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FINAL



**CITY OF FORT
SASKATCHEWAN**

HARBOUR POOL FACILITY EVALUATION, FORT SASKATCHEWAN, ALBERTA



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1.0 INTRODUCTION

In July 2014, BR2 Architecture was commissioned by the City of Fort Saskatchewan to undertake a visual facility analysis of the existing Harbour Pool Facility. The Facility is located at 10001-94 avenue, Fort Saskatchewan, Alberta.

Constructed in 1982, the building is located in the heart of the City of Fort Saskatchewan, and provides one component of the recreation campus that has been developed by the City. The Pool is in close proximity to the Jubilee Recreation Centre, outdoor playfields, outdoor skate park and the Boys and Girls Club. The main floor area of the facility is approximately 2,125M².

The building is a single story with a small 150m² second level mechanical room and a basement for pool equipment with access to the perimeter of the pool. The facility consists of a six lane 25M lane pool with a zero entry shallow pool and warm pool area. The pool has a separate hot tub for approximately 25 persons and a steam sauna room. The main floor also consists of the main entrance, administration suite, male and female change rooms, a program room, natatorium to accommodate 200 persons (posted) and miscellaneous storage space.

Overall, the facility has been well maintained and received significant upgrades in the past. The ongoing maintenance program has ensured the longevity of the facility, the systems and the components in the facility. Some elements of the facility are in need of upgrade or repair. The deficiencies that do exist are attributable to program area expectations, aesthetics and current building code requirements.

The objectives identified for this report are to evaluate the following specific conditions:

- .1 Compliance with current building and safety codes.
- .2 Building structure including visual observations of foundations, floor slabs, supporting structures and roof assemblies.
- .3 Building envelope including observations of exterior walls, doors, windows, parapets, fascia, soffit and roofs.
- .4 Interior surface and finishes.
- .5 Mechanical HVAC, plumbing and fire suppression systems.
- .6 Electrical power, lighting, low voltage and fire alarm systems.

The study team was comprised of the following:

- .1 Building Science and Architectural Review – BR2 Architecture
- .2 Structural Review – Protostatix Engineering Consultants Inc.
- .3 Mechanical Review – Reinbold Engineering Group
- .4 Electrical Review - Hemisphere Engineering Inc.

Representatives of the consultant team toured the existing facility on June 30, 2014. The study team observed the exterior and interior of the facility including roof surfaces.

The following summarizes the observations and recommendations presented.

Cost opinions reflect the current construction values for all recommended upgrades. Refer to Section 7.3.

2.0 Existing Facility Construction

2.0 EXISTING FACILITY CONSTRUCTION

2.1 General

The original 1983 building was constructed of load bearing concrete masonry walls sitting on cast-in place structural main floor slab on concrete foundation walls or slab on grade where basement conditions are not present. Exterior and interior walls are constructed of concrete block masonry units, exposed and painted. The roof assembly is constructed of 38mm steel deck at all locations outside of the natatorium of a base sheet and cap, insulation, fiberboard and four-ply built-up roofing covered with gravel ballast. From the drawings and information provided the roof appears to have been replaced in approximately 1988 or 1989.

The exterior of the facility has been upgrade twice since the original construction in 1983. The original exterior finish consisted of exposed split face block or prefinished metal cladding on the pool wall above the lower roof. In approximately 1988-89 the exterior of the facility underwent renovations to re-clad the building with new stucco and rigid insulation, and then again in the 1990s the exterior was completely clad in prefinished metal.

The interior of the facility has not received many improvements or upgrades. The existing finishes remain in all areas where repairs or changes have not been required. Areas that have received upgrades include Public Washrooms, Staff Locker Room, Staff Lunch Room, Administration Offices, Sauna Room and the Program Room.

2.2 Exterior Grounds and Hard Surfaces

Concrete Walks and Aprons

Hard landscaped areas are in fair to good condition. Concrete sidewalks and aprons at major building entrances are in good condition and do not require any immediate repairs. Curbs along the roadway are chipped and have been repaired numerous times over the life of the building. The damage appears to be from snow removal and vehicle impacts, but nothing requires attention at this time. On the north side of the building, east of the front doors, an area of paving stones is inlaid in the concrete sidewalk. This area is in good condition but does have some weeds growing between the paver stones. Concrete splash aprons are in good condition and are draining the rain water away from the foundations of the facility.

Hard Surface Vehicle Roads and Parking

Hard surfaces are in fair condition. Cracks in the asphalt surface of the parking lot will start to deteriorate more quickly due to water infiltration and freeze / thaw cycles. Parking lines are becoming less visible and will be required to be repainted in the near future. Curbs at parking areas show signs of numerous years of winter freeze / thaw cycles and snow removal, however, replacement is not required at this time. Drainage from the parking lot to the west is achieved through asphalt swales that discharge the water into the grassy areas adjacent the lot. This asphalt swale is deteriorating but is still performing the required service. Repair or replacement of these swales should be completed when the parking lot is resurfaced.

The loading area asphalt surface has received patching and repairs, however these patches are temporary measures and proper removal and replacement in this area should be considered in the near future. This work can be completed at the same time as the rest of the parking lot rehabilitation.

Soft Landscaping

Soft landscaped areas including sod, planting and trees are in good condition. The majority of the planting appears mature and ongoing maintenance is all that would be required. Visual inspection of the roof and roof drains indicated that pine needles and foliage debris were clogging the drains over time, and therefore maintenance procedures should include cleaning of the roof drains on a regular basis.

Future expansion of the facility may require elimination or relocation of some mature landscape areas. Review of the landscaping design will need to be re-evaluated if expansion is considered for this facility.

2.3 Exterior Walls

The exterior superstructure of the facility consists of load bearing concrete masonry units with reinforced concrete fill and steel reinforcing. The remaining voids in the concrete block walls are filled with loose fill insulation. This insulation should be reviewed for hazardous materials in the event that an expansion or disturbance of this material is expected. The entire exterior envelope is clad with prefinished metal cladding over 75mm rigid insulation on the original concrete masonry load bearing wall. No details of the latest envelope upgrade were available therefore it is not possible to verify the presence of the vapour barrier or its continuity. The lack of staining and cracking on the interior suggests that the vapour barrier is achieving the required performance.

The only exterior wall area that is not load bearing concrete block is found above the lower roof section and is part of the north wall of the natatorium. This wall construction consists of prefinished metal cladding on hat channels, 75mm rigid insulation on the existing 12 mm exterior gypsum board, R-20 fiberglass batt insulation, 92mm steel stud framing, air space for structural framing, 92mm steel studs, fiberglass batt insulation poly vapour barrier and 12mm gypsum board.

The thermal performance of these walls is approximately R15 for the concrete block walls and R35 for the steel stud wall. The performance of these walls is close to today's current standards and will continue to perform at this level for the next 10 - 15 yrs.

The nature of load bearing block walls does not readily lend itself to modifications. The pattern of vertical and horizontal core reinforcing and concrete fill is difficult to make major modification to without significant cost implications. The existing concrete block units are filled with loose fill insulation and would need to be tested for the presence of hazardous materials and abated if tested positive.

Exterior Wall Finishes

The exterior prefinished metal cladding is performing as required and in good shape. Some small areas of peeling finish is evident, however these locations can be touched up with localized treatment and touch up. Some minor damage to lower panels was observed, this damage appears to have been done by ground-keeping activities. These items are minor and do not require any action.

2.4 Roofs and Parapets

Three different roofing structures are used in the construction of this facility. A 38 mm steel deck on open web steel joist on a steel super structure is found in all areas except for the natatorium and the mechanical roofs. The natatorium roof structure consists of a structural 38 x 140 T& G cedar wood deck on glue laminated wood beams supported by steel columns. The mechanical roof system is fabricated

of wood plywood decking on 28 x 289 dimensional wood joists on load bearing concrete block walls. This assembly is rated for a 1 hour fire resistance rating. All the roof assemblies are a flat roof configuration with localized roof drains controlling the collection and drainage of rain water on the roof.

The roof assembly above the structural components is comprised of the following items:

- 12mm drywall
- #180 base sheet
- 93mm fiberglass base cap
- 12 mm rigid fibreboard
- 4 ply built up roofing

This roofing system was installed in approximately 1988-89.

The roofing membrane is showing signs of bubbling and leaching up through the gravel ballast. From the colour of the ballast it appears that patching has been completed in the past, however, no current leaks were noted by the staff and maintenance crews. It is recommended that a professional roofing inspector be retained to confirm the overall condition of the roof and its components prior to a roof retrofit being commissioned.

2.5 Doors and Windows

The windows have been replaced during the 1988 renovations with extruded, clear anodized aluminum sections. The windows and frames have been upgraded to a good quality system and therefore perform well to today's standards. The remainder of the doors are insulated metal in pressed steel frames. Conversation with the operator indicated that frosting does occur on the doors that lead directly from the pool area. This can be attributed to the high humidity in the pool space and a weak seal on the perimeter of the doors. New weather stripping may reduce the frosting but it will always be an issue during extreme cold temperatures. The operator did note that the frosting was not severe enough to make the door inoperable.

2.6 Interior Finishes

Interior Partitions

The majority of the wall surfaces are painted concrete block with some limited gypsum wall board partitions in the public washrooms and offices. The wall paint finishes are in good condition and have been maintained to a high level. Cracking in both the concrete and gypsum board walls was not observed nor pointed out by the user. If any cracking is evident it would be minor in nature and not require any immediate repairs. Adjustment or modification to the layout of the partitions will be difficult due to the load bearing nature of the partitions. Small, limited penetrations or removal of the walls could be achieved without great expense.

Floor Finishes

Floor finishes are a combination of different hard surfaces, with a few small areas of exposed concrete in service rooms. The visible floor surfaces throughout the facility are in fair to good service condition.

The pool lobby, change rooms and pool natatorium deck are still the original quarry tile finish. The pool deck is a traditional 4 x 4. These areas are starting to deteriorate in localized areas and are currently manageable. The products are no longer available for repair materials and the frequency and size of the

tile failures are increasing and therefore the floor finish, even though in good condition, will need to be replaced.

The public washrooms off the main lobby have been recently renovated with all new 12 x 12 floor tile. These areas do not require any improvements.

The offices and program room have also had their floor finishes upgraded recently with new 6 x 6 porcelain floor tiles and therefore are in good condition.

Interior Doors and Windows

The doors and windows throughout the facility are in good condition. The hollow metal doors and frames are painted and in good repair. The main entrance aluminum automated doors and frames are clear anodized and in good working order.

The interior windows at the main lobby to the pool are brown anodized in fair to good condition. Door hardware appears to be operational and in good condition and no issues with the door hardware was raised during the walk through.

All doors are receiving regular maintenance and adjustment to keep them in good operating condition.

Ceilings

Three different ceiling finishes can be found in the facility. The office, program room and washrooms have 2' x 4' acoustical ceiling tiles. These tiles are in good condition and have been upgraded during the last interior renovation to the staff room and office area.

The change rooms and service rooms use painted gypsum board as a ceiling finish. These ceilings are in fair condition and show some signs of paint peeling or cracking but these issues are repairable and minor in nature. Further investigation should be completed in areas where staining from leaks are present.

The natatorium has original cedar structural wood ceilings. These ceilings are in fair condition and show signs of staining and the appearance is dated. As these finishes are structural the options for upgrades are limited to refinishing the cedar or adding a new finish over the existing exposed decking.

The main lobby has a linear cedar wood ceiling finish to match the natatorium. This material is in good condition but is dated in appearance and needs to be refinished.

2.7 Natatorium

The pool area has been well maintained and cared for. The pool tank was not visibly inspected as it was full of water at the time of the site visit, therefore the condition of the tiles in the pool tank were not observed. Visual inspection of the tiled areas in the tank was possible at the zero depth entry areas. This inspection revealed that the tile is in fair to good condition, however, there are signs that more and more repairs are being performed which would indicate that the tank should be considered for a complete retile in the near future to avoid any leaks or safety issues with tiles coming loose. The deck of the pool is original 4 x 4 quarry tile and has stood the test of time. Some perimeter tiles are in need of repair but overall the tiles are performing satisfactorily. It would be recommended to replace the pool deck tiles at the same time as the pool tank tiles to efficiently use shut down time to perform all the upgrades to the pool area.

3.0 Building and Safety Code Review

3.0 BUILDING AND SAFETY CODE REVIEW

3.1 Harbour Pool Facility Evaluation – Ft. Saskatchewan, Alberta

Date: Aug 19, 2014

Applicable Building Code: 2006 Alberta Building Code

Legal Land Description

Municipal Address: 10001 94 Ave, Fort Saskatchewan, AB

Occupancy Classification: **Core School Classification:**

3.2.2.25 - Group A, Division 2, up to 3 Storeys

- 1) A building classified as Group A, Division 2, that is not limited by building area, is permitted to conform to sentence (2) provided
 - a. It is not more than 3 storeys in building height.
 - b. It has a building height not more than the value in table 3.2.2.25 – 2 storeys facing 3 streets = 1200m².

Commentary: Building is 2 storeys -facing 3 streets and is 2125m² total. Building is considered to be over the allowable area.

- 2) The Building referred to in Sentence 1 is permitted to be of combustible construction or Noncombustible Construction used singly or in combination, and
 - a. Floor assemblies shall be Fire Separations and if of combustible construction, shall have a fire-resistance rating not less than 45 mins
 - b. Mezzanines shall if of combustible construction, have a Fire-resistance rating not less than 45 mins,
 - c. Roof assemblies shall have if of combustible construction, a fire resistance rating not less than 45 min. except in a building not more than 1 storey in building height, the fire resistance rating is permitted to be waived provided the roof assembly is constructed as a fire retardant treated wood roof system conforming to article 3.1.14.1, and the building area is not more than
 1. 800m² if facing 1 street
 2. 1000m² if facing 2 streets
 3. 1200m² if facing 3 streets.
 - d. Loadbearing walls, columns and arches supporting an assembly required to have a fire resistance rating shall

1. Have a fire resistance rating of 45 min, or
2. Be of non-combustible construction

Number of Storeys:	2
Building Area	2125 m ² total
Type of Construction:	non-combustible
Sprinklers:	not required
Floor Assembly Separation:	45 mins

Commentary: Facility consists of Non-combustible construction. Main floor over basement is a concrete slab and provides the required 45 min fire rating. Roof assemblies are constructed of non-combustible and heavy timber construction and therefore do not require a fire resistance rating. Supporting walls and columns are of non-combustible construction and provide the required 45 min fire separation.

Building Area (See definition 1.4.1.2): 2150 m² total main floor area
 150 m² Second floor area
125 m² Basement
 2425 m² total

Number of Streets Facing: Per article 3.2.2.10(1) – Facing 3 streets

Sprinklers: Per article 3.2.2.25 – not required

Commentary: Building is over the allowable area to be non-sprinklered. Sprinklers would be required to make the building conform to section 3.2.2.6 Group A, Division 2, up to 3 storeys, increased area, sprinklered.

Spatial separation and exposure protection: Per article 3.2.3.1

Commentary: Building is set back from property lines more than 8m, the limiting distance required for 100% unprotected openings.

Component Fire Separation:

<i>Stairs and Exits:</i>	Per article 3.4.4.1.(1) – 45 min rating required
<i>Janitors' Rooms:</i>	Per article 3.3.1.21.(3) - 45 min rating required
<i>Storage Rooms:</i>	Per article 3.3.1.26 – 45 min rating required
<i>Fuel Fired Appliance Service room:</i>	Per article 3.6.2.1.(1) – 1 hr fire rating required

Commentary: Based upon visual inspections, the fire resistance ratings appear to be in place, however concealed spaces or fire stopping above ceilings were not observed to verify conformance.

Access for Firefighting:

- Per article 3.2.5.1. – Provide openings for fire fighting access.
- Per article 3.2.5.2. – Not applicable – building has no basement dimension longer than 25 m.
- Per article 3.2.5.3. – not applicable – building is not more than 3 storeys in height
- Per article 3.2.5.4. – Access route required
- Per article 3.2.5.5.
 - (a) Access required to principal entrance within 3m and 15m.
 - (b) A Fire Department connection, & a hydrant located in conformance with article 3.2.5.5.(2) shall be provided.
 - (c) Unobstructed path of travel for the fire fighter from the vehicle to the building is not more than 45 m.

Commentary: *Access for fire fighting meets code requirements*

Fire alarm and Detection Systems:

Per article 3.2.4.1.(1) -
a fire alarm system shall be installed in a *building* that is not sprinklered and has an occupant load of more than 300 persons, other than in open air seating areas.

Commentary: *Fire alarm system is not required currently as the building does not contain a sprinkler system nor is the occupancy over 300 persons. Occupant load is posted at 200 persons.*

Exiting and Means of Egress:*Number of Exits:*

Per articles 3.3.1.5. and 3.4.2.1.(1) every *floor area* Intended for occupancy shall be served by at least two exits where:

- a) *Occupant load* more than 60 or
- b) *Area travel distance* exceeds 25m or
- c) *Area of room or suite* is greater than 200 sq.m.

Service Room Exit:

Per article 3.3.1.3.7 Two points of egress shall be provided for a *service space* referred to in Sentence 3.2.1.1.(8) if

- a) the area is more than 200sq.m, or
- b) the travel distance measured from any point in the *service space* is more than 25m.

Exit Width:

doorways: 6.1mm/person based on posted occupancy.
3.4.3.4.(1)(a)

Travel Distance to Exit:

Per article 3.4.2.5.(1)(f) – 30m in any floor area other than those referred to in clauses (a) to (e)

Commentary: Multiple exits are provided from the facility. Service rooms are below 200 m² and less than 25m travel distance and therefore only require one exit. Exit width required for 200 persons would be 1,220 mm, exit doors exceed those requirements. Travel distance to exits are below the required 30m.

Corridors:*Corridor Width:*

Per article 3.3.1.9.(1) – minimum corridor width – 1100 mm

Dead End Corridor:

Per article 3.3.1.9.(7) – 3m max. dead end corridor length

Commentary: All corridor width are at or over 1100 mm wide. No corridors greater than 3 m were observed.

Occupant Load:

Occupant load of the building is based the posted occupancy loads – 200 persons max.

Washroom Facilities:

Occupancy = 200 posted
(100 male / 100 female)

Water closets Required: for Assembly Occupancies

2 Male 4 Female

Per article 7.2.4.1.(1)- 1 lavatory required for first two Water closets and one additional lavatory for each Additional 2 water closets.

Lavatories Required:

1 Male 2 Female

Commentary: Washroom facilities meet the required counts.

Swimming Pool Construction

Colour

Per Article 7.3.3.4 - Except for the lane, depth and orientation markings, the sides and bottom of a swimming pool shall be uniform and white in colour to provide clear visibility of bathers.

Commentary: Pool tile is white and meets code requirements.

Diving Boards or Platforms

Per Article 7.3.3.13

- 1) Any Diving board or platform that is provided shall have corrosion-resistant anchorage fittings and hardware and be rigidly constructed and properly anchored at the base with sufficient bracing to ensure stability under the heaviest possible design load.

Commentary: a single 1 m spring board is located at the deep end of the pool. This is a pre manufactured item mounted to 2 supports cast into the deck.

- 2) There shall be not less than 5 m free and unobstructed headroom above diving boards and towers and not less than 4 m above deck level diving boards.

Commentary: the diving board is 1 m above the deck and appears to have the required 5 m clearance. Accurate measurements to beams and light fixtures was not possible at the time of the review.

- 3) The clearances required by sentence 2 shall extend not less than 3m on either side and in front of all diving boards and platforms measured from the tip or end of the board.

Commentary: the diving board is 1 m above the deck and appears to have the required 3 m clearances. Accurate measurements to beams and light fixtures was not possible at the time of the review.

- 4) The design of a diving board or platform and corresponding water depth and clearances for a public swimming pool shall be in accordance with the "FINA Handbook"

Commentary: Clearances could not be confirmed due to water being in the pool and the inability of taking measurements required by the FINA Handbook. However the pool depth is confirmed to be adequate for spring board diving at a depth of 3.5m

Decks

Per Article 7.3.3.15

- 1) Except for specific requirements of, Sentences 7.3.6.2.(7), (8) and (9), and Sentences 7.3.7.3.(19) and (20), a non-porous , impervious, hard-surfaced area shall
 - a) be provided around the entire *swimming pool*, solely for the use of *bathers*, not less than 1.8 m wide, and
 - b) provide not less than 0.9 m of unobstructed passage behind a diving board, support column, or a slide or other piece of play equipment and its supporting structure.

Commentary: All deck surfaces are finished with porcelain tile and are impervious. Deck clearances are met in all areas except where the spectator seating is located. This area does not provide 1.8m of space from the pool edge solely for bathers.

- 2) The deck area of a deck-level *swimming pool* shall have a slope not less than 1:50 and not more than 1:25 away from the *swimming pool* for a distance of at least 0.6 m with positive drainage to the deck drains.

Commentary: Deck drains were observed and standing water was not evident. Accurate measure of the slopes was not taken.

- 3) For a deck-level *swimming pool*, the width of deck beyond the edge of the gutter drained to the circulation system of the deck-level *swimming pool* shall be not more than 900 mm.

Commentary: 50% of the pool is deck level and drained to a perimeter gutter system and is within the 900 mm requirement.

- 4) For the deck area of a *swimming pool* in which recessed

gutters or skimmers are used, the deck shall be sloped not less than 1:50 and not more than 1:25 away from the *swimming pool* and drained to waste.

Commentary: Recessed gutters draining approx. 50% of the pool. Accurate measure of the slopes was not taken, however it appears that the slopes conform to the requirements.

5) All walks, decks and terraces surrounding a *swimming pool* shall be uniformly sloped not less than 1:50 and not more than 1:25 to drains or points at which the water will have a free unobstructed flow at all times to points of collection.

Commentary: Deck drains were observed and standing water was not evident. Accurate measure of the slopes was not taken.

6) A deck surface shall be slip-resistant when wet, sufficiently smooth to facilitate disinfecting, and finished so that there will be no discomfort to bare feet. (See Appendix A.)

Commentary: Deck finish is a quarry tile, this provides a smooth surface with the required slip resistance.

7) If a brushed concrete finish is used on a deck surface, the brushing shall be done toward the drains.

Commentary: Deck is not Concrete.

8) The deck of an outdoor *swimming pool* shall be not less than 150 mm above the finished ground elevation.

Commentary: Pool is an indoor facility

9) A deck shall

- a) be designed to be free of obstacles for the full minimum required width,
- b) be designed to be free of tripping hazards such as uneven surfaces or changes in elevation, and
- c) have its edges bevelled, tapered, or otherwise designed to eliminate sharp corners.

Commentary: No permanent obstacles were observed on the deck. All surfaces are even and free of tripping hazards. Tiles have bullnosed or eased edges to eliminate sharp and hazardous corners.

10) For areas between adjacent *swimming pools*, the minimum required deck width shall be the aggregate of the minimum required deck width for each pool.

Commentary: Deck clearances between the 2 bodies of water are greater than the aggregate required for each pool.

Dressing and Sanitary Facilities

7.3.4.1. Bathing Load

- 1)** For the purposes of this Subsection, the *bathing load* shall be based on
- a) one *bather* for each 1.5 m² of *swimming pool* area or the *maximum design bathing load* for the water circulation system, whichever is lesser, for a *swimming pool*, other than a *whirlpool*,
 - b) one *bather* for each 1.0 m² of *swimming pool* area or the *maximum design bathing load* for the water circulation system, whichever is lesser, for *whirlpools*, and
 - c) one *bather* for each 1.0 m² of spray deck or splash area for a *water spray park*.

Commentary: Pool Occupant load is posted @ 200 persons and is less than the bather loads if calculated by water area or the circulation system.

7.3.4.2. Male, Female Design Criteria

- 1)** Any portion of the *swimming pool* or *water spray park* construction concerning itself with facilities for its occupants shall be designed on the basis of 50% male and 50% female, or as dictated from experience or proposed use.

Commentary: Pool change rooms are designed for a 50/50 split of male and female bathers.

7.3.4.3. Dressing Rooms

- 1)** Exclusive of washroom and shower areas, 0.5 m² for each male and 0.5 m² for each female is required for dressing room space on the basis of the *bathing load*.
- 2)** No steps or curbs shall be permitted in the interior of a dressing area nor between the dressing room and adjoining *swimming pool* or *water spray park* deck areas.
- 3)** If dressing room facilities are required to be at a different elevation from the *swimming pool* deck or *water spray park* area, a ramp with a slip-resistant surface and a slope not more than 1:12 shall be provided.

Commentary: Required change room area based on 100 male or females would require 50m² of dedicated change room area. Change room area provided is greater than 50m². No steps or curbs are found in the change room areas. The change rooms are on the same level as the pool deck.

7.3.4.4. Partitions and Walls

1) All *partitions* and walls between portions of the dressing room areas, screen *partitions*, shower, water closet cubicles and dressing room booths shall be of durable material not subject to damage by water and shall be so designed that a gap of not less than 150 mm above floor level is provided between the *partitions* and the floor.

2) Walls or *partitions* of wood construction shall be mounted not less than 200 mm above the finished floor.

Commentary: Showers in the change rooms are gang showers and do not have partitions. Walls of the showers are concrete block masonry with ceramic tile.

7.3.4.5. Dressing Room Floors

1) Floors that are wet traffic areas for *bathers*, including dressing rooms, shall

- a) have a smooth but slip-resistant finish,
- b) be impervious to moisture with no open cracks or joints,
- c) be drained with no pooling of water,
- d) have a slope not less than 1:50 and not more than 1:25 in the direction of the closest drain, and
- e) have rounded corners for ease of cleaning where floors intersect with walls and *partitions*.

Commentary: Floor finish in the change rooms are quarry tile. The finish is smooth and slip resistant, and slopes to a centre trench drain. No standing water was observed at the time of the review. Cove tile is provided at the base of the wall to floor, however cracking and grout deterioration is found in select locations and required repair.

7.3.4.8. Plumbing Fixtures

1) The number of water closets, lavatories and urinals serving dressing rooms shall be based *load* and determined in accordance with Articles 3.7.2.2. and 3.7.2.3.

Commentary: Based on a bather load of 200 persons (100 male/ 100 female) the required number of fixtures would be 2 for male and 4 for female. Washroom fixture counts exceed the required counts.

7.3.4.10. Non-Bather Washroom Facilities

1) Plumbing fixtures for persons, other than *bathers*, using a *swimming pool* or *water spray park* facility shall be provided outside the dressing room and wet traffic areas and shall be in conformance with Subsection 3.7.2.

Commentary: Separate male and female single stall washrooms are provided for nonbathers which conforms to the requirements of Article 7.2.2.6 (3)

Barrier Free Requirements:

The *building* is subject to the requirements of Section 3.8.

Commentary: The building has automatic doors and barrier free push buttons to gain access to the change rooms. The main reception counted does not provide a lower counter space for barrier free users. The washroom stalls in the change rooms do not meet the current barrier free guidelines for size and turning radius'.

4.0 STRUCTURAL

4.1 Overview

On July 30, 2014, Larp Chitnuyanondh of Protostatix Engineering Consultants Inc. carried out a structural condition assessment of the Harbour Pool located in the City of Fort Saskatchewan, Alberta. The building is currently in use and basically contains a deep pool with an adjoining wade pool. The building was constructed in 1980 and does not have any major additions or modifications. The pool is currently being utilized to the full capacity due to the high population growth in the region.

The general purpose of the assessment is to identify any major structural issues that would require substantial repair cost. There is a desire by the owner to evaluate if the pool could be expanded or it would be more advantageous to construct a separate building. The economic analysis for different alternatives is not within the scope of this report and will be carried out separately by other parties.

4.2 Existing Facility Construction

The existing aquatic center is a detached building having a rectangular footprint measuring approximately 110 ft by 165 ft with the north west corner being notched to allow the placement of the main entrance canopy as shown in Photo 1.

The building is basically a single storey structure but has a small mezzanine at the south edge which houses the mechanical room.

The roof is basically constructed of glue laminated timber beams commonly known as glulam beams, supporting a timber deck, as shown in Photos 2 and 3. The main roof girders comprise two large timber glulam beams located at mid width of the building, running east-west. They in turn support secondary glulam beams spanning north-south. Resting on these beams are glulam purlins spaced at approximately 6 ft, which directly support the timber deck.

The mezzanine is constructed of reinforced concrete beams with one way reinforced concrete slabs.

The floor around the pool is made up of structural reinforced concrete slabs under which is located a basement containing all the filtration and mechanical equipment.

The exterior perimeter wall is constructed of load bearing concrete masonry block walls with pilasters which directly support the glulam girders and secondary beams as shown in Photo 4. The walls are clad on the exterior with metal panels with horizontal flutes as shown in Photo 5.

4.3 Observations

Generally, the entire building is in good condition suggesting that structure is founded on sound foundations which do not exhibit significant movements. Also, proper maintenance appears to have been carried out well as there are no signs of areas in disrepair. It is reported that the roof structure and the walls are of the original construction and no modifications had been carried out.

The timber beams in the roof are in good conditions as there are no cracking or checking along the laminations. The steel brackets supporting the beams have not rusted in spite of the moist condition of the complex.

The concrete block walls have not exhibit any cracking and are in remarkable condition.

The concrete slab is performing exceptionally well and there was no report of any significant cracking or settlement.

Rain water leakage is not a problem in this building.

4.4 Conclusion

The complex is about 24 years and is performing extremely well from structural viewpoint. In spite of the moist environment of the interior, both the laminated timber beams and the steel supported brackets are in good condition and do not require any immediate attention. Similarly, the rather extensive block walls do not have cracks and are performing satisfactorily.

Due to its excellent condition, this building would be suitable for expansion if it is deemed viable from a usage viewpoint

5.0 MECHANICAL

5.1 General

.1 Purpose of the Report

This report is a summary of the visual inspection performed by Reinbold Engineering Group for the Harbour Pool Aquatic Centre located in 10001-94 Avenue, Fort Saskatchewan, AB. Harbour Pool is a Natatorium facility, approximately 2,265m². It was originally constructed in 1983 and incorporates a hot tub, warm pool and combined leisure pool/lap pool areas.

The intent of the inspection was to determine areas of the mechanical system that have visually evident deterioration and are in need of repair or replacement. The mandate was also to determine in a general way, the overall condition of the mechanical system and identify potential items or issues inherent in the system for consideration.

.2 Methodology

The report incorporates a review of available record drawings and operations and maintenance manuals and visual inspection performed on the July 30th, 2014 in conjunction with information provided by the facility operators.

.3 Limitations

Inspections were performed on a random basis with no attempt to review or inspect every element or portion of the building. Our comments are not a guarantee or warranty of any aspect of the condition of the building whatsoever.

The available mechanical record drawings were limited and certain information related to the base building underground sanitary and storm sizing could not be determined. It should be noted that city of Fort Saskatchewan Facilities do not report any major issues with the building and site drainage.

Cost estimates in this report are typically based on preliminary information, which are influenced by factors such as market conditions. The opinions of probable costs are based on current dollars and subject to change due to market conditions.

Where available, equipment age was determined from equipment labels, drawings, maintenance manuals or comments from maintenance personnel. Where no information was available assumptions were made based on the equipment's general condition. Equipment ages cannot be guaranteed.

Location and identification of asbestos containing materials is beyond the scope of this report.

.4 Codes and Standards

For the purpose of this report, the following applicable codes and standards will be used for evaluation of the building systems:

Alberta Building Code 2006
 Alberta Fire Code 2006
 National Plumbing Code 2005
 Local Building By-Laws
 Workers Compensation Board
 Canadian Standards Association (CSA)
 Canadian Gas Code B-149.1
 Boiler and pressure vessel Act.
 National Fire Protection Association (NFPA)
 Underwriters' Laboratories of Canada (ULC)
 American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE)

.5 Building Overview

The Harbour Aquatic Centre is a 2,265m² single story building incorporating a six lane swimming pool (30°C), a warm pool (32°C), a whirlpool (40°C), a dry sauna, a zero depth walk-in bay area and water accessories such as a diving board, Tarzan rope sky walker climbing apparatus and locker and change facilities. The Aquatic centre was constructed in 1983 with a major mechanical upgrade completed in 2004. Many of the mechanical and pool systems have been replaced during the major retrofit and along with a high level of care of maintenance from the facilities operators the equipment are generally in fair to good condition.

.6 Equipment Life Expectancy

The following contains an excerpt table of median equipment life expectancy table produced by ASHRAE. Facilities which undergo high levels of operation and maintenance of mechanical systems and equipment can allow for longer equipment service lifespan in comparison the tabulated median life spans indicated in the table. Throughout the reports comments regarding the life expectancy of a piece of equipment will be made with respect to the ASHRAE table.

Table 1: Comparison of Service Life Estimates

Owning and Operating Costs

37.3

Table 4 Comparison of Service Life Estimates

Equipment Item	Median Service Life, Years		Equipment Item	Median Service Life, Years		Equipment Item	Median Service Life, Years	
	Abramson et al. (2005)	Akalin (1978)		Abramson et al. (2005)	Akalin (1978)		Abramson et al. (2005)	Akalin (1978)
Air Conditioners			Air Terminals			Condensers		
Window unit	N/A*	10	Diffusers, grilles, and registers	N/A*	27	Air-cooled	N/A	20
Residential single or split package	N/A*	15	Induction and fan-coil units	N/A*	20	Evaporative	N/A*	20
Commercial through-the-wall	N/A*	15	VAV and double-duct boxes	N/A*	20	Insulation		
Water-cooled package	>24	15	Air washers	N/A*	17	Molded	N/A*	20
Heat pumps			Ductwork	N/A*	30	Blanket	N/A*	24
Residential air-to-air	N/A*	15 ^b	Dampers	N/A*	20	Pumps		
Commercial air-to-air	N/A*	15	Fans	N/A*		Base-mounted	N/A*	20
Commercial water-to-air	>24	19	Centrifugal	N/A*	25	Pipe-mounted	N/A*	10
Roof-top air conditioners			Axial	N/A*	20	Sump and well	N/A*	10
Single-zone	N/A*	15	Propeller	N/A*	15	Condensate	N/A*	15
Multizone	N/A*	15	Ventilating roof-mounted	N/A*	20	Reciprocating engines	N/A*	20
Boilers, Hot-Water (Steam)			Coils			Steam turbines	N/A*	30
Steel water-tube	>22	24 (30)	DX, water, or steam	N/A*	20	Electric motors	N/A*	18
Steel fire-tube		25 (25)	Electric	N/A*	15	Motor starters	N/A*	17
Cast iron	N/A*	35 (30)	Heat Exchangers			Electric transformers	N/A*	30
Electric	N/A*	15	Shell-and-tube	N/A*	24	Controls		
Burners	N/A*	21	Reciprocating compressors	N/A*	20	Pneumatic	N/A*	20
Furnaces			Packaged Chillers			Electric	N/A*	16
Gas- or oil-fired	N/A*	18	Reciprocating	N/A*	20	Electronic	N/A*	15
Unit heaters			Centrifugal	>25	23	Valve actuators		
Gas or electric	N/A*	13	Absorption	N/A*	23	Hydraulic	N/A*	15
Hot-water or steam	N/A*	20	Cooling Towers			Pneumatic	N/A*	20
Radiant heaters			Galvanized metal	>22	20	Self-contained		10
Electric	N/A*	10	Wood	N/A*	20			
Hot-water or steam	N/A*	25	Ceramic	N/A*	34			

*N/A: Not enough data yet in Abramson et al. (2005). Note that data from Akalin (1978) for these categories may be outdated and not statistically relevant. Use these data with caution until enough updated data are accumulated in Abramson et al.

5.2 Plumbing

.1 Drainage Systems

Storm Drainage Systems

The roof structure is sloped to the roof drains which enters the facility via rainwater leaders and drain by gravity to a dedicated storm service for the facility. The facility should be serviced with a minimum 150mm diameter storm service. At the time of the site review there was no evidence of any problems with the existing storm sewer service.

Sanitary Drainage Systems

Drainage from the washrooms, lockers and pool deck drains are collected into the sanitary sewer. The facility should be serviced with a minimum 150mm diameter sanitary service. At the time of the site review there was no evidence of any problems with the existing sanitary sewer service.

.2 Domestic Water Cold Water

The Aquatic Centre has its own dedicated 100mm diameter water service. The water service enters into the pool mechanical room where it is reduced in size to 50mm before passing through a water meter then servicing the facility. Deepening Surface corrosion in apparent on the domestic water service flange connection. This is caused by condensation from moisture produced at the adjacent element pool filtration system on the surface. We recommend refurbishing the surface to remove rust and re-application of rust inhibitor paint.

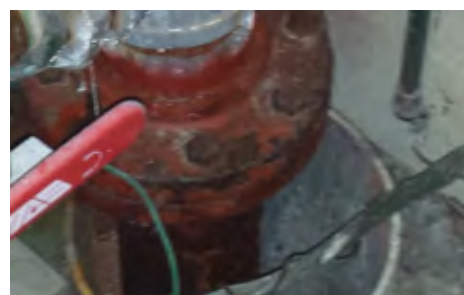


Figure 1: Corrosion Pitting on DCW

Opinion of Probable Cost = < \$500

It should be noted that a cross contamination control device or backflow preventer is not present at the water entry. This could lead to cross contamination of the municipal water supply. Consideration should be given to installing an approved backflow preventer on the domestic water entry and reconfiguration of the piping to allow the installation of a vertical backflow preventer device.

Opinion of Probable Cost = < \$15,000

.3 Domestic Hot Water

Domestic hot water for the locker change rooms is generated by two High efficiency AO Smith Cyclones Model BTH250 100 gas fired natural draft hot water tanks. Each tank has a storage capacity of 380 liters and a heating capacity of 73kW. The tanks are located in the mechanical penthouse. Both hot water tanks were replaced in 2011 and appear to be in very good condition.

A domestic hot water re-circulation system is provided to ensure timely delivery of hot water to the plumbing fixtures. The system is distributed throughout the facility and extends out the furthest public washrooms. Previous reports of leaking recirculation pipes have been repaired. This phenomenon occurs in recirculation piping when high water velocities in the piping are present. Careful attention to the operation of the recirculation system and the installation of circuit flow setters can be considered to mitigate sections of piping with high velocities.

Opinion of Probable Cost = < \$1,500

A single wet rotor circulator located adjacent to the tanks is used to circulate the water. This pump was replaced during the 2011 upgrade and is in very good condition.

.4 Plumbing Fixtures (Condition Very Good: Remaining Service Life 10-15 Years)

Electronic (flush valve) water closets are used in the locker/change rooms and public washrooms. The locker/change room water closets are wall hung and have been upgraded to incorporate electronic infrared flush valves. The public washroom water closets appear to have been upgraded recently with low flow automatic infrared sensor fixtures. These water closets appear to be in very good condition.

Electronic (flush valve) urinals are located in the Men's Locker room. The urinals appear to be in very good condition.

Porcelain enameled steel lavatories and automatic faucets are used in the locker and change rooms, and the public washrooms. The infrared faucets appear to be in fair condition. Some minor chipping was evident on some of the lavatory basins. As part of preventative maintenance, the chips can be filled periodically to mitigate the chips from spreading.

The locker/change rooms incorporates six showers each. The showers are built up and is equipped with a metering shower valve. At the time of the site investigation, the showers appear to be in good working condition. A mechanical mixing valve is present and provides tempered water for the showers. The mixing valves were not reviewed due to access limitations on site.

5.3 Heating Ventilation and Air Conditioning (HVAC)

The majority of the HVAC systems including air systems, pool boilers, domestic hot water, pumps and accessories were replaced as part of a major mechanical upgrade in 2004 & 2011. During this time a glycol recovery loop was installed in the ductwork to provide some ability for heat recovery during the colder months.

Pool Mechanical HVAC Units (AS-1 & RF-1 (Remaining Service Life 10-15 Years))

AS-1 is located in the mechanical penthouse and operates in conjunction with a dedicated return air/relief air fan. The combined system is a recirculation system that provides a ventilation rate of (nominally) 30,000 cfm. This equates to approximately 6 Air changes per hour and satisfies the ASHRAE recommended range of 6-8 Air changes per hour for Pools with Spectator areas. The Air system is equipped with a category 1 heating furnace section that is vented with B vent up through the roof. AS-1 can provide tempered air as required for the facility during the heating season. AS-1 was noted to be in very good condition. Figure 2 indicates surface corrosion at the base of the flue. This is caused by the condensation of acidic flue gases falling on metal surface. This is also noted at the base of the Stainless Steel boiler vents as shown on Figure 3.



Figure 2: Surface Corrosion at B Vent Base Flange

The environmental conditions in the pool during the time of the visit were: 30.7°C @ 63% Relative Humidity. This occurred as the outdoor air temperature was at 24.3°C. This is beyond the ASHRAE recommended environmental limits range of 40%-60% Relative humidity and a 23.8°C-29.4°C inside the pool.

The existing system was unable to maintain the environmental conditions on this humid day within the ASHRAE recommended limits due to the lack of active cooling/dehumidification in the system.

Pool humidity is maintained by modulating the outside air damper setting in the air system. This approach is generally acceptable in Alberta due to the relatively dry air environment throughout a typical year; as there is less than 1% of time where the outdoor air conditions makes it more challenging to stay within the recommended environmental limits.



Figure 3: Surface Corrosion at Boiler Flue Base Flange

Opinion of Probable Cost = < \$1,000

Figure 4: Pool Deck Temp vs Outdoor Temp (January to June)

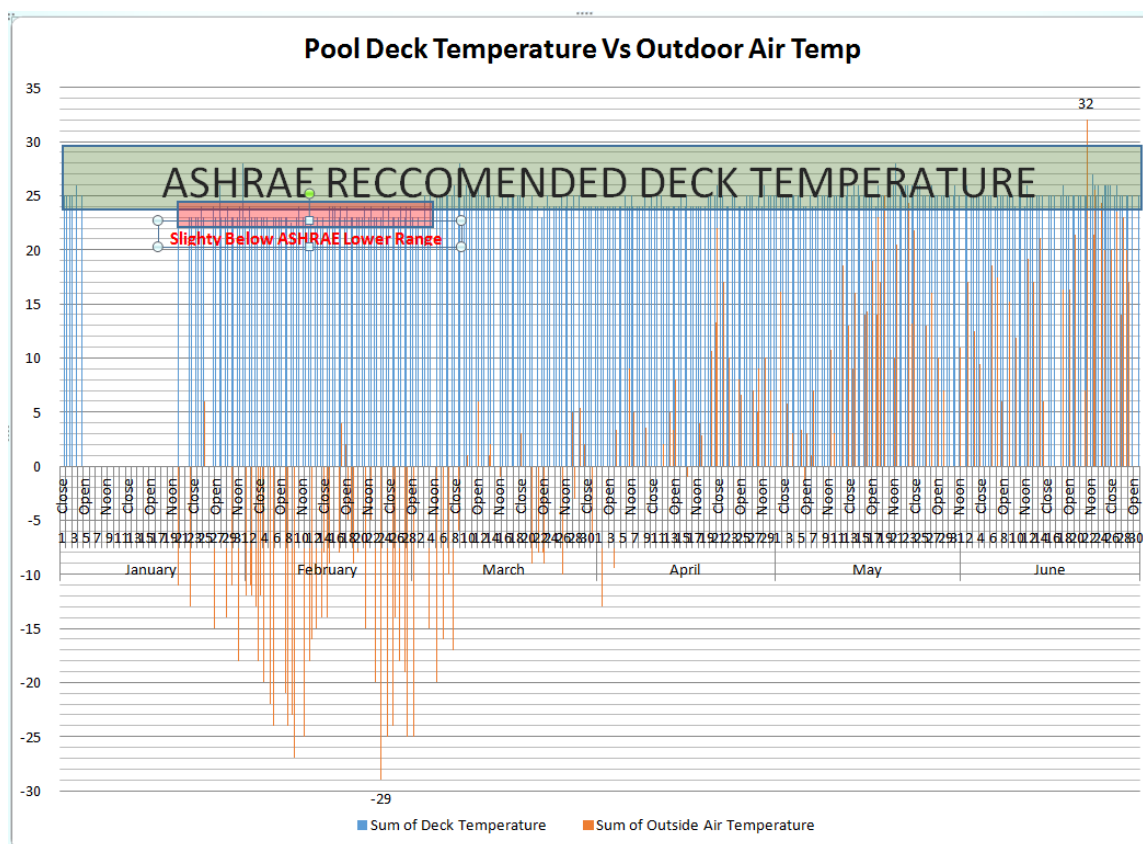
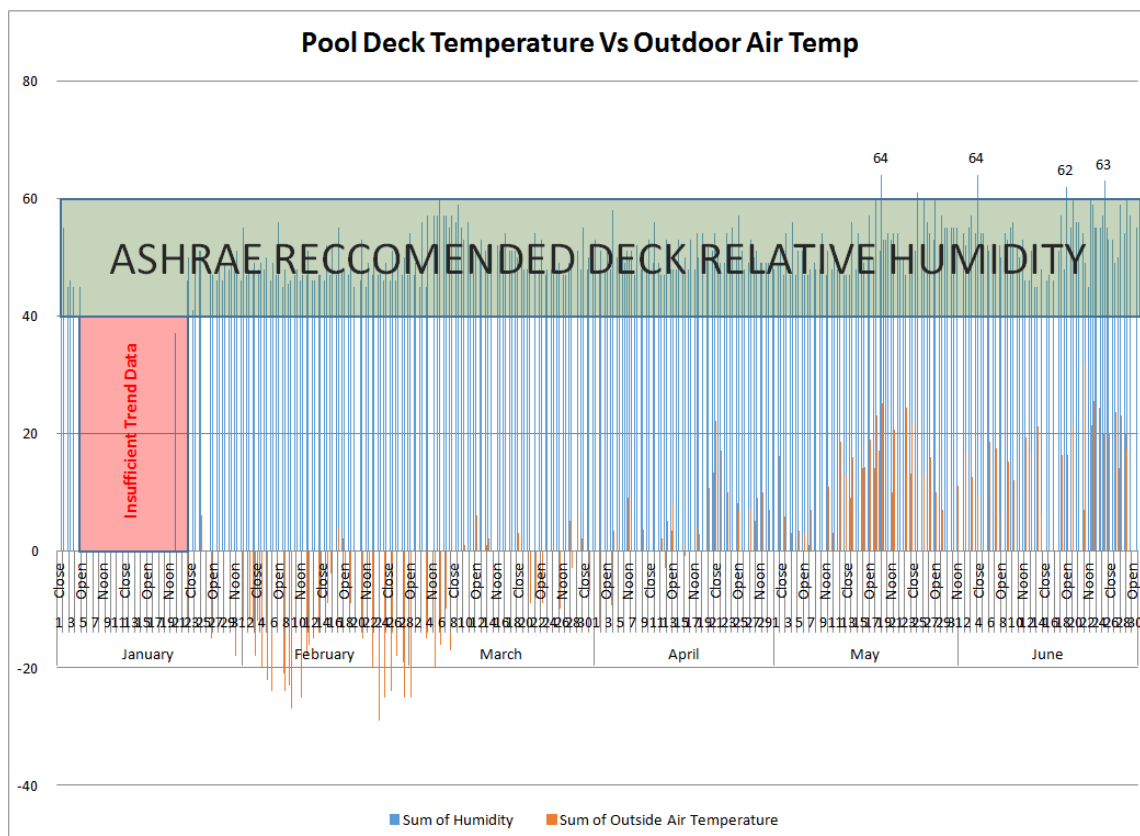


Figure 4 Summarizes received log information of pool deck temperature versus outdoor air temperature. The facilities group tracks temperatures during the open/noon/closing hours of the pool. It can be seen that for representative "Coldest days" The HVAC SYSTEM is capable of maintaining indoor deck temperatures. It is evident through that logged information for in February indicates that the deck temperature is slightly outside the recommended range. A Simple cause of this can be the deviation of calibration between the HVAC control duct temperature sensor and the manual deck thermometer used in the log. This can be addressed by resetting the user set point for the heating season. Further trending of data can help identify a growing hysteresis between the two temperature measuring devices and allow facility staff to maintain temperature sensing equipment as necessary. Figure 5 summarizes the received log information of pool deck humidity versus outdoor air temperature. It can be seen that for the representative data controlling the humidity inside of the ASHRAE recommended limits occur, however not very often.

If the city of Fort Saskatchewan desires their pool air system to be capable of maintaining environmental conditions during the 1% of the typical meteorological year, some cooling/dehumidification can be introduced to the unit by coupling a parallel closed loop fluid cooler to the recovery coil located in the unit. The amount of cooling ability will be limited to the existing coil performance characteristics. Alternately a separate cooling/dehumidification system can be considered for installation. This approach is generally cost prohibitive without any available (existing infrastructure), only to benefit less than 1% in the year and is not recommended.

Opinion of Probable Cost = \$50,000 - \$90,000

Figure 5: Pool Deck Humidity vs Outdoor Temp (January to June)



The Pool Air System also incorporates a glycol heat recovery coil system. The design intent of this system is to allow for heat recovery from the pool relief air during the heating season. This type of system will provide optimum energy savings during periods of high outdoor air damper settings and cold weather. During the time of the visit the system was not operating however facility staff has mentioned that the recovery system does operate during the winter.



Figure 6: Glycol Leak @ Flanges

Evidence of previous leaks can be identified on the heat recovery piping. Glycol piping above the roof is complete with aluminum jacketing. Evidence of deterioration can be found near the exhaust recovery coil above the roof. A local exhaust above the whirlpool is also untitled to evacuate increase chloramines generation above the whirl pool. At the time of the review, the system was not operating.
Opinion of Probable Cost = < \$1,500



Figure 7: Alum. Jacket Deterioration

Back of House HVAC Units

Dedicated Heating and Cooling furnaces provide ventilation and temperature zone control for the Staff, Lobby and Multipurpose areas. The furnaces are multi stage and appear to be in good condition. Cooling is provided via duct mounted cooling coils connected to condensing units located up on the roof. At the time of the visit, the units were operating properly and were easily maintain the building setpoint.

The following existing units are present:

- F1-[Gas Fired, DX] Staff Area Furnace (Heating/Cooling) – Good Condition, (Remaining Service Life 8-10 Years)
- F2-[Gas Fired, DX] Lobby Furnace (Heating/Cooling) – Good Condition (Remaining Service Life 8-10 Years)
- F3-[Gas Fired, DX] Multipurpose Rooms (Heating/Cooling) – Good Condition (Remaining Service Life 8-10 Years)
- F4-[Gas Fired, DX] Male/Female Change Rooms (Heating Only) – Good Condition (Remaining Service Life 8-10 Years)
- Also Operates in conjunction with dedicated exhaust system – Good Condition (Remaining Service Life 10-15 Years)

Miscellaneous HVAC

Various gas fired unit heaters are utilized for space heating of the back of house areas not normally serviced by the primary air systems above. These unit appear to be in good condition from their last installation in 2004.

A heat recovery ventilator is installed in the pool mechanical room and appears to have been installed as part of the major retrofit in 2004. The unit is used to ventilate the pool

mechanical room. It currently has a condensate drain that is

currently terminating at high level. It is recommended that the condensate drain be extended down to terminate closer to the adjacent floor drain.

Opinion of Probable Cost = < \$250

The Trench Drain is passively ventilated via a duct mounted exhaust fan. The fan appeared to be in Fair to good Condition. It was noted that duct damage is evident at the connection ductwork. The hole can be repaired and refurbished.

Opinion of Probable Cost = < \$100



Figure 6: HRV condensate pipe



Figure 7: Exhaust Fan Hole @ Duct

Building Controls

The building incorporates a Building management system that monitors and controls the facilities HVAC Units, Pool Boilers, Pumps, heat exchangers and control valves, and Glycol Heat Recovery Loop. Basic parameters and set points can be viewed and appears to be in good working order. At the time of the visit, it was noted by the facility personnel that it was not possible to manually reset the pool heat exchanger set points. This may be due to a lockout feature in the graphical software suite. Representative system operational points have been captured during the review and included in the appendix.

5.4 Fire Protection

Portable hand held fire extinguishers are provided. The building is not presently equipped with an automatic fire sprinkler system however the facility is equipped with a fire hose cabinet adjacent to the pool mechanical room and fire extinguishers throughout the facility.

5.5 Main Pool Systems

Pool Heating Plant

Pool heating is provided by a two RBI Futera III High efficiency boilers. The boilers have been replaced in 2004 and appear to be in very good condition. The boilers operation at LWT=85.0°C set point however were cycled off at the time of the site visit. Each boiler utilizes a primary boiler circulation pump that operates with the boilers to distribute water through a series of dedicated pool heat exchangers. A condensate neutralizer should be installed to neutralize any flue gas condensation that drops out of the stainless steel vents. The Leisure/Fitness Pool, Warm Pool and Whirl Pool is warmed via dedicated heat exchangers piped in a side stream configuration to the main pool supply/return lines. At the time of the visit all pools temperature set points were satisfied and were not receiving heat from the boiler plant.

(Add Condensate Neutralizer) Opinion of Probable Cost = < \$500

Equipment	QTY	Condition : Remaining Service Life
High Eff. Boilers:	2	Fair/Good Condition : 15-20 Years

Pool Distribution and Turnover Rates

The pool currently has a surge tank which has been decommissioned and abandoned.; the original intent of the leisure pool was for a wave pool operation, however since the pool did not progress with the wave pool function, this made the use of the surge tank redundant. Pool Distribution piping record drawings was not provided and this not reviewed as part of the study. The head end major equipment was reviewed and the Information collected from the site visit is summarized in Table 2. All pool pumps are base mounted end suction pumps and is summarized below:

Pool Pumps	Pump QTY	Condition : Remaining Service Life
Pool Spray Toy:	1	Fair/Good Condition : 10-15 Years
Water Slide:	1	Fair/Good Condition : 10-15 Years
Main pool: Circ. Pumps	1	Fair/Good Condition : 10-15 Years
*(C/W onsite backup motor)		
Whirl pool: Jet Pumps	2	Fair/Good Condition : 10-15 Years
Whirl pool: Circ. Pumps	2**	Fair/Good Condition : 10-15 Years
Warm pool: Circ. Pumps	2**	Fair/Good Condition : 10-15 Years
Vacuum: Vacuum Pumps	2	Fair/Good Condition : 10-15 Years

** (Warm pool and Whirl pool share backup pumps)

The facility staff reported that several pumps recently had reconditioned impellers and motors. And all motors appear to be in Fair/Good condition. Each pump assembly appears to be well constructed and very well maintained with little to no signs of leakage or deferred maintenance.

Table 2: Pool Summary

	Leisure/Fitness Pool	Code or Standard Compliant	Warm Pool	Code or Standard Compliant	Whirl Pool	Code or Standard Compliant
Operating Temperature	31.7 °C	No: Recommended Max 29.4°C	33.1 °C	Yes	39.0 °C	Yes
Method of waste water disposal	Pump to Sanitary	Yes	Pump to Sanitary	Yes	Pump to Sanitary	Yes
Make-up water source	Metered water supply	Yes	Metered water supply	Yes	Metered water supply	Yes
Pool Volume	730.6 m ³	-	30.3 m ³	-	15.5 m ³	-
Pool Surface Area	515 m ²	-	16 m ²	-	14.7 m ²	-
System Flowrate	850 gpm	Yes: Turnover of 4 Hours	190gpm	Yes: Turnover of 1 Hour	160 gpm	Yes: Turnover of 20 mins
Maximum bather capacity	268	Code Allowable= 343	16	YES	16	YES
Type of Chlorine	Salt Electrolysis Chlorinator System	-	Salt Electrolysis Chlorinator System	-	Salt Electrolysis Chlorinator System	-
pH control (+)	Sodium bicarbonate	-	Sodium bicarbonate	-	Sodium bicarbonate	-
pH control (-)	Carbon dioxide/Sodium Bisulphate		Carbon dioxide/Sodium Bisulphate		Carbon dioxide/Sodium Bisulphate	
Automatic controller for ORP & pH	AK600 Accutrol	-	AK400 Accutrol	-	AK400 Accutrol	-
Capabilities of automatic controller	ORP, pH, temp	-	ORP, pH, temp	-	ORP, pH, temp	-
Supplementary disinfection technology	Wapotec System: Hydroxan, Clear It	-	Wapotec System: Hydroxan, Clear It	-	Wapotec System: Hydroxan, Clear It	-

Pool Deck Drainage, Inlets and Outlets

The pool deck trench drainage was recently upgraded in the facility and appears to be in very good condition. Spot drains via deck floor drainage also appear to be in very good condition.
Condition Very Good: Remaining Service Life 20-25 Years

Pool Filtration and Disinfection System

The pool filtration system is comprised of two element style concrete basin filters utilizing Sil Kleer filter aid as the primary filtration media. Previously Diatomaceous Earth was used as a filter media. The filtration system is also complemented with a Waptoec system which uses Hydroxan and clear it to further enhance water quality. During the inspection it appeared that the pool facility smell of chloramines levels were very well maintained and the air quality in the pool was found to be very good. Review of the pool water quality log indicates very good control of pool water quality. Regular shocking of the pool after high loads is reported to be performed regularly.



Figure 5: Corrosion @ Hopper Support

Pool water combined chlorines consistently maintained well below 1ppm and at some occasions below 1-1.5ppm during heavy loads.

The filter basins are a cast in place concrete basin with an epoxy finish. The filter basin does not show evidence of cracking and appears to be in very good condition. Condition Very Good: Remaining Service Life 25-30 Years

An automatic level controller is present in the system to maintain pool levels. It appeared to be functioning and in fair/good condition. Manual fill valves are located at the pool filter to allow for water makeup and pool fill as required by the facility. Condition Fair/ Good: Remaining Service Life 10-15 Years

PH Control is in the form of CO₂ (PH Down) and Sodium bisulphate (PH and Alk Down) and Sodium Bicarbonate (PH and Alk Up). Bulk CO₂ is located in a separate protective room that is monitored and alarmed. At the time of the visit it appeared that the PH control system was operating and in good condition. The facility crew mentioned that the PH up chemical is seldom used and as such was not being utilized. Remaining Service Life 10-15 Years

Chlorine generation is provided by three chemical electrolysis chlorine generators. These electrolysis generators utilize salt in the pool to generate free chlorines for pool water disinfection. Each system is regularly maintained by the facility personnel and appears to be in good working condition. Condition Fair/ Good: Remaining Service Life 10-15 Years

(Replace Lectranator Cells Opinion of Probable Cost 0-5 Years) = < \$15,000

5.6 Sauna Room

(Replace Sauna Heater) The sauna room is a cedar paneled room with a single electric sauna heater. The heater appeared to be in fair to good condition and was working appropriately during the time of the visit. Mild corrosion is evident on the surface

Condition Fair/ Good: Remaining Service Life 0-5 Years

Opinion of Probable Cost 0-5 Years) = < \$5,000

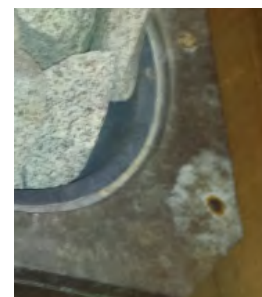


Figure 6: Corrosion @ Sauna Heater

5.7 Upgrades to Extend Lifecycle of Facility

The following is a list of suggested repairs and upgrades for the building based on the building review. Please note that the approximate cost is to be used as a guide to establish the order of magnitude, and the time frame is a general recommendation to assist in cash flow planning. Actual construction costs may vary due to market conditions. Opinions of probable costs cannot be guaranteed. Since the majority mechanical upgrade in 2004, 2007 and 2011, the majority of the mechanical equipment is in good shape. Continual maintenance of the major equipment can produce a residual service lifespan of 10-15 years for most components at which time another major mechanical upgrade can be investigated.

Item	Time Frame (Years)	Opinion of Probable Cost
Preventative Maintenance @ DCW Service	0	\$500
Add an approved backflow preventer to the potable water entry	0	\$15,000
Calibrate Temperature and humidity sensors	0	\$3,000
Miscellaneous Improvements (Corrosion Mitigation)	0-5	\$3,000
Replace Lectranator Cells	5-10	\$15,000
Replace Sauna Heater	5-10	\$5,000
Add Dehumidification to Handle 1% of Condition limits - each year	-	\$50,000- \$90,000

5.8 Expandability of Facility

Based on the existing site services to the facility, there is a likelihood that the domestic water service, sanitary and storm drainage may potentially be limiting factors to support a major expansion to the facility. In such cases, a collaboration will be required with the owner/architect to establish programming parameters that can be reviewed mechanically. In extreme expansion scenarios, new domestic water, gas and drainage services may need to be provided with new mechanical room spaces.

Relative to the existing mechanical spaces, there is limited space to accommodate new mechanical equipment to support a large expansion to the facility. Smaller expansions may be accommodated that have heating and ventilation requirements that the existing plant can accommodate. The existing trench mechanical room can provide additional space at the abandoned surge tank to house additional pool pumps. The surge tank will have to be demolished to accommodate this space.

Any major additions for the pool will have to be coordinated with the owner/architect to establish new minimum space requirements for mechanical systems.

6.0 ELECTRICAL

6.1 General

A site visit was conducted July 30, 2014 at the Harbor Pool to review the existing electrical system in reference to their condition and code violations; the following was noted.

6.2 Power Service and Distribution

The existing service to this facility is fed underground from a pad mounted transformer to a 347/600 Volt, 600 Amp Bus, 1982 Square D Distribution. The main breaker is a 3 pole 400 Amp. The 600 V distribution provides power to mechanical equipment, site lighting and a 125 KVA transformer which supplies power to a 120/208V, 3 Phase C.D.P. 400 Amp Bus. The main board has 4-3 pole spaces.

The existing C.D.P. supplies power to Panels "A", "B", "C", "D" and "M", a Sauna and an electric heater in the Boy's Change Room.

Panel "M" is located in the Mechanical Room, Second Floor, a condensing unit is mounted below and in front of this panel which makes it hard to access.

All the panels are clean and in good shape, we recommend an Infra-Red scan be done on the Main Board, clean and tighten all feeder lugs.

6.3 Lighting

Lighting in the main lobby consists of fluorescent one lamp fixtures of which the lens are yellowed due to age.

The office/administration consisted of recessed fluorescent fixtures with either lamp removed or ballasts due to the room being too bright.

The pool area has a combination of H.I.D., direct/indirect LED, and fluorescent with recessed pots over the Jacuzzi. The area is dark due to the dark ceiling and flooring. The Pool and Deck area lighting levels don't meet the recommendation of IES Illuminating Engineering Society of North America.

The fluorescent fixtures are slowly being replaced with T8 lamps and electronic ballasts would be recommended. Replacing the H.I.D. fixture with direct lighting would also be recommended.

The exterior building lighting are H.I.D. wall packs and a couple of sidewalk mounted direct fixtures shining on the building, changing these to LED would be recommended.

The existing site lighting fixtures are mounted on 3.5M poles with double heads consider change to LED on a higher pole.

6.4 Lighting Control

The existing lighting control is a combination of occupancy sensors and line voltage switch.

6.5 Emergency Lighting and Exit Lights

The facility is equipped with emergency battery packs and exit lights. We recommend that these exits be replaced with LED types but the battery packs be replaced with new self-test technology.

6.6 Telephone System

The existing system is analog with no issues.

6.7 Security System

The existing system supervised by Telsco, consists of a keypad in the kitchen area with 3 security cameras just over the reception counter, door contacts and motion sensors. There does not seem to be any issues with the system.

6.8 Sound System

The existing sound system is a Bogen located in the reception area with speakers throughout the facility. No exterior speakers are on the building.

6.9 Fire Alarm System

The existing system is an Edwards EST series with the Fire Control Panel in the main electrical room with an enunciator in the vestibule. The system has eight zones and a fan shut down. The system was last verified on October 3, 2013.

The audible devices are a small 150mm diameter bells. There were only two heat detectors in the Mechanical Room on the second floor, recommend the addition of one more. No smoke detector at the top of the stair and would recommend adding one. Also there was no exterior audible devices. We would recommend for safety concerns.

6.10 Exterior Car Parking

Exterior receptacles are damaged and should be replaced.

6.11 Cost Estimate

• Power Distribution	\$ 2,000.00
• Lighting	\$110,000.00
• Branch circuit Panels	\$ 1,500.00
• Security System	\$ 1,200.00
• Sound System	\$ 2,500.00
• Fire Alarm System	\$ 2,000.00
• Exterior Car Parking	\$ 1,500.00

Total	\$ 120,700.00
--------------	----------------------

7.0 SUMMARY

7.1 Future Expansions and Renovations

The Harbour Pool Facility is currently under review to identify potential expansions opportunities or upgrades. Aside from any potential additions, the existing facility is in good condition and is not in need of any major upgrades to keep it operational. The majority of the upgrades are recommended as items to replace aging elements and should be considered as near future activities, not immediate requirements. Should future additions be planned for this facility, it would be a good time to include the recommendations in this report in addition to the new scope items to be included

7.2 Recommendations

It is recommended that budgets should be established for all systems, finishes and elements identified in this report as in need of replacement or upgrade. With the budget costs identified, a schedule of upgrades should be prepared, containing a capital strategy of implementation for the next 5 years. The upgrades should be scheduled in order of priority from envelope, mechanical, electrical and interior finishes and aesthetics.

7.3 Cost Opinion

•	Building Exterior Upgrades		
-	Roofing	\$	350,000.00
-	Asphalt Repairs and Painting	\$	15,000.00
•	Building Interior Upgrades		
-	Change Rooms	\$	100,000.00
-	Pool Tanks	\$	500,000.00
-	Pool Deck	\$	125,000.00
-	Main Lobby	\$	75,000.00
•	Building Mechanical Upgrades	\$	41,500.00
•	Building Electrical Upgrades	\$	<u>120,700.00</u>
	Total Building Upgrade Cost Opinion	\$	<u>1,327,200.00</u>

7.4 Future Action

- .1 A review of this report in conjunction with future developments in the community and potential facility expansions should be completed.
- .2 A Hazardous Materials Assessment is recommended to identify any sources of hazardous materials present in the existing building.

7.5 Conclusion

Overall, the facility is in good condition and has been maintained and repaired in a consistent manner. This maintenance has ensured the longevity of the complex and the facility's components. The recommendations identified in this report are primarily upgrades to bring the building finishes up to a current standard and to replace items that are starting to show signs of age. The biggest deficiency noted during our review of the facility is the inability to provide programs and service to the residents of Fort Saskatchewan, primarily due to the lack of leisure pool elements and size. Increased use has made it difficult to provide for the expectations of the community and offer an aquatics experience comparative to neighboring communities.

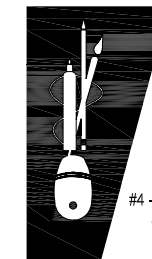
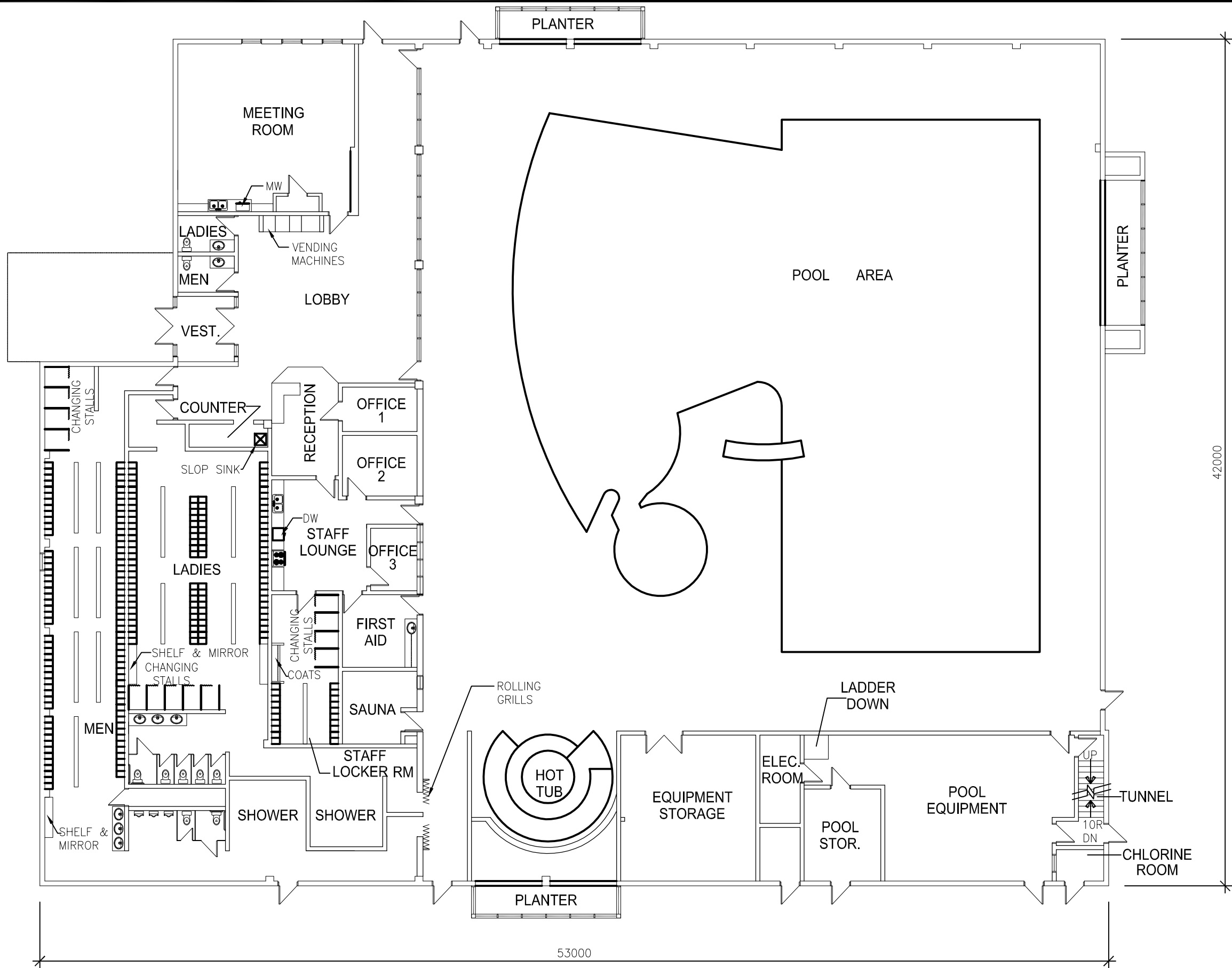
It is recommended that a long term aquatics master plan be developed to identify opportunities for the existing pool in the overall scope of the community recreation plan. As the pool is still an asset to the City, it should be considered as a part of any decisions on future aquatics and recreation improvements for the City of Fort Saskatchewan.

ROOM #	ROOM NAME	FLOOR				N WALL			S WALL			E WALL			W WALL			CEILING			DOOR			DESCRIPTION			COMMENTS / RECOMMENDATIONS		
		TILE	CONCRETE	RESILIENT SHEET FLOORING	OTHER	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	EXPOSED STRUCTURE	PAINTED DRYWALL	ACOUSTIC CEILING TILE	CEDAR PLANKS	WOOD DOORS / FRAMES	HOLLOW METAL-PSF	ALUMINUM		LIFE EXPECTANCY	[<5; 5-10; >10]	PRIORITY = [C] CRITICAL [H] HIGH [M] MEDIUM [L] LOW	
101	ENTRY	X						X				X					X		X					X	Boot racks	5:10	L	Replace floor finish	
102	VIEWING	X						X				X	X				X	X				X		X	Finishes are dated but in good condition.	5:10	M	Replace floor, ceiling and wall finishes.	
103	PROGRAM ROOM	X					X					X				X				X			X	Room has received upgrades - nothing required	>10	L			
104	WOMEN'S WR	X				X	X			X		X		X		X	X			X			X	Room has received upgrades - nothing required	>10	L			
105	MEN'S WR	X				X	X			X		X		X		X	X			X			X	Room has received upgrades - nothing required	>10	L			
106	RECEPTION	X						X								X				X				Mill work is showing signs of use.	5:10	L	Millwork and finished can be upgraded.		
107	OFFICE	X						X				X			X					X			X	Office is in good condition - nothing required	>10	L			
108	STAFFROOM	X						X				X				X				X			X	Room has been upgraded with new paint and cabinets - nothing required	>10	L			
109	STAFF LOCKERS	X						X			X				X					X				Lockers built against west wall, Change cubicles on east wall.	>10	L	Room is too small for the number of staff.		

ROOM #	ROOM NAME	FLOOR				N WALL			S WALL			E WALL			W WALL			CEILING			DOOR			DESCRIPTION			COMMENTS / RECOMMENDATIONS	
		TILE	CONCRETE	RESILIENT SHEET FLOORING	OTHER	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	EXPOSED STRUCTURE	PAINTED DRYWALL	ACOUSTIC CEILING TILE	CEDAR PLANKS	WOOD DOORS / FRAMES	HOLLOW METAL-PSF	ALUMINUM		LIFE EXPECTANCY	PRIORITY = [C] CRITICAL [H] HIGH [M] MEDIUM [L] LOW	
																										[<5; 5-10; >10]		
110	FIRST AID	X						X				X				X				X			X		Office is in good condition - nothing required	>10	L	Room is used for office and First aid - does not function well as a combined space, not enough room for both function.
111	SAUNA	X																		X				Walls are cedar wood on block painted. Wood needs to be refinished.	>5	L	Refinish cedar wall finishes.	
112	LADIES CHANGE	X					X				X				X				X				X	Lockers are stainless steel and in good shape. Floor tile is dated and starting to degrade.	5<10	L	Replace floor tile.	
113	LADIES CH ENTRY	X					X				X				X				X				X	Floor tile is dated and starting to degrade.	5:10	L	Replace floor tile.	
114	WOMEN'S CHANGE WR	X					X				X				X									Washroom partitons appear to be newer, wall tile and floor tile are dated and starting to degrade.	5:10	L	Replace floor and wall tiles	
115	CORRIDOR	X					X				X				X				X					Wall and floor tiles are dated and starting to degrade.	5:10	L	Replace floor and wall tiles	
116	WOMEN' SHOWER	X					X				X				X				X					Wall and floor tiles are dated and starting to degrade.	5:10	L	Replace floor and wall tiles	
117	MEN'S CHANGE RM	X					X				X				X				X				X	Lockers are stainless steel and in good shape. Floor tile is dated and starting to degrade.	5:10	L	Replace floor tile.	

ROOM #	ROOM NAME	FLOOR				N WALL			S WALL			E WALL			W WALL			CEILING			DOOR			DESCRIPTION	LIFE EXPECTANCY	PRIORITY = [C] CRITICAL [H] HIGH [M] MEDIUM [L] LOW	COMMENTS / RECOMMENDATIONS		
		TILE	CONCRETE	RESILIENT SHEET FLOORING	OTHER	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	EXPOSED STRUCTURE	PAINTED DRYWALL	ACOUSTIC CEILING TILE	CEDAR PLANKS	WOOD DOORS / FRAMES	HOLLOW METAL-PSF	ALUMINUM					
118	MEN' CHANGE ENTRY	X				X				X				X				X					X			Floor tile is dated and starting to degrade.	5:10	L	Replace floor tile.
119	MEN'S CHANGE WR	X				X				X				X				X								Washroom partitons appear to be newer, wall tile and floor tile are dated and starting to degrade.	5:10	L	Replace floor and wall tiles
120	MEN'S CHANGE SHOWER	X				X				X				X				X								Wall and floor tiles are dated and starting to degrade.	5:10	L	Replace floor and wall tiles
121	CORRIDOR	X				X				X				X				X								Wall and floor tiles are dated and starting to degrade.	5:10	L	Replace floor and wall tiles
122	POOL	X				X				X				X				X				X	X			Wall are partially covered with cedar planks. Pool tile is dated and startnig to degrade.	5:10	M	Replace tiles on deck and in tank.
123	POOL EQUIPMENT		X			X				X				X				X					X			Room serves basic functions.	>10	L	
124	CHEMICAL STOR.		X			X				X				X				X					X			Room serves basic functions.	5:10	L	
125	METER		X			X				X				X				X					X			Room serves basic functions.	>10	L	
126	ELECTRICAL		X			X				X				X				X					X			Room serves basic functions.	>10	L	

ROOM #	ROOM NAME	FLOOR				N WALL			S WALL			E WALL			W WALL			CEILING			DOOR			DESCRIPTION			COMMENTS / RECOMMENDATIONS		
		TILE	CONCRETE	RESILIENT SHEET FLOORING	OTHER	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	TILE	PAINTED BLOCK	PAINTED DRYWALL	GLAZING	EXPOSED STRUCTURE	PAINTED DRYWALL	ACOUSTIC CEILING TILE	CEDAR PLANKS	WOOD DOORS / FRAMES	HOLLOW METAL-PSF	ALUMINUM					
127	STORAGE	X				X				X				X				X		X	X					Room serves basic functions.	>10	L	
128	JANITOR	X					X				X				X			X					X			Room serves basic functions.	>10	L	
129	OFFICE	X						X		X	X						X		X					X		Office has been renovated to create a dedicated office space - no upgrades are required.	>10	L	
130	STORAGE	X					X				X				X			X					X			Rooms serves basic functions.	>10	L	



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NO DATE DATE
SEAL / PERMIT

SEAL / PERMIT

PROJECT

HARBOUR
POOL
FACILITY EVALUATIONS

SHEET TITLE

EXISTING MAIN
FLOOR PLAN

Scale

1:200

Drawn

MO

Checked

TMN

Date (MM-DD-YY)

03-27-06

Sheet No.

Project No.

06-21

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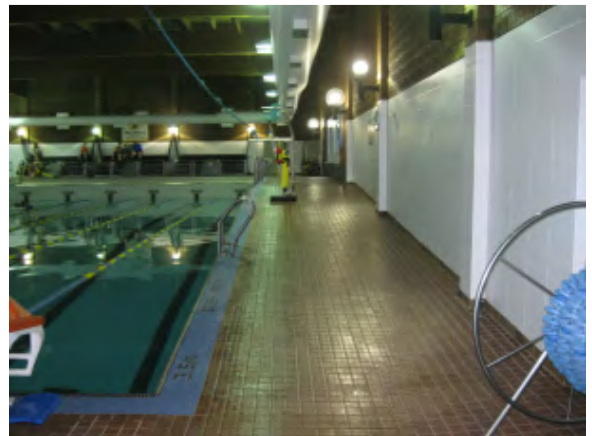
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EXISTING MAIN FLOOR PLAN

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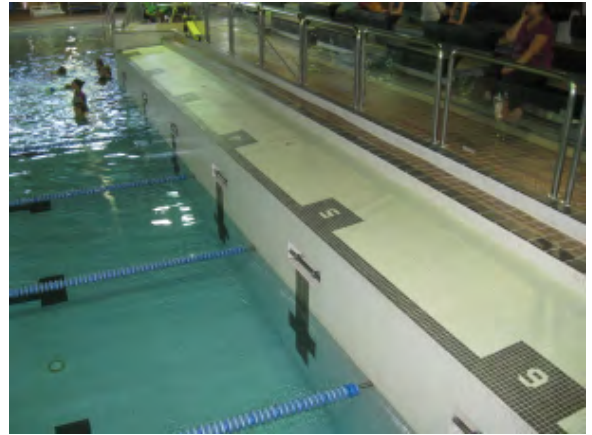






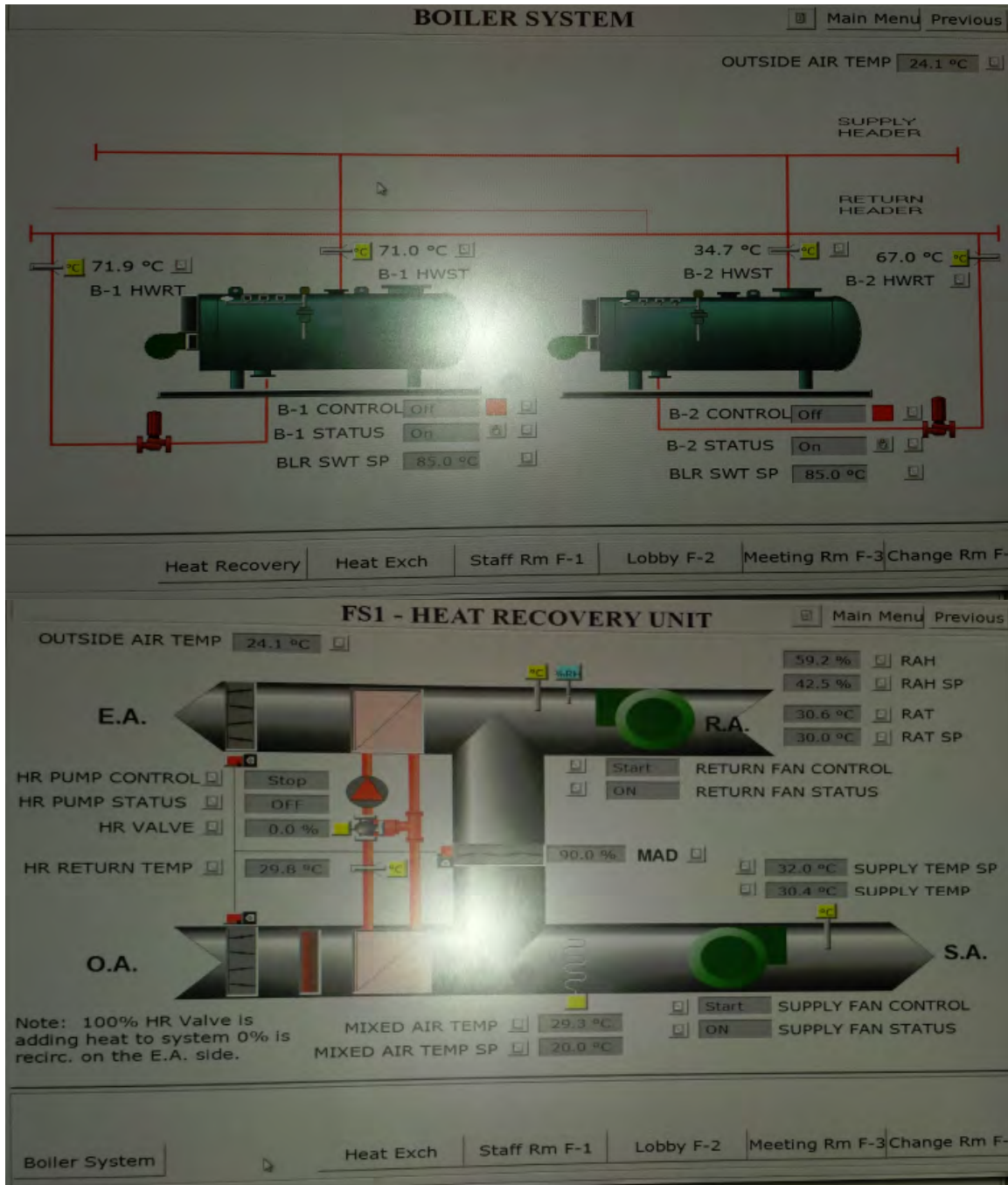


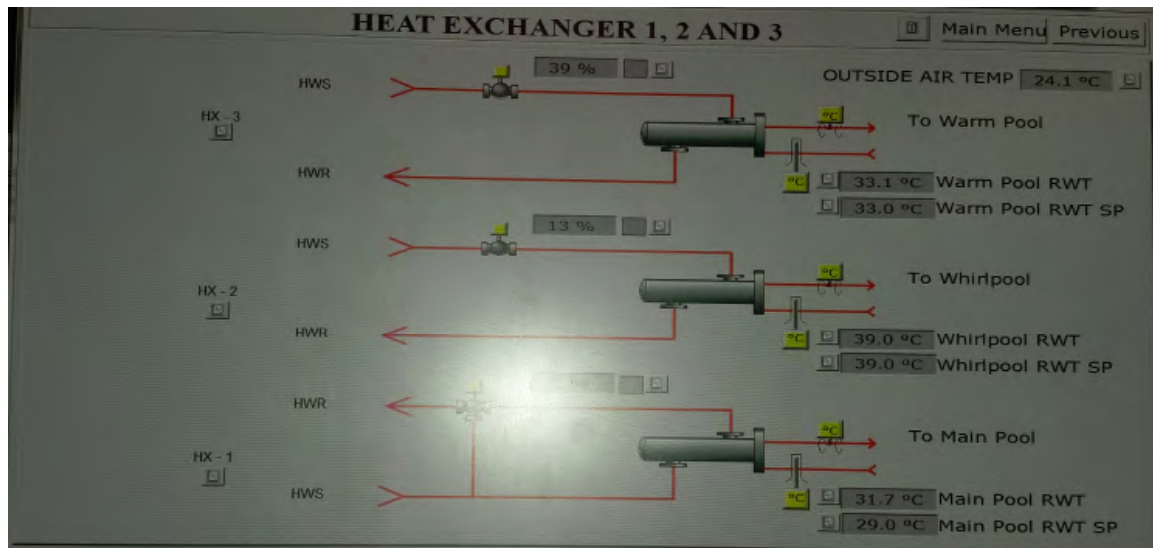


Table 4 Comparison of Service Life Estimates

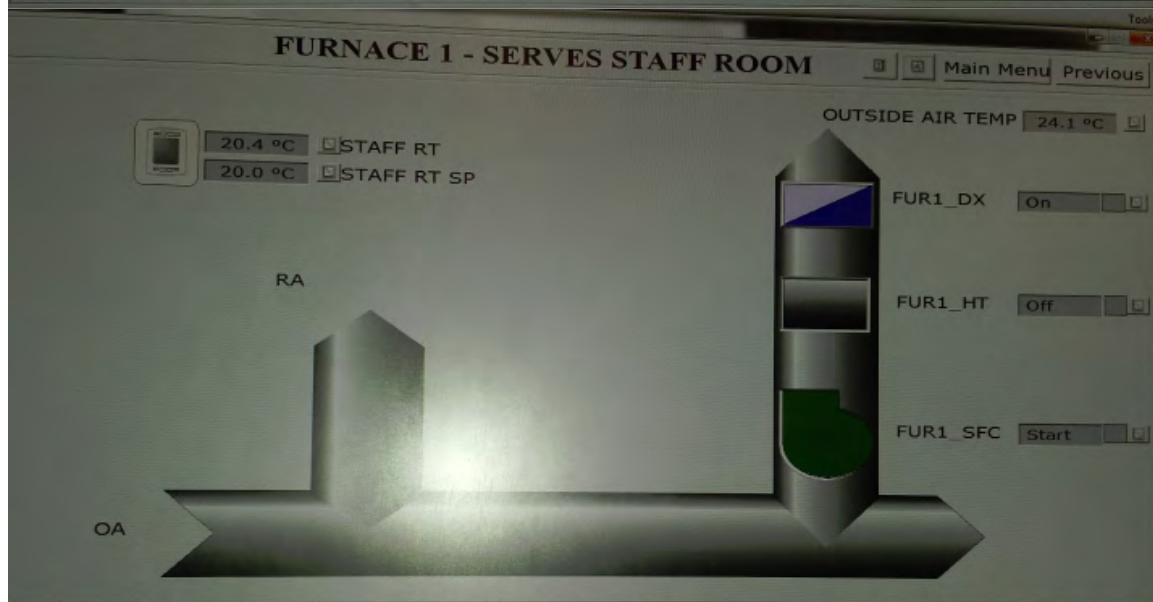
Equipment Item	Median Service Life, Years		Equipment Item	Median Service Life, Years		Equipment Item	Median Service Life, Years	
	Abramson et al. (2005)	Akalin (1978)		Abramson et al. (2005)	Akalin (1978)		Abramson et al. (2005)	Akalin (1978)
Air Conditioners			Air Terminals			Condensers		
Window unit	N/A*	10	Diffusers, grilles, and registers	N/A*	27	Air-cooled	N/A	20
Residential single or split package	N/A*	15	Induction and fan-coil units	N/A*	20	Evaporative	N/A*	20
Commercial through-the-wall	N/A*	15	VAV and double-duct boxes	N/A*	20	Insulation		
Water-cooled package	>24	15	Air washers	N/A*	17	Molded	N/A*	20
Heat pumps			Ductwork	N/A*	30	Blanket	N/A*	24
Residential air-to-air	N/A*	15 ^b	Dampers	N/A*	20	Pumps		
Commercial air-to-air	N/A*	15	Fans	N/A*		Base-mounted	N/A*	20
Commercial water-to-air	>24	19	Centrifugal	N/A*	25	Pipe-mounted	N/A*	10
Roof-top air conditioners			Axial	N/A*	20	Sump and well	N/A*	10
Single-zone	N/A*	15	Propeller	N/A*	15	Condensate	N/A*	15
Multizone	N/A*	15	Ventilating roof-mounted	N/A*	20	Reciprocating engines	N/A*	20
Boilers, Hot-Water (Steam)			Coils			Steam turbines	N/A*	30
Steel water-tube	>22	24 (30)	DX, water, or steam	N/A*	20	Electric motors	N/A*	18
Steel fire-tube		25 (25)	Electric	N/A*	15	Motor starters	N/A*	17
Cast iron	N/A*	35 (30)	Heat Exchangers			Electric transformers	N/A*	30
Electric	N/A*	15	Shell-and-tube	N/A*	24	Controls		
Burners	N/A*	21	Reciprocating compressors	N/A*	20	Pneumatic	N/A*	20
Furnaces			Packaged Chillers			Electric	N/A*	16
Gas- or oil-fired	N/A*	18	Reciprocating	N/A*	20	Electronic	N/A*	15
Unit heaters			Centrifugal	>25	23	Valve actuators		
Gas or electric	N/A*	13	Absorption	N/A*	23	Hydraulic	N/A*	15
Hot-water or steam	N/A*	20	Cooling Towers			Pneumatic	N/A*	20
Radiant heaters			Galvanized metal	>22	20	Self-contained		10
Electric	N/A*	10	Wood	N/A*	20			
Hot-water or steam	N/A*	25	Ceramic	N/A*	34			

*N/A: Not enough data yet in Abramson et al. (2005). Note that data from Akalin (1978) for these categories may be outdated and not statistically relevant. Use these data with caution until enough updated data are accumulated in Abramson et al.





Boller System Heat Recovery Staff Rm F-1 Lobby F-2 Meeting Rm F-3 Change Rm F-4



Boller System Heat Recovery Heat Exch Lobby F-2 Meeting Rm F-3 Change Rm F-4

