resistive – the better.

Programming includes junior lifeguarding, advanced swimming and diving. These help to build endurance, strength, speed and increase overall fitness levels. An activity night or designated swim night with peers is attractive as this age group is beginning to thrive socially outside the family unit.

3.6.14 Teens

It is common knowledge that during our teenage years our socialization moves from our families to our peer groups. We channel our energy (fun) into specialized clubs, youth groups, volunteer activities, and team sports. The complexity has moved from blissful play to that of self awareness and social standing.

In addition to the entertainment value of the challenging environments of their previous peer group, teenagers desire separate social spaces. These often difficult-to-please demographics do not want to always hang out with mom and dad. An aquatic craze among those participants is the “Teen Zone”. This is a separate, yet very visible, section of the deck or grass area that is programmed for this specific group. Within their “own space” they can socialize, enjoy popular music, engage in social interactive activities like ‘rock and roll band, guitar hero or others” and just hang out to be social.

Aquatic programming for this age group could include lifeguard and instructor training, and competitive swim groups.

3.6.15 Adults

We have a big lesson to relearn here. Play. Somewhere along the way we concluded that grown up play is viewed as a weakness and the successful people just work; we need permission to play again. We have just agreed that play is a mind and body integration and social necessity. Play is a relaxed spontaneity that should be embraced, even into adulthood.

Adults should revisit what fun was for them as a child. Many adults that were involved in competitive swim groups are seeking out adult swim master programs. Water exercise, aerobics, water polo, aqua jog and resistance walk programs translate into fun adult programming. *Shhhhhh*… adults have fun on waterslides too.

3.6.16 Parents

The pool is an ideal opportunity for parents of young children to meet likeminded people who share common interests. Take a quick scan over the pool area and you will find moms and dads congregating in the zero depth area with their tots. It is also common to find parents floating down the lazy river with a baby or sleeping child strewn across their lap. It is also pretty cool to be able to tell your friends that you beat your dad down the mat racer slide.

Aquatic programming to support the parent network is important; parent/infant, parent/toddler and adult swim classes.

3.6.17 Active Senior Adults

Swimming is one of the best exercise and social environments available to seniors. It is safe and easy on the body, allowing people to move their bodies without bearing their weight. It is an ideal way for seniors to get in shape and improve their overall well being. For some disabled and seniors, water gives them a sense of freedom as they freely move around in the water.

An aquatic fitness class is a great social outlet for seniors. Warm water lap lanes and wellness pools provide popular warm water activities such as silver sneakers, aqua restore (stay young with water) low impact aqua fitness, aqua walking, and underwater bikes. Vortex and lazy rivers offer assistive walking opportunities and whirlpools and social benches offer social spaces enjoyed by this age group.

Do not forget about the non-aquatic amenities in any age group, let alone seniors. Areas that promote socialization outside of class, a café or comfortable deck seating are ideal. This is an attractive amenity that promotes return guests.

3.6.18 How People Play Together

Multi-generational recreation and fitness provide something for everyone under one roof; swimming is ageless. It is often said that families that play together, stay together. For example, recreational swimming provides seniors occasion to frequent the aquatic facility with their children and grandchildren. Teenagers can challenge their younger siblings or parents to a game of basketball in the water. Or we can just relax together floating down the lazy river.

It is interesting to watch the interaction between age groups; best friends, rivals, siblings, parents, and grandparents. This is where a cross over into each area of the pool occurs and where we find a social interaction between generations. Water brings together generations and allows everyone an opportunity to benefit individually and together.

3.6.19 Multi-generational pool amenities

Canadians love to swim. The traditional competitive venues are seeing a movement to include leisure components in their facilities. A variety of surveys and studies conducted throughout the nation have provided us with the conclusive evidence of the importance of swimming as a leisure activity.

Combining competitive and leisure components into one facility creates a partnership that includes a full spectrum of activities that complement each other well. A community aquatic facility is an amenity that helps to weave the threads of a community and enhance

the quality of life, family, togetherness, and wellness of its residents. It serves a multi-generational public including seniors, parents, teenagers, young children, toddlers, and infants. There is recreational value that meets the needs of each demographic in a community.
The Aquatic Centre responds to the very basic needs and interests of the consumer. Its emphasis is based upon the premise that the swimming pool visitor is primarily interested in a quality leisure experience that includes high entertainment and social values. The right blend of entertainment, along with the traditional aquatic requirements of competitive swimming, exercise and fitness, has proven successful for communities of all sizes.

3.7 EQUIPMENT

Extremely limited inventory of equipment on site including casework, residential appliances, a slide on the pool deck and a packaged sauna.

3.8 HAZARDOUS COMPONENTS

3.8.1 Introduction and Background

At the request of Mr. Brandel Rock, of the City of Edmonton (Client), Ecomark Ltd. (Ecomark) was retained to conduct a hazardous building materials assessment at Strathcona Pool located at 10450 - 72 Ave., Edmonton, Alberta (Site). Ecomark conducted site visits on August 18, 2009 and August 21, 2009; the Client requested a detailed destructive sampling program to be included in a Uniformat Facility Condition Assessment report developed by a team of consultants. Upon Client approval of the IEP, Ecomark conducted sampling at the Site on August 26 and 27, 2009 according to the procedures outlined.

3.8.1 Executive Summary

Between August 26 and 27, 2009 Ecomark assessed and sampled the Strathcona Pool site for lead, PCBs, mercury, asbestos and mould in accordance with the sampling plan prepared on August 24, 2009. Significant findings included the presence of lead paint, lead solder, various asbestos-containing materials (ACMs) and polychlorinated biphenyl (PCB)-containing light ballasts throughout the building. Ecomark's recommendations include immediate action for certain ACMs and the implementation of a comprehensive special operations and maintenance (O&M) program for managing all hazards for future occupants and facility managers (Section 5). The ACMs do not require attention until they are disturbed. The only building material requiring immediate attention is the presence of mould in the mechanical room and on the window plaster on the pool deck.

3.8.2 Findings

Lead
Lead hazards at Strathcona Pool were assessed by both non-destructive and destructive sampling methods. Field screening using Lead Check® swabs indicated that lead paint was not found on the exposed surface layer of paint on any of the structures. While all of the painted structures examined had a minimum of 3 layers of paint, lead paint was only detected on one of these layers. Lead Check® swabs detected lead-containing paint on the metal beam roof supports in the main pool area, on the doorframe to the lifeguard room, on the wall in the ladies change room and on the ceiling of the ramp leading down to the change rooms. Additionally, lead paint was detected on a silver painted cast iron pipe in the storage area under the pool. Lead solder was detected on pipes used in the mechanical room and on the pipes connected to the drinking water fountain on the pool deck.

Paint samples were collected for laboratory analysis based on the field screening results. Exova performed an acid digestion procedure, EPA procedure SW-846 and EPA 3050B (US EPA, 1996), to determine lead concentration in the layers of paint originating from the metal roof beams over the pool area. Exova reported lead concentration of 32,400 ppm present in the sample. One sample of paint was collected from a doorframe in the lifeguard room, which Exova determined to contain a lead concentration at 7420 ppm. See Table 2.0 in Appendix 1.

Asbestos
Asbestos-containing materials were found in two construction materials chosen for destructive sampling. Ecomark collected 12 bulk samples throughout the spaces considered as Strathcona Pool. Specifically, samples were collected from the main pool area, the lifeguard area, the ramp between the pool and the change rooms, the change rooms, the storage areas, a crawlspace, a mechanical room on the roof, and the party/staff room. Samples of insulation were not taken from the interior of cinderblocks used in the construction of the mechanical room on the roof, though it is possible this insulation is asbestos-containing. See Table 1.0 in Appendix 1.

The construction materials suspected to be asbestos-containing included: ceiling tiles, leveling or adhesive compound for ceramic tiles, plaster, mortar for ceramic tiles, mortar for structural clay tiles, drywall joint compound and organic felt debris near insulated pipes. Laboratory analysis indicated that no asbestos fibers were detected in these materials.

There is existing signage on asbestos-containing pipe elbows, pipe straight-run insulating wrap, and asbestos insulation board. Signs are posted at entrances to notify occupants of the presence of asbestos fibers. Ecomark chose not to sample these clearly marked asbestos-containing materials. These signs are posted in areas restricted to the public. Additionally, there has been previous asbestos abatement work completed in certain areas such as the boiler room and the mechanical room on the roof.

PCBs and Mercury
Approximately 9% of the ninety-three light ballasts counted at Strathcona Pool were visually inspected for PCBs (polychlorinated biphenyls). There were some light ballasts that Ecomark can positively confirm as PCB-containing; however there were also light ballasts that could not be positively identified as such because of the absence of labelling. Residual PCB leakage was found in the aluminum cover of some fluorescent light fixtures; the ballasts with this evidence have already been replaced but the puddle of PCBs remains in the fixture. Most older fluorescent light ballasts have small capacitors that contain high concentrations of PCBs. Nearly all ballasts manufactured before 1979 contain PCBs. All ballasts manufactured after July 1, 1978 that do not contain PCBs are required to be clearly marked “No PCBs” and ballasts marked in this way were found on Site. Unmarked ballasts or ballasts on Site without a date code should be assumed to be PCB containing ballasts. See Table 5.0 in Appendix 1 for details.
There was a large black stain on a plank of wood and on the concrete wall beneath a high voltage power panel mounted in the boiler room. This stain is suspected to be PCBs. There is a transformer in the restricted access area.

No mercury switches or thermostats containing mercury were found on Site. Additionally, fluorescent light tubes may contain leachable mercury. Approximately one hundred and thirty-four installed fluorescent light tubes were counted at Strathcona Pool. Metal halide lighting is used in the main pool area and thee bulbs are likely to contain leachable mercury.

Mould
From air quality samples collected and analyzed for mould, the indoor spaces of Strathcona Pool contain fewer spores relative to the control sample taken outdoors with the exception of the mechanical room. The mechanical room contained *aspergillus* spores that were not found in the outside control as well as having higher amounts of *basidiospores*, *cladosporium* and unidentified spores compared to other indoor samples. See Table 3.0 in Appendix 3 for air sampling details. In the four tape lift samples collected from suspected surfaces using Bio-Tape™, only sparse to moderate mould growth was found. The moderate mould growth was found on the plaster around a window on the pool deck. The control sample showed no growth.

The Delmhorst BD-2100™ moisture meter was operated in a mode appropriate to the material tested. The results ranged from a maximum of 82.4% moisture content in a ceiling tile to 20.6% in drywall at Site. A Kestrel hand-held weather meter was used in conjunction with the mould air sampler. ee Table 4.0 in Appendix 1.

Other Hazardous Materials
A variety of chemicals were found in the mechanical rooms. These chemicals include: muriatic acid, Aquaguard 301, Silkleer Filter Aid, Lithium Shock Chlorinating Granules, Dense Soda Ash, calcium chloride, sodium thiosulphate, sodium hydroxide, ALGYSOLVE, diatomaceous earth, and refractory ceramic fiber product. They are stored on pallets and some chemicals were in plastic tubs. Chlorine gas cylinders are stored in a separate ventilated room with access only from the outdoors.

3.8.3 Analysis and Conclusions

Lead
There is lead in paints at Strathcona Pool in concentrations that may pose a hazard to users and poses a hazard to the public if disposed of improperly. According to Work Safe Alberta, the paint applied to metal roof beams over the pool is considered lead-containing paint as it exceeds 5000 ppm or 0.5% (2005, p. 10). It is in a red layer underneath the current white surface layer. Additionally, the lead paint found on the doorframe and on the plaster ceiling in the ramp was over 0.5% lead. This lead paint is found in a layer of white paint between layers of other colors and is inferred to be used throughout all painted interiors of Strathcona Pool. The lead paint layer cannot be separated from the older layers and newest surface layers. The boiler in the mechanical room is built in 1956 and appears to be repainted with a layer of silver paint. Field screening on the paint did not produce a positive result but there may be layers underneath that are lead-containing.

Asbestos
Asbestos is a hazardous building material on Site. It is present wherever pipe elbows and pipe insulation wrap is marked as asbestos containing. It is present on other materials specifically marked with spray paint and felt marker. Additionally, signage posted at the entrance of the crawlspace (drama storage) and mechanical room indicates additional materials, that may not be marked, contain asbestos. Materials indicated include: asbestos mud, foam-like insulation and any grey or blue straight-run pipe insulation wrap posing a high-risk. Cinderblocks used in the roof mechanical room may contain asbestos-containing insulation. Asbestos-containing pipe insulation was found in the roof mechanical room. There were no asbestos-containing materials found in the public spaces of the Site. It is important to note that asbestos sampling was not entirely exhaustive but was representative of the building materials on Site.

PCBs and Mercury
There are some light ballasts on Site containing PCBs as well as leakage of PCBs from previously removed ballasts. There is a high voltage power transformer suspected to be leaking PCBs in the boiler room. Fluorescent light tubes containing mercury are unlikely to be TCLP (Toxicity Characteristic Leaching Procedure) compliant (low-level mercury) lamps and, due to the sheer number of light tubes, they may pose a risk to the public if not disposed of properly. Additionally, the age of the metal halide bulbs and the ballasts powering them indicate the presence of mercury and PCBs, respectively.

Mould
Minor mould contamination has been determined as a result of the slightly elevated spore counts and additional types of mould found in the air quality samples taken from the boiler room and around windows on the pool deck. Moisture is the primary factor that leads to mould infestations in a building. Readings from the moisture meter, Kestrel, RH logging meters and visual inspection indicate moisture damage on Site.

Other Hazardous Materials
In all cases, safety training should be mandatory for any individual using or coming in contact with the materials listed below. Proper personal protective equipment and storage procedures should be reviewed and updated.

Chlorine gas is used as a disinfectant in the pool water, however, improper storage and use of chlorine gas can cause damage to the respiratory system. Consequences of exposure to chlorine gas can be as severe as death.

Calcium chloride is an additive in swimming pools to increase the calcium hardness values for water If it is not used safely it is an irritant to skin and eyes, especially if skin is moist.

Sodium thiosulfate anhydrous is used to lower chlorine levels following super chlorination It is an irritant to eyes, skin, mucus membranes and the respiratory track if exposed.

Sodium hydroxide is a caustic cleaning agent and can cause severe chemical burns or blindness.

Silver paint is suspected to be used on the boiler It is heat reflective, dry heat resistant and protects against weather and moisture. If the paint is disturbed it can be an irritant to the skin, eyes and the respiratory tract.

ALGYSOLVE is a means to control algae in swimming waters It is poisonous if ingested and is an irritant to the eyes, skin and respiratory tract.

Diatomaceous earth is used as a filtration system for the pool water It is dangerous if inhaled, containing fibers that can irritate and damage the lungs. It is also an irritant to the skin.

Refractory ceramic fiber product is used for high temperature insulation If the fibers are disturbed and inhaled they can cause severe damage to the respiratory system, especially the lungs.

Muriatic acid is used to balance pH and alkalinity in swimming pools. Exposure can cause burning and irritation to the skin, eyes and respiratory tract.

Aquaguard 301 is a liquid catalyzed sulphite oxygen scavenger designed to deoxygenate boiler feedwater to prevent corrosion within the boiler. Exposure causes irritation to the skin, eyes, mucous membranes and respiratory tract.

Silkleer Filter Aid is a filter aid for swimming pools. It is an upper respiratory irritant if inhaled.

Lithium Shock Chlorinating Granules are used as a shock treatment, super-chlorinating swimming pools. Highly corrosive to the eyes, skin, mucous membrane and respiratory tract.

Dense soda ash is used as a clarifier. It is an irritant to the eyes, nose, throat and skin.

3.8.4 Recommendations

There are a number of hazardous building materials on Site that require attention. A common measure to implement for all hazards is the development of a special operations and maintenance (O&M) program, which would be communicated to future users, managers and occupants of the Site. Specific recommendations follow.

Following the exposure assessment algorithm in the Alberta Asbestos Abatement Manual to determine the level of control, the action to take at Strathcona Pool is to continue control, meaning: prevent disturbance to the asbestos-containing materials and abate if possible. Removal is the recommended approach for these asbestos-containing materials and should be completed according to safe work practices in compliance with the *Alberta Asbestos Abatement Manual*.

Options for controlling asbestos contamination in the crawlspace and mechanical rooms are management (special O&M program), removal or encapsulation. Both the development of a special O&M program and encapsulation options introduce a deferred cost in which removal and proper disposal may be required in the future. Encapsulation entails a management plan be developed. Additionally, free elbow-

piping and other debris resting on the ground in the crawlspace (drama storage) should be bagged and disposed of prior to the abatement of the elbows and insulating wrap. If removal or encapsulation is to be performed, Ecomark recommends corrective approach of removal. An O&M program would consist of already in-place signage, further education of maintenance workers, provision of safety for entrants and periodic inspections.
The lead paint on the metal roof beams hould be chemically stripped if they are to remain part of the support structure of the building. The liquid by-products of chemical stripping must be sent to an approved facility for hazardous waste disposal and hazardous recyclables, as would any other industrial waste produced from lead abatement. Many asbestos abatement contractors also have the competencies to complete lead abatement. The lead paint on the interior plaster walls, doorframes, and window frames should be removed and TCLP testing conducted to determine their final destination.

The concern with PC-containing light ballasts, mercury containing fluorescent light tubes and metal halide bulbs is that they will eventually need to be replaced. The leaking high voltage transformer should be repaired or replaced immediately and the PCBs disposed of properly at a hazardous waste facility. The special O&M program should contain specific instructions for the removal, storage and disposal/recycling of light ballasts, fluorescent light tubes and metal halide bulbs.
The prevention of water damage and moisture build-up is the goal for mould control and structural integrity of Strathcona Pool. The boiler room contained *aspergillus* spores that were not found in the outside control as well as having higher amounts of *basidiospores*, *cladosporium* and unidentified spores compared to other indoor samples. Further investigation is needed to identify the source and location of the mould as well as the conditions leading to the mould growth. Once located, the mould will need to be removed. Until this is completed an N95 mask should be worn for protection.

Mould was also found in moderate amounts on the plaster surrounding a window on the pool deck. This mould will need to be removed using IICRC S500 and S520 methods. With the exception of the mechanical room and window plaster, mould is not currently an issue on Site; however, maintenance and future renovation, landscaping and designs must consider potential water damage of building materials.

In each case of the remaining hazardous materials (i.e. muriatic acid, Aquaguard 301, Sil Keer Filter Aid, Lithium Shock Chlorinating Granules, dense soda ash, chlorine gas, calcium chloride, sodium thiosulphate anhydrous, sodium hydroxide, silver paint, ALGYSOLVE, diatomaceous earth and refractory ceramic fiber products), detailed safety standards, storage, handling procedures and training, as well as personal protective equipment should be documented and training provided. As a long-term solution, alternative treatment methods should be investigated that provide a lower risk to users, staff and occupants of the Strathcona Pool.

3.8.5 References

- Alberta Environment. (1996). Alberta User Guide for Waste Managers. Government of Alberta
- Alberta Human Resources and Employment. (2006). Alberta Asbestos Abatement Manual. Government of Alberta.
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UniFormat	System - Assembly	Design Life	Install Year	Rating	Component Description	Concern	1-3 Year Event/Recommended Action	1-3 year Cost	5-10 Year Event/Recommended Action	5-10 Year Cost	20-25 Year Event/Recommended Action	20-25 Year Cost
S1	**STRUCTURAL**											
A10	**Foundations**											
A1010	**Standard Foundations***	100	1953	4	Reinforced concrete grade beam bearing on reinforced concrete spread footings.	Problem with plumbness of structural columns likely related to structural foundations. (Costs for under-pinning of foundation included in B1020.01)						
A1030	**Slab on Grade**											
A1030	**Slab on Grade***	100	1953	4	5 inch thick concrete slab on grade throughout.							
A2020	**Basement Walls**											
A2020	**Basement Walls (& Crawl Space)***	100	1953	4	Concrete basement walls at change room areas below School portion.	Water penetration evident on east basement wall in mechanical room. See photos.					Waterproof east basement wall and add weeping tile.	$20,000
B1010	**Floor Construction**											
B1010.01	**Floor Structural Frame*(Building Frame)**	100	1953	5	Suspended floor assembly over basement is cast-in-place concrete over hollow clay tiles. See photos.							
B1010.02	**Structural Interior Walls Supporting Floors (or Roofs)***	100	1953	4	Cast in place concrete load bearing walls throughout basement area.							
B1010.03	**Floor Decks, Slabs, and Toppings***	100	1953	4	Concrete topping slab over precast concrete suspended floor assembly.							
B1010.07	**Exterior Stairs***	40	1953	4	Cast-in-place concrete stairs at west entry to school also act as entrance to Scona pool change rooms in the basement.							
B1010.10	**Floor Construction Firestopping***	50	1953	3	Mechanical ductwork and electrical conduit penetrate fre rated floor assemblies.	Original construction and renovations over the years have cut openings in floor slabs which have not been properly fire stopped to current standards. See photos.	Fire stop all openings and around penetrations of piping and conduit through the floor slab (648.2 sq.m. @ $ 3.90)	$2,530	All future renovations requiring penetrations through the floor slab should include fire stopping as component of project.	$10,000		
B1020	**Roof Construction**											
B1020.01	**Roof Structural Frame***	100	1953	5	Precast concrete beams bearing on steel trusses, beams and columns.	Column in northwest corner of pool is out of plumb approximately 2 inches - leaning to the north. Paint is peeling on steel trusses and columns however there is no significant loss of steel section. Photos B1020.01-1 and B1020.01-2.	Investigate cause of column out of plumbness (8,000). Costs identified to address structural issues include correcting plumbness of columns, underpinning of concrete foundation, and landscape remediation. Architectural costs of $50,000 also included	358,000.		$350,000		
B1020.04	**Canopies***	100	1953	5	Cast in place concrete canopy over south entrance to pool.							
S1	**Structural Costs - sub totals**							**360,530**		**10,000**		**$20,000**
S2	**ENVELOPE**											
B2010.01	**Exterior Wall Exterior Skin**											
B2010.01.01	**Precast Concrete: Exterior Wall Skin***	75	1957	3	Precast terrazo window sills and headers. Precast terrazo around south entrance.	Some spalling of terrazo especially near grade level at south entrance. Mortar deteriorating. Photo B2010.01.01-1.			Repair deterioration to terrazo.	$5,000		
B2010.01.03	**Stone Assemblies: Exterior Wall Skin***	75	1957	4	Cut stone parapet copings currently covered by pre-finished metal flashings.							
B2010.01.09	**Expansion Control: Exterior Wall Skin***	75	1980	3	Expansion joint provided where pool addition abutts original school.	Caulking failing. Photo B2010.01.09-1.	Replace expansion joint caulking.	$2,000			Replace expansion joint caulking.	$2,000
B2010.01.11	**Joint Sealers (caulking): Ext. Wall****	20	1980	3	Control joints and transitions between dis-similar materials are caulked.	Exterior caulking has surpassed it's life expectancy, cracking in joints.	Cut out and replace caulking (686.5 sq.m. @ $5.10)	$3,430			Cut out and replace caulking (686.5 sq.m. @ $5.10)	$3,430

UniFormat	System - Assembly	Design Life	Install Year	Rating	Component Description	Concern	1-3 Year Event/Recommended Action	$-	5-10 Year Event/Recommended Action	5-10 Year Cost	20-25 Year Event/Recommended Action	20-25 Year Cost
B2010.02	Exterior Wall Construction											
B2010.02.03	**Masonry Units: Exterior Wall Construction***	100	1957	1	Face brick used as an exterior finish. Brick appears to be keyed in to the hollow clay tile backup. Test opening shows 4 inch thick clay face brick with header courses keyed into two wythes of 4 inch hollow clay tile backup.	Serious freeze-thaw damage to exterior brick wythe due to condensation caused by air leakage. Damage is most evident on uppper half of west and north elevations. Large cracks adjacent columns on north elevation. Danger of pieces of brick falling on pedestrians. Masonry at northwest corner is out of plumb 3.5 inches to north and 2.5 inches to west. Photo B2010.02.03-1 through B2010.02.03-6.	Remove all loose deteriorated brick on all exterior walls, prepare the surface and adhere an SBS modified bitumen air barrier membrane. Extend the membrane over top and down the parapet in order to provide air seal continuity with roof. Insulate all parapets on the exterior with rigid insulation. For walls, add mechanically fastened rigid insulation over the membrane, provide a drained air space and an exterior rainscreen cladding. Air seal membrane also to be continuous with windows, doors and curtainwall. Exterior cladding could be brick, metal or EIFS. Costs based on brick.	$600,000				
B2010.03	**Exterior Wall Vapor Retarders, Air Barriers, and Insulation***	100	1957	4	Test openings at pool deck level shows 2 inches glass fibre insulation, 3/4 inch plaster on expanded metal lath. Ceramic tile or painted plaster interior finish.							
B2010.05	**Parapets***	50	1957	1	200 mm clay brickwork with a stone coping at parapets. Coping currently covered by prefinished metal flashings.	Brick on exterior of parapets is deteriorating due to freeze-thaw damage caused by condensation from air leakage. Interior of parapets are difficult to assess because they are covered in roofing membrane and prefinished metal. See Item B2010.02.03	An air seal membrane must be installed over the parapet and it must be connected to the air seal of the new wall repairs and the vapour barrier of the roofing system. It should be insulated on the exterior and then clad with metal flashings.	$75,000				
B2010.06	**Exterior Louvers, Grilles and Screens***	50	1957	3	Copper louvres.	Louvre blades have been damaged. See Photo B2010.06-1 Costed in D3040.01.07.			Replace louvres	$5,000		
B2020.01	Exterior Standard Windows											
B2020.01.01.01	**Steel Windows (Glass & Frame)****	40	1957	4	Original window in basement mechanical room.	Window is cracked and thermally inefficent. See Photo B2020.01.01.01-1					Replace with new curtainwall type window including tempered laminated sealed units.	$5,000
B2020.01.01.02	**Aluminum Windows (Glass & Frame)****	40	1972	2	Original operable windows in pool replaced in early 1970s with fixed aluminum frames with double glazed sealed units. Frames are not thermally broken and are not a rainscreen design.	Pool windows have very poor condensation resistance for a high humidity environment. Serious condensation has caused seal failures in glazing units and promotes growth of mold and algae. Windows are not rainscreened and vulnerable to rain penetration, glazing seals are deteriorated. Photo B2020.01.01.02-1 through B2020.01.01.02-4.	Replace windows with modern high performance curtainwall type windows.	$104,000				
B2020.01.01.06	**Vinyl, Fiberglass & Plastic Windows****	40	2000	5	There is one PVC framed window with triple glazing added to Supervisors Room.							
B2020.03	**Glazed Curtain Wall****	40	circa 1972	2	Original early generation curtain wall has been replaced with a a 1970s aluminum frame curtain wall system with double glazed sealed units. The curtainwall is not thermally broken but it is a rainscreen design. There are no exterior gaskets.	Curtainwall has poor condensation resistance for a high humidity environment. Serious condensation has caused seal failures in glazing units and copious dripping. Photo B2020.03-1 and B2020.03-2.	Replace curtainwall with modern hi9gh performance system.	$112,000				
B2030.01	Exterior Entrance Doors											
B2030.01.01	**Aluminum-Framed Storefronts: Doors****	30	1972	2	There are sliding doors incorporated into the curtainwall on the south elevation of the pool.	Door hardware and weatherstripping is in poor condition.	Replace doors with a set of thermally high performance doors incorporated into the glazed curtainwall.	$20,000				
B2030.02	**Exterior Utility Doors****	40	1980	3	Original exterior doors replaced with insulated hollow metal doors set in original pressed steel frames.	Doors are rusting due to high humidity. See photo B2030.02-1			Replace doors.	$4,000		
B3010	Roof Coverings											
B3010.01	**Deck Vapor Retarder and Insulation***	25	1991	3	Pool was re-roofed in 1991. The original vapour retarder and insulation (fibreboard) was retained in the 1991 roof replacement. Sloped (1%) type 1 polystyrene was adhered to original insulation with hot asphalt. A one inch thick wood fibreboard overlay was adhered over the sloped polystyrene.	Paint lines on R1 suggest that some moisture in the insulation may have been detected by infrared thermography.			See Item B3010.04.04 below.			

UniFormat	System - Assembly	Design Life	Install Year	Rating	Component Description	Concern	1-3 Year Event/Recommended Action	$-	5-10 Year Event/Recommended Action	5-10 Year Cost	20-25 Year Event/Recommended Action	20-25 Year Cost
B3010.04	**Membrane Roofing**											
B3010.04.04	**Modified Bituminous Membrane Roofing (SBS)****	25	1991	3	There are five roof areas. See Roof Plan. The waterproofing membrane is a two-ply SBS membrane consisting of a base sheet adhered with hot asphalt and a torch applied granular cap sheet.	The soof are 19 years old. There are blisters on some roofs, especially numerous on R2. Paint lines on R1 suggest that some moisture in the insulation may have been detected by infrared thermography. Membrane on parapet is wrinkled, suggestive of building movement. See photos B3010.04.04-1 through B3010.04.04-5.	Replace roofs at time of wall recladding in order to properly maintain air seal continuity and thermal resistance at parapets. See B2010.02.03. Roofing will also be nearing end of lifecycle in 2016.	$200,000				
B3010.08	**Flashing and Sheet Metal**											
B3010.08.02	**Metal Gutters and Downspouts****	30	1991	4	Gutter formed at bottom of sloped roof and feeds into internal rain water leaders.	Minor maintenance required on gutters to keep them clear of plant material.						
S2	**Envelope costs - sub totals**							**$1,116,430**		**$14,000**		**$10,430**
S3	**INTERIOR**											
C1010	**Partitions**											
C1010.01.03	**Unit Masonry Assemblies: Partitions***	100	1957	4	Partitions in basement are predominately hollow clay tile. See photos.							
C1010.01.07	**Framed Partitions (Stud)***	100	1980	5	Metal stud partitions used where staff and party rooms were added in basement.							
C1010.05	**Interior Windows***	80	1957	4	Laminated glazing set in pressed steel frames at Supervisors office to permit visual supervision.							
C1010.07	**Interior Partition Firestopping***	50	1957	3	Structure, mechanical ductwork and electrical conduit penetrate fre rated partitions.	Original construction and renovations over the years have cut openings in partitions which have not bee properly fire stopped to current standards. See photos.	Fire stop all openinga and around penetrations of piping and conduit through the floor slab (648.2 sq.m. @ $ 3.90)	$2,530	All future renovations requiring penetrations through the floor slab should include fire stopping as component of project.			
C1010.08	**Other Partitions***	100	1957	4	Wire mesh partitions used to separate basement pool change rooms from school locker rooms.	Wire mesh partitions are in acceptable condition and are required to allow ventilation air pass to and from adjacent School locker rooms. However, these partitions should be fire rated. See K4020						
C1020	**Interior Doors**											
C1020.01	**Interior Swinging Doors (& Hardware)***	50	1957	3	Solid core wood and hollow metal doors set in pressed steel frames.	Interior doors are showing signs of age. Some warping and delamination present.			Replace interior doors and hardware (9 doors @ $ 1,200).	$10,800		
C1020.03	**Interior Fire Doors***	50	1957	3	Solid core wood and hollow metal doors set in pressed steel frames.	Interior fire doors do not comply to current codes. Hardware is wearing and becoming problematic.	Replace interior fire doors and hardware (7 doors @ $ 1,500).	$10,500				
C1020.04	**Interior Sliding and Folding Doors***	25	1995	5	Open design sliding aluminum grille at top of ramps to close off pool area.				Replace sliding aluminum grille at top of ramp to change rooms (2.0 meters @ $ 2,000)	$4,000		
C1030	**Fittings**											
C1030.01	**Visual Display Boards****	20	1995	4	Small amount of chalkboards and whiteboards throughout.				Replace chalkboards and whiteboards (4 boards at $ 400)	$1,600		
C1030.02	**Fabricated Compartments (Toilets/Showers)****	30	1957	4	Original wood toilet partitions in Men's change room washroom are floor supported wood partitions. Change cubicles in Womens change room are wood cubicles.				Replace original wood toilet partitions in Men's change room washroom with phenolic toilet partitions for improved performance in a humid environment (6 cubicles @ $ 4,500).	$27,000		
C1030.02	**Fabricated Compartments (Toilets/Showers)****	30	1980	5	Original toilet partitions in Womens change room washroom replaced with floor supported metal partitions.						Replace metal toilet partitions in Men's change room washroom with ceiling phenolic toilet partitions to comply to Recreation Facility Standards. Improved performance in a humid environment (4 cubicles @ $ 4,500).	$18,000
C1030.08	**Interior Identifying Devices***	20	1995	4	Variety of metal, wood and paper signs throughout the facility	Signage is not conducive to the facility and does not meet barrier free standards.			Replace signage with a consistent design and that complies to barrier free design (24 signs). Signage to comply to Recreation Facility Standards currently being developed.	$2,000		
C1030.10	**Lockers****	30	1995	5	Metal lockers with sloping metal tops provided in both change rooms and Staff room. See photos.							
C1030.14	**Toilet, Bath, Laundry Accessories***	20	1995	5	A variety of original and new commercial grade washroom accessories.							

UniFormat	System - Assembly	Design Life	Install Year	Rating	Component Description	Concern	1-3 Year Event/Recommended Action	$-	5-10 Year Event/Recommended Action	5-10 Year Cost	20-25 Year Event/Recommended Action	20-25 Year Cost
C2010	Stair Construction											
C2010.01	Stair Construction*	100			Stairs in basement are cast-in-place concrete.							
C2020	Stair Finishes											
C2020.01	Tile Stair Finishes*	60	1953	4	Ceramic tile nosings on stair from exterior entrance to basement public corridor shared with school.	Exit stair is a school issue.						
C2020.02	Terrazzo Stair Finishes*	80	1953	4	Terrazzo stair treads and risers on stair from exterior entrance to basement public corridor shared with school.	Exit stair is a school issue.						
C2020.06	Carpet Stair Finishes**	10	1995	3	Carpet on small 2 riser stair from ramp to Staff and Party rooms.	Carpet is very worn and dirty. Replace when carpet in adjoining rooms is replaced.	Replace carpet stair finishes with rubber treads and risers (1.2 sq.m. @ $ 90)	$300				
C2020.08	Stair Railings and Balustrades*	40		5	Stainless steel and painted steel railings on stair from exterior entrance to basement public corridor shared with school.	Exit stair is a school issue.						
C2030	Interior Ramps											
C2030.01	Ramp Construction*	100	1957	2	Ramp from basement change rooms to pool area is suspended cast-in-place concrete over balance of basement area.	Concrete ramp is in acceptable condition but too steep for barrier free standards. See K4010.						
C2030.02	Ramp Finishes*	30	1980	4	Ramp flooring is ceramic tile with anti-slip strips.	Ramp flooring is acceptable but would require replacement when ramps is replaced for barrier free issues. Anti-slip strips are wearing down. See also K4010.	Replace antil-slip strips on ramp.	$4,500			Replace ceramic tile on ramp (or corridor) with smaller ceramic tiles to improve traction since the anti-slip strips will wear down (80 sq.m. @ $ 140)	$11,200
C2030.03	Ramp Railings*	50	1980	5	Ramp railings at each side and down the middle are stainless steel mounted at 850 mm above floor.						Replace stainless steel ramp railings (44 meters @ $ 280)	$12,320
C3010	Wall Finishes											
C3010.01	Concrete Wall Finishes (Unpainted)*	100	1957	4	Concrete wall surfaces within basement mechanical rooms are left unpainted.							
C3010.03	Plaster Wall Finishes (Unpainted)*	60	1957	4	Keenes cement plaster on metal lath used as interior finish of exterior walls and on partitions in change rooms.	Plaster and gypsum board wall finishes in change rooms are not appropriate due to high humidity.			Add ceramic wall tile to plaster and gyypsum board surfaces in change rooms to a height of 2400 mm above floor (192.5 sq.m.@ $ 200))	$38,500		
C3010.04	Gypsum Board Wall Finishes	60	1980	5	Small number of partitions in Staff/Party rooms have gypsum board finishes.							
C3010.06	Tile Wall Finishes - Original	40	1957	4	Original ceramic wall tile in corridor between change rooms and showers, walls in washrooms and on walls beside ramp to pool area.	Tile is in good condition but for some very minor hariline cracks in a few tiles. See photos.					Replace ceramic wall tiles in corridor, washrooms and ramp (198 sq.m. @ $ 200).	$39,600
C3010.06	Tile Wall Finishes - 1975	40	1975	4	Original ceramic tile on shower walls has beem replaced. See photos.						Replace ceramic wall tiles in shower rooms (92.2 sq.m. @ $ 200).	$18,440
C3010.06	Tile Wall Finishes - 1985	40	1985	5	Original ceramic tile on walls around pool area has been replaced.				Replace ceramic wall tiles in pool area (320 sq.m. @ $ 200).	$64,000		
C3010.06	Tile Wall Finishes - School	40	1957	5	Original ceramic tile wainscot on exit stair and public corridor to pool. .	These areas are a school issue.						
C3010.11	Interior Wall Painting*	15	1995		All interior wall and partition surfaces without ceramic tile finish are painted. See photos.				Re-paint all interior wall surfaces (1,334.7 sq.m. @ $ 18)	$24,020	Re-paint all interior wall surfaces (1,334.7 sq.m. @ $ 18)	$24,020
C3020	Floor Finishes											
C3020.01.02	Paint Concrete Floor Finishes*	10	2000	4	Concrete floor slab in change rooms are painted.	Paint finish is in acceptable condition but inappropriate in a change room. Floor slab does not slope to drain. See K4020.						
C3020.02	Tile Floor Finishes 1975	50	1975	4	Ceramic mosaic tile in washrooms and shower rooms.	Mosaic tiles are marginal but should be replaced as part of a code upgrade. See photos. See K4020.08						
C3020.02	Tile Floor Finishes 1985	50	1985	5	Ceramic or porcelain tile on pool deck and ramp down to change rooms. Anti-slip strips have been added on ramp	Painted concrete finish on stairs and public corridor are painted concrete which is not appropriate. Cost sharing with School?			Add ceramic tile finish to stairs and public corridor from stairs to change room entrances (18.6 sq.m. @ $ 180	$3,350	Replace ceramic floor tile on swimming pool deck. Costed in F1040.01.09.	
C3020.07	Resilient Flooring**	20	1985	5	Vinyl tiles in public corridor access to pool	School issue.						

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C3020.08	**Carpet Flooring****	15	1995	3	Carpet flooring in 2 offices and 2 party rooms.	Carpet is in poor condition. Seams are opening up and badly stained. Carpet is a maintenance concern and may not be appropriate in this building.	Replace carpet in Staff room, Party room and 2 offices with resilient flooring (85 sq.m. @ 70)	$5,950				
C3030	**Ceiling Finishes**											
C3030.03	**Plaster Ceiling Finishes**	60	1957		Plaster ceilings in basement change room areas.							
C3030.06	**Acoustical Ceiling Treatment (Susp. T-Bar)****	25	1957	3	Acoustic ceiling tiles set in suspended T-bar grid in pool area and 2 offices.	Acoustic tiles are in poor condition with water stains, mis-matched tile patterns and rusting T-bars. See photos.			Removce acoustic tile and replace with suspended moisture resistant acoustic panels	$25,000		
C3030.07	**Interior Ceiling Painting***	20	1995	4	All interior plaster ceilings and exposed steel structure are painted.	Paint on structural components in pool area is peeling due to high humidity. Exposed steel beginning to rust in areas. See photos.		$34,330	Remove existing paint finishes down to bare metal and re-apply a superior paint finish. Paint exposed concrete roof deck (686.5 sq.m. x 2.5 @ $ 20)			
S3	**Interior Costs - sub totals**							$58,110		$200,270		$123,580
S4	**MECHANICAL**											
D2010	**Plumbing Fixtures**											
D2010.05	**Showers****	30	1953	3	Motion controlled with thermostatic mixing valves.	Shower drains do not meet code. No drains in change room.			Install drains in shower rooms and change room.	$20,000		
D2010.10	**Washrooms Fixtures (WC, Lav., Uril.)****	35	1953	3	Floor W.C. flush valve. Stall urinals with flush valve. Lavs with on/off brass.	No barrier free lavs and water closets. Fixture brass not low consumption.			Install barrier free fixtures and low water consumption brass.	$30,000		
D2020.01	**Water Supply Piping Systems**											
D2020.01.01	**Pipes and Tubes: Domestic Water***	40	1953	3	Exposed piping was noted to be copper.	Expected service life exceeded.	Replace piping.	$30,000				
D2020.01.02	**Valves: Domestic Water****	40	1953	3	Original gate valves. Ball valves installed where repairs made.	Gate valve expected service life exceeded. Valvesare 53 years old.	Replace original valves.	$4,000				
D2020.01.03	**Piping Specialties (Backflow Preventors)****	20	1953	3	Reduced pressure for steam system make up.	Yearly inspections to be done.	Implement yearly inspection.	$800				
D2020.02	**Water Supply Equipment**											
D2020.02.06	**Domestic Water Heaters****	20	2007	6	Steam insert heat exchanger in horizontal storage tank replaced in 2007.							
D2020.02.07	**Domestic Hot Water Storage Tank**	20	1953	3	Steam insert heat exchanger in horizontal storage tank.	Expected service life of storage tank exceeded.	Conduct ultrasound test to determine condition of tank.	$2,000	Replace domestic hot water storage tank.	$50,000		
D2020.03	**Water Supply Insulation: Domestic***	40	1953	3	Domestic piping distribution	No insulation. Domestic cold water lines discolored.	Insulate exposed piping. Shared cost.	$10,000				
D2030	**Sanitary Waste**											
D2030.01	**Waste and Vent Piping***	50	1953	3	Cast iron sewer and vent piping.	Underground piping condition suspect.	Video underground piping performed in September 2009. Vitreous clay tile does not appear to be leaking from the line to adjacent ground BUT from adjacent ground into the line. Test water in line for chlorine to determine link to leaking pool tank.	$1,000	Monitor condition of line with additional videos of piping as required.	$2,500		
D2040	**Rain Water Drainage**											
D2040.01	**Rain Water Drainage Piping Systems***	50	1953	3	Cast iron piping.	Underground piping condition suspect.	Video underground piping.	$4,000				
D2040.02.04	**Roof Drains***	40	1991	2	Typical drains are 4 inch diameter cast iron. Drains on mechanical room addition are 2 inch diameter (Roof R4 and R5). There are overflow scuppers on Roofs R1 and R2.	Insufficient drainage on Roofs R2, R4 and R5.	Add 4 inch diameter drains on Roofs R4 and R5.	$10,000	Add a drain to R2.	$5,000		
D3020	**Heat generation**											
D3020.01.01	**Heating Boilers and Accessories: Steam****	35	1957	3	Low pressure steam boiler. Shared with the School.	Single boiler. Life expectancy exceeded. High maintenance cost.			Remove steam heating plant and replace with two hot water heating boliers, two swimming pool water boliers and one domestic hot water boiler. Replace distribution piping.	$1,200,000		

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D3020.01.03	Chimneys (& Combustion Air): Steam Boilers**	35	1957	3	Masonry chimney.	Boiler room relief not installed.			Install boiler room relief.	$2,000		
D3020.01.04	Water Treatment Equipment: Steam Boilers*	35	2000	4	Chemical pump injects chemical into condensate receiver.							
D3030	Refrigeration											
D3030.06.01	Refrigeration Compressors**	25	2001	2	Several offices are ventilated and cooled via window type air conditioning unit. Party room ventilated and cooled via split air conditioning unit.	Units do not provide required outdoor air CFC refrigerant.	Install ductwork distribution from central air system. Costed in D3040.01.01					
D3030.06.02	Refrigerant Condensing Units**	25	2001	2	Party room complete with remote condensing unit. CFC refrigerant.		Install ductwork distribution from central air system. Costed in D3040.01.01					
D3040.01	Air Distribution Systems											
D3040.01.01	Air Handling Units: Air Distribution - Pool**	30	1957	3	Pool ventilation provided by dedicated air system consisting of louvre, return fan, mixing dampers, steam heating coil, pad filter, supply fan.	Expected service life exceeded. Heating coils plugged solid with dust; dampers in poor condition, air system internals dust laden; supply fan complete with inlet vanes. Purpose of vanes not known. Pool area was very warm and humid during site review. Air change meeting present code requirements suspect.	Repair and clean	$15,000	Remove existing system and install new with controls to meet temperature and humidity requirements, ductwork distribution.	$350,000		
D3040.01.01	Air Handling Units: Air Distribution - Change Rooms**	30	1957	3	Separate air system provides ventilation air for change room area.	No existing drawings available to determine building area served by air system. Expected service life exceeded. Heating coils plugged solid with dust; dampers in poor condition; air system internals bust laden; supply fan complete with inlet vanes, purpose unknown, several rooms within area served by air system have no ventilation air.		$15,000	Remove existing system and install new with controls, ductwork distribution.	$340,000		
D3040.01.02	Fans: Air Distribution (Remote from AHU)*	30	1957	3	Remote exhaust fan at grade for pool exhaust.	Expected service life exceeded.	Replace fan. Cost included in D3040.01.01					
D3040.01.03	Air Cleaning Devices: Air Distribution*	30	1957	3	Low efficiency pad filters.	Air system heating coils plugged solid.	Replace filter bank with air system replacement.					
D3040.01.04	Ducts: Air Distribution*	50	1957	3	Galvanized sheet metal.	Expected service life exceeded.	Replace ductwork. Cost included in D3040.01.01					
D3040.01.07	Air Outlets and Inlets: Air Distribution*	50	1957	3	Wall louvres complete with birdscreen.	Louvres damaged and birdscreen subject to hoar frost buildup.	Repair and clean louvres	$7,500	Install new louvres with 25 x 25 mm birdscreen.	$14,000		
D3040.02	Steam and Condensate Piping	40	1957	3	Black iron piping and valves. Expected service life exceeded.	Uninsulated pipe sections indicates recent repairs.	Replace piping, valves throughout pool area.	$200,000				
D3040.03	Steam Condensate Pumps	40	1957	3	Simplex condensate pump installed on condensate receiver.	No standby pump provided.	Install condensate tank with duplex pump and controls. Shared cost.	$20,000				
D3040.04	Special Exhaust Systems											
D3040.04.05	Air Outlets and Inlets: Exhaust*	30	1957		Double deflection side wall. Round ceiling diffusers egg crate grilles.	Dust and dirt laden.	Clean grilles and diffusers.	$2,000				
D3050.05	Terminal Heat Transfer Units											
D3050.05.06	Unit Heaters**	30	1957		5 vertical unit heaters in pool area.	Expected service life exceeded.	Replace unit heaters.	$50,000				
D3060.02	HVAC Instrumentation and											
D3060.02.02	Pneumatic Controls**	40	1957		Pneumatic valves and components.	Expected service life exceeded. Components and controllers not providing efficient control.	Upgrade control system to digital control system.	$80,000				
D3060.02.04	Self-Powered Controls*	30	2003		Simplex control compressor. No dryer.	No standby; lack of air dryer results in moisture migration into control piping distribution resulting in component failure.	Install second air compressor.	$14,000				
D4030	Fire Protection Specialties											
D4030.01	Fire Extinguisher, Cabinets and Accessories*	30			Multipurpose ABC fire extinguishers.	Yearly inspections required.	Continue yearly inspections.	$1,000	Hydrostatically test every 10 years.	1,000		

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S4	Mechanical Costs - sub total							$466,300		$2,014,500		
S5	ELECTRICAL											
D5010	Electrical Service and Distribution											
D5010.01	Main Electrical Transformers**	40			Pad mounted transformer by EPCOR serves both the school and the pool. The pool area is subfed from the school system. The pool is not separately metered.							
D5010.02	Secondary Electrical Transformers (Interior)	25		4	Transformer 6T 2D2 for the pool service is located in a dedicated room adjacent to the pool mechanical room. The transformer is fed through a fused switch on the 600V side located in the same room. The transformer is FPE ANN, Class 220 150º rise, 150kVA, 600V to 120/208V 3 ph 4 wire.	Thevoltages read approximately 590V phase to phase on a nominal 600V service. This is within the allowable voltage drop of 3% or 18V.A, 109A and 94A. The phase currents were measured at 110A, 109A and 94A. The unbalance is acceptable. The full load current for a 150kVA transformer is approximately 150A. The currents were measured on a warm day. There are parking stall receptacles on this transformer which would add approximately 13kVA of load. This transformer is effectively fully loaded. Any	Periodically measure the currents to establish any developing trend. The highest load would probable occur during midwinter during the day; i.e. With the pool in full operation and the cars plugged in in the parking lot.					
D5010.03	Main Electrical Switchboards (Main Distribution)**	25		4	The pool equipment is fed at 120/208 Volts from the above noted transformer through a splitter and switches. The equipment is located on the south wall of the pool equiipment room. The main switch on the secondary side of the transformer is rated 400A which is appropriate for the transformer rating. The equipment is clean, appears to be in good repair. There is no visible evidence of any heat stress.	There is limited clearance between the electrical equipment and the adjacent boiler.		$2,000				
D5010.05	Electrical Branch Circuit Panelboards (Secondary Distribution)**	25 3 1		4	Panel CC serves the pool area. Adjacent Panel CCA is subfed from Panel CC and also serves the pool area. 30% of the breaker spaces in these two panels are available for future use. A car plug panel is located on the east wall of the mechanical room. It is fitted with 1/2 size breakers which is a residential standard. There are 11 breakers and 21 spaces. the panel is controlled by a contactor/timer arrangement. The panel in the pool office has been upgraded. The old panel is now used as a splice box/ wireway. There is an old style FPE Stab Lok panel in the Party Room. It is fitted with half size breakers and there are 16 hals size spaces available.	The car plug panel is old and not to an institutional standard. There is no visible evidence of stress or damage. The panel feeds car stalls to the north and east of the pool and appear to be for teacher parking. The old panel space in the office is accessible to non qualified people. This panel is adequate for its intended purpose but should be replaced if the area is renovated.	Replace the car plug panel with the associated contactor and timer ($ 4,000). Replace the existing cover on the panel in the pool office with a blank cover over the existing tub to prevent access by non qualified people ($ 1,500).	$5,500				
D5010.07.02	Motor Starters and Accessories**	10		3	Motor starters and miscellaneous control equipment are located on the east wall of the pool equipment room. Some of the equipment is relatively new and some is outdated.	The "outdated" starters should be replaced when the equipment they serve is updated or replaced. Typically, this would be driven by the mechanical equipment replacement/upgrade program or if the equipment fails.						
D5020	Lighting and Branch Wiring											
D5020.01	Electrical Branch Wiring*	25	1957	4	Branch wiring generally is copper conductors in emt raceways. No problems with the raceways were observed. No assessment is possible of the integrity of the grounding and bonding of any metal aroung the pool. None of the connetion points are accessible.							
D5020.02	Interior Lighting											
D5020.02.01	Lighting Accessories(Lighting Controls)*	30	1957	4	Lighting is controlled by line voltage switches. Switches for the pool area and change rooms are located in the pool office.							
D5020.02.02	Interior Luminaries											
D5020.02.02.02	Interior Florescent Fixtures**	10	1957	4	Areas other than the pool are lit with fluorescent fixtures. The fixtures are not new but clean and in good repair.							

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D5020.02.02.03	Interior Metal Halide Fixture*	10	1957	4	The pool lighting is metal halide. The fixtures appear to be in good condition and the quality of the light is consistent from fixture to fixture. The fixtures are suspended through the ceiling tiles on rods. The lighting levels on the pool deck approach 150fc. The illumination level was measured on a weekday morning and is the sum of artificial and natural light as there are many windows.	There are no ballast compartments integral with the fixtures therefore it is assumed that the ballasts are remote mounted above the ceiling tiles. The metal halide lamps will experience reduced lumen output and consume more energy as they age.	It is recommended that the light fixtures be replaced as part of the ceiling upgrade project. Fluorescent fixtures fitted with T5HO lamps should be considered at tha time because of long life, lumen maintenance during life and instant on feature.See C3030.06	$25,000				
D5020.02.03	Emergency Lighting Battery Packs**	20	1957	4	The facility has recently been retrofitted with new battery packs for emergency lighting.							
D5020.02.04	Exit Signs*	25	1957	4	Some areas have recently been retrofitted with new exit lights. The lights are appropriately placed but there is a mix of old and new.							
D5030	Communications and Security											
D5030.01	Detection and Fire Alarm**	25		4	The existing fire alarm system is an Edwards IRC-3. This is an early addressable system. The field devices are a mix of addressable and non addressable.	GE Security, the Edwards representative has advised that the IRC panels are no longer fully supported. The fire alarm system is by the school and the pool area is therefore monitored by the school.	Establish an administrative protocol to review the annual inspection reports prepared for the school board to ensure any problems in the pool areas are addressed.	$1,500				
D5030.04	Voice and Data Systems											
D5030.04.01	Telephone Systems*	25	1957	4	Telephone service is provided from the school telephone room. The service does not go through the school switchboard.							
D5030.04.06	Door Answering Systems	25	1957	4	There is a door bell at the west entrance to the pool for access during non operating times.							
D5030.05	Public Address and Music Systems**	20	1957	4	There is a paging/music system for the pool and change room areas. The door bell system and pump alarm system will override the music signal.							
D5090.	Electrical Costs related to Mechanical											
D5090.01	Electrical Costs related to Heating Boilers			3	Mechanical section replacement of heating boilers and distribution piping in 5-10 year window.				Electrical costs associated with replacing boilers. Event must occur concurrently with D3020.01.01	$150,000		
D5090.02	Electrical Costs related to Air Handling Units: Air Distribution - Pool**			3	Mechanical section replacement of pool ventilation system in 5-10 year window.				Electrical costs associated with replacing pool ventilation system. Event must occur concurrently with D3040.01.01 Pool	$25,000		
D5090.03	Electrical Costs related to Air Handling Units: Air Distribution - Change Rooms**			3	Mechanical section replacement of change rooms ventilation system in 5-10 year window.				Electrical costs associated with replacing change rooms ventilation system. Event must occur concurrently with D3040.01.01 Change Rooms.	$30,000		
D5090.04	Electrical Costs related to Unit Heaters**			3	Mechanical section replacement of vertical unit heaters in 1-3 year window.		Electrical costs associated with replacing vertical unit heaters. Event must occur concurrently with D3050.05.06	$15,000				
D5090.05	Electrical Costs related to Self-Powered Controls*			3	Mechanical section addition of second air compressor in 1-3 year window.		Electrical costs associated with adding second air compressor. Event must occur concurrently with D3060.02.04	$3,500	Event must occur concurrently with			
S5	Electrical Costs - sub total							$34,000		$205,000		
S6A	SPECIAL CONSTRUCTION -											
E1090.01	Equipment											
E1090.04	Residential Equipment*	10	2000	5	Residential grade microwave oven in staff areas.							
E1090.07	Athletic, Recreational, and Therapeutic Equipment*	15	1995	5	Plastic slide provided at pool area. Climbing rope over deep end of pool.							
E2010	Fixed Furnishings											
E2010.02	Fixed Casework**	35	1995	4	Stainless steel clad vanities in change room washrooms. Painted wood cabinets in Party Room. See photos.				Replace vanities in washrooms 4.6 meters) and wood cabinets in Party room (6.4 meters).	$9,570		
F1020	Integrated Construction											

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F1020.02	Special Purpose Rooms*		1995	4	Self-contained cedar sauna provided on pool deck.							
F1040.01	Aquatic Facilities*	40										
F1040.01.01	Pool Structure	80	1957	5	The reinforced concrete structure appears to be in good condition. There are no visible cracks or reported water loss throught the strucuture							
F1040.01.02	Pool Interior Finishes	60	1957	4	The ceramic mosaic tile appears to be in good condition with some exhibited repairs which would be expected in a pool of this age	Ceramic tile will often times need to be spot repaired. This should be budgeted for every 5 years for repair	Repair as required	$10,000				
F1040.01	Pool Tile Epoxy Grout	20	1957	2	The tile is reported to sealed with epoxy grout which is the best form of grout for a tile swimming pool. The grout is reapplied every 8 to 10 years with the last re-grout approx. 7 years ago	The existing grout has several areas that the tile spacers or old grout is exposed. This will need to be regrouted within a year	Regrout with epoxy	$85,000	Regrout with epoxy	$95,000	Replace ceramic tile surfaces	$225,000
F1040.01.03	Pool Joint Sealants	5	2009	1	There is a cold pour expansion joint between the deep and shallow ends of the pool. Leak detection report completed in July 2009 identifies expansion joints as source of leaks.	Reports that the pool tank may be leaking as much as 10,000 liters per week prior to the repairs to the expansion joint in August 2009.	Field test to determaine if expansion joints are leaking. If these joint are leaking install water stop system and re-caulk with two part caulking	$65,000	The joints need to be re-caulked every 5 years or when the caulking fails.	$6,000	Re-caulk joints	$25,000
F1040.01.04	Pool Traditional Access	80	1957	5	There are five traditional sets of recessed steps with companion grab rails.							
F1040.01.05	Special Needs Access	10		3	No handicap access observed or reported on site	A handicap lift should be installed to provide access for individuals with disabilities, once the rest of the facility is made accessible			Install Lift	$6,000		
F1040.01.06	Pool Safety Signage and Rescue Equipment	5		5	Pool signage and rescue equipment were observed at the pool		Update equipment and training as required	$2,500	Update equipment and training as required	$7,000	Update equipment and trainting	$12,000
F1040.01.07	Recreational Features: Slide and Rope Swings	40		3	The pool has a residential water slide and two rope swings that go into the deep end of the pool.	The slide is not commercial grade and should be removed or replaced. The rope swings are difficult to regulate and are a safety concern	Removal and replacement of waterslide	$125,000			Resurface slide and equipment update	$23,000
F1040.01.08	Deck Hand Hold at Pool Edge	20	1957	2	The ceramic tile hand hold is used for gripping the edge. There are several areas where this has been damaged	Broken tiles should be removed and replaced	Replacement of deck edge handhold tiles	$13,000				
F1040.01.09	Deck Tile Finish	40	1957	1	The deck has an 8 by 8 tile finish in concert with area deck drains.	The deck is reportedly slippery and has had several incidents of people slipping and falling. The deck surfaces should be coated with an anti-slip coating	Deck anti-slip coating installed on annual basis	$8,500	Deck anti-slip coating installed on annual basis	$15,000	Replace ceramic tile surfaces	$135,000
F1040.01.10	Pool Surface Skimmers	80	1957	2	The skimmers were operational at approximately a 50% level without the use of weirs.	The skimmers do not have any of the operational parts such as weirs. Either new weirs or circular floating weirs should be installed. Equalizer line needs to be VGBA compliant	Replace skimmer weir and install VGBA grates	$5,200	New hardware	$1,200	New hardware	$2,500
F1040.01.11	Drain Boxes and Grates	80	1957	1	The drain grates were not updated to comply with the VGBA safety suction release	Drain grates conforming with VGBA need to be installed	Evaluated sumps and grates and install VGBA grates	$12,000			New grates	$3,000
F1040.01.12	Inlets	40	1957	3	Pool wall inlets were observed around the pool perimeter	Inlets should be pressure tested to ensure that no water loss is occurring here and that the original galvanized pipe is mechanically sound. New eyeball inlets should be installed	Dye flow and camera test with new inlets adjusted after dye test	$8,500			New hardware	$1,000
F1040.01.13	Water Distribution Plumbing	40	1986	5	The original cast iron and galvanized plumbing was reported to be replaced in 1986 with schedule 80 PVC pipe and fittings	Pressure test to verify that no water loss is occurring	Pressure test piping	$2,800				
F1040.01.14	Manual Operational Valves	5	VARIES	4	The manually operated valves are checked every two years and repaired or replace when required	Continue existing maintenance program	Annual repair and replace as required	$8,000	Annual repair as required	$15,000	Annual repair as required	$60,000
F1040.01.15	Automated Operational Valves	20	2006	2	The operational unit for the modulation valve was reported to be replaced 3 years ago	Continue existing maintenance on automated valves and especially on check valves. Consider the addition of automated valves on all normally open filter tank pipes to prevent overflow of water if check valves foul.	Installation of shut off system	$15,000	Annual repair as required	$5,000	Annual repair as required	$12,000
F1040.01.16	Water Level Sensing Devices	20	1957	3	The control valve for the automated water level appears to have been replaced somewhat recently and all aspects were reportedly functional	Ensure that float valves operate and protect pumps from cavitation and tank from over flowing	Annual repair and replace as required	$3,000	Annual repair as required	$5,000	Annual repair as required	$20,000

UniFormat	System - Assembly	Design Life	Install Year	Rating	Component Description	Concern	1-3 Year Event/Recommended Action	$-	5-10 Year Event/Recommended Action	5-10 Year Cost	20-25 Year Event/Recommended Action	20-25 Year Cost
F1040.01.17	**Water Flow Measuring and Control Devices**	10		2	There is no automated control other than the modulating float valve on the discharge pump. The pitot tube flow meter is not operational	Replace all non working gauges and meters	Replace all non funtional flow meters	$2,800	Annual repair as required	$2,000	Annual repair as required	$4,000
F1040.01.18	**Pool Pumps**	5	2008	3	The dual swimming pool pumps and motors have recently been renovated and are in good working condition.	Continue existing maintenance program. Replace hair and lint strainer with PVC or stainless steel strainer with clear lid.	Maintenace program and replace hair lint strainer	$13,500	Annual repair as required	$10,000	Annual repair as required	$40,000
F1040.01.19	**Pool Filter Tank**	40-5	1957	1	The concrete filter tank appears to have areas that are starting to degenerated and could be an issue in the near future if not properly lined. Elements and covers were just replaced.	Epoxy inject existing cracks in filter tank and line interior with either PVC or Tank lining system	Repair tank and install lining system	$20,000			Repair as required	$15,000
F1040.01.20	**Pool Heat Exchanger**	10	2000	2	The heat exchanger is a shell and tube type with the tube bundle reported to have been replaced 8 to 10 years ago.	Replace heat exchanger with new shell and tube or consider using frame and plate. Use stainless steel internals.	Replace heat exchanger and udate controls	$7,500			New heat exchanger	$7,500
F1040.01.21	**Pressure and Vacuum Gauges, Thermometers and Other Gauges**	5	VARIES	3	there are numerous gauges and thermometers that are not automated control related devices	Replace all non working gauges and thermometers	Replace gauges as required	$2,000	Annual repair as required	$5,000	Annual repair as required	$15,000
F1040.01.22	**Water Analyzation System**	10	2006	5	The Acu-Trol water chemistry analyzer appears to be of a recent vintage. It was reported to operate effectively	Consideration should be given to update controller to more comprehensive unit that can monitor more functions and alert maintenance when outside of normal parameters.			New Comprehensive controlller	$15,000		
F1040.01.23	**Sanitation System**	10		1	The sanitation is provided by a gas chlorine system. This system is reported to have been modified to meet school district operational criteria.	Consideration should be given to update the safety equipment to include the venting and also release of chlorine gas with scrubber system or use different safer sanitation system	Replace gas chlorine with safer to use system and medium pressure UV system	$40,000	Annual repair as required	$7,000	New equipment	$20,000
F1040.01.24	**PH Control System**	5		4	It appears that liquid caustic soda is used to balance pH. It is reported that the domestic water has enough alkalinity that there is not a large demand for significant bi carbonate usage.				New equipment	$3,000		
F1040.01.25	**Ancillary Product Storage**	80		3	The open storage room provides for all the various chemicals and filter media to be stored in once central location.	Individual storage rooms that are mechanically exhausted should be constructed to store these chemicals.	Install 3 individually exhausted storage rooms	$23,500				
F1040.01.26	**Fencing and Access Control**	20	1957	3	Fencing and all gate hardware must meet current code requirements	Fencing does not meet requirements	Replace fencing	$3,500				
S6A	**Special Construction - Aquatics costs sub total**							**$289,300**		**$206,770**		**$620,000**
S6B	**SPECIAL CONSTRUCTION -**											
E1090.01	**Equipment**											
E1090.04	**Residential Equipment***	10	2000	5	Residential grade microwave oven in staff areas.							
E1090.07	**Athletic, Recreational, and Therapeutic Equipment***	15	1995	5	Plastic slide provided at pool area. Climbing rope over deep end of pool.							
E2010	**Fixed Furnishings**											
E2010.02	**Fixed Casework****	35	1995	4	Stainless steel clad vanities in change room washrooms. Painted wood cabinets in Party Room.				Replace vanities in washrooms 4.6 meters) and wood cabinets in Party room (6.4 meters).	$9,570		
F1020	**Integrated Construction**											
F1020.02	**Special Purpose Rooms***		1995	4	Self-contained cedar sauna provided on pool deck.							
F2020	**Hazardous Components**											
F2020.01	**Asbestos***	50	1980		Pipe elbows, pipe insulation wrap	Asbestos fibres can cause serious illness including asbestosis, which can be fatal. If asbestos is disturbed fibres can become mobile and inhaled. See photos.	Implement a special operations and maintenance (O&M) program. Abatement only of construction will disturb areas containing asbestos.	$1,700	Abatement only if construction will disturb areas containing asbestos.	$5,000	Asbestos abatement, replace all piping containing asbestos product.	$25,000
F2020.02	**PCBs***	20	1978		PCBs - Light Ballasts, high voltage power panel; Mecury - Fluorescent light tubes, metal halide bulbs	PCB's can cause acute health effects such as skin irritation and rashes, headaches and cough. Long term health effects include liver damage, cancer, immune deficiencies and birth defects. Mecury can cause central nervous system effects and memory loss. See photos.	Implement a special operations and maintenance (O&M) program. Replacement of light ballasts with non PCB and mercury containing bulbs. Repair or replace high voltage power panel leaking PCBs	$5,000	Replace all light ballasts and bulbs containing PCBs and mercury. Remove occurrences of PCB leakage from fixtures	$7,000		
F2020.04	**Mould***				Boiler room, plaster surrounding window	Exposure to mould can cause allergic reactions and respiratory problems.	Implement a special operations and maintenance (O&M) program. Remove plaster around the window on the pool deck that contained mould. Further investigation and removal of the mould in the boiler room. Until mould is removed use PPE while in the room (N95 mask).	$3,000	Replace filter system in boiler room to reduce moisture content. Replace any plaster or other surfaces showing mould growth. Reduce moisture content in building.		Replace all plaster walls with moisture resistant material such as ceramic tile. See C????.	

UniFormat	System - Assembly	Design Life	Install Year	Rating	Component Description	Concern	1-3 Year Event/Recommended Action	$-	5-10 Year Event/Recommended Action	5-10 Year Cost	20-25 Year Event/Recommended Action	20-25 Year Cost
F2020.09	Other Hazardous Materials*				Water treatment supplies and consumables. Lead-containing paints.	Entire interior of pool building is believed to have lead paint. The metal roof beams are painted in lead. Lead can cause nervous system and neurological problems, especially in young children.	Implement a special operations and maintenance (O&M) program. Remove paint from areas where construction is occurring.	$4,000	Remove lead paint in areas where construction is occurring.	$4,000	Replace all lead paint materials.	$25,000
S6B	Special Construction Equipment and Harvardous Components Costs - sub total							$13,700		$25,570		$50,000
S7	SITE - beyond scope of this study											
S8	FUNCTIONAL ASSESSMENT											
K2030	Program Layout											
K2030	Program Layout		1957		All functional issues are beyond the scope of this report. However, there are a number of functional issues or shortcomings at Strathcona Pool which should be addressed over the long term if the pool is to remain open. These may include staff change rooms, family change rooms, hot tubs, steam room and introduction of leisure pool activities. Where practical, some components have been added as part of K4010.03							
K4010	Barrier-Free Access											
K4010.01	Barrier-Free Route: Parking to Entrance*				Refer to section entitled CODE ANALYSIS for more information.	Sidewalks from designated parking have to be 1100 mm wide and have a curb cut. This is provided at Staff entrance but should be addressed as part of K4010.02						
K4010.01	Barrier-Free Entrances*				Refer to section entitled CODE ANALYSIS for more information.	Barrier free entrance at Staff Room would not normally qualify as BFA since it is a back door entrance and fosters a non-inclusive attitude. See photos.			Develop a barrier free entrance at grade along the west side of the school to serve as entrance for all. Locate designated parking within easy walking distance. Estimate based on 30 sq.m. addition to the building.	$90,000		
K4010.02	Barrier-Free Interior Circulation*				Refer to section entitled CODE ANALYSIS for more information.	Significant barriers to people in wheel chairs include stairs at main entrance, stairs in public corridor, very steep ramp to pool area.			Introduce elevator into west building addition as per K4020.02 ($ 100,000). Eliminate ramp to pool and introduce corridor with stairs (40.2 sq.m. @ $ 1,620). Add horizontal wheel chair lifts in two locations ($ 25,000 each).	$215,120		
K4010.03	Barrier-Free Washrooms*				Refer to section entitled CODE ANALYSIS for more information.	Washrooms in change rooms are somewhat barrier free but require upgrades. Universal toilet room is missing.			Modify exisitng washrooms to improve clearances ($ 8,500) and add universal toilet rooms. Estimate for UTR based on 100 sq.m. addition to northeast corner of pool area. This addition could also address shortcomings in Staff areas and add family change rooms.	$258,500		
K4010.04	Miscellaneous Barrier Free				Refer to section entitled CODE ANALYSIS for more information.	Public counters must be barrier free. Assistive listening devices required.			Replace public counters(2 meters @ $ 2,400) and add assistive listening device ($ 4,000).	$8,800		
K4020	Building Code											
K4020	Building Code		1953		Original building complied to the code of the day and there is no need to upgrade to new code standards. However, there are issues which should be upgraded to provide a higher level of protection for the Public. See Code Analaysis							
K4020.01	School Major Code Upgrade		1953	3	Strathcona School may undergo a major code upgrade and be required to add sprinklers to the building. In that event, it would be necessary to add sprinklers to the swimming pool portions of the building as well. Cost sharing could be negotiated with Edmonton Public Schools.							
K4020.02	Occupancy Separations		1953	3	Refer to section entitled CODE ANALYSIS for more information.	The swimming pool occupancy must be separated from the School occupancy.See photos.	Upgrade partitions between swimming pool occupancy and school occupancy in the change rooms (104 sq.m. @ $ 360). Modify mechanical system to suit new partitions. See also D3040.01.01	$37,440				

UniFormat	System - Assembly	Design Life	Install Year	Rating	Component Description	Concern	1-3 Year Event/Recommended Action	$-	5-10 Year Event/Recommended Action	5-10 Year Cost	20-25 Year Event/Recommended Action	20-25 Year Cost
K4020.03	**Fire Separations**		1953	3	Code Analysis outlines a number of existing fire separations that are existing or required.	Partitions and doors require upgrading or replacement in order to comply to current codes. See photos.	Upgrade partitions around Suites, Janitor rooms, Service rooms and Storage Rooms (123 sq.m. @ $ 360).	$44,280				
K4020.04	**Egress**		1957	3	Refer to section entitled CODE ANALYSIS for more information.		Upgrade egress doorways (2 doors). Add protection of BFA floor areas. Cost included in K4020.03. Increase size of stair landing to Staff Room or eliminate stair when ramp removed. See photos. Costs included in K4010.02.					
K4020.05	**Plumbing Fixtures**		1957	3	Refer to section entitled CODE ANALYSIS for more information.	Womens's washroom is short one water closet. BFA drinking fountain also required.			Add one water closet in Womens Washroom and three BFA drinking fountains. One in each change room and one in pool area.	$4,500		
K4020.06	**Swimming Pool Deck Drainage**		1957	3	Refer to section entitled CODE ANALYSIS for more information.	Pool deck drainage does not meet code drainage standard.					Replace portions of pool deck and introduce sufficient floor drains to meet drainage standard (320 sq.m. @ $ 510). Ceramic tile floor finish included in C3020.01 - 1985	$163,200
K4020.07	**Change Room Floor Drainage**		1957	3	Refer to section entitled CODE ANALYSIS for more information.	See photos.						
K4020.08	**Shower Floor Drainage**		1957	3	Refer to section entitled CODE ANALYSIS for more information.	See photos.						
K4020.09	**Chemical Storage**		1957	3	Refer to section entitled CODE ANALYSIS for more information.	Chemical storage room is accessed through Pary Room and Staff Room which does not comply to code. See photos.	Add door to separate Party room from Staff Room.	$1,200				
K4020.10	**Chlorine Room**		1957	3	Refer to section entitled CODE ANALYSIS for more information.	Floor, walls and ceilings do not comply to current standards. See photos.	Upgrade walls (17.0 sq.m. @ $ 360), ceiling (6.0 sq.m. @ $ 450) and floor (6.0 sq.m. @ $ 180), to the chlorine room.	$9,900				
S8	**Functional Assessment costs**							**$92,820**		**$576,920**		**$163,200**
S1 - S8	**COST SUMMARY**											
S1							**Structural**	**$1360,530**		**$10,000**		**$20,000**
S2							**Envelope**	**$1,116,430**		**$14,000**		**$10,430**
S3							**Interior**	**$58,110**		**$200,720**		**$123,580**
S4							**Mechanical**	**$466,300**		**$2,014,500**		**$-**
S5							**Electrical**	**$34,000**		**$205,000**		**$-**
S6A							**Special Construction - Aquatics**	**$289,300**		**$206,770**		**$620,000**
S6B							**Special Construction - Equipment and Hazardous Components**	**$13,700**		**$25,570**		**$50,000**
S8							**Functional Assessment**	**$92,820**		**$576,920**		**$163,200**
Mark-ups							**SUB-TOTALS**	**$2,081,190**		**$3,603,480**		**$987,210**
							Contractor Overhead and Profit (10%)	**$208,120**		**$360,350**		**$98,720**
							Construction Contingency (15%)	**$312,180**		**$540,520**		**$148,080**
							Consultant Fees (10%)	**$208,120**		**$360,350**		**$98,720**
							Project Management (8%)	**$166,500**		**$288,280**		**$78,980**
							GST (5%)	**$104,060**		**$180,180**		**$155,100**
	SUB TOTAL COSTS BY EVENT WINDOW							**$3,598,170**		**$4,815,160**		**$1,566,810**
	TOTAL COSTS											**$9,980,140**

Photo No.	1
Reference	
Comment	Swimming pool from the south west with the exterior deck in the foreground.

Photo No.	2
Reference	
Comment	Exterior View of pool from the north west side.

Photo No.	3
Reference	
Comment	Exterior View of pool from the west side showing entrance to both the pool and Strathcona High Schools.

Photo No.	4
Reference	
Comment	Interior view of the swimming pool from the top of the ramp down to change rooms (south east corner).

Photo No.	5
Reference	
Comment	Interior view of pool from the north east corner.

Photo No.	6
Reference	
Comment	Interior view of the steep ramp from change rooms up to pool.

Photo No.	7
Reference	A1010-1
Comment	Differential movement within north elevation foundations. First and fourth columns from west end are displaced downward approximately 1 inch in relation to second and third columns.

Photo No.	8
Reference	A1010-2
Comment	Approximate ¾ inch gap between floor tile return and tile finished wall above at northwest corner.

Photo No.	9
Reference	A2020-1
Comment	Water leakage through east basement wall of mechanical room.

Photo No.	10
Reference	B1020.01-1
Comment	Steel column in northwest corner is out of plumb. Note peeling paint.

Photo No.	11
Reference	B1020.01-2
Comment	Peeling paint on structural steel due to condensation. No significant loss of steel section was observed.

Photo No.	12
Reference	B1020.01-3
Comment	Precast concrete beams displaced approximately 5/32 inches off north elevation steel roof beam at northwest corner. This is not considered a large displacement.

Photo No.	13
Reference	B2010.01.01-1
Comment	The precast terrazzo around the south curtainwall glazing has numerous chips and spalls and joints need repointing.

Photo No.	14
Reference	B2010.01.09-1
Comment	Movement joint in brick requires re-caulking.

Photo No.	15
Reference	B2010.02.03-1
Comment	Typical freeze-thaw damage to brick on west elevation due to condensation within wall system.

Photo No.	16
Reference	B2010.02.03-2
Comment	This corner of the wall is out of plumb 2½ to 3½ inches in each direction. Note deterioration of brick. Arrows indicate location of smoke exfiltration during air leakage testing.

Photo No.	17
Reference	B2010.02.03-3
Comment	Typical damage to brick at parapet level.

Photo No.	18
Reference	B2010.02.03-4
Comment	Brick fragment ready to fall.

Photo No.	19
Reference	B2010.02.03-5
Comment	Brick fragments ready to fall.

Photo No.	20
Reference	B2010.02.03-6
Comment	Typical freeze-thaw damage to brick on east elevation. Note accumulation of fragments on the roof.

Photo No.	21
Reference	B2010.02.03-7
Comment	Test opening in exterior wall on north elevation. The opening showed that there were two wythes of hollow clay tile behind the brick. The outer clay tile showed signs of freeze-thaw damage.

Photo No.	22
Reference	B2010.02.03-8
Comment	There is a 2½ inch wide vertical crack in the masonry along the second column on the north elevation. It is likely related to foundation movements. The crack was recently caulked.

Photo No.	23
Reference	B2010.02.03-9
Comment	Close-up of crack at second column on the north elevation, also showing gap that opened up between coping stone units and deformed metal parapet flashing. Note crack is caulked.

Photo No.	24
Reference	B2010.02.03-10
Comment	Spalling of interior face of inner clay tile at northwest corner. This is a view into cavity.

Photo No.	25
Reference	B2010.02.03-11
Comment	West elevation masonry wall panel south of northwest corner displaced outwards 1 inch from adjacent steel roof truss.

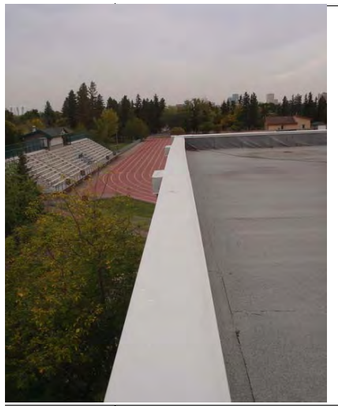


Photo No.	26
Reference	B2010.02.03-12
Comment	West elevation parapet showing wall bulging.

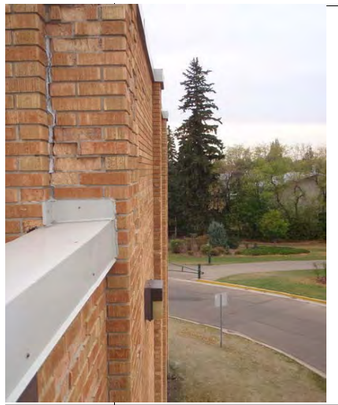


Photo No.	27
Reference	B2010.02.03-13
Comment	Top of second column from west bulging out approximately 1.5 inches on north elevation.

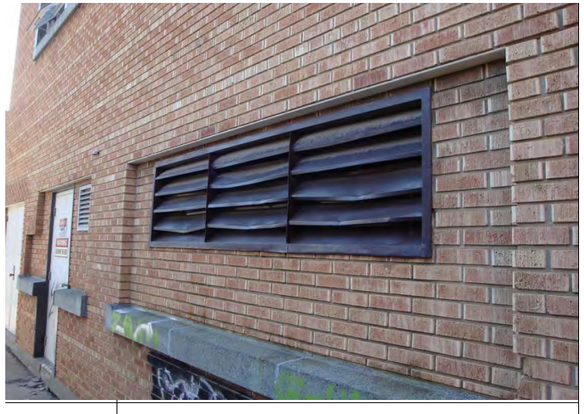


Photo No.	28
Reference	B2010.06-1
Comment	These louvre blades have been damaged, likely by vandals. We recommend replacement of the louvre.

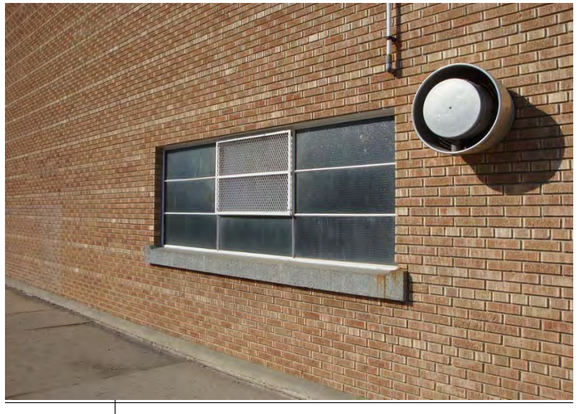


Photo No.	29
Reference	B2020.01.01.01-1
Comment	This window in the mechanical room is cracked and has poor thermal resistance.

Photo No.	30
Reference	B2020.01.01.02-1
Comment	There has been so much condensation on this pool window sill that algae has started to grow on it. We also saw black spots that are suggestive of mold in some locations. The window framing system is not

Photo No.	31
Reference	B2020.01.01.02-2
Comment	This sealed unit in the pool has fogged. There have been numerous sealed unit replacements over the years as indicated by the various dates on spacer bars.

Photo No.	32
Reference	B2020.01.01.02-3
Comment	The glazing seals on the pool windows are deteriorating.

Photo No.	33
Reference	B2020.01.01.02-4
Comment	Condensation around the windows has caused extensive blistering and peeling paint. The dark spots are suggestive of mold.

Photo No.	34
Reference	B2020.01.01.02-5
Comment	Typical opening in tile on interior of north wall. There was no significant deterioration inside the opening. Note dirt in insulation is suggestive of air leakage.

Photo No.	35
Reference	B2020.03-1
Comment	The south elevation is dominated by a curtainwall type glazing system. There are sliding doors incorporated into the curtainwall.

Photo No.	36
Reference	B2020.03-2
Comment	The curtain wall is a very early version and is not thermally broken and does not have exterior gaskets.

Photo No.	37
Reference	B2030.02-1
Comment	The hardware on the west exit door is rusting.

Photo No.	38
Reference	B3010.04.04-1
Comment	View of R1, the largest roof over the pool. All the roofs were replaced about 19 years ago.

Photo No.	39
Reference	B3010.04.04-2
Comment	There are wrinkles in the parapet stripping in a number of locations. This wrinkling could be caused by movement of the parapets due to differential settlement of footings.

Photo No.	40
Reference	B3010.04.04-3
Comment	This is a drain from R4 on to R5. The drain is only 2 inches diameter.

Photo No.	41
Reference	B3010.04.04-4
Comment	This drain on R5 is undersized.

Photo No.	42
Reference	B3010.04.04-5
Comment	A typical blister. There are numerous blisters on R2 and some blisters on R1.

Photo No.	43
Reference	B3010.04.04-6
Comment	Wood fibreboard was wet at Roof R1 test cut.

Photo No.	44
Reference	B3010.04.04-7
Comment	Roof composition at Roof R1 test cut. 2-ply SBS membrane, wood fibreboard, expanded polystyrene insulation and vapour barrier are visible.

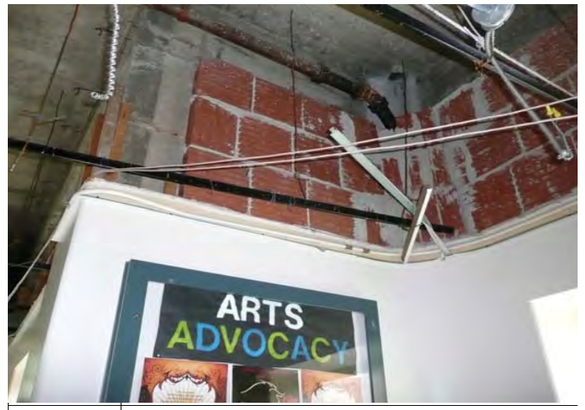


Photo No.	45
Reference	C1010.01.03
Comment	Typical partition in change room area. Plaster finish over hollow clay tile.

Photo No.	46
Reference	C1030.10
Comment	Lockers in both change rooms are realtively new

Photo No.	47
Reference	C3010.06-1
Comment	1975 ceramic tile has been patched in areas butgenerally acceptable

Photo No.	48
Reference	C3010.06-2
Comment	Original ceramic tile is old but with only a few hairline cracks in 2-3 locations.

Photo No.	49
Reference	C3020.02
Comment	1975 Ceramic mosaic tile is in marginal condition but would be replaced as paert of code upgrade under K4020.08

Photo No.	50
Reference	E2010.02
Comment	Stanless steel clad casework in good condition but sdoes not comply to current BFA standards.

Photo No.	51
Reference	F2020.01
Comment	Asbesto insulated pipe elbows and straight run chases.

Photo No.	52
Reference	F2020.02-1
Comment	High voltage transformer 6T-2D2 leaking PCBs.

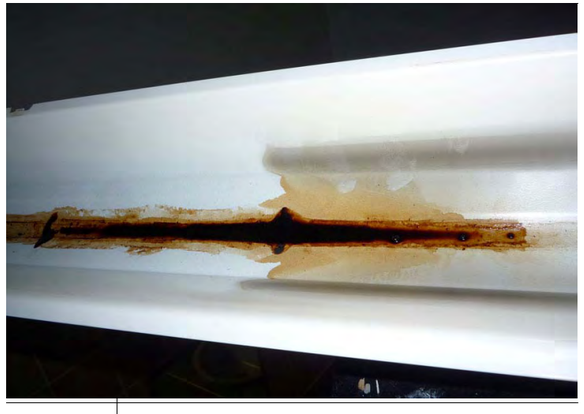


Photo No.	53
Reference	F2020.02-2
Comment	PCB leakage in light fixture. Ballast was already replaced.

Photo No.	54
Reference	F2020.04
Comment	Mould found on plaster wall.

Photo No.	55
Reference	F2020.09-1
Comment	Painted door frame with white lead-containing paint.

Photo No.	56
Reference	F2020.09-2
Comment	Plaster wall finish used throighout building with layer of white lead-containing paint.

Photo No.	57
Reference	F2020.09-3
Comment	Hazardous chemicals stored in plastic tubs.

Photo No.	58
Reference	K4020.02
Comment	Wire mesh poartition with plywood backing used to separate change rooms from adjacent school locker rooms does not comply to code. Partition should be a fire separation.

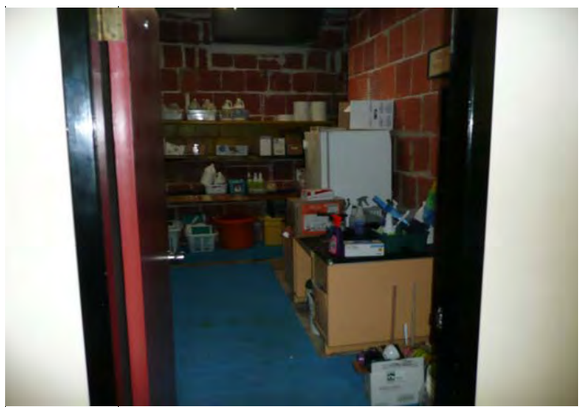


Photo No.	59
Reference	K4020.03
Comment	Partition and door around Janitor room are not fire rated. Door lacks closer.

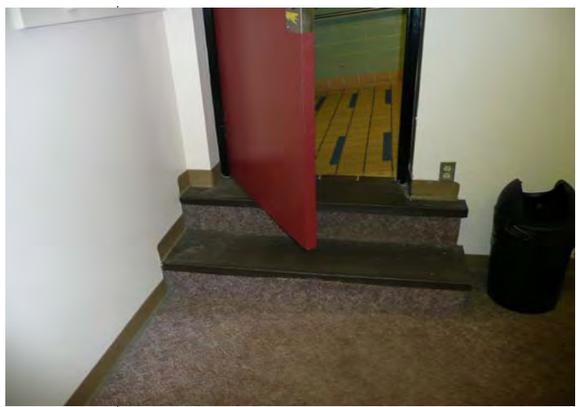


Photo No.	60
Reference	K4020.04
Comment	Door swinging over stairs does not comply to code.

Photo No.	61
Reference	K4020.07
Comment	Floor slab in change rooms is flat and staff must squezee water to floor grille at end of day. Code requires that floor slope to drain.

Photo No.	62
Reference	K4020.08
Comment	Single drain in shower rooms does not comply to code as soiled water must flow directly to a drain without others walking through it.

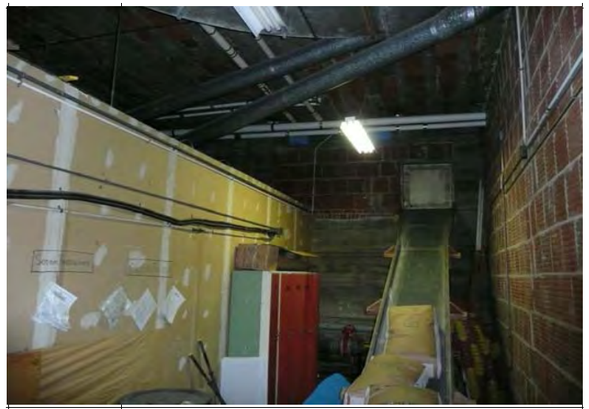


Photo No.	63
Reference	K4020.09
Comment	Chemical storage room required to be enclosed in fire separation. Partition on left is partial hieght and lacks rated ceiling.

Photo No.	64
Reference	K4020.10-3
Comment	Chlorine Storage room does not have required fire separations.

Photo No.	65
Reference	K4020.10-2
Comment	Chlorine Storage room. Unprotected steel below floor slab does not comply to code.

Photo No.	66
Reference	K4020.10-3
Comment	Chlorine Storage room. Duct without fire damper and non-rated ceiling over room.

6. BUILDING CODE ANALYSIS

Strathcona Pool is a tenant within Strathcona High School and there are several overriding issues that must be addressed as part of any code review.

First and foremost the building legally complied to the building code at the time of construction. Second, there is no compelling reason to make any upgrades to comply to current code unless it can be shown that the building is undergoing a change in use OR there is an existing unsafe condition as per the following excerpt from ABC 2006.

1.1.1.2. Application to Existing Buildings

1) *This Article applies to a building that has been legally built, occupied and used before 02 September 2007.*
2) *If a building is altered, rehabilitated, refurbished, renovated or repaired, the level of life safety and building performance shall not be decreased.*
3) *Except as specified in Part 10 of Division B, the authority having jurisdiction shall accept any construction or condition that lawfully existed in Alberta before 02 September 2007 if the construction or condition does not constitute an unsafe condition.*
4) *A change in occupancy or alteration of any building constructed before 02 September 2007 shall be permitted if the level of safety and building performance proposed are acceptable to the authority having jurisdiction.*
5) *For a building constructed before 02 September 2007, the authority having jurisdiction may accept an alternative or a proposal that achieves the appropriate level of safety for the specific activity for which the building is to be used.*
6) *The authority having jurisdiction may accept existing construction not in complete compliance with this Code, in which case it may be accepted subject to conditions.*

It is clear that neither of these two conditions are being met at Strathcona High School so there is no legal reason to upgrade to current standards. However, we would argue that it may be prudent to upgrade certain items that will increase the life safety within the school. We feel that the following issues should be addressed as part of the 25 year plan for Strathcona Pool:

- control the spread of fire within floor areas
- safeguard a means of egress from the building
- upgrade barrier free access

In assigning the timing of code upgrades, we have generally assigned items that improve the spread of fire or egress from the building as a 1-3 year event. We have assigned barrier free upgrade to the 5-10 year window but the City may want to move this up to the 1-3 year window in recognition of policies towards inclusion and barrier free design.

Also important to remember; Strathcona School may undergo a major code upgrade and be required to add sprinklers to the building. In that event, it would be necessary to add sprinklers to the swimming pool portions of the building as well since partially sprinklered buildings are no longer acceptable. All of the following code references refer to Alberta Building Code 2006. Some of the area calculation used in preparing this code review include.

- 1953 School Building floor plate (main): 8,211.25 m^2
- 1957 Swimming Pool Addition: 686.5 m^2
- Maximum floor plate (main): 8,897.75 m^2
- Swimming Pool leased area in basement of School: 648.2 m^2
- Shared access to exit: 123.2 m^2
- Area of swimming pool tank: 287.0 m^2

A3.1.2.1(1)	Occupancies	Group A2: Assembly - School Group A3: Assembly - Swimming Pool (less than 10%)		
1.1.3.2.	Building Area	main floor area (maximum floor plate) = 8,897.75 m^2		
3.2.2.24	Size and Occupancy	Group A2: 8,897.75 m^2 any size, any area, facing three streets maximum building area of 8,897.75 m^2 non-combustible construction provided sprinklers required but not provided		School issue
3.1.3.1.	Occupancy Separations	A2/A3: one hour fire separation required		5-10 year event
7.3.2.4	Occupant load	A2: school A3: pool bathing load	n/a 287/1.5 = 192	
3.2.1.4.1	Basement	Floor over basement	1 hour FS	School issue
3.2.2.24.	Fire Separations	Roof assemblies	not required	School issue
3.2.2.24.		Floor assemblies	required	School issue
3.3.1.1.3		Separation of suites	not required	1-3 year event
3.3.1.4.3		Public corridors	required	School issue
3.2.1.21.1		Janitor rooms	required	1-3 year event
3.3.1.26.1		Storage rooms	required	1-3 year event
3.4.4.1.1		Exits	required	School issue
3.6.2.1.1		Service rooms	required	1-3 year event
3.2.2.24.	Fire Resistance Ratings	Roof assemblies	not required	School issue
3.2.2.24		Floor assemblies	1 hour	School issue
3.2.2.24		Load bearing	1 hour	School issue
3.3.1.1.3		Separation of suites	1 hour	1-3 year event
3.3.1.4.3		Public corridors	45 minutes	School issue
3.3.1.21.3		Janitor Rooms	1 hour	1-3 year event
3.3.1.26.1		Storage Rooms	1 hour	1-3 year event
3.4.4.1.2		Exits	1 hour	School issue
3.6.2.1.1		Service Rooms	1 hour	1-3 year event
3.3.1.5.b	Egress doorways in suites	group A3 tenant suites larger than 150 m^2 or 15 m. travel distance require 2 exit doorways.		1-3 year event
3.3.1.7.1	Protection of floor areas in BFA	fire compartments required since building is not sprinklered		1-3 year event
3.3.1.9.1	Public Corridor Width	group A2	1100 mm min.	School issue
3.8.3.3 3.8.3.3.5	Doorways	clear width of 800 mm power door operators	complies required	5-10 year event
3.4.2.1	Number of exits	minimum 2 exits required	complies	
3.4.2.3	Distance between exits	one half maximum diagonal	complies	
3.4.2.4.2	Travel distance	40 meters measured from suite doors to exit	complies	
3.4.3.2.1	Exit capacity at main floor	doorways: 192 x 6.1 = 1171 mm corridors: 192 x 6.1 = 1171 mm	complies	School issue
3.4.3.2.8.	Exit Width	Group A2: corridor minimum	1100 mm	School issue

3.4.4.4.	Integrity of exits	service, storage, laundry and washrooms cannot open into exits		School issue
3.4.6.7. 9.8.4.1 2.2.2.4.	Treads and risers	minimum tread run = 280 variance from successive flights? risers = 125 to 180 mm	181.8 mm riser 6 mm ? 2% tolerance	
3.4.6.10	Doors to exits	cannot swing within 300 mm of riser		1-3 year event
3.8.1.2.	Entrances	BFA to 50% building entrances, suites	required	
3.8.2.1.	Areas requiring BFA path of travel	everywhere except service rooms, elevator machine room, janitor rooms	required	5-10 year event
3.8.2.3.	Washrooms required to be barrier free	public washrooms on all floors above main are BFA	required	5-10 year event
3.8.3.2.1	Exterior walks	1100 mm wide, ramp if slope greater than 1:20, curb cut	required	5-10 year event
3.8.3.3. 3.8.3.3.5	Doorways and doors	clear width of 800 mm power door operators	required required	
3.8.3.4	Ramps	slope 1:12, 870 mm clear wide, level area 1500 x 1500 every 9 meters	required	5-10 year event
3.8.3.7.	Communication systems	assistive listening devices required in assembly occupancies	required	5-10 year event
3.8.3.12	Special Washrooms	Termed universal toilet rooms in 2006 code. Uni-sex washrooms for a handicapped person and caregiver.	optional	5-10 year event
3.8.3.14	Counters	counters longer than 2000 mm require dropped section for wheel chairs	required	5-10 year event
3.8.3.15	Telephone Counters	special requirements for public telephones including shelves and TDD	optional	5-10 year event
3.8.3.16	Drinking Fountain	special fountains for BFA	optional	5-10 year event
7.2.2.6.3)	Plumbing Fixtures	Male: 192/2 = 96 Female: 192/2 = 96	4 required 4 required	5-10 year event
7.3.3.15	Swimming Pool Deck drainage	deck must slope to drain at between 1:25 and 1:50	required	5-10 year event
7.3.3.25	Change Room Floor drainage	floors in dressing rooms must slope to drain at between 1:25 and 1:50	required	5-10 year event
7.3.3.27.2)	Showers	1 shower per 50 bathers with 3 minimum	complies	
7.3.3.27.2)	Shower Floor Drainage	water in showers must drain directly to trench	required	5-10 year event
7.3.3.48	Chemical Storage	direct access to public area not permitted	required	1-3 year event
7.3.3.54	Chlorine Room	room must be separated by 1 hour FRR	required	1-3 year event
O, H and S	Fall Arrest	fall arrest anchors required for workers on the roof		School issue

In the past few decades, the sustainable design movement has emerged as a responsible method for building design. This recognition has spawned a new approach to design in which we continue to explore the possibilities of new technologies yet remain conscious of the need to create places that are climatically responsive and spaces that appeal to people combined with responsible resources and material use. The Green Buildings BC - New Buildings Program recommended in their Guide to Value Analysis and the Integrated Green Design Process that facilities are required to be more resource-efficient in their use of energy, water and materials, in addition to generating cost savings and improving the comfort of building occupants.

The goal of sustainable design is not only to be more energy efficient and to reduce associated greenhouse gas emissions, but also, it is to view development more holistically by analyzing such interconnected issues as:

- Site and building design;
- Energy and water efficiency;
- Resource-efficient construction;
- Lighting and mechanical design;
- Building ecology; and to optimize all these aspects in an integrated design.

Features that might have higher capital costs (i.e. better windows) will reduce the operating or life-cycle costs because other elements such as the heating system can be downsized or eliminated. In order to capture these multiple benefits of synergistic design elements, the building must be evaluated as a whole, not ‘value-engineered’ item by item. This approach can result in reduced capital and operating costs while at the same time meeting environmental and social goals. It can also produce a big-picture vision that goes beyond the original project scope, permitting on solution to be leveraged to create many more solutions.

A LEED checklist provides an initial assessment as to the potential for Strathcona School to become LEED Silver shadow/certified for events in the 20-25 year window. The LEED checklist is a tool to provide a comparative based assessment between the performance of the existing building and it’s improved performance after modifications. Steps taken in the 1-3 year and 5-10 year window will dramatically improve the energy performance of the building but it is unclear how a building upgraded over 25 years would be assessed in the year 2035.

7.1 Sustainable Sites (14 points)

Site Selection (1 point)

The design will avoid development of inappropriate sites to reduce the environmental impact from the location of a building on a site. The selected site is not in a prohibited area.

Alternative Transportation: Bicycle Storage & Changing Rooms (1 point)

To satisfy the requirements of the Alternative Transportation- Bicycle Storage & Changing Rooms credit, buildings must provide secure bicycle storage with convenient changing/ shower facilities for 5% or more of regular building occupants.

To satisfy the requirements of the Alternative Transportation - Parking Capacity credit size parking capacity to meet, but not exceed, minimum local zoning requirements AND provide preferred and designated parking for carpools, vanpools, or car co-ops equal to 10% of the total number of non-visitor parking spaces.

Stormwater Management: Rate and Quantity (1 point)

To meet this credit requirement, disruption and pollution of natural water flows must be limited by managing stormwater runoff. The design will control stormwater runoff from the site to municipal storm sewer systems through a number of devices such as drainage swales, porous pavers, and green roofs.

Heat Island Effect: Non-Roof; Roof (1 point)

To help reduce the heat island effect and minimize negative impacts on microclimates and habitat, a number of strategies for both roof and non-roof areas can be utilized. On roof areas, a combination of Energy Star compliant roofing material could be integrated into the design.

Light Pollution Reduction (1 point)

All interior light emitted from the building and all exterior lighting must be controlled to eliminate all vertical light distribution above 90 degree cut-off plane. Luminaries are specifically selected to meet this requirement.

7.2 Water Efficiency (5 points)

Water Efficient Landscaping - Reduce by 50%; No Potable Use or No Irrigation (2 points)

Appropriate plant selection is important in developing a water efficient, sustainable and attractive site landscaping. Drainage of water from roofs and other impervious surfaces could be collected in a cistern to avoid the use of potable water for irrigation. Further work is required to determine the volume of water required for a two-month storage of water during the growing season. The plumbing systems will address the LEEDTM Credits associated with Water Use Reduction by implementation of water conserving plumbing fixtures.

Water Use Reduction - 20% Reduction; 30% Reduction (2 points)

Water closets will be specified as dual flush, which incorporate two activation controls, one for a full flush when the circumstance requires it and the second control for a half flush for light usage generally after urination.

Urinals in the men's washrooms will be specified as water free. These urinals appear very similar to conventional wall mounted urinals and include a sanitary drain connection, however there is no water supply connection or flushing mechanism. A special fluid is maintained in the trap at the base of the fixture to seal against odors rising from the drainage piping, however the fluid permits urine to pass through without consuming the fluid itself.

Lavatories will be specified with low flow aerators and self closing valves to eliminate the faucets being left on. Sinks in coffee rooms and in similar areas will be specified with low flow aerators.

7.3 Energy & Atmosphere (17 points)

Optimize Energy Performance (3 points)

The design is required to reduce energy cost compared to the energy cost of the MNECB/CBIP or ASHRAE/IESNA 90.1-1999 reference building for energy systems regulated by these standards. Compliance shall be demonstrated by using whole building energy simulation using the same compliance path (MNEB/CBIP or ASHRAE 90.1) as was used for EAp2. The calculation of percentage energy cost reduction shall exclude "non-regulated" loads.

Ozone Protection (1 point)

The design must install base building level HVAC and refrigeration equipment that do not contain HCFCs.

7.4 Material & Resources (13 Points)

Construction Waste Management - Divert 50% From Landfill; Divert 75% From Landfill (2 points)

The design will develop and implement a waste management plan into the construction documents so that the maximum amount of waste can be diverted from landfill. It will divert construction, demolition and land clearing debris from landfill disposal. It will also redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.

Recycled Content - 7.5% (post consumer + ½ post-industrial) (1 point)

The design will use materials with recycled content such that the sum of post-consumer recycled content plus one half of the post-industrial content constitutes at least 7.5% of the total value of the materials in the project.

7.5 Indoor Environmental Quality (15 points)

Carbon Dioxide (CO2) Monitoring (1 point)

An effective Indoor Air Quality Management plan will be followed during construction phase and a two-week minimum building flush-out after construction is complete is recommended to further ensure the well-being of building occupants. This flush out period should be factored into the schedule and could be organized with the commissioning activities.

Construction IAQ Management Plan - During Construction; Testing before Occupancy (2 points)

The design will develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building

Low-Emitting Materials - Adhesives and Sealants; Paints and Coating; Carpet; Composite Wood and Laminate Adhesives (4 points)

The design must reduce the quantity of indoor air contaminants that are odorous, potentially irritating and/or harmful to the comfort and well-being of installers and occupants.

Indoor Chemical & Pollutant Source Control (1 point)

Entryway grilles, separation of chemical use areas such as photocopy or janitor rooms, and use separate plumbing systems for spaces where chemical concentrates and water are mixed will help control indoor pollution. All odorous and contaminated air from janitor rooms, washrooms, cafes, kitchenettes, photocopier rooms shall be exhausted by the air to air heat recovery exhaust unit.

Controllability of Systems - Perimeter Spaces (1 point)

For each perimeter office with operable windows, ventilation air shall be supplied through variable volume air valve and distributed to the space via displacement air terminals to maintain minimum ventilation rates. The windows shall be monitored by window sensors and shall shut down the VAV box and setback the space temperature setpoint when all associated offices windows are sensed to be opened.

Thermal Comfort - Compliance with ASHRAE 5501992; Permanent Monitoring (2 points)

The design will provide a thermally comfortable environment that supports the productivity and well-being of building occupants.

Daylight & Views - Daylight 75% of Spaces; Views 90% of Spaces (2 points)

The design will provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

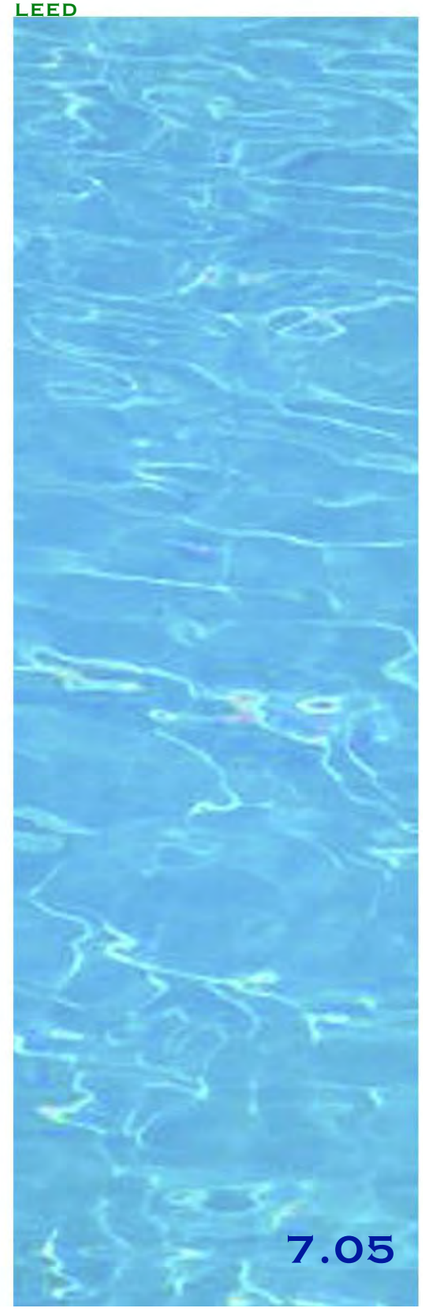
LEEDTM Accredited Professionals (1 point)

Under Innovation and Design, LEEDTM awards a credit for having 1 LEEDTM Accredited Professional on the team. Currently there are a number of LEEDTM Accredited Professionals on the team.

Obviously, the following spreadsheet is an initial assessment by a limited number of individuals. Likely that the final result will change significantly after consultations with all stakeholders.

Yes	?	No		Project Checklist: New Construction and Major Renovations		
3	**5**	**6**		**Sustainable Site**	**14 points**	
Y				Prereq 1	Erosion and Sedimentation Control	Req
Y				Prereq 2	Age of Building	Req
	?			Credit 1.1	Plan for Green Site & Building Exterior Management - 4 specific actions	1
	?			Credit 1.2	Plan for Green Site & Building Exterior Management - 8 specific action	1
		1		Credit 2	High Development Density Building & Area	1
1				Credit 3.1	Alternative Transportation - Public Transportation Access	1
1				Credit 3.2	Alternative Transportation - Bicycle Storage and Changing Rooms	1
		1		Credit 3.3	Alternative Transportation - Alternative Fuel Vehicles	1
		1		Credit 3.4	Alternative Transportation - Car Pooling & Telecommuting	1
		1		Credit 4.1	Reduced Site Disturbance - Protect and Restore Open Space (50% of site area)	1
		1		Credit 4.2	Reduced Site Disturbance - Protect and Restore Open Space (75% of site area)	1
	?			Credit 5.1	Stormwater Management - 25% Rate and Quality Reduction	1
	?			Credit 5.2	Stormwater Management - 50% Rate and Quality Reduction	1
	?			Credit 6.1	Heat Island Effect - Non-Roof	1
		1		Credit 6.2	Heat Island Effect - Roof	1
1				Credit 7	Light Pollution Reduction	1
Yes	?	No				
3	**2**	**0**		**Water Efficiency**	**5 points**	
Y				Prereq 1	**Minimum Water Efficiency**	Req
Y				Prereq 2	**Discharge Water Compliance**	Req
1				Credit 1	**Water Efficient Landscaping -** Reduce Potable Water Use by 50%	1
	?			Credit 1.2	**Water Efficient Landscaping -** Reduce Potable Water Use by 95%	1
1				Credit 2	**Innovative Wastewater Technologies**	1
1				Credit 3.1	**Water Use Reduction** - 10% Reduction	1
	?			Credit 3.2	**Water Use Reduction** - 20% Reduction	1

Yes	?	No				
8	**4**	**11**		**Energy & Atmosphere**	**17 points**	
Y				Prereq 1	**Fundamental Building Commissioning**	Req
Y				Prereq 2	**Minimum Energy Performance** - Energy Star 60	Req
Y				Prereq 3	**Ozone Protection**	Req
				Credit 1	**Optimize Energy Performance**	
1					Energy Star Rating - 63	1
1					Energy Star Rating - 67	2
1					Energy Star Rating - 71	3
1					Energy Star Rating - 75	4
	?				Energy Star Rating - 79	5
		1			Energy Star Rating - 83	6
		1			Energy Star Rating - 87	7
		1			Energy Star Rating - 91	8
		1			Energy Star Rating - 95	9
		1			Energy Star Rating - 99	10
		1		Credit 2.1	**Renewable Energy** - On-site 3% / Off-site 15%	1
		1		Credit 2.2	**Renewable Energy** - On-site 6% / Off-site 30%	1
		1		Credit 2.3	**Renewable Energy** - On-site 9% / Off-site 45%	1
		1		Credit 2.4	**Renewable Energy** - On-site 12% / Off-site 60%	1
1				Credit 3.1	**Building Operation & Maintenance** - Staff Education	1
1				Credit 3.2	**Building Operation & Maintenance -** Building Systems Maintenance	1
1				Credit 3.3	**Building Operation & Maintenance** - Building Systems Monitoring	1
1				Credit 4	**Additional Ozone Protection**	1
	?			Credit 5.1	**Performance Measurement -** Enhanced Metering (4 specific actions)	1
	?			Credit 5.2	**Performance Measurement -** Enhanced Metering (8 specific actions)	1
		1		Credit 5.3	**Performance Measurement -** Enhanced Metering (12 specific actions)	1
		1		Credit 5.4	**Performance Measurement -** Emission Reduction Reporting	1
	?			Credit 6	**Documenting Sustainable Building Cost Impacts**	1
Yes	?	No				
6	**6**	**4**		**Materials & Resources**	**14 points**	
Y				Prereq 1	**Source Reduction & Waste Management -** Water Stream Audit	Req
Y				Prereq 1.2	**Source Reduction & Waste Management** - Storage & Collection	Req
Y				Prereq 2	**Toxic Material Source Reduction** - Reduce Mercury in Light Bulbs	Req
1				Credit 1.1	**Construction, Demolition & Renovation Waste Management** - Divert 50%	1
	?			Credit 1.2	**Construction, Demolition & Renovation Waste Management** - Divert 75%	1
1				Credit 2.1	**Optimize Use of Alternative Materials** - 10% of Total Purchases	1
	?			Credit 2.2	**Optimize Use of Alternative Materials** - 20% of Total Purchases	1
	?			Credit 2.3	**Optimize Use of Alternative Materials -** 30% of Total Purchases	1
		1		Credit 2.4	**Optimize Use of Alternative Materials** - 40% of Total Purchases	1
		1		Credit 2.5	**Optimize Use of Alternative Materials** - 50% of Total Purchases	1



1				Credit 3.1	**Optimize Use of IAQ Compliant Products -** 45% of Annual Purchases	1
		1		Credit 3.2	**Optimize Use of IAQ Compliant Products -** 90% of Annual Purchases	1
1				Credit 4.1	**Sustainable Cleaning Products & Materials -** 30% of Annual Purchases	1
	?			Credit 4.2	**Sustainable Cleaning Products & Materials -** 60% of Annual Purchases	1
		1		Credit 4.3	**Sustainable Cleaning Products & Materials -** 90% of Annual Purchases	1
1				Credit 5.1	**Occupant Recycling -** Recycle 30% of the Total Waste Stream	1
	?			Credit 5.2	**Occupant Recycling -** Recycle 40% of the Total Waste Stream	1
	?			Credit 5.3	**Occupant Recycling -** Recycle 50% of the Total Waste Stream	1
1				Credit 6	**Additional Toxic Material Source Reduction -** Reduced Mercury in Light Bulbs	
Yes	?	No				
13	**5**	**3**		**Indoor Environmental Quality**	**15 points**	
Y				Prereq 1	**Outside Air Introduction & Exhaust Systems**	Req
Y				Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Req
Y				Prereq 3	**Asbestos Removal or Encapsulation**	Req
Y				Prereq 4	**PCB Removal**	Req
1				Credit 1	**Outside Air Delivery Monitoring**	1
	?			Credit 2	**Increased Ventilation**	1
1				Credit 3	**Construction IAQ Management Plan**	1
1				Credit 4.1	**Documenting Productivity Impacts -** Absenteeism & Healthcare Cost Impacts	1
	?			Credit 4.2	**Documenting Productivity Impacts** - Other Productivity Impacts	1
1				Credit 5.1	**Indoor Chemical & Pollutant Source Control -** Reduce Particulate in Air System	1
1				Credit 5.2	**Indoor Chemical & Pollutant Source Control -** Isolation of High Volume Copy/Print/Fax	1
1				Credit 6.1	**Controllability of Systems -** Lighting	
	?			Credit 6.2	**Controllability of Systems -** Temperature & Ventilation	1
1				Credit 7.1	**Thermal Comfort** - Compliance	1
	?			Credit 7.2	**Thermal Comfort -** Permanent Monitoring System	1
	?			Credit 8.1	**Daylight & Views -** Daylight for 50% of Spaces	1
		1		Credit 8.2	**Daylight & Views** - Daylight for 75% of Spaces	1
		1		Credit 8.3	**Daylight & Views** - Views for 45% of Spaces	1
		1		Credit 8.4	**Daylight & Views** - Views for 90% of Spaces	1
1				Credit 9	**Contemporary IAQ Practice**	
1				Credit 10.1	**Green Cleaning** - Entry Systems	
1				Credit 10.2	**Green Cleaning** - Isolation of Janitorial Closets	
1				Credit 10.3	**Green Cleaning** - Low Environmental Impact Cleaning Policy	
1				Credit 10.4	**Green Cleaning** - Low Environmental Impact Pest Management Policy	
1				Credit 10.5	**Green Cleaning** - Low Environmental Impact Pest management Policy	
1				Credit 10.6	**Green Cleaning** - Low Environmental Impact Cleaning Equipment Policy	
Yes	?	No				
2	**3**	**0**		**Innovation & Design Process 5 Possible Points**	**5 points**	
1				Credit 1.1	**Innovation in Upgrades, Operation & Maintenance**	1
	?			Credit 1.2	**Innovation in Upgrades, Operation & Maintenance**	1
	?			Credit 1.3	**Innovation in Upgrades, Operation & Maintenance**	1
	?			Credit 1.4	**Innovation in Upgrades, Operation & Maintenance**	1

1				Credit 2.1	**LEED Accredited Professional**	1
Yes	?	No				
35	**25**	**24**		**Project Totals 70 Possible Points (pre-certification estimate)**		
					Certified 26 - 32 points	
X					Silver 33 - 38 points	
					Gold 39 - 51 points	
					Platinum 52 - 70 points	

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Facility Condition Assessment: Hazardous Building Materials Inventory

Strathcona Pool
10450 - 72 Ave. Edmonton, Alberta

Presented to

Mr. Brandel Rock
Buildings Design and Construction Branch
Capital Construction Department
City of Edmonton

REVISION INDEX

ECOMARK Project No.: EDMON-09601-TBD-0					
A	September 30, 2009	Issue for Review	HY	BM	
Rev	**Date**	**Description**	**Prepared**	**Checked**	**Approved**

LETTER OF TRANSMITTAL

September 30, 2009 Our Project Number: EDMON-09601-TBD-0

Mr. Brandel Rock
City of Edmonton
18th Floor, 9803-102A Ave
Edmonton, AB T5J 3A3

Dear Mr. Rock:

RE: Condition Assessment - Hazardous Materials
10450 - 72 Ave., Edmonton, Alberta

We are pleased to present the above-referenced facility condition assessment report (Report) for your review. This Report summarizes the findings and results of the hazardous building materials assessment and complements the overall Uniformat Facility Condition Assessment report on the property known as 10450 - 72 Ave., Edmonton, Alberta.

The opinions expressed in this Report are solely those of Ecomark Ltd. This Report is furnished in our capacity as consultants to Mr. Rock of the City of Edmonton (Client) for the project described in this program and do not necessarily reflect the viewpoint of the Client. The Report is written for the benefit and use of the Client only and may only be relied upon by the Client in connection with the assessment project. Conditions assessed are valid to the date of assessment and are limited by the information that was shared by the third parties involved. Liability is limited to the invoiced amount for the report. While every effort was made to confirm that the data collected from third parties is factual, complete and accurate, Ecomark Ltd. makes no guaranties or warranties whatsoever with respect to such data. While strict data quality objectives were developed and met in the sampling procedure, Ecomark does not represent that the sampling and analyses reported herein are exhaustive.

Yours sincerely,

Bill Marsh, P.Eng.

Harvey Yuen, B.Com.

PROFESSIONAL ENGINEER ALBERTA WILLIAM P. MARSH

Professional Seal
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Appendix 3: Laboratory Results

1 Introduction and Background

1.1 At the request of Mr. Brandel Rock, of the City of Edmonton (Client), Ecomark Ltd. (Ecomark) was retained to conduct a hazardous building materials assessment at Strathcona Pool located at 10450 - 72 Ave., Edmonton, Alberta (Site). Ecomark conducted site visits on August 18, 2009 and August 21, 2009; the Client requested a detailed destructive sampling program to be included in a Uniformat Facility Condition Assessment report developed by a team of consultants consisting of Burgess Bredo Architect Ltd., Building Science Engineering Ltd., Vision Engineering Ltd., Water Technology Inc., Hukalo Oberg Engineering Ltd., and Ecomark Ltd. On August 24, 2009, Ecomark delivered an investigation execution plan (IEP) to the Client describing the sampling program and safety measures to be followed. Upon Client approval of the IEP, Ecomark conducted sampling at the Site on August 26 and 27, 2009 according to the procedures outlined.

2 Executive Summary

2.1 Between August 26 and 27, 2009 Ecomark assessed and sampled the Strathcona Pool site for lead, PCBs, mercury, asbestos and mould in accordance with the sampling plan prepared on August 24, 2009. Significant findings included the presence of lead paint, lead solder, various asbestos-containing materials (ACMs) and polychlorinated biphenyl (PCB)-containing light ballasts throughout the building. Ecomark's recommendations include immediate action for certain ACMs and the implementation of a comprehensive special operations and maintenance (O&M) program for managing all hazards for future occupants and facility managers (Section 5). The ACMs do not require attention until they are disturbed. The only building material requiring immediate attention is the presence of mould in the mechanical room and on the window plaster on the pool deck.

3 Findings

3.1 Lead

3.1.1 Lead hazards at Strathcona Pool were assessed by both non-destructive and destructive sampling methods. Field screening using Lead Check® swabs indicated that lead paint was not found on the exposed surface layer of paint on any of the structures. While all of the painted structures examined had a minimum of 3 layers of paint, lead paint was only detected on one of these layers. Lead Check® swabs detected lead-containing paint on the metal beam roof supports in the main pool area, on the doorframe to the lifeguard room, on the wall in the ladies change room and on the ceiling of the ramp leading down to the change rooms. Additionally, lead paint was detected on a silver painted cast iron pipe in the storage area under the pool. Lead solder was detected on pipes used in the mechanical room and on the pipes connected to the drinking water fountain on the pool deck.

3.1.2 Paint samples were collected for laboratory analysis based on the field screening results. Exova performed an acid digestion procedure, EPA procedure SW-846 and EPA 3050B (US EPA, 1996), to determine lead concentration in the layers of paint originating from the metal roof beams over the pool area. Exova reported lead concentration of 32,400 ppm present in the sample. One sample of paint was collected from a doorframe in the lifeguard room, which Exova determined to contain a lead concentration at 7420 ppm. See Table 2.0 in Appendix 1.

3.2 Asbestos

3.2.1 Asbestos-containing materials were found in two construction materials chosen for destructive sampling. Ecomark collected 12 bulk samples throughout the spaces considered as Strathcona Pool. Specifically, samples were collected from the main pool area, the lifeguard area, the ramp between the pool and the change rooms, the change rooms, the storage areas, a crawlspace, a mechanical room on the roof, and the party/staff room. Samples of insulation were not taken from the interior of cinderblocks used in the construction of the mechanical room on the roof, though it is possible this insulation is asbestos-containing. See Table 1.0 in Appendix 1.

3.2.2 The construction materials suspected to be asbestos-containing included: ceiling tiles, leveling or adhesive compound for ceramic tiles, plaster, mortar for ceramic tiles, mortar for structural clay tiles, drywall joint compound and organic felt debris near insulated pipes. Laboratory analysis indicated that no asbestos fibers were detected in these materials.

3.2.3 There is existing signage on asbestos-containing pipe elbows, pipe straight-run insulating wrap, and asbestos insulation board. Signs are posted at entrances to notify occupants of the presence of asbestos fibers. Ecomark chose not to sample these clearly marked asbestos-containing materials. These signs are posted in areas restricted to the public. Additionally, there has been previous asbestos abatement work completed in certain areas such as the boiler room and the mechanical room on the roof.

3.3 PCBs and Mercury

3.3.1 Approximately 9% of the ninety-three light ballasts counted at Strathcona Pool were visually inspected for PCBs (polychlorinated biphenyls). There were some light ballasts that Ecomark can positively confirm as PCB-containing; however there were also light ballasts that could not be positively identified as such because of the absence of labelling. Residual PCB leakage was found in the aluminum cover of some fluorescent light fixtures; the ballasts with this evidence have already been replaced but the puddle of PCBs remains in the fixture. Most older fluorescent light ballasts have small capacitors that contain high concentrations of PCBs. Nearly all ballasts manufactured before 1979 contain PCBs. All ballasts manufactured after July 1, 1978 that do not contain PCBs are required to be clearly marked "No PCBs" and ballasts marked in this way were found on Site. Unmarked ballasts or ballasts on Site without

a date code should be assumed to be PCB containing ballasts. See Table 5.0 in Appendix 1 for details.

3.3.2 There was a large black stain on a plank of wood and on the concrete wall beneath a high voltage power panel mounted in the boiler room. This stain is suspected to be PCBs. There is a transformer in the restricted access area.

3.3.3 No mercury switches or thermostats containing mercury were found on Site. Additionally, fluorescent light tubes may contain leachable mercury. Approximately one hundred and thirty-four installed fluorescent light tubes were counted at Strathcona Pool. Metal halide lighting is used in the main pool area and these bulbs are likely to contain leachable mercury.

3.4 Mould

3.4.1 From air quality samples collected and analyzed for mould, the indoor spaces of Strathcona Pool contain fewer spores relative to the control sample taken outdoors with the exception of the mechanical room. The mechanical room contained *aspergillus* spores that were not found in the outside control as well as having higher amounts of *basidiospores*, *cladosporium* and unidentified spores compared to other indoor samples. See Table 3.0 in Appendix 3 for air sampling details. In the four tape lift samples collected from suspected surfaces using Bio-Tape™, only sparse to moderate mould growth was found. The moderate mould growth was found on the plaster around a window on the pool deck. The control sample showed no growth.

3.4.2 The Delmhorst BD-2100™ moisture meter was operated in a mode appropriate to the material tested. The results ranged from a maximum of 82.4% moisture content in a ceiling tile to 20.6% in drywall at Site. A Kestrel hand-held weather meter was used in conjunction with the mould air sampler. See Table 4.0 in Appendix 1.

3.5 Other Hazardous Materials

3.5.1 A variety of chemicals were found in the mechanical rooms. These chemicals include: muriatic acid, Aquaguard 301, Silkleer Filter Aid, Lithium Shock Chlorinating Granules, Dense Soda Ash, calcium chloride, sodium thiosulphate, sodium hydroxide, ALGYSOLVE, diatomaceous earth, and refractory ceramic fiber product. They are stored on pallets and some chemicals were in plastic tubs. Chlorine gas cylinders are stored in a separate ventilated room with access only from the outdoors.

4 Analysis and Conclusions

4.1 Lead

4.1.1 There is lead in paints at Strathcona Pool in concentrations that may pose a hazard to users and poses a hazard to the public if disposed of improperly. According to Work Safe Alberta, the paint applied to metal roof beams over the pool is considered lead-containing paint as it exceeds 5000 ppm or 0.5% (2005, p. 10). It is in a red layer underneath the current white surface layer. Additionally, the lead paint found on the doorframe and on the plaster ceiling in the ramp was over 0.5% lead. This lead paint is found in a layer of white paint between layers of other colors and is inferred to be used throughout all painted interiors of Strathcona Pool. The lead paint layer cannot be separated from the older layers and newest surface layers. The boiler in the mechanical room is built in 1956 and appears to be repainted with a layer of silver paint. Field screening on the paint did not produce a positive result but there may be layers underneath that are lead-containing.

4.2 Asbestos

4.2.1 Asbestos is a hazardous building material on Site. It is present wherever pipe elbows and pipe insulation wrap is marked as asbestos containing. It is present on other materials specifically marked with spray paint and felt marker. Additionally, signage posted at the entrance of the crawlspace (drama storage) and mechanical room indicates additional materials, that may not be marked, contain asbestos. Materials indicated include: asbestos mud, foam-like insulation and any grey or blue straight-run pipe insulation wrap posing a high-risk. Cinderblocks used in the roof mechanical room may contain asbestos-containing insulation. Asbestos-containing pipe insulation was found in the roof mechanical room. There were no asbestos-containing materials found in the public spaces of the Site. It is important to note that asbestos sampling was not entirely exhaustive but was representative of the building materials on Site.

4.3 PCBs and Mercury

4.3.1 There are some light ballasts on Site containing PCBs as well as leakage of PCBs from previously removed ballasts. There is a high voltage power transformer suspected to be leaking PCBs in the boiler room. Fluorescent light tubes containing mercury are unlikely to be TCLP (Toxicity Characteristic Leaching Procedure) compliant (low-level mercury) lamps and, due to the sheer number of light tubes, they may pose a risk to the public if not disposed of properly. Additionally, the age of the metal halide bulbs and the ballasts powering them indicate the presence of mercury and PCBs, respectively.

4.4 Mould

4.4.1 Minor mould contamination has been determined as a result of the slightly elevated spore counts and additional types of mould found in the air quality samples taken from the boiler room and around windows on the pool deck. Moisture is the primary factor that leads to mould infestations in a building. Readings from the moisture meter, Kestrel, RH logging meters and visual inspection indicate moisture damage on Site.

4.5 Other Hazardous Materials

4.5.1 In all cases, safety training should be mandatory for any individual using or coming in contact with the materials listed below. Proper personal protective equipment and storage procedures should be reviewed and updated.

4.5.2 Chlorine gas is used as a disinfectant in the pool water, however, improper storage and use of chlorine gas can cause damage to the respiratory system. Consequences of exposure to chlorine gas can be as severe as death.

4.5.3 Calcium chloride is an additive in swimming pools to increase the calcium hardness values for water. If it is not used safely it is an irritant to skin and eyes, especially if skin is moist.

4.5.4 Sodium thiosulfate anhydrous is used to lower chlorine levels following super chlorination. It is an irritant to eyes, skin, mucus membranes and the respiratory track if exposed.

4.5.5 Sodium hydroxide is a caustic cleaning agent and can cause severe chemical burns or blindness.

4.5.6 Silver paint is suspected to be used on the boiler. It is heat reflective, dry heat resistant and protects against weather and moisture. If the paint is disturbed it can be an irritant to the skin, eyes and the respiratory tract.

4.5.7 ALGYSOLVE is a means to control algae in swimming waters. It is poisonous if ingested and is an irritant to the eyes, skin and respiratory tract.

4.5.8 Diatomaceous earth is used as a filtration system for the pool water. It is dangerous if inhaled, containing fibers that can irritate and damage the lungs. It is also an irritant to the skin.

4.5.9 Refractory ceramic fiber product is used for high temperature insulation. If the fibers are disturbed and inhaled they can cause severe damage to the respiratory system, especially the lungs.

4.5.10 Muriatic acid is used to balance pH and alkalinity in swimming pools. Exposure can cause burning and irritation to the skin, eyes and respiratory tract.

4.5.11 Aquaguard 301 is a liquid catalyzed sulphite oxygen scavenger designed to deoxygenate boiler feedwater to prevent corrosion within the boiler. Exposure causes irritation to the skin, eyes, mucous membranes and respiratory tract.

4.5.12 Silkleer Filter Aid is a filter aid for swimming pools. It is an upper respiratory irritant if inhaled.

4.5.13 Lithium Shock Chlorinating Granules is used as a shock treatment, superchlorinating swimming pools. It is highly corrosive to the eyes, skin, mucous membrane and respiratory tract.

4.5.14 Dense soda ash is used as a clarifier. It is an irritant to the eyes, nose, throat and skin.

5 Recommendations

5.1 There are a number of hazardous building materials on Site that require attention. A common measure to implement for all hazards is the development of a special operations and maintenance (O&M) program, which would be communicated to future users, managers and occupants of the Site. Specific recommendations follow.

5.2 Following the exposure assessment algorithm in the Alberta Asbestos Abatement Manual to determine the level of control, the action to take at Strathcona Pool is to continue control, meaning: prevent disturbance to the asbestos-containing materials and abate if possible. Removal is the recommended approach for these asbestos-containing materials and should be completed according to safe work practices in compliance with the *Alberta Asbestos Abatement Manual*.

5.3 Options for controlling asbestos contamination in the crawlspace and mechanical rooms are management (special O&M program), removal or encapsulation. Both the development of a special O&M program and encapsulation options introduce a deferred cost in which removal and proper disposal may be required in the future. Encapsulation entails a management plan be developed. Additionally, free elbow-piping and other debris resting on the ground in the crawlspace (drama storage) should be bagged and disposed of prior to the abatement of the elbows and insulating wrap. If removal or encapsulation is to be performed, Ecomark recommends corrective approach of removal. An O&M program would consist of already in-place signage, further education of maintenance workers, provision of safety for entrants and periodic inspections.

5.4 The lead paint on the metal roof beams should be chemically stripped if they are to remain part of the support structure of the building. The liquid by-products of chemical stripping must be sent to an approved facility for hazardous waste disposal and hazardous recyclables, as would any other industrial waste produced from lead abatement. Many asbestos abatement contractors also have the competencies to complete lead abatement. The lead paint on the interior plaster walls, doorframes, and window frames should be removed and TCLP testing conducted to determine their final destination.

5.5 The concern with PCB-containing light ballasts, mercury containing fluorescent light tubes and metal halide bulbs is that they will eventually need to be replaced. The leaking high voltage transformer should be repaired or replaced immediately and the PCBs disposed of properly at a hazardous waste facility. The special O&M program should contain specific instructions for the removal, storage and disposal/recycling of light ballasts, fluorescent light tubes and metal halide bulbs.

5.6 The prevention of water damage and moisture build-up is the goal for mould control and structural integrity of Strathcona Pool. The boiler room contained *aspergillus* spores that were not found in the outside control as well as having higher amounts of *basidiospores*, *cladosporium* and unidentified spores compared to other indoor samples. Further investigation is needed to identify the source and location of the mould as well as the conditions leading to the mould growth. Once located, the mould will need to be removed. Until this is completed an N95 mask should be worn for protection.

Mould was also found in moderate amounts on the plaster surrounding a window on the pool deck. This mould will need to be removed using IICRC S500 and S520 methods.

With the exception of the mechanical room and window plaster, mould is not currently an issue on Site; however, maintenance and future renovation, landscaping and designs must consider potential water damage of building materials.

5.7 In each case of the remaining hazardous materials (i.e. muriatic acid, Aquaguard 301, Sil Keer Filter Aid, Lithium Shock Chlorinating Granules, dense soda ash, chlorine gas, calcium chloride, sodium thiosulphate anhydrous, sodium hydroxide, silver paint, ALGYSOLVE, diatomaceous earth and refractory ceramic fiber products), detailed safety standards, storage, handling procedures and training, as well as personal protective equipment should be documented and training provided. As a long-term solution, alternative treatment methods should be investigated that provide a lower risk to users, staff and occupants of the Strathcona Pool.

6 References

Alberta Environment. (1996). *Alberta User Guide for Waste Managers.* Government of Alberta

Alberta Human Resources and Employment. (2006). *Alberta Asbestos Abatement Manual.* Government of Alberta.

Alberta Human Resources and Employment. (2005). *CH061 – Chemical Hazards Workplace Health and Safety Bulletin.* Government of Alberta

United States Environment Protection Agency (US EPA). 1985. *Guidance for Controlling Asbestos-Containing Materials in Buildings.*

7 Figures

Figure 1: Metal Halide light bulbs and HID ballasts. Also shown, steel beams with lead paint

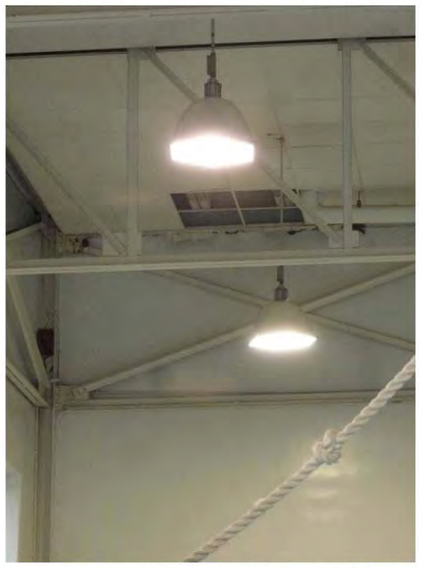

Figure 2: PCB leakage in light fixture. Ballast was already replaced

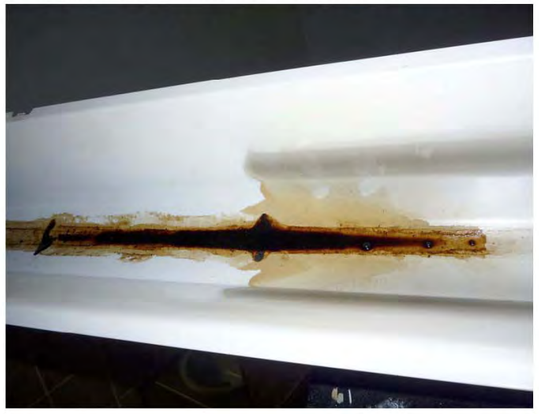

Figure 3: High voltage transformer 6T-2D2 leaking PCBs

Figure 4: Painted door frame with white lead-containing paint layer

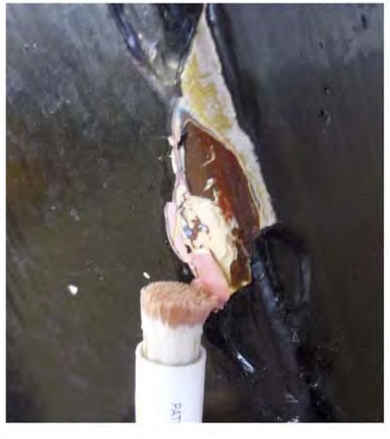

Figure 5: Plaster wall used throughout building with layer of white lead-containing paint

Figure 6: Leaded solder on copper pipes in mechanical room

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Figure 7: Air sampling for mould in mechanical room

Figure 8: Mould found on plaster wall

Figure 9: Marked asbestos insulation around duct

Figure 10: Asbestos insulated pipe elbows and straight-run chases.

Figure 11: Signage indicating asbestos fibres may be in area

Figure 12: Cinderblocks on roof mechanical room may have asbestos-containing insulation

Figure 13: Previous asbestos abatement in roof mechanical room

Figure 14: Hazardous chemicals stored in plastic tubs

Figure 15: Dense soda ash, calcium chloride, and diatomite absorbent stored on pallets

Appendix 1: Summary Tables of Sampling and Results

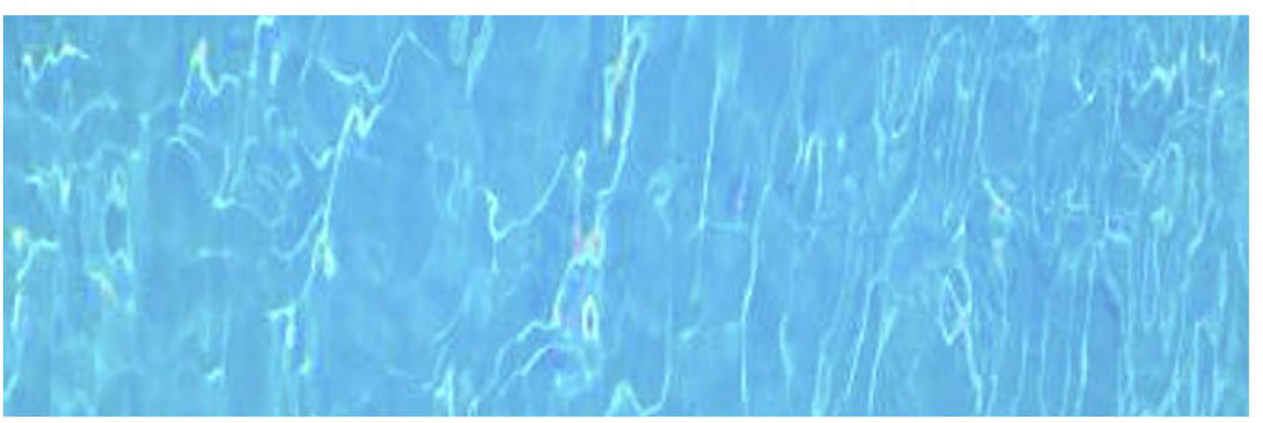
Table 1.0 Laboratory Analysis Results of the Asbestos Samples

Sample ID	ID on Site Drawing	Sample Method	Location	Comments and other fibres detected	Matrix	Asbestos fibre type	Asbestos Content (Area %)
ASB1	A1	Bulk	Main Pool Deck	Cellulose, glass fibres	Ceiling tile	None detected	0
ASB2	A2	Bulk	Main Pool Deck; Under ceramic wall tile		Levelling or adhesive compound	None detected	0
ASB3	A3	Bulk	Main Pool Deck; Window sill wall above pool		Plaster	None detected	0
ASB4	A4	Bulk	Main Pool Deck; Under west exit door floor tile		Mortar	None detected	0
ASB5	A5	Bulk	Lifeguards washroom; Under ceramic wall tile		Adhesive compound	None detected	0
ASB6	A6	Bulk	Ramp between change rooms and pool; ceiling		Plaster	None detected	0
ASB7	A7	Bulk	Change room; wall	Cellulose	Plaster	None detected	0
ASB8	A8	Bulk	Between structural hollow clay tiles used throughout building		Mortar	None detected	0
ASB9	A9	Bulk	Party room/staff rooms; wall	Cellulose	Drywall joint compound	None detected	0
ASB10	A10	Bulk	Crawlspace; floor debris near asbestos-wrapped pipes and duct	Cellulose	Organic felt	None detected	0
ASB11		Bulk	Mechanical room on roof		Insulation wrapped around large diameter pipe	Amosite	75
ASB12		Bulk	Mechanical room on roof		Insulation wrapped around small diamter pipe	Amosite	75

Strathcona Pool
Hazardous Building Materials Inventory
Appendix 1

Table 2.0 Lead Hazardous Material Assessment

ID	Room	Location	Field Screening** Result for Pb (+/-)	Phase of Positive Reaction	Lab analysis code	Total Metal in Water by ICPOES (mg/L)	Strong Acid Extractable Lead (mg/Kg)	TCLP Leachate Lead (mg/L)
Samples Screened with LeadCheck© and Confirmed with Laboratory Analysis								
L1	Main Pool Deck	Drinking water fountain	N/A	Water sample	L811568-MET-T-L-TCP-ED	<0.050	-	-
L2	Main Pool Deck	Metal Ceiling Support	Positive	Mid Layer of Red Paint	MS (Hot Block) in soil SW-846	-	32400	-
L3	Main Pool Deck	Door Frame to Lifeguard Room	Positive	Mid Layer of White Paint	699683-1 Metals ICP-MS (Hot Block) in soil SW-846	-	7420	-
Samples Screened with LeadCheck© only								
L4	Crawl Space (Drama Storage Area)	Copper Pipe leading to Water Fountain on Pool Deck	Positive	Solder on pipes				
L5	Ladies Change & Bathroom	Beside access panel	Positive	Mid Layer of White Paint				
L6	Ladies Change Room & Bathroom	Paint on changing cubicles	Negative	Paint				
L7	Ladies Change Room & Bathroom	Paint on cubicles in bathroom	Negative	Paint				
L8	Lifeguard Room	On inside of exterior door	Negative	Paint				
L9	Lifeguard Room - Bathroom	Wall above tile	Negative	Paint				
L10	Mechanical Room	Copper pipe under large tank in north end of room (near exterior exit doors)	Positive	Solder on pipes				
L11	Men's Change Room & Bathroom	Floor next to bench	Negative					
L13	Lifeguard Room	Door to Lifeguard Room	Negative	Paint				
L14	Main Pool Deck	Wall by sliding doors to patio	Negative	Paint				
L15	Main Pool Deck	Inside of exterior metal door where shallow arm and deep arm of the pool intersect	Negative					



L16	Main Pool Deck	Floor to ceiling beam that is next to vending machine	Negative	Paint
L17	Main Pool Deck	Painted pipe near entrance to the ramp	Negative	
L18	Ramp connecting change rooms and pool	On ceiling where ramp descends	Positive	Mid Layer of White Paint
L19	Storage Room off of Party Room	Piping in corner farthest from the door	Negative	Solder on pipes
L20	Crawl Space (Drama Storage Area)	Cast iron pipe, painted silver color	Positive	Paint
L21	No public access party room/staff rooms	Doors, Frames and Walls	Negative	Paint

Strathcona Pool
Hazardous Building Materials Inventory

Appendix 1

Table 3.0 Mould Assessment - Sampling Using Quick Take 15 Air Pump

		ID on Site Drawing	M1	M2	M3	M4	M5	M6	M7
		Location	Outside	Pool Deck	Lifeguard Area	Ladies Change Room	Men's Shower	Crawl Space (Drama Storage Area)	Mechanical Room
		Sampling Method	Vacuum Pump	Vacuum Pump	Vacuum Pump	Vacuum Pump	Vacuum Pump	Vacuum Pump	Vacuum Pump
		Sample ID	LB10706-1	LB10706-2	LB10706-3	LB10706-4	LB10706-5	LB10706-6	LB10706-7
		Sampled Date	8/26/09	8/26/09	8/26/09	8/26/09	8/26/09	8/26/09	8/26/09
Parameter Name	**Unit**	**Detection Limit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Physical Properties									
Relative Humidity	%		55	57	51	45	45	35	37
Ambient Temperature	degrees C		21	28	29	28	29	30	31
Total Spores/m3			8308	387	846	645	293	315	2008
Phylum or Genus									
Alternaria	Total Spores/m3	0	-	-	-	-	29	-	29
Ascospores, Undifferentiated		0	215	-	29	14	29	-	72
Aspergillus/Penicillium-like		0	-	-	-	-	-	-	502
Basidiospores, Undifferentiated		0	1860	100	258	229	100	43	244
Cercospora-like		0	72	-	-	-	-	-	-
Cladosporium		0	4440	201	459	330	358	229	360
Hyphal Fragments		0	72	-	14	-	-	14	43
Myxomycetes/Periconia/Smuts/Rusts		0	932	-		-	-	-	-
Other Unidentified Spores		0	573	43	72	43	14	29	129
Unidentified Round Dark Spores		0	72	14	-	-	43	-	-
Unidentified Round Colorless Spores		0	72	29	14	29	29	-	29

High in comparison to other indoor samples
Not present in the outdoor (control) sample

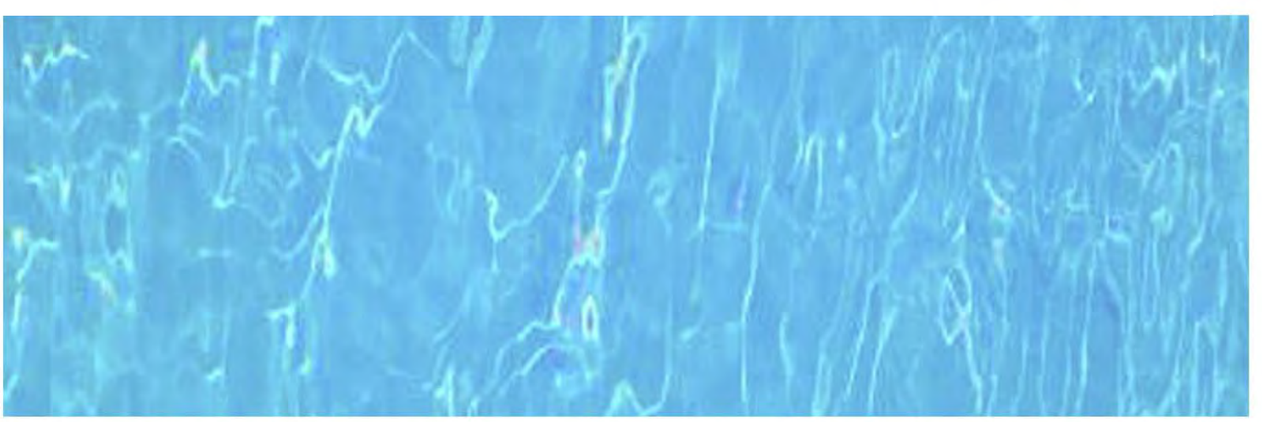


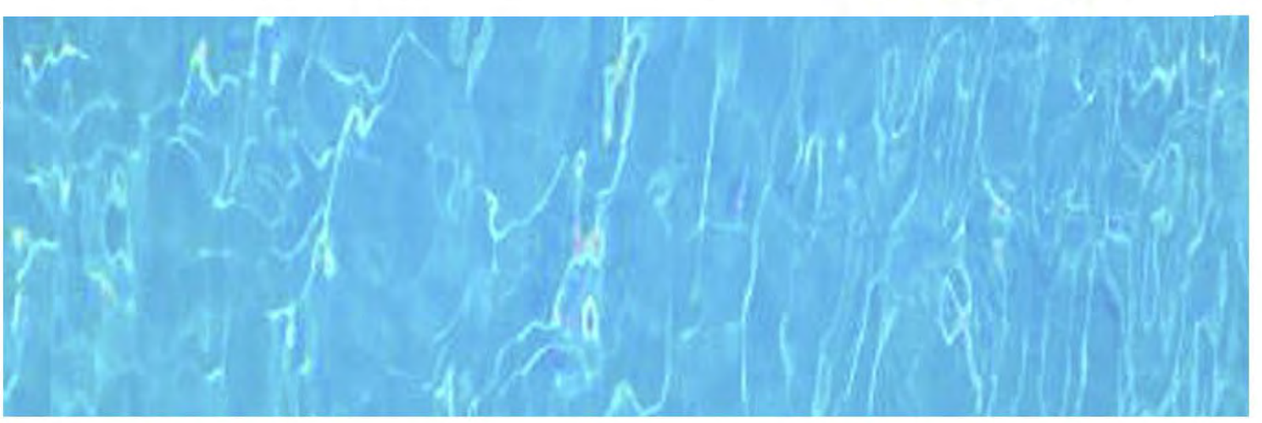
Table 4.0 Mould Assessment - Tape Lift Sampling and Moisture Reading

Location and matrix	Date Sampled	Moisture Probe Reading	Moisture Probe Mode	Relative Humidity (%)	Ambient Temperature (°C)	Observation / Comments	Mould Growth
Tile on Pool Deck - Lower Corner	27-Aug-09	82.4	#3	57	28	Sample ID Tile 1	None
Pool Deck - Plaster around window	27-Aug-09	25.6	#2	57	28	Sample ID B2	Moderate
Pool Deck - Glass on Pool window	27-Aug-09	N/A	N/A	57	28	Sample ID B3	Sparse
Pool Deck - Side of Candy Machine (Control)	27-Aug-09	N/A	N/A	57	28	Sample ID B4	None
Under shelves in coal chute room	27-Aug-09	20.6	#1	37	31	Sample ID B5	Sparse

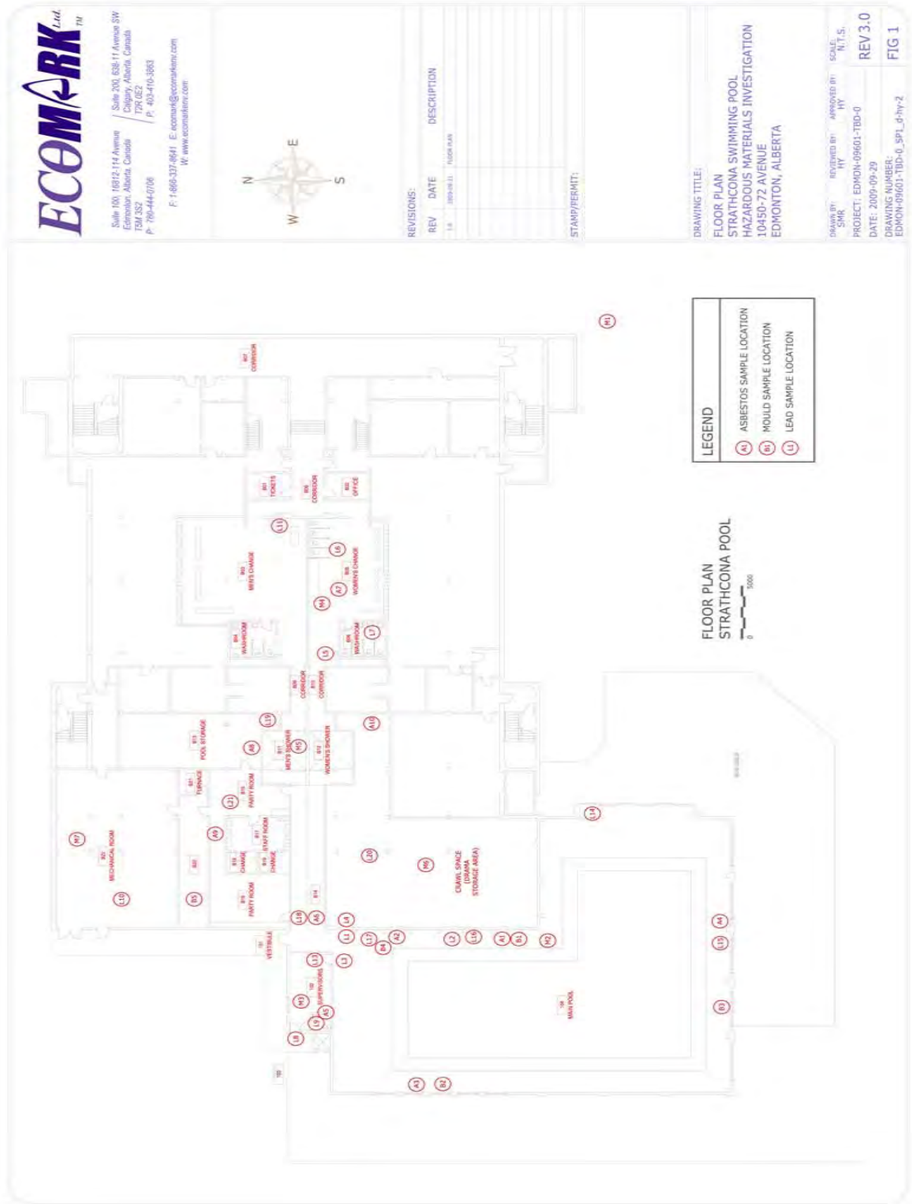
Strathcona Pool
Hazardous Building Materials Inventory
Appendix 1

Table 5.0 PCB, and Mercury Hazardous Material Assessment

	PCBs in Lighting					Mercury
Location	Light tube count*	Total ballast count	# of ballasts inspected	PCB status of ballasts	Comments	Items of concern
Change rooms and showers	58	29	6	Mixture of Possible, No PCBs, and PCB containing	There was residual PCB leakage on the aluminum cover of some fixtures	Fluorescent light tubes
Ramp between change rooms and pool	10	5	1	No PCBs	There was residual PCB leakage on the aluminum cover of the inspected fixture	Fluorescent light tubes
Lifeguards room	6	3	1	No PCBs		Fluorescent light tubes
Main pool deck		18	0	Unknown	HID lamps were out of reach; ballasts were not checked	Metal halide bulbs
No public access party room/staff rooms, mechanical rooms and crawlspace	76	38	0	Unknown	Assume there are a mix of ballasts and probable residual PCB leakage	Fluorescent light tubes
Plank of wood on wall beneath high voltage power transformer (6T-2D2)				Probable PCBs	See Figure 3 in report	



Appendix 2: Site Drawings and Sampling Locations



Appendix 3: Laboratory Results

Waltech Associates Inc
SAFETY MANAGEMENT AND ANALYTICAL SERVICES
603, Burgess Close, Edmonton, AB T6R 1Z7
Phone: (780) 434-9784 Fax: (780) 439-4434
email:waltech@shaw.ca

ANALYSIS REPORT

Analysis Requested: ASBESTOS IDENTIFICATION

Requested by: Ecomark Ltd **#100,14964-121A Ave** **Edmonton, AB** **T5V 1A3** **Attn: Ann Laing**	**Date received:** August 27, 2009 **Sample Type:** Bulk **No. of samples: 10** **Worksite/ Job #: EDMON-09601-TBD** **Date completed:** Sept 1, 2009

ANALYSIS RESULTS

Our File #	Ref#	Description	Asbestos type and percent	Other fibres detected
		Main Pool Deck:		
09AI3194	1	Ceiling tile	NONE DETECTED	Cellulose, glass fibres
09AI3195	2	Under wall tile	NONE DETECTED	None
09AI3196	3	Window sill above pool – plaster	NONE DETECTED	None
09AI3197	4	Under W. exit door – floor tile, mortar	NONE DETECTED	None
		Lifeguards bathroom:		
09AI3198	5	Tile adhesive from wall	NONE DETECTED	None
		Ceiling on ramp:		
09AI3199	6	Plaster	NONE DETECTED	None
		Change room:		
09AI3200	7	Wall plaster	NONE DETECTED	Cellulose
		Between clay tiles for structure:		
09AI3201	8	Mortar	NONE DETECTED	None
		Party room/Mechanical room:		
09AI3202	9	DWJC	NONE DETECTED	Cellulose
		Crawlspace:		
09AI3203	10	Organic felt	NONE DETECTED	Cellulose

COMMENTS:

ANALYTICAL PARAMETERS:
Method used: NIOSH Method 9002 (4th Edition)
Methodology: Polarized Light Microscope (PLM)

Analysis Performed by: Irene Z. Walewski, B. Sc. Chem

Waltech Associates Inc
SAFETY MANAGEMENT AND ANALYTICAL SERVICES
603, Burgess Close, Edmonton, AB T6R 1Z7
Phone: (780) 434-9784 Fax: (780) 439-4434
email:waltech@shaw.ca

ANALYSIS REPORT

Analysis Requested: ASBESTOS IDENTIFICATION

Requested by: Ecomark Ltd **#100,14964-121A Ave** **Edmonton, AB** **T5V 1A3** **Attn: Harvey Yuen**	**Date received:** September 28, 2009 **Sample Type:** Bulk **No. of samples: 2** **Worksite/ Job #: EDMON-09601** **Date completed:** September 30, 2009

ANALYSIS RESULTS

Our File #	Ref#	Description	Asbestos type and percent	Other fibres detected
		Scona Maintenance Room on Roof		
09AI3495	ASB01	Maintenance Room Large Dia.	**AMOSITE 75%**	None
09AI3496	ASB02	Maintenance Room Pipe Small Dia.	**AMOSITE 75%**	None

COMMENTS:

ANALYTICAL PARAMETERS:
Method used: NIOSH Method 9002 (4th Edition)
Methodology: Polarized Light Microscope (PLM)

Analysis Performed for: Irene Z. Walewski, B. Sc. Chem

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

ALS

Certificate of Analysis

CASH CLIENTS - WINNIPEG
ATTN: ANN LAING
ECOMARK LTD
EDMONTON MB T5M 3S2

Report Date: 31-AUG-09 14:23 (MT)
Version: FINAL

Lab Work Order #: L810706 **Date Received:** 26-AUG-09

Project P.O. #:
Job Reference: EDMON-09601
Legal Site Desc:
CofC Numbers:
Other Information:

Comments:

B. Glowacka
BOZENA GLOWACKA
Account Manager

Manitoba Technology Centre Ltd.
Part of the **ALS Laboratory Group**
1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4
Phone: +1 204 255 9720 Fax: +1 204 255 9721 www.alsglobal.com
A Campbell Brothers Limited Company

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

ECOMARK LTD
ATTN: ANN LAING
#100, 16812 - 114 AVE
EDMONTON AB T5M 3S2

Report Date: 01-SEP-09 16:08 (MT)
Version: FINAL

Lab Work Order #: L811568 **Date Received:** 27-AUG-09

Project P.O. #:
Job Reference:
Legal Site Desc:
CofC Numbers: 09-010523
Other Information:

Comments:

SHANNON LUCHKA
Account Manager

ALS Canada Ltd.
Part of the **ALS Laboratory Group**
9936-67 Avenue, Edmonton, AB T6E 0P5
Phone: +1 780 413 5227 Fax: +1 780 437 2311 www.alsglobal.com
A Campbell Brothers Limited Company

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L811568-1 SCONA WATER FOUNTAIN Sampled By: NOT PROVIDED on 27-AUG-09 @ 17:00 Matrix: WATER							
Single Metal in Water by ICPOES (Total)							
Total Metals in Water by ICPOES (Low)							
Lead (Pb)-Total	<0.050		0.050	mg/L		31-AUG-09	R926604

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-T-L-ICP-ED	Water	Total Metals in Water by ICPOES (Low)	APHA 3120 B-ICP-OES

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer

Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA

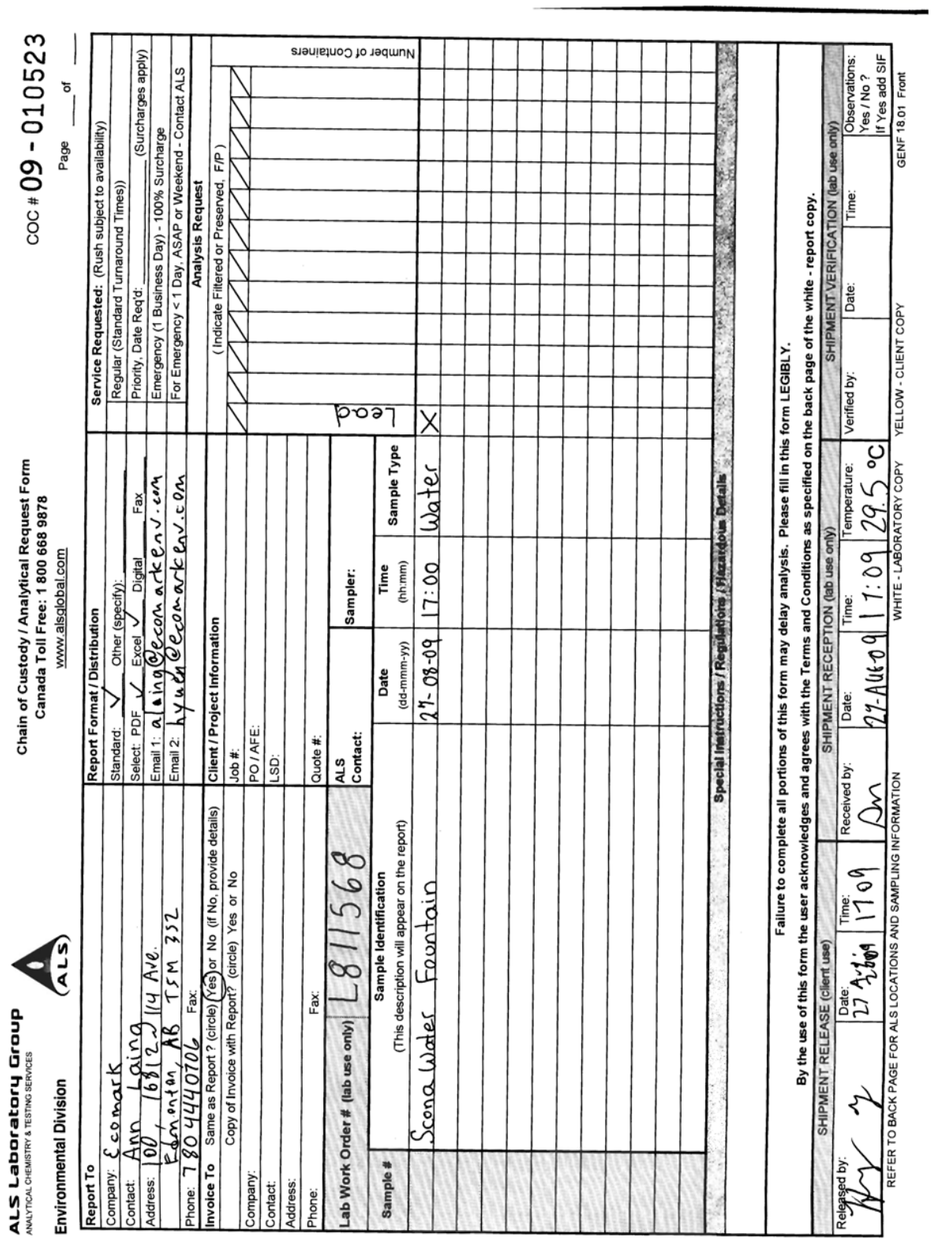
Chain of Custody Numbers:

09-010523

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmer applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mk/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # 09 - 010523
Page ___ of ___

Report To
Company: Ecomark
Contact: Ann Laing
Address: 100, 16812 114 Ave. Edmonton, AB T5M 3Z2
Phone: 7804440706 Fax:
Invoice To Same as Report ? (circle) (Yes) or No (if No, provide details)
Copy of Invoice with Report? (circle) Yes or No
Company:
Contact:
Address:
Phone: Fax:
Lab Work Order # (lab use only) L811568

Report Format / Distribution
Standard: ✓ Other (specify):
Select: PDF ✓ Excel ✓ Digital Fax
Email 1: alaing@ecomarkenv.com
Email 2: kyuen@ecomarkenv.com

Client / Project Information
Job #:
PO / AFE:
LSD:
Quote #:
ALS Contact: Sampler:

Service Requested: (Rush subject to availability)
Regular (Standard Turnaround Times))
Priority, Date Req'd: (Surcharges apply)
Emergency (1 Business Day) - 100% Surcharge
For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request
(Indicate Filtered or Preserved, F/P)
Number of Containers
Lead X

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type
	Scona Water Fountain	27-08-09	17:00	Water

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT VERIFICATION (lab use only)
Verified by: Date: Time: Observations: Yes / No ? If Yes add SIF

SHIPMENT RELEASE (client use)
Released by: Date: Time:

SHIPMENT RECEPTION (lab use only)
Received by: Date: 27 Aug 09 Time: 11:09 Temperature: 29.5 °C

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

GENF 18.01 Front

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L810706-1 OUTSIDE BY POOL ENTRANCE							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Acremonium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Alternaria	Not Detected		0	Count/m3		31-AUG-09	R925518
Arthrinium	Not Detected		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	200		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	15		0	Count		31-AUG-09	R925518
Aspergillus/Penicillium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	1730		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	130		0	Count		31-AUG-09	R925518
Bipolaris/Drechslera/Helminthosporium	Not Detected		0	Count/m3		31-AUG-09	R925518
Botrytis	Not Detected		0	Count/m3		31-AUG-09	R925518
Cercospora-like	67		0	Count/m3		31-AUG-09	R925518
Cercospora-like	5		0	Count		31-AUG-09	R925518
Chaetomium	Not Detected		0	Count/m3		31-AUG-09	R925518
Cladosporium	4130		0	Count/m3		31-AUG-09	R925518
Cladosporium	310		0	Count		31-AUG-09	R925518
Curvularia	Not Detected		0	Count/m3		31-AUG-09	R925518
Epicoccum	Not Detected		0	Count/m3		31-AUG-09	R925518
Fusarium	Not Detected		0	Count/m3		31-AUG-09	R925518
Trichothecium	Not Detected		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	67		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	5		0	Count		31-AUG-09	R925518
Myxomycetes/Periconia/Smuts/Rusts	867		0	Count/m3		31-AUG-09	R925518
Myxomycetes/Periconia/Smuts/Rusts	65		0	Count		31-AUG-09	R925518
Nigrospora	Not Detected		0	Count/m3		31-AUG-09	R925518
Pithomyces/Stamphylium/Ulocladium	Not Detected		0	Count/m3		31-AUG-09	R925518
Scopulariopsis	Not Detected		0	Count/m3		31-AUG-09	R925518
Stachybotrys	Not Detected		0	Count/m3		31-AUG-09	R925518
Tetraploa	Not Detected		0	Count/m3		31-AUG-09	R925518
Torula	Not Detected		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	533		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	40		0	Count		31-AUG-09	R925518
Unidentified Round Dark Spores	67		0	Count/m3		31-AUG-09	R925518
Unidentified Round Dark Spores	5		0	Count		31-AUG-09	R925518
Unidentified Round Colorless Spores	67		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	5		0	Count		31-AUG-09	R925518
Dust Mites/Insect Parts	Not Detected		0	Count/m3		31-AUG-09	R925518
Background(Heavy,Moderate,Light,None)	Light					31-AUG-09	R925518
Sample Volume	0.075			m3		31-AUG-09	R925518
L810706-2 MAIN POOL DECK INNER ELBOW OF L							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Acremonium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Alternaria	Not Detected		0	Count/m3		31-AUG-09	R925518
Arthrinium	Not Detected		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	Not Detected		0	Count/m3		31-AUG-09	R925518
Aspergillus/Penicillium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	93		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	7		0	Count		31-AUG-09	R925518

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L810706-2 MAIN POOL DECK INNER ELBOW OF L							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Bipolaris/Drechslera/Helminthosporium	Not Detected		0	Count/m3		31-AUG-09	R925518
Botrytis	Not Detected		0	Count/m3		31-AUG-09	R925518
Cercospora-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Chaetomium	Not Detected		0	Count/m3		31-AUG-09	R925518
Cladosporium	187		0	Count/m3		31-AUG-09	R925518
Cladosporium	14		0	Count		31-AUG-09	R925518
Curvularia	Not Detected		0	Count/m3		31-AUG-09	R925518
Epicoccum	Not Detected		0	Count/m3		31-AUG-09	R925518
Fusarium	Not Detected		0	Count/m3		31-AUG-09	R925518
Trichothecium	Not Detected		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	Not Detected		0	Count/m3		31-AUG-09	R925518
Myxomycetes/Periconia/Smuts/Rusts	Not Detected		0	Count/m3		31-AUG-09	R925518
Nigrospora	Not Detected		0	Count/m3		31-AUG-09	R925518
Pithomyces/Stamphylium/Ulocladium	Not Detected		0	Count/m3		31-AUG-09	R925518
Scopulariopsis	Not Detected		0	Count/m3		31-AUG-09	R925518
Stachybotrys	Not Detected		0	Count/m3		31-AUG-09	R925518
Tetraploa	Not Detected		0	Count/m3		31-AUG-09	R925518
Torula	Not Detected		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	40		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	3		0	Count		31-AUG-09	R925518
Unidentified Round Dark Spores	13		0	Count/m3		31-AUG-09	R925518
Unidentified Round Dark Spores	1		0	Count		31-AUG-09	R925518
Unidentified Round Colorless Spores	27		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	2		0	Count		31-AUG-09	R925518
Dust Mites/Insect Parts	Not Detected		0	Count/m3		31-AUG-09	R925518
Background(Heavy,Moderate,Light,None)	Light					31-AUG-09	R925518
Sample Volume	0.075			m3		31-AUG-09	R925518
L810706-3 LIFEGUARD AREA							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Acremonium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Alternaria	Not Detected		0	Count/m3		31-AUG-09	R925518
Arthrinium	Not Detected		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	27		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	2		0	Count		31-AUG-09	R925518
Aspergillus/Penicillium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	240		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	18		0	Count		31-AUG-09	R925518
Bipolaris/Drechslera/Helminthosporium	Not Detected		0	Count/m3		31-AUG-09	R925518
Botrytis	Not Detected		0	Count/m3		31-AUG-09	R925518
Cercospora-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Chaetomium	Not Detected		0	Count/m3		31-AUG-09	R925518
Cladosporium	427		0	Count/m3		31-AUG-09	R925518
Cladosporium	32		0	Count		31-AUG-09	R925518
Curvularia	Not Detected		0	Count/m3		31-AUG-09	R925518
Epicoccum	Not Detected		0	Count/m3		31-AUG-09	R925518
Fusarium	Not Detected		0	Count/m3		31-AUG-09	R925518
Trichothecium	Not Detected		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	13		0	Count/m3		31-AUG-09	R925518

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L810706-3 LIFEGUARD AREA							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Hyphal Fragments	1		0	Count		31-AUG-09	R925518
Myxomycetes/Periconia/Smuts/Rusts	Not Detected		0	Count/m3		31-AUG-09	R925518
Nigrospora	Not Detected		0	Count/m3		31-AUG-09	R925518
Pithomyces/Stamphylium/Ulocladium	Not Detected		0	Count/m3		31-AUG-09	R925518
Scopulariopsis	Not Detected		0	Count/m3		31-AUG-09	R925518
Stachybotrys	Not Detected		0	Count/m3		31-AUG-09	R925518
Tetraploa	Not Detected		0	Count/m3		31-AUG-09	R925518
Torula	Not Detected		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	67		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	5		0	Count		31-AUG-09	R925518
Unidentified Round Dark Spores	Not Detected		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	13		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	1		0	Count		31-AUG-09	R925518
Dust Mites/Insect Parts	Not Detected		0	Count/m3		31-AUG-09	R925518
Background(Heavy,Moderate,Light,None)	Light					31-AUG-09	R925518
Sample Volume	0.075			m3		31-AUG-09	R925518
L810706-4 WOMEN'S CHANGE ROOM							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Acremonium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Alternaria	Not Detected		0	Count/m3		31-AUG-09	R925518
Arthrinium	Not Detected		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	13		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	1		0	Count		31-AUG-09	R925518
Aspergillus/Penicillium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	213		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	16		0	Count		31-AUG-09	R925518
Bipolaris/Drechslera/Helminthosporium	Not Detected		0	Count/m3		31-AUG-09	R925518
Botrytis	Not Detected		0	Count/m3		31-AUG-09	R925518
Cercospora-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Chaetomium	Not Detected		0	Count/m3		31-AUG-09	R925518
Cladosporium	307		0	Count/m3		31-AUG-09	R925518
Cladosporium	23		0	Count		31-AUG-09	R925518
Curvularia	Not Detected		0	Count/m3		31-AUG-09	R925518
Epicoccum	Not Detected		0	Count/m3		31-AUG-09	R925518
Fusarium	Not Detected		0	Count/m3		31-AUG-09	R925518
Trichothecium	Not Detected		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	Not Detected		0	Count/m3		31-AUG-09	R925518
Myxomycetes/Periconia/Smuts/Rusts	Not Detected		0	Count/m3		31-AUG-09	R925518
Nigrospora	Not Detected		0	Count/m3		31-AUG-09	R925518
Pithomyces/Stamphylium/Ulocladium	Not Detected		0	Count/m3		31-AUG-09	R925518
Scopulariopsis	Not Detected		0	Count/m3		31-AUG-09	R925518
Stachybotrys	Not Detected		0	Count/m3		31-AUG-09	R925518
Tetraploa	Not Detected		0	Count/m3		31-AUG-09	R925518
Torula	Not Detected		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	40		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	3		0	Count		31-AUG-09	R925518
Unidentified Round Dark Spores	Not Detected		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	27		0	Count/m3		31-AUG-09	R925518

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L810706-4 WOMEN'S CHANGE ROOM							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Unidentified Round Colorless Spores	2		0	Count		31-AUG-09	R925518
Dust Mites/Insect Parts	Not Detected		0	Count/m3		31-AUG-09	R925518
Background(Heavy,Moderate,Light,None)	Light					31-AUG-09	R925518
Sample Volume	0.075			m3		31-AUG-09	R925518
L810706-5 MEN'S CHANGE SHOWER							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Acremonium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Alternaria	27		0	Count/m3		31-AUG-09	R925518
Alternaria	2		0	Count		31-AUG-09	R925518
Arthrinium	Not Detected		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	27		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	2		0	Count		31-AUG-09	R925518
Aspergillus/Penicillium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	93		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	7		0	Count		31-AUG-09	R925518
Bipolaris/Drechslera/Helminthosporium	Not Detected		0	Count/m3		31-AUG-09	R925518
Botrytis	Not Detected		0	Count/m3		31-AUG-09	R925518
Cercospora-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Chaetomium	Not Detected		0	Count/m3		31-AUG-09	R925518
Cladosporium	333		0	Count/m3		31-AUG-09	R925518
Cladosporium	25		0	Count		31-AUG-09	R925518
Curvularia	Not Detected		0	Count/m3		31-AUG-09	R925518
Epicoccum	Not Detected		0	Count/m3		31-AUG-09	R925518
Fusarium	Not Detected		0	Count/m3		31-AUG-09	R925518
Trichothecium	Not Detected		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	Not Detected		0	Count/m3		31-AUG-09	R925518
Myxomycetes/Periconia/Smuts/Rusts	Not Detected		0	Count/m3		31-AUG-09	R925518
Nigrospora	Not Detected		0	Count/m3		31-AUG-09	R925518
Pithomyces/Stamphylium/Ulocladium	Not Detected		0	Count/m3		31-AUG-09	R925518
Scopulariopsis	Not Detected		0	Count/m3		31-AUG-09	R925518
Stachybotrys	Not Detected		0	Count/m3		31-AUG-09	R925518
Tetraploa	Not Detected		0	Count/m3		31-AUG-09	R925518
Torula	Not Detected		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	13		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	1		0	Count		31-AUG-09	R925518
Unidentified Round Dark Spores	40		0	Count/m3		31-AUG-09	R925518
Unidentified Round Dark Spores	3		0	Count		31-AUG-09	R925518
Unidentified Round Colorless Spores	27		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	2		0	Count		31-AUG-09	R925518
Dust Mites/Insect Parts	Not Detected		0	Count/m3		31-AUG-09	R925518
Background(Heavy,Moderate,Light,None)	Light					31-AUG-09	R925518
Sample Volume	0.075			m3		31-AUG-09	R925518
L810706-6 CRAWLSPACE (DRAMA STORAGE AREA)							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Acremonium-like	Not Detected		0	Count/m3		31-AUG-09	R925518

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

EDMON-09601 L810706 CONTD....
PAGE 6 of 8

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L810706-6 CRAWLSPACE (DRAMA STORAGE AREA)							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Alternaria	Not Detected		0	Count/m3		31-AUG-09	R925518
Arthrinium	Not Detected		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	Not Detected		0	Count/m3		31-AUG-09	R925518
Aspergillus/Penicillium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	40		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	3		0	Count		31-AUG-09	R925518
Bipolaris/Drechslera/Helminthosporium	Not Detected		0	Count/m3		31-AUG-09	R925518
Botrytis	Not Detected		0	Count/m3		31-AUG-09	R925518
Cercospora-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Chaetomium	Not Detected		0	Count/m3		31-AUG-09	R925518
Cladosporium	213		0	Count/m3		31-AUG-09	R925518
Cladosporium	16		0	Count		31-AUG-09	R925518
Curvularia	Not Detected		0	Count/m3		31-AUG-09	R925518
Epicoccum	Not Detected		0	Count/m3		31-AUG-09	R925518
Fusarium	Not Detected		0	Count/m3		31-AUG-09	R925518
Trichothecium	Not Detected		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	13		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	1		0	Count		31-AUG-09	R925518
Myxomycetes/Periconia/Smuts/Rusts	Not Detected		0	Count/m3		31-AUG-09	R925518
Nigrospora	Not Detected		0	Count/m3		31-AUG-09	R925518
Pithomyces/Stamphylium/Ulocladium	Not Detected		0	Count/m3		31-AUG-09	R925518
Scopulariopsis	Not Detected		0	Count/m3		31-AUG-09	R925518
Stachybotrys	Not Detected		0	Count/m3		31-AUG-09	R925518
Tetraploa	Not Detected		0	Count/m3		31-AUG-09	R925518
Torula	Not Detected		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	27		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	2		0	Count		31-AUG-09	R925518
Unidentified Round Dark Spores	Not Detected		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	Not Detected		0	Count/m3		31-AUG-09	R925518
Dust Mites/Insect Parts	Not Detected		0	Count/m3		31-AUG-09	R925518
Background(Heavy,Moderate,Light,None)	Light					31-AUG-09	R925518
Sample Volume	0.075			m3		31-AUG-09	R925518
L810706-7 MECHANICAL/BOILER ROOM							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Acremonium-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Alternaria	27		0	Count/m3		31-AUG-09	R925518
Alternaria	2		0	Count		31-AUG-09	R925518
Arthrinium	Not Detected		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	67		0	Count/m3		31-AUG-09	R925518
Ascospores, undifferentiated	5		0	Count		31-AUG-09	R925518
Aspergillus/Penicillium-like	467		0	Count/m3		31-AUG-09	R925518
Aspergillus/Penicillium-like	35		0	Count		31-AUG-09	R925518
Basidiospores, undifferentiated	227		0	Count/m3		31-AUG-09	R925518
Basidiospores, undifferentiated	17		0	Count		31-AUG-09	R925518
Bipolaris/Drechslera/Helminthosporium	Not Detected		0	Count/m3		31-AUG-09	R925518
Botrytis	Not Detected		0	Count/m3		31-AUG-09	R925518
Cercospora-like	Not Detected		0	Count/m3		31-AUG-09	R925518
Chaetomium	Not Detected		0	Count/m3		31-AUG-09	R925518

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

EDMON-09601 L810706 CONTD....
PAGE 7 of 8

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L810706-7 MECHANICAL/BOILER ROOM							
Sampled By: CM/HY on 26-AUG-09 @ 11:00							
Matrix: AIR O CELL							
Spore Trap							
Cladosporium	893		0	Count/m3		31-AUG-09	R925518
Cladosporium	67		0	Count		31-AUG-09	R925518
Curvularia	Not Detected		0	Count/m3		31-AUG-09	R925518
Epicoccum	Not Detected		0	Count/m3		31-AUG-09	R925518
Fusarium	Not Detected		0	Count/m3		31-AUG-09	R925518
Trichothecium	Not Detected		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	40		0	Count/m3		31-AUG-09	R925518
Hyphal Fragments	3		0	Count		31-AUG-09	R925518
Myxomycetes/Periconia/Smuts/Rusts	Not Detected		0	Count/m3		31-AUG-09	R925518
Nigrospora	Not Detected		0	Count/m3		31-AUG-09	R925518
Pithomyces/Stamphylium/Ulocladium	Not Detected		0	Count/m3		31-AUG-09	R925518
Scopulariopsis	Not Detected		0	Count/m3		31-AUG-09	R925518
Stachybotrys	Not Detected		0	Count/m3		31-AUG-09	R925518
Tetraploa	Not Detected		0	Count/m3		31-AUG-09	R925518
Torula	Not Detected		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	120		0	Count/m3		31-AUG-09	R925518
Other Unidentified Spores	9		0	Count		31-AUG-09	R925518
Unidentified Round Dark Spores	Not Detected		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	27		0	Count/m3		31-AUG-09	R925518
Unidentified Round Colorless Spores	2		0	Count		31-AUG-09	R925518
Dust Mites/Insect Parts	Not Detected		0	Count/m3		31-AUG-09	R925518
Background(Heavy,Moderate,Light,None)	Light					31-AUG-09	R925518
Sample Volume	0.075			m3		31-AUG-09	R925518

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

EDMON-09601

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmer. applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mk/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

emcscientific INCORPORATED

Laboratory Analysis Report

To:

Anne Laing
Ecomark Ltd.
#100, 16812-114 Avenue
Edmonton, Alberta
T5M 3S2

EMC LAB REPORT NUMBER: 23020
Job/Project Name: Edmon-09601
Job/Project No: **No. of Samples:** 5
Sample Type: Tape Lift **Date Received:** Aug 31/09
Analysis Method(s): Direct Microscopic Examination
Date Analyzed: Sep 4/09 **Date Reported:** Sep 4/09
Analyst: Fajun Chen, Ph.D., *Principal Mycologist*

Client's Sample ID	Lab Sample No.	Date Sampled	Description/Location	Mould Identified, in Rank Order	Mould Growth
Tile 1	123963	Aug 27/09	Tile on pool deck – lower corner	Fungal hyphal fragments (a few)	None
B2	123964	Aug 27/09	Plaster around window	*Aspergillus* *Cladosporium* (a few spores)	Moderate
B3	123965	Aug 27/09	Glass on pool window	Fungal hyphae	Sparse
B4	123966	Aug 27/09	Side of candy machine	*Aspergillus/Penicillium* (a few spores) *Cladosporium* (a few spores)	None
B5	123967	Aug 27/09	Under shelves in coal shute room	*Cladosporium* *Aspergillus/Penicillium* (a few spores) Smut-like (a few spores)	Sparse

Note:
1. Mould growth is subjectively assessed with description terms sparse, moderate and abundant.
2. The presence of spores (lacking other fungal structures associated) is assessed as following: a few spores (< 10 spores average per microscopic field at 400X), some spores (10-100 spores average per microscopic field at 400X), many spores (>100 spores average per microscopic field at 400X).
3. The presence of a few spores generally represents settled spores on the surface of the sample rather than indicating mould growth.
4. The results are only related to the samples analyzed.

EMC Scientific Inc. 5800 Ambler Drive • Suite 100 • Mississauga • Ontario • L4W 4J4 • T: 905 629 9247 • F: 905 629 2607
AIHA EMPAT Participant (Lab ID# 174080)

Burgess Bredo ARCHITECT LTD.

THE CITY OF Edmonton CAPITAL CONSTRUCTION

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # 09-002906 Page ___ of ___

Report To	**Report Format / Distribution**
Company: Ecomark Ltd.	Standard: Other (specify):
Contact: Ann Laing	Select: PDF ✓ Excel ✓ Digital Fax
Address: 100, 16812 - 114 Ave. Edmonton, AB T5M 3S2	Email 1: alaing@ecomarkenv.com
Phone: 780-444-0706 Fax:	Email 2: kjue@ecomarkenv.com
Invoice To Same as Report? (circle) Yes or No (If No, provide details)	**Client / Project Information**
Copy of Invoice with Report? (circle) Yes or No	Job #: EDMON-09601
Company:	PO / AFE:
Contact:	LSD: 10450 - 72 Ave.
Address:	
Phone: Fax:	Quote #:
Lab Work Order # (lab use only) L810700	ALS Contact: Sampler: CM/HY

Service Requested: (Rush subject to availability)
- Regular (Standard Turnaround Times))
- ✓ Priority, Date Req'd: _____ (Surcharges apply)
- Emergency (1 Business Day) - 100% Surcharge
- For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request
(Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Number of Containers
Mould 1	Outside by Pool Entrance	26-Aug.09	1100	Mould	1
Mould 2	Main Pool deck inner elbow of L	26-Aug.09	1045	Mould	1
Mould 3	Lifeguard area	26-Aug.09	1115	Mould	1
Mould 4	Women's change room	26-Aug.09	1130	Mould	1
Mould 5	Mens change - shower	26-Aug.09	12:15	Mould	1
Mould 6	Crawlspace Drama storage area	26-Aug.09	1345	Mould	1
Mould 7	Mechanical/Boiler Room	26 Aug. 09	1415	Mould	1
Mould 8	Water Fountain	26-Aug.09			

SHIPMENT VERIFICATION (lab use only) Verified by: Date: Time: Observations: Yes / No ? (If Yes add SIF)

SHIPMENT RECEPTION (lab use only) Received by: Date: Time: Temperature: 8°C

SHIPMENT RELEASE (client use) Released by: Harvey Date: 26-Aug 09 Time: 1600

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

GENF 18.01 Front

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Exova
7211 Roper Road NW
Edmonton, Alberta
T6B 3J4, Canada

T +1 (780) 435-5521
F +1 (780) 436-0389
E NWL-Edmonton@exova.com
W www.exova.com

Exova

Report Transmission Cover Page

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**699683**
Report To:	Ecomark Ltd.	ID:	EDMON-09601	Approval Status:	Approved
	100, 16812 - 114 Avenue	Name:	Haz. Mat.	Invoice Frequency:	by Lot
	Edmonton, AB, Canada	Location:	Scona Pool	COD Status:	
	T5M 3S2	LSD:		Control Number:	A058305
Attn:	Ann Laing	P.O.:		Date Received:	Aug 27, 2009
Sampled By:		Acct code:		Date Reported:	Aug 31, 2009
Company:	Ecomark Ltd.			Report Number:	1245444

Contact & Affiliation	Address	Delivery Commitments
Ann Laing Ecomark Ltd.	100, 16812 - 114 Avenue Edmonton, Alberta T5M 3S2 Phone: (780) 444-0706 Fax: (780) 481-2431 Email: alaing@ecomarkenv.com	On [Lot Verification] send (COA) by Email - Merge Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Merge Reports

Notes To Clients:

Exova
7217 Roper Road NW
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E: NWL-Edmonton@exova.com
W: www.exova.com

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Sample Custody

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**699683**
Report To:	Ecomark Ltd.	ID:	EDMON-09601	Control Number:	A058305
	100, 16812 - 114 Avenue	Name:	Haz. Mat.	Date Received:	Aug 27, 2009
	Edmonton, AB, Canada	Location:	Scona Pool	Date Reported:	Aug 31, 2009
	T5M 3S2	LSD:		Report Number:	1245444
Attn:	Ann Laing	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark Ltd.				

Sample Disposal Date: October 30, 2009

All samples will be stored until this date unless other instructions are received. Please indicate other requirements below and return this form to the address or fax number on the top of this page.

☐ Extend Sample Storage Until _____ (MM/DD/YY)

The following charges apply to extended sample storage:

Storage for an additional 30 days	$ 2.50 per sample
Storage for an additional 60 days	$ 5.00 per sample
Storage for an additional 90 days	$ 7.50 per sample

☐ Return Sample, collect, to the address below via:

- ☐ Greyhound
- ☐ DHL
- ☐ Purolator
- ☐ Other (specify) _____

Name _____
Company _____
Address _____
_____
Phone _____
Fax _____

Signature _____

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F: +1 (780) 436-0389
E: NWL-Edmonton@exova.com
W: www.exova.com

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Analytical Report

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**699683**
Report To:	Ecomark Ltd.	ID:	EDMON-09601	Control Number:	A058305
	100, 16812 - 114 Avenue	Name:	Haz. Mat.	Date Received:	Aug 27, 2009
	Edmonton, AB, Canada	Location:	Scona Pool	Date Reported:	Aug 31, 2009
	T5M 3S2	LSD:		Report Number:	1245444
Attn:	Ann Laing	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark Ltd.				

Reference Number			699683-1	699683-2		
Sample Date			Aug 26, 2009	Aug 26, 2009		
Sample Time			11:00	10:30		
Sample Location						
Sample Description			Inside Frame Of Door To Pool	Ceiling Beams		
Matrix			Waste - industrial	Waste - industrial		
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Metals Strong Acid Digestion						
Lead	Strong Acid Extractable	mg/kg	7420	32400		0.1

Approved by: RL Neumann

Randy Neumann, BSc
General Manager

Terms and Conditions: www.exova.ca/terms&conditions.htm

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W www.exova.com

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Methodology and Notes

Bill To:	Ecomark Ltd.	Project:		Lot ID:	**699683**
Report To:	Ecomark Ltd.	ID:	EDMON-09601	Control Number:	A058305
	100, 16812 - 114 Avenue	Name:	Haz. Mat.	Date Received:	Aug 27, 2009
	Edmonton, AB, Canada	Location:	Scona Pool	Date Reported:	Aug 31, 2009
	T5M 3S2	LSD:		Report Number:	1245444
Attn:	Ann Laing	P.O.:			
Sampled By:		Acct code:			
Company:	Ecomark Ltd.				

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Metals ICP-MS (Hot Block) in soil	SW-846	* Acid Digestion of Sediments, Sludges, and Soils, EPA 3050B	28-Aug-09	Exova Edmonton

*Laboratory method(s) based on reference method

References

SW-846 Test Methods for Evaluating Solid Waste

Comments:

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
The test report shall not be reproduced except in full, without the written approval of the laboratory.

Bodycote TESTING GROUP

Control Number A058305

Sample Information Sheet

NOTE: Proper completion of this form is required in order to proceed with analysis
See reverse for your nearest Bodycote location and proper sampling protocol

Billing Address:	**Copy of Report To:**	**Copy of Invoice:**
Company: Ecomark Ltd.	Company: Ecomark Ltd.	Mail Invoice to this address for approval ☐
Address: 100, 16812-114 Ave. T5M 3S2 Edmonton, AB	Address: 100, 16812-114 Ave. Edmonton, AB T5M 3S2	
Attention: Ann Laing	Attention: Ann Laing	
Phone: 780-444-0706	Phone: 780-444-0706	
Fax:	Fax:	
Cell: 780-266-0714	Cell:	
e-mail: alaing@ecomarkenv.com	e-mail: alaing@ecomarkenv.com	
QA/QC Report ☐	Report Results: Fax ☐ Mail ☐ Courier ☐ e-mail ☐ e-Service ☐	Report Results: Fax ☐ Mail ☐ Courier ☐ e-mail ☐ e-Service ☐

Information to be included on Report and Invoice

Project ID: EDMON-09601
Project Name: Haz. Mat.
Project Location: Scona Pool
Legal Location:
PO#:
Proj. Acct. Code:
Agreement ID:

Rush Please contact the laboratory to confirm rush dates and times before submitting samples.

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All analysis ☐ or As indicated ☐

Date Required: _____

Signature: _____

Bodycote Authorization: _____

Sample Custody (Please Print)
Sampled by:
Company Ecomark Ltd. Signature

I authorize Bodycote to proceed with the work indicated on this form:
Date: 26 Aug. 2009 Initial: H.Y

Received by: RS Sample Temp. °C

Waybill # AUG 26 PM 4:25

Company EXOVA Time

Special Instructions / Comments

Please indicate which regulations you are required to meet: _____

FOR LAB USE ONLY
Condition of containers / coolers upon arrival at lab

☐ Check here if Bodycote is required to report results directly to a regulatory body (Please include contact information)

☐ Check here if you're testing POTABLE WATER for **HUMAN CONSUMPTION.**

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers: PBPT — Enter tests above (✓ relevant samples below)
1	Inside Frame of Door to pool		-	1100 26-08/09	paint	grab	1 ✓
2	Ceiling Beams		-	1030 26-08/09	paint	grab	1 ✓
3			-				
4			-				
5			-				
6			-				
7			-				
8			-				
9			-				
10			-				
11			-				
12			-				
13			-				
14			-				
15			-				

LOT: 699683 COC

NOTE: All hazardous samples must be labeled according to WHMIS guidelines.

Page 1 of 1

Form No. 0006 (Rev. 04/07)

Exova
7217 Roper Road NW
Edmonton, Alberta
Canada, T6B 3J4
T: +1 (780) 438-5522
F: +1 (780) 436-2399
E: NWL-Edmonton@exova.com
W: www.exova.com

Exova

Confirmation of Service Request

Lot ID: **699683**
Number of Samples: 2
Printed Date: Aug 27, 2009

Please verify the following service request. If you have corrections or questions, please contact Client Services.

Main Contact:	***Primary Administrator***	***Invoice Delivery To:***	***Bill Paid by:***
Attn: Ann Laing	Attn: Ann Laing	Attn: Mark Polet	Attn: Accounts Payable
Ecomark Ltd.	Ecomark Ltd.	Ecomark Ltd.	Ecomark Ltd.
100, 16812 - 114 Avenue	100, 16812 - 114 Avenue	100, 16812 - 114 Avenue	100, 16812 - 114 Ave NW
Edmonton, AB T5M 3S2	Edmonton, AB T5M 3S2	Edmonton, AB T5M 3S2	Edmonton, AB T5M 3S2
Phone: (780) 444-0706	Phone: (780) 444-0706	Phone: (780) 444-0706	Phone: (780) 444-0706
Fax: (780) 481-2431	Fax: (780) 481-2431	Fax: (780) 481-2431	Fax: (866) 337-8631

Agreement Id	89438	**Well Name**	
Project Id	EDMON-09601	**Well Location**	
Project Name	Haz. Mat.	**Field**	
Project Location	Scona Pool	**Formation**	
Project Legal		**Elevation KB**	
PO#		**Elevation GR**	
Proj. Acct. Code		**Drilling License**	
Control Id	A058305	**Sampled By**	
Report Due	Sep 02, 2009	**Sampling Company**	Ecomark Ltd.
Received Date	Aug 27, 2009	**Est. Disposal Date**	Nov 01, 2009

Service Information

Sample Id	**1** **3121372**	**Service**	**Service Name**
		PBPT	Lead in Paint
		DISP60	Disposal fee - 60 day sample retention
Date Sampled	08-26-2009		
Priority	Normal		
Sample Description	Inside Frame Of Door To Pool		

Sample Id	**2** **3121373**	**Service**	**Service Name**
		PBPT	Lead in Paint
		DISP60	Disposal fee - 60 day sample retention
Date Sampled	08-26-2009		
Priority	Normal		
Sample Description	Ceiling Beams		

Other Billable Services	**Service**	**Service Name**	**Quantity**

Sample Service Count

Service Name	Service Code	Service Quantity
Disposal fee - 60 day sample retention	DISP60	2
Lead in Paint	PBPT	2

Notes

If required for invoice approval, please sign and return to the address indicated at the top of the page.

(Signature) _____

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Exova

Confirmation of Service Request

Lot ID: **699683**
Number of Samples: 2
Printed Date: Aug 27, 2009

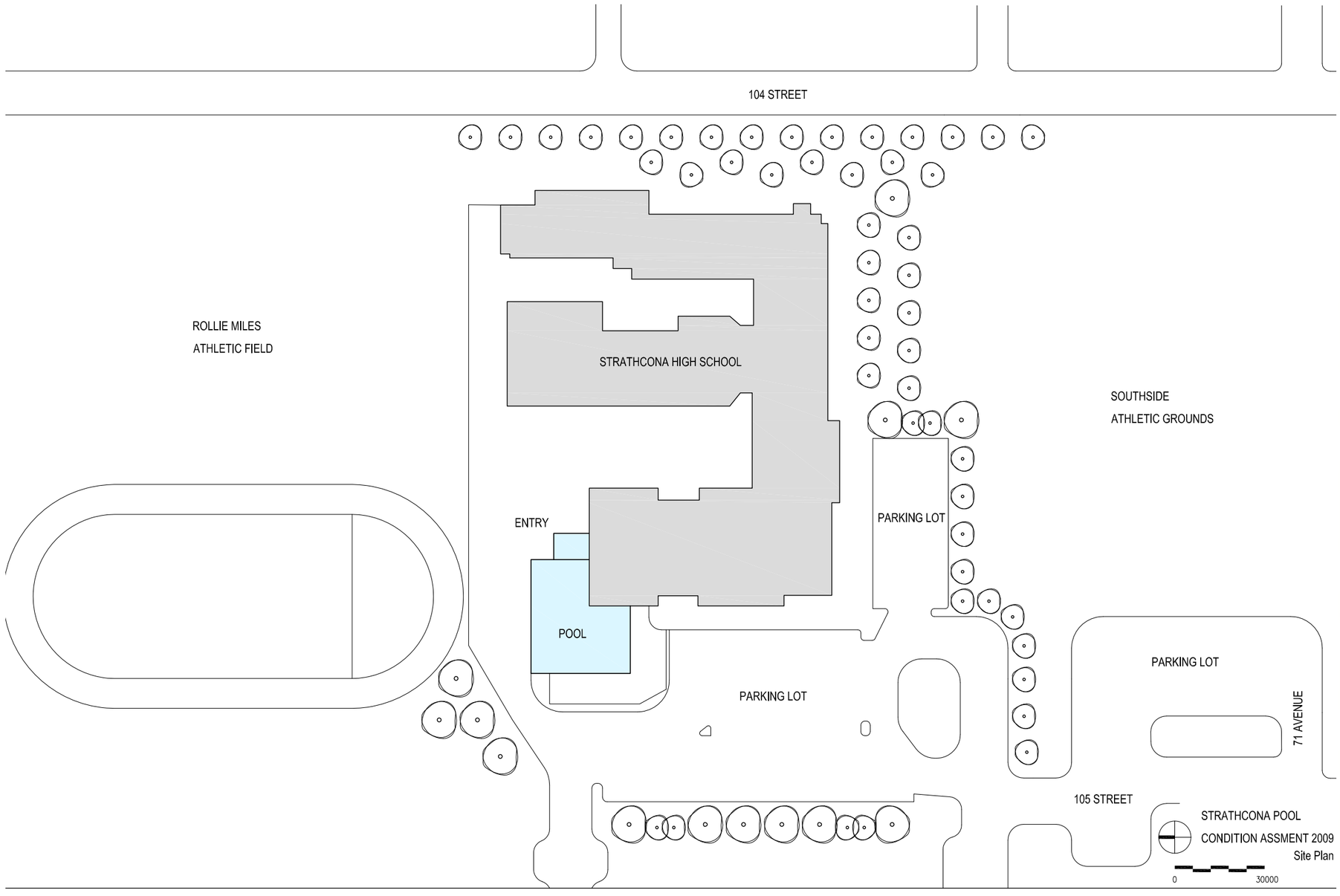
Please verify the following service request. If you have corrections or questions, please contact Client Services.

Report Delivery Plan

Contact	Company	Address
Ann Laing	Ecomark Ltd.	100, 16812 - 114 Avenue Edmonton, AB T5M 3S2 Phone: (780) 444-0706 Fax: (780) 481-2431 Email: alaing@ecomarkenv.com

Copies	Delivery	Format
1	Email - Merge Reports	PDF

Terms and Conditions: www.bodycoteusa.com/terms/conditions


104 STREET
ROLLIE MILES
ATHLETIC FIELD
STRATHCONA HIGH SCHOOL
SOUTHSIDE
ATHLETIC GROUNDS
ENTRY
POOL
PARKING LOT
PARKING LOT
PARKING LOT
71 AVENUE
105 STREET
STRATHCONA POOL
CONDITION ASSMENT 2009
Site Plan
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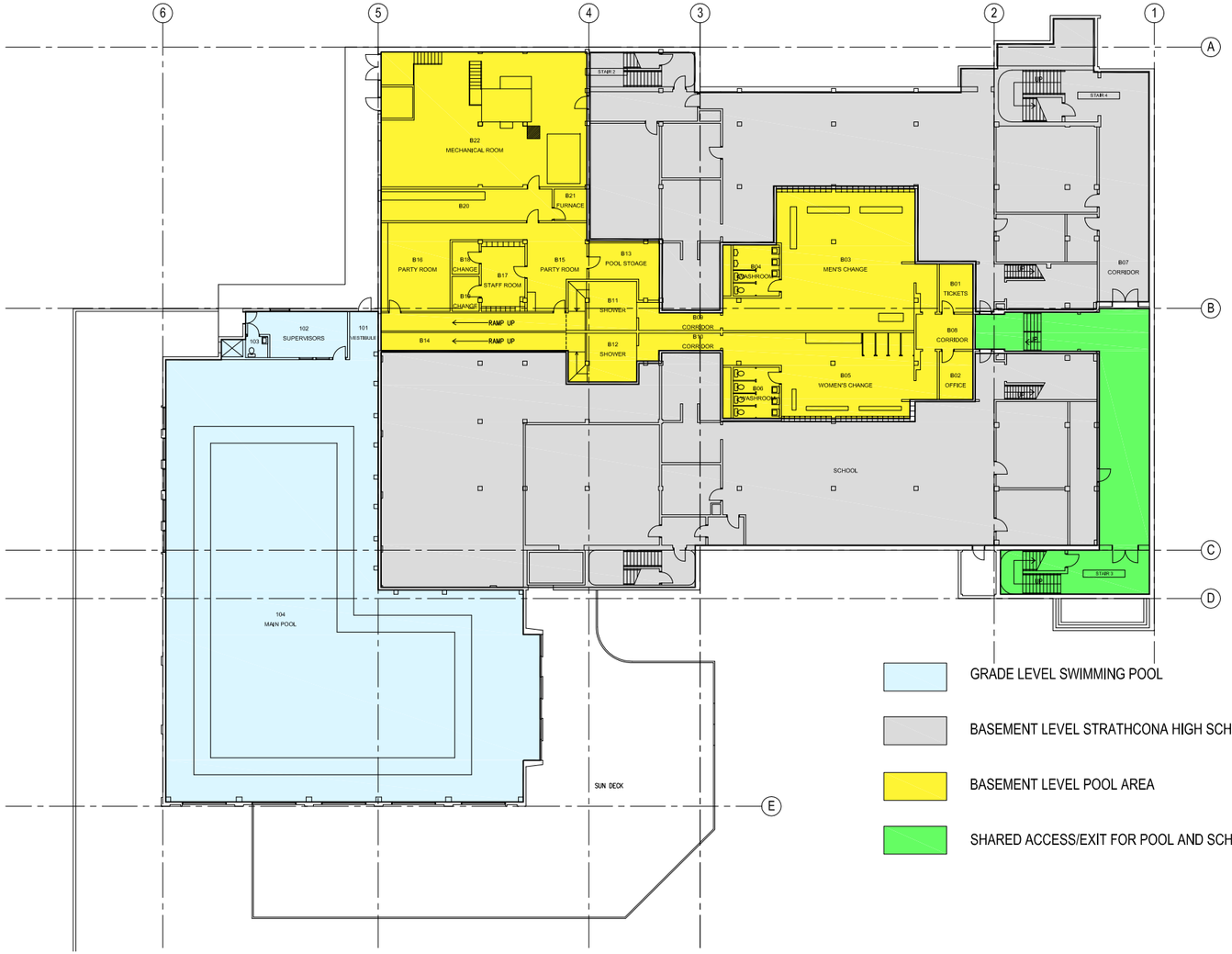
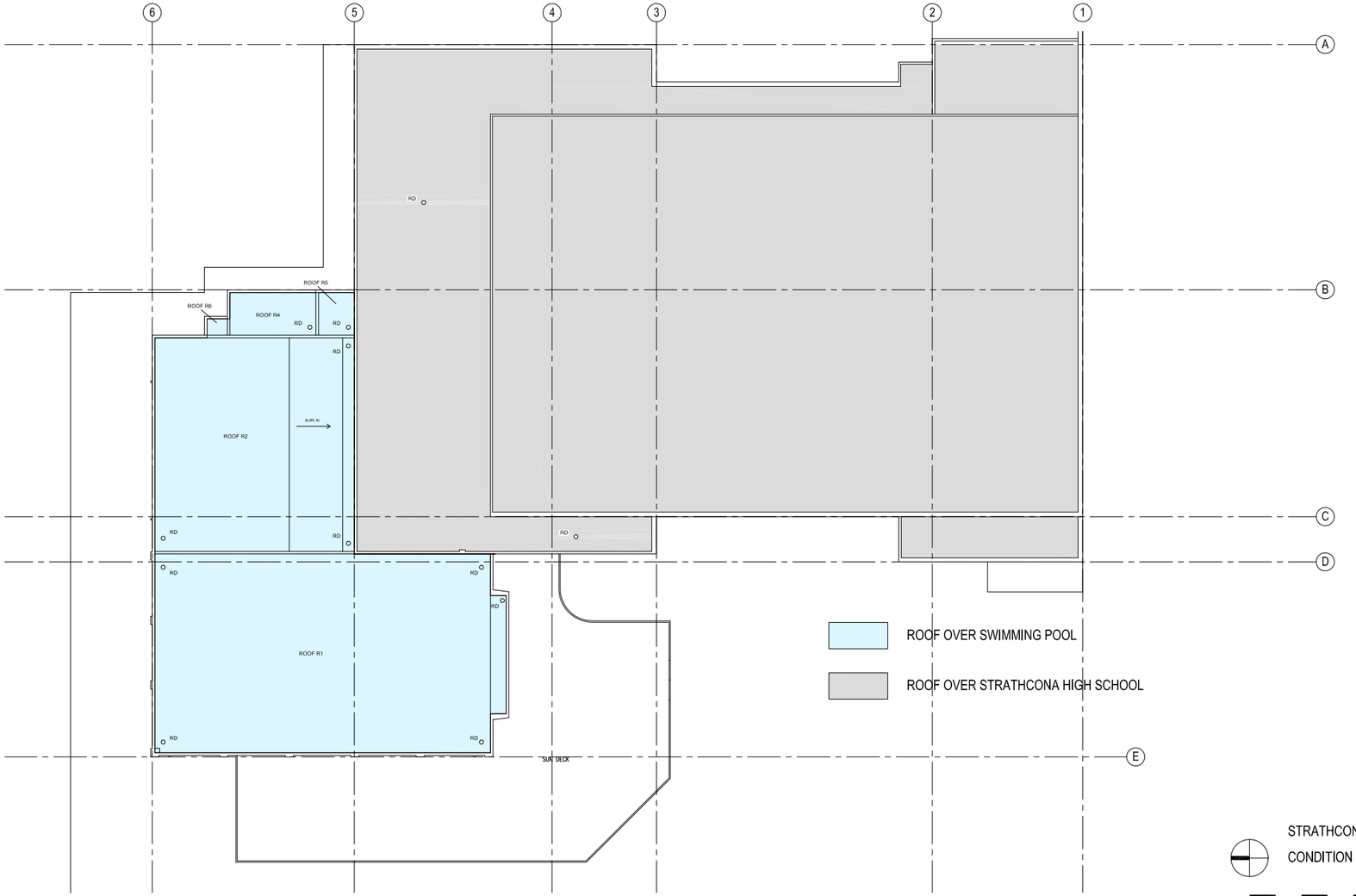
30000


B.01


6
5
4
3
2
1
A
B
C
D
E
STAIR 2
STAIR 4
STAIR 3
B22
MECHANICAL ROOM
B20
B21
FURNACE
B16
PARTY ROOM
B18
CHANGE
B17
STAFF ROOM
B19
CHANGE
B15
PARTY ROOM
B13
POOL STOAGE
B11
SHOWER
B10
CORRIDOR
B09
CORRIDOR
B14
RAMP UP
RAMP UP
B12
SHOWER
B04
WASHROOM
B03
MEN'S CHANGE
B01
TICKETS
B08
CORRIDOR
B07
CORRIDOR
B05
WOMEN'S CHANGE
B06
WASHROOM
B02
OFFICE
SCHOOL
102
SUPERVISORS
103
101
VESTIBULE
104
MAIN POOL
SUN DECK
GRADE LEVEL SWIMMING POOL
BASEMENT LEVEL STRATHCONA HIGH SCHOOL AREA
BASEMENT LEVEL POOL AREA
SHARED ACCESS/EXIT FOR POOL AND SCHOOL
STRATHCONA POOL
CONDITION ASSMENT 2009
Floor Plan
0
10000


B.02



STRATHCONA POOL
CONDITION ASSMENT 2009
Roof Plan

0 10000

B.03