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# Final Report - Capital Plan
# Building Condition and Energy Assessments
# Gray Memorial Arena
# 10 Monique Avenue
# Dartmouth, NS

**September 13, 2010**
**Project Number 1001046.2**

Prepared for:

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# 1 Introduction

Capital Management Engineering Limited (CMEL) was retained by Mr. Lou Dursi, Coordinator of Buildings with the Infrastructure & Asset Management Department of the Halifax Regional Municipality (HRM) to complete a twenty-five year Capital Plan, an energy assessment, and a comparative analysis of incorporating energy efficiencies into the recapitalization of the Gray Memorial Arena.

# 2 Purpose

Halifax Regional Municipality operates and maintains more than a dozen arenas located throughout the municipality. HRM has initiated a comprehensive review of the condition and utilization of the arena portfolio in support of the Municipality`s long term asset management plan. To start the comprehensive review, CMEL was asked to complete a building condition and energy assessment of the Gray Memorial Arena the results of which are the subject of this report.

# 3 Methodology

## 3.1 Project Approach

The project was broken down into the following phases:

- **Phase I – Capital Plan Site Assessment**
  A site assessment was carried out to determine the current condition of the building and its major components, and where they were in their life-cycle. Operational cost (operating, maintenance and recapitalization budget) and energy consumption data were collected from HRM.

- **Phase II - Capital Plan Calculations**
  Following site visits and preliminary analysis of the energy and facility assessment data, the building was modelled using industry data to provide an anticipated replacement schedule for the constituent major components over the next twenty-five years with the objective of maintaining the current level of operations for the same duration.

- **Phase III - Energy Audit**
  Specifications on major energy consuming equipment at the site were collected. This audit was conducted concurrently with the site assessment for the Capital Plan.

- **Phase IV - Energy Modeling**
  Based on the site data and historical energy consumption records, the building was modelled and results checked for accuracy against the known historical data. Following ratification of the theoretical modeling, substitutions and alternatives were modeled to provide a predicted output of energy consumption savings.

- **Phase V - Recommendations and Costing**
  Where energy efficient substitutions and alternatives produce a theoretical reduction in energy consumption, a budget level cost was calculated for each specific energy efficiency project. The costing took

into account the offsetting operation and maintenance cost reduction. The simple payback period was calculated for each energy efficient project. The Capital Plan and the energy efficiency related recapitalization projects were input into the Energy Efficiency Capital Planning – Tool (EECP-T), developed by CMEL for Efficiency New Brunswick, to produce an organized base recapitalization schedule for each arena and the resultant Facility Condition Index (FCI) was projected for the next twenty-five years.

- **Reporting and the EECP-T**
  The last phase of the project consisted of developing recommendations and populating the EECP-T such that it can be used by HRM on a going forward basis to support future capital investment and asset management strategies for each arena.

## 3.2 Expected Outcomes

The goals of the Project were to produce a Capital Plan that identified the current building condition and anticipated capital investment requirement to sustain each facility over the next twenty-five years. The Capital Plan is based on using as like as kind component replacement. As a result, the Capital Plan for the arena will continue to be a respective baseline for comparative analysis of potential component refurbishments or substitutions, as well as for alternatives with respect to energy efficiency initiatives.

The objective of the energy assessment was to identify specific alterations to the arena that would result in energy savings. The alterations are typically the result of component substitution, adding alternate technologies or changing building operations procedures while maintaining the same overall building use and objective. The focus of the energy assessment was to identify feasible energy efficiency initiatives, calculate the cost of achieving energy savings, and identify the potential offsetting operational savings as a result of the decrease in energy usage. In some cases, where alternate technologies may produce a significant operational savings but not necessarily an energy reduction, the alternate technologies was identified but not labelled as an energy saving measure.
The last outcome of the project involved incorporating a cost avoidance strategy. Cost avoidance was modeled by incorporating any operation savings as a result of completing energy saving projects and reinvesting those savings into future capital projects. This last phase was accomplished by populating the Energy Efficient Capital Planning Tool (EECP-T). It allows for the comparative modeling of incorporating energy efficiencies into a building while maintaining the capital investment and building operations over a specific time, typically twenty-five years.

## 3.3 General Methodology

The analysis for the Gray Memorial Arena carried out by CMEL consisted of the following:

- Interviews with the Coordinator – Buildings for the Halifax Regional Municipality, as well as with the on-site building managers and maintenance staff as made available;

- Review of available building drawings and equipment specifications;

- On-site assessments that each included a building walk-through, data collection, collection of operating schedules, and observation of building, equipment and component conditions;

- Analysis of energy consumption and billing data;

- Building energy consumption modelling and reconciliation;

- Identification of building component and equipment replacement requirements, estimated costs and schedule;

- Identification of potential operational procedure changes and feasible capital reinvestment initiatives to improve energy efficiency;

- Re-analysis of energy saving initiatives using building modelling to confirm costs and savings;

- Population of the EECP-T with building condition and energy efficiency recommendations to produce a 25 year Capital Plan for the arenas; and

- Responses to a review of a draft report by HRM.

### 3.4 Building Condition Assessment (BCA)

The BCA carried out by Capital Management Engineering Limited on the property are based on the ASTM Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process (ASTM E 2018-08) and consisted of the following:

- Interviews with building managers and maintenance staff and review of existing documentation including drawings, specifications and previous reports when available;
- A site visit to visually review the types and conditions of the building systems and elements;
- The identification of actions, with costs in present value dollars, to remediate health and safety issues, to mitigate code violations[1] and to repair major defects in materials or systems that may significantly affect the value of the building or continued operation of the site during the evaluation period;
- Recommendations, with cost estimates, for further investigations if required and provide Opinions of Probable Costs for work that may be required as a result of these investigations; and,
- The preparation of a report, presented herein.

ASTM E 2018-08 defines a 'Physical Deficiency' as a conspicuous defect or significant deferred maintenance of a Site's material systems, components or equipment as observed during the site assessor's walk-through site visit. Included within this definition are material systems, components or equipment that are approaching, have reached, or have exceeded their typical Expected Useful Life (EUL) or whose Remaining Useful Life (RUL) should not be relied upon in view of actual or effective age, abuse, excessive wear and tear, exposure to the elements, lack of proper or routine maintenance, etc.. This definition specifically excludes deficiencies that may be remedied with routine maintenance, miscellaneous minor repairs, normal operating maintenance, etc., and excludes de minimis conditions that generally do not constitute a material physical deficiency of the Site.[2]

The assessment of the Site was based on a visual assessment of the visible and accessible components of the property, building and related structures. The site components, building exterior, roof membrane(s) and interior finishes of the on-site building and related structures were visually reviewed to check their condition and to identify if any obvious physical deficiencies were present. The review did not include an intrusive investigation of wall assemblies, ceiling cavities or any other enclosure spaces.

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[1] A code compliance is beyond the scope of this project, however specific codes may be referenced during the discussion as a reference standard.
[2] ASTM E 2018-01 Section 2.3.22

No physical tests were conducted and no samples of building materials were collected to confirm or support the findings presented unless otherwise noted in this report. Recommendations and estimates for additional testing or investigations may be presented as part of the report when, in the assessors opinion, a condition may exist that would substantially alter the findings and cannot be adequately assessed by non-intrusive visual means.

The review of the mechanical and electrical systems at the property included discussions with the site contact(s). A visual review of the mechanical and electrical systems was conducted to determine the type of systems present, age and aesthetic condition. No physical tests were conducted on the mechanical and electrical operating systems.

A detailed evaluation of the property development's compliance with national and provincial Building Codes and/or Fire Codes is not part of the scope of this assessment. However, applicable codes may be used as a reference in determining appropriate recommendations. It is assumed that the existing building was reviewed and approved by local authorities at the time of construction. Inquiries were also made to the Halifax Regional Fire & Emergency Services regarding any outstanding issues or violations with regards to the property.

The estimated costs outlined in this report are based on the conditions observed during the site assessment and the documents provided. Estimated costs are based on a combination of past experience, known contractor pricing and estimating guides such as R.S. Means. The opinions of cost are intended for global budgeting purposes only. Actual costs for work recommended can only be determined after preparation of tender documents and/or soliciting quotations from qualified contractors. Costs associated with site and scheduling restrictions, and impacts to ongoing operations have not been taken into account in determining probable costs. The replacement, repair or maintenance recommendations in this report should be confirmed with a more detailed site investigation and project evaluation prior to implementation.

## 3.5 Energy Assessment

For the arena CMEL approximated the current energy consumption of the building based on the reported operational parameters, observed and reported building components. The arena's energy consumption and efficiency opportunities were modeled using *RETScreen. RETScreen* is a computer energy analysis tool offered through Natural Resources Canada (NRCan) and is considered an industry accepted energy screening tool designed for the analysis of building energy consumption.

The data for the base case modeling is typically gained from information gathered from an on-site assessment, interviews from the building manager(s), superintendents, as built drawings and personnel interviews when available. The data gathering is completed in a similar method as the building condition assessment, however more attention is paid to those components that either consume or have the ability to impact the consumption of energy.

The initial modeling produces a baseline case, where the building is modeled reflective of the current "as built" condition. The baseline model is ratified against historical data

when available to provide confidence in the model. For the purposes of RETScreen and typical of energy assessment screening the baseline model is expected to be within 20-30% of actual historical data. Following successful modeling, various component / system replacement and or upgrades are suggested and modeled to evaluate the potential impact on the buildings' energy consumption. As a result of the modeling, CMEL evaluates the component substitutions / upgrades which will have a positive impact on the arena's energy usage and recommends system upgrades and energy management measures that will reduce the overall energy consumption of the arenas. For each of the suggested recommendations, potential savings, cost of implementation, and simple payback periods are calculated.

# 4 Building Condition Assessment & Capital Plan

## 4.1 Salient Property Information

| | |
|---|---|
| **Property Name** | Gray Memorial Arena |
| **Street Address** | 10 Monique Avenue |
| **City, Province** | Dartmouth, Nova Scotia |
| **Primary Use** | Arena |
| **Number of Buildings on Site** | One |
| **Foundation** | Concrete |
| **Superstructure** | Structural Steel |
| **Cladding** | Metal Siding and Brick Masonry |
| **Roof Membrane** | Standing Seam Metal |
| **Reported Year Built** | 1972 |
| **Building Area** | 27,800 $ft^2$ (Reported) |
| **Evaluation Period** | 25 Years |
| **Site Assessment Conducted By** | Scott MacLeod and George Polimac, August 26th, 2010 |

The building is a one storey steel structure containing two mezzanines and is assumed to be founded on standard concrete footings and concrete foundation walls. It was reported that the structure and foundation were originally constructed circa 1972. An addition to the base building consisting of additional dressing rooms, a referee room and a mechanical space was reported to have been completed in 2004. The exterior envelope of the base building and addition is clad with metal siding. The roof consists of standing seam metal panel supported by purlins which are in turn supported by the steel superstructure. The reported area of the building is approximately 27,800 $ft^2$.

The building is located at 10 Monique Avenue in Dartmouth, Nova Scotia and is bordered by Monique Avenue to the east, Farthington Place to the south, residential properties to the north and west. Primary access to the property is provided by an asphalt paved roadway from Monique Avenue with a secondary roadway from Farthington Place. Asphalt paved parking areas are located generally to the north of the of the site building. The site is partially fenced with a section fronting onto Monique Avenue and an additional area of fencing located adjacent to the residential properties to the east that appears to border the property line.

Site improvements include playground area and a two asphalt paved tennis courts on the east side of the property. The playground consists of a multi level free standing structure and an adjacent swing set. The equipment is surrounded by pea gravel base and perimeter wood frames. The tennis courts consists of the asphalt paved play surface, nets and perimeter chain link fencing.

Landscaping predominantly consists of grassed areas fronting onto Monique Avenue and the playground areas. Undeveloped treed areas are located on the north and south sides of the property. The wooded areas do not appear to have been developed or

maintained and as such we have not considered this to be a landscaped portion of the property.

Mr. George Polimac, P. Eng. and Mr. Scott MacLeod of CMEL completed the site visit on August 26th, 2010. CMEL was accompanied by the site contact and Mr. Lou Dursi from the Halifax Regional Municipality. All areas of the building were accessible during the site visit with the exception of sloped roof of the building.

Selected photographs of the site are presented in **Appendix B**.

## 4.2 Site Work

### *Description*

Access to the property is provided by an asphalt paved roadway from Monique Avenue to the north and a secondary asphalt paved roadway from Farthington Place to the south. These roadways provide access to the asphalt paved parking area generally located to the north of the site building and to the mechanical/service areas on the south side of the building. The site is partially fenced with a section fronting onto Monique Avenue and an additional area of fencing located adjacent to the residential properties to the east that appears to border the property line.

Site improvements include playground area and two asphalt paved tennis courts on the east side of the property. The playground consists of a multi level free standing structure and an adjacent swing set. The equipment is surrounded by pea gravel base and perimeter wood frames. The tennis courts consists of the asphalt paved play surface, nets and perimeter chain link fencing.

Landscaping predominantly consists of grassed areas fronting onto Monique Avenue and the playground areas. Undeveloped treed areas are located on the north and south sides of the property. The wooded areas do not appear to have been developed or maintained and as such we have not considered this to be a landscaped portion of the property.

Site lighting is provided by building mounted fixtures and a single pole mounted high intensity discharge (HID) fixture located on the northeast side of the parking area.

### *Observations/Comments*

At the time of the site visit the asphalt parking areas appeared to be in fair to poor condition with numerous areas of settlement, alligator/longitudinal cracking and evidence of past localized repairs. Asphalt paving typically has an expected useful life of fifteen years depending on the frequency of use, maintenance and quality of the original installation. In addition this can be further extended with ongoing localized repairs and minor replacements completed on an as required basis. Based on the observed condition it is expected that a resurfacing will be required in the short term of the evaluation period. For the purposes of the capital plan a resurfacing/replacement allowance has been included in the short term with additional localized repairs beginning at year ten of the evaluation period with additional repairs at approximately seven year intervals thereafter.

The secondary asphalt paved roadway appeared to be in good condition and it was reported that the roadway was installed in 2009 on top of an existing gravel roadway.

Typically asphalt paved roadways have an expected useful life of fifteen to twenty years depending on the quality of the original installation and amount/frequency of use. Based on the observed condition and expected useful life, replacement is not expected to be required although localized patching and repairs can be expected during the evaluation period. It is expected that the majority of the repairs would coincide with repair of the parking areas. An allowance has been included in the capital plan for these localized repairs at seven year intervals during the evaluation period.

The site fencing was observed to vary in condition from poor to good condition. The majority of the fencing was observed to be corroded and at, or nearing, the end of its remaining useful life. A section of the fencing fronting on to Monique appeared to have been recently replaced and is in good condition. Typically chain link fencing has an expected useful life of twenty to twenty five years. Based on the observed condition it is expected that the deteriorated fencing will require replacement in the short term of the evaluation period with an additional cyclical replacement in the extended term of the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Table.

The playground area appeared to be in generally fair condition with some areas of damage and or vandalism observed. The age of the equipment was not reported but the swing set appeared to be fifteen or more years with the free standing equipment appearing to be approximately five years in age. Freestanding modular playground equipment has an expected useful life of ten to fifteen years with the swing set having a useful life of twenty or more years with occasional replacement of swing hardware. Based on the observed condition it is expected that that replacement will be required during the long term of the evaluation period. The estimated cost and timing has been included in the Probable Cost Table.

The tennis court appeared to be in poor condition with the condition of the asphalt playing surface appearing to be in unusable condition. Evidence of past asphalt repairs and extensive vegetation growth was observed during the site visit. The perimeter fencing and gates were corroded and only partially functional. Based on the observed condition it is recommended that the courts be either completely replaced or decommissioned if deemed not required. For the purposes of the capital plan an allowance for replacement has been included in the Probable Cost Table.

Landscaped areas appear to be in good condition and are not expected to require significant capital expenditure. Localized repairs and or replacements are assumed to be completed as part of operations and maintenance budgets. No costs have been included in the Probable Cost Table.

The single pole mounted light fixture appeared and was reported to be in functional condition. Due to the limited cost, lamp and fixture replacement as required has been assumed to be completed as part of general operating and maintenance budgets. No costs have been included in the capital plan.

### *Probable Cost Estimate*

| Item | Action | Year of install | Expected Useful Life | Anticipated year of replacement | Quantity | Unit cost | Item cost |
|---|---|---|---|---|---|---|---|
| **Asphalt Paving - Resurface** | Allowance for resurfacing of asphalt paved parking area | 1972 | 15 | **2011** | 11 | $75,000 | **$75,000** |
| **Asphalt Paving - Repair** | Asphalt paving repair allowance | 2011 | 7 | **2018** | 1 | $5,000 | **$5,000** |
| **Asphalt Roadway - Secondary** | Repair allowance for as required repairs | 2009 | 7 | **2016** | 1 | $1,000 | **$1,000** |
| **Chain Link Fencing** | Replacement of aged fencing | 1972 | 25 | **2011** | 520 | $19.58 | **$10,182** |
| **Chain Link Fencing** | Replacement at end of EUL | 2011 | 25 | **2036** | 650 | $19.58 | **$12,727** |
| **Playground Equipment** | Replacement of playground equipment | 2005 | 15 | **2020** | 1 | $50,000 | **$50,000** |
| **Tennis Court** | Replacement of Tennis Courts (2) | 1972 | 20 | **2011** | 2 | $42,000 | **$84,000** |

## 4.3 Structure

### *Description*

The building was reported to be and was observed to be a single storey steel structure originally constructed in 1972. An addition to the base building was reportedly completed in 2004. It is assumed that the structure of the base building and addition is founded on standard concrete foundations consisting of spread footings and a frost wall. The foundation wall on the north side of building appears to have additional concrete buttress supports as a result of the sloped grade. Interiors consist of concrete slab on grade floors. As a result there is no basement or crawl space associated with the building. There are two partial mezzanines that have been constructed within the original structure. The mezzanines are supported by a combination of block walls and steel columns and assumed to be timber floor joists.

The roof system is supported by metal purlins in turn supported by the steel superstructure.

### *Observations/Comments*

No evidence of major structural faults was observed or reported with the building structure. The frost wall did not exhibit any signs of cracking or settling and there were no obvious signs of structural distress of failure. The buildings floor appeared to be level and stable; no significant signs of deflection or movement were observed. Based on the observed condition, no significant repair or replacement of the structural components is expected to be required during the evaluation period. No costs have been included in the Probable Cost Tables.

### *Probable Cost Estimate*

| Item | Action | Year of install | Expected Useful Life | Anticipated year of replacement | Quantity | Unit cost | Item cost |
|---|---|---|---|---|---|---|---|
| **No major recapitalization anticipated** | | | | | | | |

## 4.4 Roofing

### *Description*

At the time of the site visit the roof was not accessible and was visually reviewed on the exterior from ground level where possible. The site contact was questioned regarding any past or active water ingress and the exposed roof structure in the interior of the building was also visually reviewed where possible.

Roofing for the base building and addition consists of prefinished standing seam metal roofs. It was reported that the main arena roof has an applied water proofing membrane (Silver-Shield). Insulation for the roof was reported to consist of batt insulation. Drainage for the roof is provided by sheeting action to eavestroughs and downspouts.

### *Observations/Comments*

The main arena metal roof membrane was reported to be original to the building and in poor overall condition with a history of past water ingress. The expected useful life of a metal roof is approximately thirty years. The main arena roofing has exceeded its useful life and based on the reported condition and estimated remaining service life, replacement is expected to be required in the short term of the evaluation period. The addition roofing appeared and was reported to be in good condition with no reported areas of damage or water ingress. The expected useful life of the roof is similar to the main arena roof and the roof is expected to require replacement near the end of the evaluation period. The estimated cost and timing of the roof replacements has been included in the Probable Cost Tables.

### *Probable Cost Estimate*

| **Item** | Action | Year of install | Expected Useful Life | **Anticipated year of replacement** | Quantity | Unit cost | **Item cost** |
|---|---|---|---|---|---|---|---|
| **Roofing – Arena** | Replace main arena metal roofing | 1972 | 30 | **2011** | 28,000 | $9.00 | **$229,500** |
| **Roofing - Addition** | Replace roofing at end of useful life | 2006 | 30 | **2035** | 2,300 | $9.00 | **$20,700** |

## 4.5 Architecture - Exterior

### *Description*

The exterior cladding on the main arena and addition predominately consists of prefinished vertical metal panels however the cladding at main entrance to the arena consists of a combination of brick veneer on the lower elevation and vertical wood siding on the upper elevation. The primary entrance is located on the east elevation and consists of four metal exterior doors in metal frames. There are a total of eight exit /secondary access associated that consist of metal doors in metal frames. The main entrance is accessed by concrete stairs and landing complete with a galvanized metal handrail from the parking area and by a concrete walkway from the municipal sidewalk on Monique Avenue. The stairs, landing and handrail were reported to have been installed in 2009. A secondary exterior wood stair with metal handrail provides access to the parking area from the exit door on the north elevation. Overhead doors are located on the east and south elevations and provide access to the ice surface and the Zamboni room. Both overhead doors consist of segmental insulated metal doors. The building is not provided with exterior glazing.

### *Observations/Comments*

The prefinished metal siding on the main arena appeared to be in fair overall condition with some localized areas of impact damage and corrosion. A section of the siding located near the addition appears to have been replaced during the construction of the addition. The expected useful life of prefinished metal siding is typically thirty years although based on the observed condition it is expected that the siding has a remaining useful life of approximately ten to fifteen years. The estimated cost and timing of the replacement has been included in the Probable Cost Tables.

The metal siding on the addition appeared and was reported to be in good condition with some minor areas of impact damage noted on the east side of the addition, possibly as a result of snow clearing during the winter. It is assumed that the siding was installed during the construction of the addition in 2004. Similar to the siding on the main arena the siding will typically have an expected useful life of thirty years. Replacement is not expected to be required until near the end of the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Tables.

The limited amount of brick veneer cladding appeared to be in generally good condition. Brick veneers have an indefinite expected useful life with occasional repointing of the mortar joints. Due to the limited amount of brick veneer any repointing or localized brick replacement is expected to be able to be completed as part of general operations and maintenance budgets. No costs have been included in the Probable Cost Table.

The section of vertical wood siding appeared to be in fair to poor condition with faded finishes and potential deterioration of the wood. Based on the observed condition it is expected that the siding will require replacement in the short and extended terms of the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Table.

The main and secondary/exit doors appeared to be in good condition. The doors were reported to have been replaced within the past five years. Typically metal exterior doors have an expected useful life of twenty to twenty-five years. Replacement of the doors is not expected to be required until the extended portion of the evaluation period. The estimated cost and timing has been included in the Probable Cost Table.

The concrete stairwell, landing, walkway and handrail accessing the main entrance appeared to be in new condition and should not require capital expenditure during the evaluation period. No costs have been included in the Probable Cost Table.

The secondary exterior wood stairs appeared to be in fair condition with damaged painted tread finishes. Exterior wood stairs have an expected useful life of fifteen years. Due to the limited replacement cost no capital funding has been included in the Probable Cost Table.

The main and secondary/exit doors appeared to be in good condition. The doors were reported to have been all replaced within the past five years. Typically metal exterior doors have an expected useful life of twenty to twenty-five years. Replacement of the doors is not expected to be required until the extended portion of the evaluation period. The estimated cost and timing has been included in the Probable Cost Table.

The overhead door on the east elevation appeared to be in fair condition although aged. Typically overhead doors have an expected useful life of fifteen years depending on the amount and frequency of use. Based on the observed condition and expected remaining useful life of the door replacement should be anticipated in the short term of the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Table.

The overhead door accessing the Zamboni room appeared to be aged and in fair to poor condition. Based on the observed condition it is expected that the door will require replacement in the short term with additional cyclical replacement in the short term of the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Table.

### *Probable Cost Estimate*

| Item | Action | Year of install | Expected Useful Life | **Anticipated year of replacement** | Quantity | Unit cost | **Item cost** |
|---|---|---|---|---|---|---|---|
| **Metal Siding - Main Building** | Replace metal siding at end of remaining useful life | 1972 | 30 | **2021** | 13,000 | $7.75 | **$100,750** |
| **Metal Siding - Addition** | Replace metal siding at end of remaining useful life | 2004 | 30 | **2034** | 2,500 | $7.75 | **$19,375** |
| **Wood Siding** | Replace wood siding | 1972 | 25 | **2012** | 500 | $7.00 | **$3,500** |
| **Main and Secondary Entrance Doors** | Replacement at end of remaining useful life | 2005 | 25 | **2030** | 8 | $1,350 | **$10,800** |
| **Overhead Door** | Replace east elevation overhead door at end of useful life | 1980 | 15 | **2014** | 1 | $4,000 | **$4,000** |
| **Overhead Door - Zamboni Room** | Replacement of overhead door to Zamboni Room | 1990 | 15 | **2014** | 1 | $1,500 | **$1,500** |

## 4.6 Architecture - Interior

### *Description*

The original portion of the building generally consists of the ice surface atop a concrete slab on grade, change rooms, washrooms, mechanical rooms, storage areas, concession room, skate sharpening room and a Zamboni garage. An addition to the base building was reported to have been completed in 2004 consisting of two additional change rooms, shared showers and a referee change room. The interior wall finishes of the arena generally consist of painted plywood and exposed painted metal columns / beams. Ceilings in the arena are generally exposed to the underside of the roof insulation. Floors generally consist of painted concrete with the perimeter of the rink and changing rooms covered with rubber mats.

The partition walls are generally painted block and or drywall walls. Each of the change rooms are finished with painted benches, rubber floor mats typical of ice arenas, and florescent lighting. The ceiling in the change rooms are generally painted plywood.

The mechanical room and the Zamboni garage have minimal finishes. The floor is exposed concrete and the walls are painted. There are two public washrooms in the building in additional to the washrooms and showers in addition.

The ice surface is surrounded by wood and metal framed dasherboards, glass and netting.

***Observations/Comments***

Overall the interior finishes in the building appeared and were reported to be in generally fair to good condition. The walls and accessible structural elements appeared to be in good condition and recently painted. It was reported that interior painting is typically completed on an as required basis each year as part of operations and maintenance budgets. It is expected that this will continue and as such no costs have been included in the Probable Cost Table.

The rubber mats were in good condition and did not have signs of excessive wear or missing sections. It was reported that the majority of the mats had been recently replaced. Rubber mats will generally have an expected useful life of fifteen years however this can vary significantly with the amount of traffic. Based on the observed condition and expected useful life we anticipated that the mats will require replacement toward the end of the long term of the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Table.

The partitions and plywood walls appeared to be in good condition and are expected to last the term of the study. It was reported the plywood has been recently replaced. As a result no recapitalization of the interior partitions is anticipated.

The dasherboards appeared to be in fair condition with no indications of significant damage to the boards or hardware. It was reported that the boards are original to the building. Dashboards have an expected useful life of twenty-five to thirty years with localized repairs and minor replacements completed on an as required basis. It is expected that any repairs would be completed as part of general operations and maintenance budgets. Based on the observed condition and estimated remaining useful service life replacement of the boards is recommended in the long term of the evaluation period. Although the metal support framing for the dasherboards may not require replacement at the same time as the other components it is recommended that a budgetary allowance for a complete replacement be included as part of the budgeting process. This would allow for potential for changes to board design, manufacturer, etc. as required.

Interior doors consist of a combination of metal and or wood doors that appeared to be in good condition overall. Interior doors have an expected useful life of approximately forty years with regular maintenance. As the cost for replacing a door is relatively minor we expect that it can be covered under regular operations and maintenance budgets.

The rink floor slab was reported to be in good condition with no cracks and no signs of settlement. Based on the reported condition no significant repairs or replacement is expected to be required during the evaluation period.

### *Probable Cost Estimate*

| Item | Action | Year of install | Expected Useful Life | Anticipated year of replacement | Quantity | Unit cost | Item cost |
|---|---|---|---|---|---|---|---|
| **Rubber Flooring** | Replace flooring at end of useful life | 2007 | 15 | **2022** | 3,900 | $25.35 | **$98,865** |
| **Dasherboards** | Replace metal framed boards, framing and glazing | 1972 | 25 | **2017** | 1 | $175,000 | **$175,000** |

## 4.7 Mechanical Systems

### 4.7.1 Plumbing

#### *Description*

Domestic water and sanitary services were reported to be provided by the municipality. The incoming water line is not provided with a back flow preventer. Within the building, copper domestic water lines feed the washrooms, change rooms and service areas. Wastewater piping is assumed to be a combination of ABS and cast iron which drains to the municipal sewer system. Washroom fixtures consist of typical water closets, urinals and sinks. Domestic hot water for the public washrooms is provided by a 30 gallon Giant electric hot water tank manufactured in 2002.

Change Rooms A and B as well as the Referee Change Room are located in the addition to the building. The change rooms are provided with a shared shower area consisting of four push button showers. The Referee Change Room is provided with a single shower, sink and water closet. Domestic hot water for the showers and sinks in the addition is provided by a Phase III indirect fired hot water heater that is heated from the oil fired boiler in the addition.

#### *Observations/Comments*

The domestic water system appears and was reported to be good overall condition. There were no reports of problems with any of the domestic water services. Typically the domestic and sanitary piping will have an expected useful life in excess of forty years. It was reported that there are no issues with the domestic water lines or sanitary piping, however it is anticipated that some repairs will be required within the term of this evaluation. We have provided an allowance in the capital plan for such repairs. In addition it was noted that the main incoming water line is not provided with a back flow preventer. It is recommended that a back flow preventer be installed in the short term of the evaluation period. The estimated cost has been included in the Probable Cost Table.

The water closets, urinals and sinks in the original building have been generally upgraded with more efficient fixtures while the fixtures in the addition were reportedly installed in approximately 2004. It was noted that the water closets and urinals are of ‘low flow’ design and the sinks have aerators. Typically water closets and urinals have an expected useful life of thirty years with replacement of specific units completed as a result of failure or damage. Due to the limited number of fixtures it is expected that replacement can be completed on an as required basis as part of general operating and maintenance budgets.

The Giant electric hot water tank was manufactured in 2002 and there were no reported issues with its operation. Domestic hot water heaters have a typical useful life of fifteen

years. As a result we anticipate replacing the heater at the end of their useful life. Additional cyclic replacement is anticipated at fifteen years intervals thereafter.

The shared showers in Change Rooms A and B are in good condition and were installed in 2004 as part of the construction of the addition. The showers are equipped push button flow regulators. Shower fixtures typically have a twenty to twenty-five year expected useful life. Replacement of the fixtures is not expected to be required until the extended portion of the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Table.

The Phase III domestic hot water tank for the addition appeared to be in good condition and has an expected useful life of twenty or more years. Based on the observed condition and typical expected useful life replacement of the tank is not expected to be required until the extended term of the evaluation period. The estimated cost has been included in the Probable Cost Table.

### 4.7.2 Heating Ventilation and Air Conditioning

***Description***

The building is provided with minimal heating and ventilation. The building is not provided with cooling.

Heating for the addition (Dressing Room A & B and Referee Change Room) is provided by in floor hot water radiant heat. Hot water is supplied by a Burnham oil fired boiler with a Riello 40 burner. Fuel oil for the boiler is provided from a Roth dual walled fuel oil tank (model #: 1000L) with a capacity of 275 gallons (1,040 litres).

Primary heating for the Dressing Room C and D, public washrooms and office areas is provided by electric unit heaters and or electric baseboard heaters of various manufacture and age. Heating for the Zamboni/equipment room is provided by two electric unit heaters. Flood water is generated by an oil fired Kerr Comet hot water boiler equipped with a Riello Oil fired burner. The boiler supplies hot water to two, sixty gallon Triangle Tube Phase III indirect fired hot water heaters (model #: TR-60). Flood water was reported to be maintained at approximately 180°F during the operating season.

Fuel oil for the flood water boiler is provided by an exterior fibreglass fuel oil storage tank. The tank has a capacity of 1,126 litres and was manufactured in 2001.

Ventilation is provided by intake and exhaust vents located in the gable portions of the exterior walls on each end of the building. The intake vent was noted to have mechanically actuated louvers with the exhaust vent provided with an exhaust fan and mechanically actuated louvers. The exhaust fan has a $CO_2$ sensor which activates the exhaust fan as well as the exhaust and intake louvers.

Heating for the bleachers consists of two coin operated propane fired radiant tube heaters. The burners were manufactured by Schwank (model #. STS-JZ-130 N) each with a rated capacity of 130 BTUH.

The ice making plant consists of an evaporative condenser manufactured by Baltimore Aircoil (BAC), a Plate chiller rated at 90 tons capacity complete with two – 25hp circulation motors, two Mycom reciprocating compressors each equipped with 75hp motors. The refrigerant for the plant is ammonia and the system is not equipped with a

heat recovery system. The plant provides chilled brine water to the header and associated under ice slab piping for ice production.

Dehumidification for the arena is provided by two Cimco dehumidification units.

***Observations/Comments***

The Burnham boiler was reported to be in good overall condition and has an expected useful life of twenty to twenty-five years. Based on the observed condition and expected useful life replacement is not expected to be required until the extended term of the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Table.

The Roth fuel oil storage tank appeared to be in fair to good condition. The tank was manufactured in 2004. It was reported that in HRM owned/managed properties that oil storage tanks are typically replaced after ten years of service due to insurance requirements. It is recommended that this be confirmed with regards to dual walled and fibreglass tanks. In keeping with the reported requirement we have allowed for replacement of the tank in the short term with additional cyclical replacements at ten year intervals thereafter during the remaining portion of the evaluation period.

The in floor radiant heating is not expected to require replacement during the evaluation period. No costs have been included in the Probable Cost Table.

The electric unit and baseboard heaters varied in age and condition from good to fair. It was reported that the unit heaters are replaced on an as required basis. Typically unit heaters have an expected useful life of fifteen to twenty years and were reported to be replaced most frequently as a result of damage from patrons. Based on the observed condition and ages it is expected that ongoing replacements will be required during the evaluation period. Due to the limited cost of the units, future replacements are expected to be completed as part of operations and maintenance budgets. As such no costs have been included in the Probable Cost Table.

The Kerr oil fired hot water boiler for flood water appeared to be fifteen years in age and in fair condition. The boiler has an expected useful life of twenty to twenty-five years although this can vary depending on the amount and frequency of maintenance and part replacement. Based on the observed condition and expected useful life it is expected that the boiler will require replacement in the short term of the evaluation period. The estimated cost and timing has been included in the Probable Cost Table.

The flood water indirect hot water heaters were reported to have been installed in 2009 and appeared to be in good condition. Typically these tanks would have an expected useful life of twenty-five years. Based on the observed condition and estimated remaining useful life replacement is expected to be required in the extended term on the evaluation period. The estimated cost of the replacement has been included in the Probable Cost Table.

The fibreglass fuel oil storage tank appeared to be in fair to good condition. The tank was manufactured in 2002 and is currently eight years in age. It was reported that in HRM owned/managed properties that oil storage tanks are typically replaced after ten years of service due to insurance requirements. As a result we have allowed for

replacement of the tank in the short term with additional cyclical replacements at ten year intervals thereafter during the remaining portion of the evaluation period.

The exhaust fan and intake vent was not accessible at the time of the site visit but were reported to have been replaced within the past ten years with the $CO_2$ sensor and controls reportedly replaced in 2003. The ventilation system was reported to functioning and in fair to good condition. Based on the observed and reported condition we expected that the fan, louvers and sensor will require replacement in the extended term of the evaluation period. The estimated cost and timing of the replacement has been included in the capital plan.

The radiant tube heaters were reported to be in good condition and installed approximately within the past five years. Typically tube heaters have an expected useful life of twenty years. Based on the recent installation and expected useful life replacement of the units is not expected to be required until the extended portion of the evaluation period. The estimated cost and timing of the replacement has been included in the Probable Cost Table.

The ice making plant was reported to be in fair to good condition overall with the plant controls replaced in 2009. The infrastructure appears and was reported to be very well maintained by the onsite staff and upgrades and replacements have been proactively completed. Upgrades to the plant components include the replacement of the original shell and tube exchanger with a plate exchanger complete with ammonia based coolant in 2002 and recent brine pump replacement. The cooling tower was also reported to have been replaced in 2002. The compressors were reported to be original although they have been upgraded as required, are assumed to be nearing the end of their remaining useful life. Based on the observed and reported condition as well as the estimated remaining useful life it is expected that the compressors will require replacement in the short term with the cooling tower requiring replacement in the long to extended term. Additional cyclical replacement of motors should be expected in the extended term of the evaluation period. The estimated costs have been included in the Probable Cost Table.

The brine header and associated under slab piping was reported to be in good condition with new hose connections recently installed. There are currently no leaks or other deficiencies with the header or piping. Typically the header and associated piping has an expected useful life of fifty or more years with localized repairs completed as required. The header and piping are original to the arena and it is recommended that the system be monitored for leaks in the future and repairs be completed to localized areas to maintain the overall system. A complete replacement is not expected to be required and an allowance to complete localized repairs during the evaluation period has been included in the Probable Cost Table.

Two of the dehumidifiers are estimated to be approximately seven to ten years in age and were reported to be in fair condition. They have an expected useful life of twenty years. It is expected that they will require replacement in the long term of the evaluation period. The estimated cost and timing of the replacements has been included in the Probable Cost Table.

## *Probable Cost Estimate*

| Item | Action | Year of install | Expected Useful Life | Anticipated year of replacement | Quantity | Unit cost | Item cost |
|---|---|---|---|---|---|---|---|
| **Domestic Water Piping** | Allowance for localized repairs as required | 1972 | 40 | **2017** | 1 | $3,000 | **$3,000** |
| **Back Flow Preventer** | Install back flow preventer on main incoming water line | 2011 | 25 | **2011** | 1 | $2,500 | **$2,500** |
| **Electric Hot Water Heater** | Replace hot water heater at end of useful life | 2002 | 15 | **2017** | 1 | $1,500 | **$1,500** |
| **Showers - Change Rooms A and B** | Replace showers at end of useful life | 2004 | 20 | **2024** | 4 | $250 | **$1,000** |
| **Hot Water Storage Tanks** | Replacement of tank at end of useful life | 2004 | 25 | **2029** | 1 | $2,500 | **$2,500** |
| **Hot Water Boiler - Addition** | Replacement of Burnham boiler at end of useful life | 2004 | 25 | **2029** | 1 | $12,500 | **$12,500** |
| **Fuel Oil Storage Tank - Roth** | Replacement of Roth tank at ten year intervals | 2004 | 10 | **2014** | 1 | $3,000 | **$3,000** |
| **Oil Fired Boiler - Flood Water** | Replacement of boiler at end of useful life | 1995 | 25 | **2020** | 1 | $12,500 | **$12,500** |
| **Hot Water Tanks - Flood Water** | Replacement of tanks at end of useful life | 2009 | 25 | **2034** | 2 | $2,500 | **$5,000** |
| **Fuel Oil Storage Tank - Flood Water** | Replacement of tank at ten year intervals | 2002 | 10 | **2012** | 1 | $2,000 | **$2,000** |
| **Ventilation** | Replace exhaust fan, $CO_2$ sensor and exhaust/intake louvers | 2003 | 20 | **2023** | 1 | $6,500 | **$6,500** |
| **Coin Operated Radiant Heaters** | Replacement at end of useful life | 2005 | 20 | **2025** | 2 | $2,000 | **$4,000** |
| **Ice Plant - Cooling Tower** | Replacement of 90 ton cooling tower at end of useful life | 2002 | 20 | **2022** | 1 | $48,000 | **$48,000** |
| **Ice Plant - Compressors** | Replacement of compressors | 1972 | 25 | **2012** | 2 | $30,000 | **$60,000** |
| **Ice Plant - 75 hp Motor** | Cyclical replacement of motor | 1987 | 25 | **2012** | 1 | $11,000 | **$11,000** |
| **Ice Plant - 75 hp Motor** | Cyclical replacement of motor | 2000 | 25 | **2025** | 1 | $11,000 | **$11,000** |
| **Ice Plant - 25 hp Motors** | Cyclical replacement of motors | 1995 | 25 | **2020** | 2 | $3,000 | **$6,000** |
| **Ice Plant - Chiller** | Replacement of chiller at end of useful life | 2002 | 25 | **2027** | 1 | $150,000 | **$150,000** |
| **Ice Plant - Brine Piping** | Allowance for localized repairs as required | 1972 | 8 | **2017** | 1 | $5,000 | **$5,000** |

| Item | Action | Year of install | Expected Useful Life | Anticipated year of replacement | Quantity | Unit cost | Item cost |
|---|---|---|---|---|---|---|---|
| **Dehumidifiers** | Replacement of two dehumidifiers at end of useful life | 2000 | 20 | **2020** | 2 | $31,000 | **$62,000** |

## 4.8 Electrical System

### *Description*

The site is supplied with power from the local power utility. Power is transmitted underground to a NSPI owned exterior pad mounted transformer located adjacent to the mechanical room on the south side of the building. The main disconnect rated at 400 A, 600 V and was manufactured by Federal Pioneer. Secondary 600V switchgear provides power to the plant equipment, unit heaters and building lighting. Power is then directed to a 30kVa transformer manufactured by Hammond Manufacturing and then to 120/208V breaker panels that service receptacles throughout the building.

Lighting consists of T8 fluorescent fixtures over the ice surface and change rooms/offices. A limited number T12 and incandescent fixtures were also observed.

### *Observations/Comments*

The exterior pad mounted transformer was noted to be next to the asphalt paved roadway at the rear of the building that has recently been installed. Although the transformer is owned by NSPI impact protection is required and typically the responsibility of the property owner. The estimated cost has been included as a Priority Repair Cost.

The main switchgear, transformer and panels were reported to be generally original to the building. Typically main switchgear and associated secondary panels/switches have an expected useful life of forty years. Based on the observed condition it is expected that at least a partial replacement will be required in the short term of the evaluation period. For the purposes of the capital plan an allowance has been included for switchgear replacement. The estimated costs have been included in the Probable Cost Table.

The branch wiring was reported to be copper with the majority being original to the construction of the building. It was reported that currently thermographic scans are not currently completed to check for areas of deterioration. It is recommended that a regular scanning be completed during the evaluation period and is assumed that this can be funded from operations and maintenance budgets. Typically branch wiring has an expected useful life of forty years. Based on the observed and reported condition a complete replacement is not expected to be required although localized replacements should be anticipated. It is expected that localized replacement can be completed as part of operation and maintenance budgets.

The majority of the interior lighting was replaced in 2009 with energy efficient T8 fixtures. Fluorescent fixtures have an expected useful life of twenty to twenty five years. Based on the recent installation additional replacement is not expected to be required until the end of the evaluation period. For the purposes of the capital plan a replacement allowance for replacement has been included at the end of their estimated remaining useful life.

### *Probable Cost Estimate*

| Item | Action | Year of install | Expected Useful Life | Anticipated year of replacement | Quantity | Unit cost | Item cost |
|---|---|---|---|---|---|---|---|
| **Main Switchgear** | Allowance for partial replacement | 1972 | 40 | 2013 | 1 | $40,000 | **$40,000** |
| **Interior Lighting** | Replacement of T8 lighting at end of useful life | 2008 | 25 | 2033 | 27,800 | $4.00 | **$111,200** |
| **Exterior NSPI Transformer** | Installation of impact protection for transformer | NA | 30 | 2010 | 1 | $2,500 | **$2,500** |

## 4.9 Life Safety

### *Description*

The building is equipped with a fire alarm panel located in the office near the front entrance. The panel is connected to smoke detectors throughout the building and reportedly externally monitored. Fire suppression is provided by a dry pipe sprinkler covering all areas of the building.

Emergency lighting is provided by battery back-up wall mounted lighting and illuminated exit signage strategically placed throughout the building.

There are a number of fire extinguishers mounted throughout the building as well as a wet chemical fire suppression system located in the canteen area.

The building is not provided with automatic door openers at the main entrances or public washrooms.

### *Observations/Comments*

It was reported that the fire alarm panel was installed within the past five to ten years and in good condition. Fire alarm panels have an expected useful life of twenty to twenty-five years and typically require replacement due to insufficient part availability or new technology. The emergency lighting typically requires replacement due to battery failure as well as the potential to replace key items with more energy efficient technology such as LED exit signs. Funds have been included in the capital plan to replace these items.

The sprinkler system was reported to be functional and in good condition with no damaged piping or air leakage. The sprinkler heads were reported to have been completely replaced in 2009. Sprinkler heads generally have an expected useful life of twenty to twenty-five years with the associated piping having useful life of approximately forty years. Based on the observed condition and expected useful life additional head replacement is not expected to be required during the evaluation period. Due to the age of the sprinkler piping it is recommended that an allowance be included in the capital plan for repairs/localized replacement of the piping during the evaluation period.

The fire extinguishers located throughout the building appeared to be well placed and in good condition. They were most recently inspected/serviced in June 2010 by SimplexGrinnell. Replacement on an as required basis is expected during the evaluation period and assumed to be funded from operations and maintenance budgets.

The wet agent fire suppression system in the kitchen was reportedly installed within the past two years and is operational although the canteen was reported have been decommissioned. If the canteen is to be returned to operation it is assumed that the system will be inspected and upgraded if required. No costs have been included in the capital plan with regards to suppression system.

### *Probable Cost Estimate*

| Item | Action | Year of install | Expected Useful Life | Anticipated year of replacement | Quantity | Unit cost | Item cost |
|---|---|---|---|---|---|---|---|
| **Fire Alarm Panel and Emergency Lighting** | Allowance for replacement | 2000 | 25 | **2026** | 1 | $25,000 | **$25,000** |
| **Sprinkler Piping** | Repair/Localized replacement allowance | 1972 | 40 | **2014** | 1 | $3,500 | **$3,500** |

## 4.10 Specialty Systems

### *Description*

The arena is provided with a Zamboni ice resurfacer (model #: 440). It was reported that the resurfacer was purchased in 2001/2002.

### *Observations/Comments*

The Zamboni ice resurfacer appeared and was reported to be in fair condition. These units have a typical expected useful life of between ten and fifteen years. For the purposes of the capital plan it is expected that cyclical replacement will be required at ten year intervals. The estimated cost of the replacement has been included in the Probable Cost Table.

### *Probable Cost Estimate*

| Item | Action | Year of install | Expected Useful Life | Anticipated year of replacement | Quantity | Unit cost | Item cost |
|---|---|---|---|---|---|---|---|
| **Ice Resurfacer (Zamboni)** | Allowance for replacement | 2001 | 10 | **2011** | 1 | $80,000 | **$80,000** |

## 4.11 Accessibility

The site does not appear to be compliant with today's accessibility standards. There are minimal accessibility systems associated with the building. Automatic door openers were not observed at the main, secondary, dressing room or public washrooms. The Public washrooms did not appear to be accessible with regards to stall size or faucets. Wheelchair accessible ramps for viewing were observed.

## 4.12 Opinion of Probable Costs – Gray Memorial Arena

### *Priority Repair Recommendations*

Priority repair costs are for deficiencies observed during the property condition assessment and energy audit that require immediate action to prevent further deterioration to the element or to prevent possible injury due to unsafe conditions and/or code violations. Priority repairs were identified in the installation of impact protection for the exterior NSPI transformer.

### *Major Component Repair and Replacement Project Costs*

Probable costs for the major component replacements identified during the site assessment and energy audit were estimated. Major component replacements can be defined as components:

- That are the responsibility of the Property Owner;
- For which major repair or replacement costs are anticipated to be incurred during its useful life; and
- For which costs of repair or replacement will not be covered as part of the annual operating or maintenance budget.

Major component replacements and energy efficiency projects, and information for developing their estimated costs, are based on observations made during the site assessment on August 26th, 2010. Quantities and areas are based on field observations, site interviews and/or client supplied drawings and equipment specifications. More precise quantity surveying or site measurements were beyond the scope of this assessment. Replacement and repair costs, and implementation of energy efficiency measures, are approximate and based on industry standards or CMEL experience. It is recommended that quotations from qualified contractors be obtained by the City before any specific project is undertaken. The City may also wish to seek advice on potential incentive programs that might assist in such replacements, particularly as they relate to energy efficiency upgrades.

Similarly, some of the identified projects may be undertaken without specific building or other permits. However, investigation of such needs, including detailed studies and engineering, was beyond the scope of this project and remains the responsibility of the City.

Our opinion on the probable costs to remedy observed physical deficiencies, replace items that will exceed their expected useful life over the short term (1-5 years), long term (6-10 years), and extended term (11-25 years) and to address opportunities to improve energy and water consumption efficiency are summarized in the Cash Flow Report in **Appendix A**.

# 5 Energy Assessment

## 5.1 Background

The energy audit was completed in conjunction with the property condition assessment. Traditional building modeling techniques were used to analyse the building envelope and the equipment and systems contained therein. The analysis resulted in the following recommendations that were considered and integrated into the EECP-T along with the general property condition recommendations.

The assessment consisted of four phases:

- Initial project meeting, interview and energy data collection
- Site assessment and additional data collection
- Energy modeling, generation of proposed energy conservation measures, and population of the EECP-T
- Report generation and delivery

On August 26th, 2010, Mr. Scott MacLeod and Mr. George Polimac, P.Eng, completed an on-site assessment of all areas of the Gray Memorial Arena Club, generating a record of operating practices, recent and planned maintenance and capital investment, building utilization data and patterns, lighting, refrigeration, HVAC systems and other energy consuming equipment. In addition to recording the majority of the electrical, #2 oil and propane loads, the building envelope and other major building components and equipment were examined to determine the materials, condition, impact on the current energy usage, and remaining expected useful life (EUL). Building occupancy and utilization were also discussed with the site contact.

The building was modeled with *RETScreen* using climate data from the Halifax International Airport. Theoretical energy consumption was reconciled to the historical electricity, #2 fuel oil and propane consumption data provided by HRM. The model was then used to compare the effectiveness of potential energy conservation measures (ECM) against other options and against existing facility conditions. The results were used to select potential cost-effective ECM.

Building condition information was entered into the EECP-T, along with the recommended ECM. Typical EUL periods and replacement costs were assigned to major building components and equipment. The energy cost savings from the recommended ECM were assumed to be fully reinvested in the facility.

## 5.2 Historical Electrical Consumption and Demand

The Arena consumes electricity, #2 fuel oil, and propane. Historic electrical records were obtained for the period April 2009 to April 2010. The energy records for 2009 for the three energy sources appeared to be most complete and consistent, and are relied upon herein.

The Arena maintains one ice sheet from mid-August to mid-April. In the off season the arena hosts other activities such as lacrosse on a sporadic basis.

### 5.2.1 Electricity

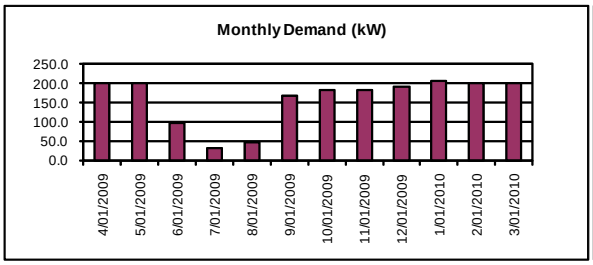
The building is served by a single entrance and meter, and electricity is distributed through two electrical rooms. Electricity is supplied by NS Power at an 11M General Tariff Rate.

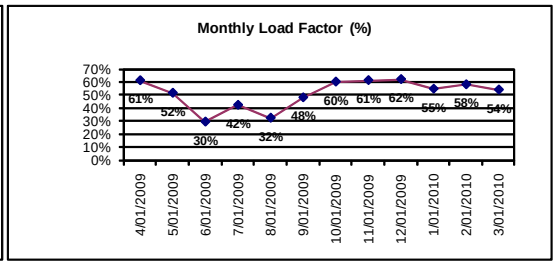
The Arena consumed 743,200 kWh (2673 GJ) for the 2009 – 2010 operating season. The electricity consumption for April 2009 to March 2010 is summarized below. The marginal electricity rate used in calculating simple payback periods is $0.06781. The Arena attracts a demand charge of $9.03 per kWh. The recommendations herein have the potential to reduce peak demand and thus the cost it attracts. However, peak demand is also very dependent on how the Arena is operated and the requirements that are placed upon it. Demand savings will assist to reduce the simple payback periods for the recommended reinvestments, but are not specifically quantified herein.

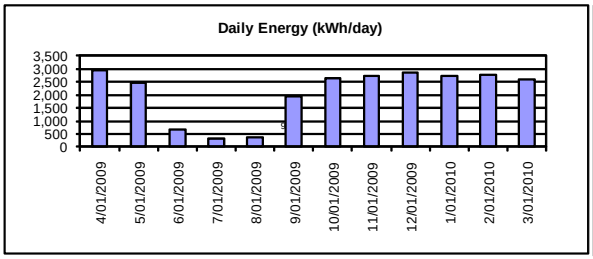
Note that there are additional charges that were not carried through on the summary chart below. They include exterior lighting charges from the City and for an Energy Efficiency program which is charged at $0.00193 per kWh.

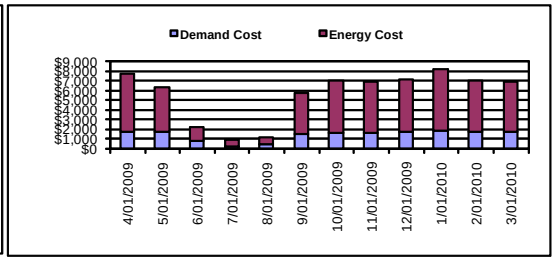
**Electricity Consumption Data** — **Location:** HRM Gray Arena, 15 Monique Ave, 2009-10

| Billing Date | Metered kVA | Metered kW | Power Factor | Billed kW | Energy kWh | Days | Daily kWh | Load Factor | Demand Cost | Energy Cost | Adjust (+/-) | Sub Total | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4/15/2009 | | 200.0 | | 200.0 | 88,000 | 30 | 2,933 | 61% | $1,807 | $5,973 | | $7,780 | $8,947 |
| 5/12/2009 | | 200.0 | | 200.0 | 66,800 | 27 | 2,474 | 52% | $1,807 | $4,535 | | $6,342 | $7,293 |
| 6/11/2009 | | 96.0 | | 96.0 | 20,400 | 30 | 680 | 30% | $867 | $1,389 | | $2,256 | $2,595 |
| 7/13/2009 | | 32.0 | | 32.0 | 10,400 | 32 | 325 | 42% | $289 | $711 | | $1,000 | $1,150 |
| 8/13/2009 | | 48.0 | | 48.0 | 11,600 | 31 | 374 | 32% | $434 | $792 | | $1,226 | $1,410 |
| 9/14/2009 | | 168.0 | | 168.0 | 62,000 | 32 | 1,938 | 48% | $1,518 | $4,210 | | $5,728 | $6,587 |
| 10/14/2009 | | 184.0 | | 184.0 | 79,600 | 30 | 2,653 | 60% | $1,662 | $5,403 | | $7,066 | $8,125 |
| 11/12/2009 | | 184.0 | | 184.0 | 78,400 | 29 | 2,703 | 61% | $1,662 | $5,322 | | $6,984 | $8,032 |
| 12/10/2009 | | 192.0 | | 192.0 | 80,000 | 28 | 2,857 | 62% | $1,735 | $5,430 | | $7,165 | $8,240 |
| 1/13/2010 | | 208.0 | | 208.0 | 92,800 | 34 | 2,729 | 55% | $1,879 | $6,298 | | $8,177 | $9,404 |
| 2/10/2010 | | 200.0 | | 200.0 | 78,000 | 28 | 2,786 | 58% | $1,807 | $5,295 | | $7,102 | $8,167 |
| 3/11/2010 | | 200.0 | | 200.0 | 75,200 | 29 | 2,593 | 54% | $1,807 | $5,105 | | $6,912 | $7,949 |
| **Totals/Max** | | **208.0** | | **208.0** | **743,200** | **360** | | | **$17,273** | **$50,464** | | **$67,737** | **$77,898** |



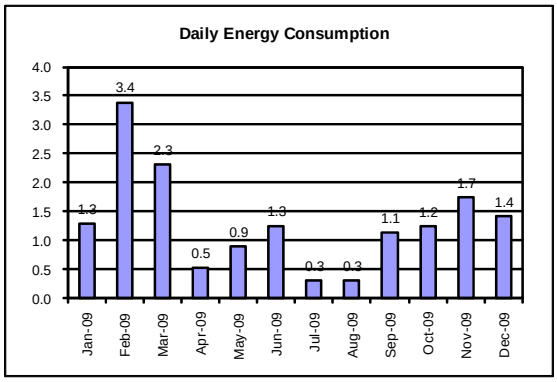
### 5.2.2 #2 Heating Oil

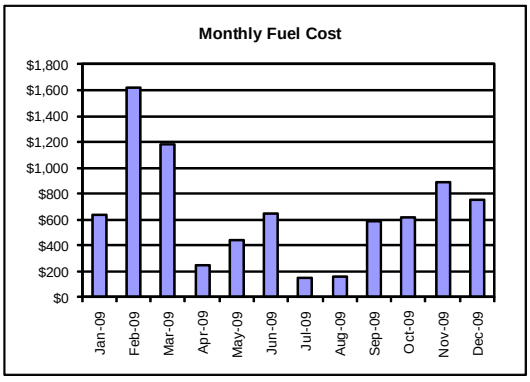
The Arena is supplied with #2 fuel oil by a local supplier. Fuel consumption and cost data for 2009 is summarized in the chart below. The facility consumed approximately 12,791 L (492 GJ) in 2009 at a cost of $7,930 giving an average per litre cost of $0.62. It is assumed that the majority of this consumption was in the winter months as the oil is used to produce flood water and as a heat source for two small fan coil units.

**#2 Oil Consumption Data**

**Location:** HRM Gray Memorial Arena - 2009

| Billing Date | Season S/W | Consumption Litre | Days | Energy GJ | GJ per Day | Demand Cost | Delivery Cost | Supply Cost | Other Cost | Adjust (+/-) | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01/30/09 | W | 1,033 | 30 | 39 | 1.3 | | | $640 | | | $640 |
| 02/28/09 | W | 2,615 | 29 | 98 | 3.4 | | | $1,621 | | | $1,621 |
| 03/31/09 | W | 1,902 | 31 | 72 | 2.3 | | | $1,179 | | | $1,179 |
| 04/28/09 | S | 401 | 28 | 15 | 0.5 | | | $249 | | | $249 |
| 05/28/09 | S | 710 | 30 | 27 | 0.9 | | | $440 | | | $440 |
| 06/28/09 | S | 1,035 | 31 | 39 | 1.3 | | | $642 | | | $642 |
| 07/28/09 | S | 250 | 30 | 9 | 0.3 | | | $155 | | | $155 |
| 08/28/09 | S | 260 | 31 | 10 | 0.3 | | | $161 | | | $161 |
| 09/28/09 | S | 942 | 31 | 35 | 1.1 | | | $584 | | | $584 |
| 10/28/09 | W | 994 | 30 | 37 | 1.2 | | | $616 | | | $616 |
| 11/28/09 | W | 1,440 | 31 | 54 | 1.7 | | | $893 | | | $893 |
| 12/30/09 | W | 1,209 | 32 | 45 | 1.4 | | | $750 | | | $750 |
| **Totals/Max** | | **12,791** | **364** | **481** | **1.3** | | | **$7,930** | | | **$7,930** |



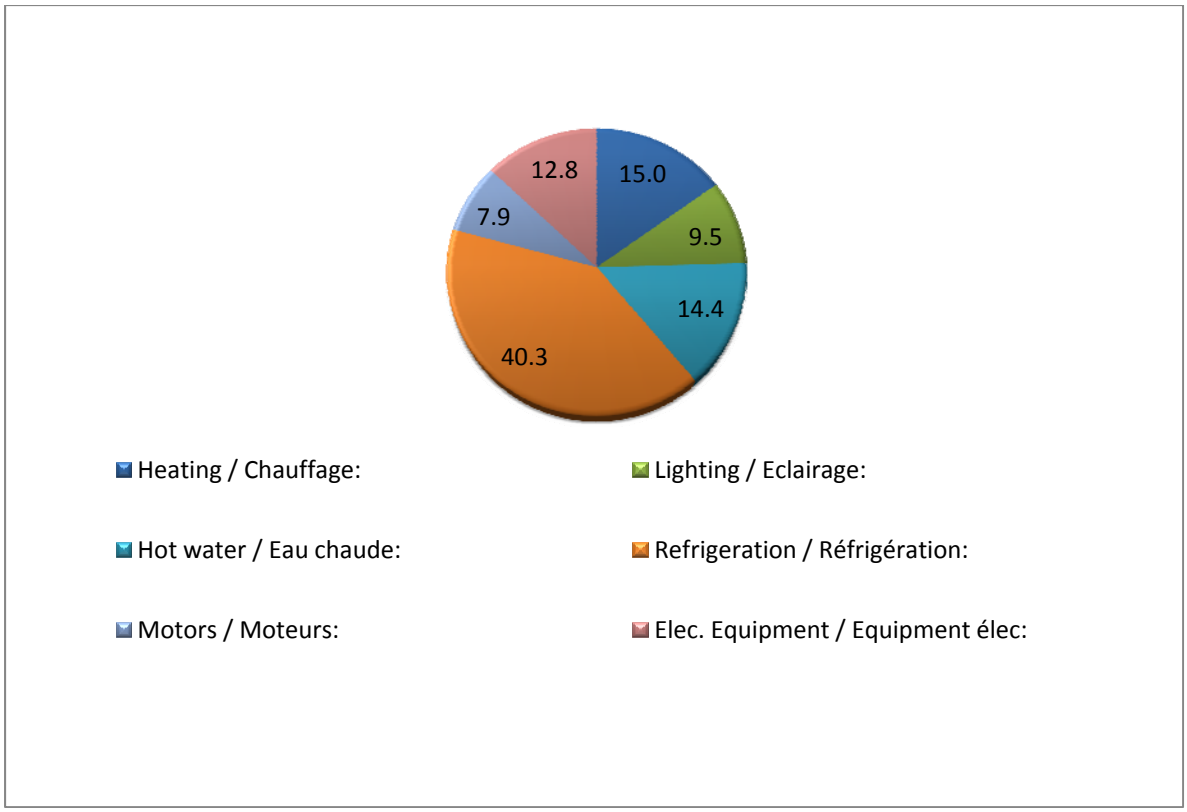

| | | |
|---|---|---|
| Oil Consumption | 2009 | 12,791 L |
| Cost for Oil | 2009 | $ 7,930 |
| Approx. $/L | | $0.62 |

### 5.2.3 Propane Consumption

The arena is equipped with coin-operated propane radiant heaters located above the spectator areas. These heaters operate for 15 to 60 minutes, depending on how much money has been inserted. Due to the lack of data on propane consumption, we have not included this in our analysis. However, it was reported that the arena is losing money on the heaters. We recommend increasing the charge required to run the heaters to better cover the costs of the propane consumed. No ECM will be associated with these heaters.

## 5.3 Summary of Energy Consumption

The arena consumed approximately 743,200 KWh of electricity during the 2009/2010 season and 12,791 L of oil in 2009. A summary chart with the estimated 2009 building energy consumption follows:




This 2009 baseline historical energy consumption was used in *RETScreen* along with 2009 / 2010 Halifax Airport weather data to develop the base case building energy model.

## 5.4 Energy Conservation Measures

The following is a list of recommended energy conservation measures (ECM) which were modeled using *RETScreen* and that provided favourable results with respect to energy saving potential. As a result, these measures make up the proposed energy retrofits for the Spryfield Lions Arena (Arena).

As part of the calculations, the cost of implementation of each ECM was developed and the resultant simple payback was calculated. All implementation costs were developed on the basis of having contractors perform the work, and are budget level accuracy only. The implementation costs were developed from a combination of historical contractor and/or client pricing, local contractor pricing, and industry pricing guides such as R.S. Means.

The recommended ECM are summarized below. Following this list, each measure is described in more detail. All measures have been modeled with the envelope replacement included.

The recommended ECM are summarized below and then described in detail.

- ***Building Envelope Upgrade*** – We recommend replacing the metal siding, doors and windows with better insulated components. This measure will increase overall R-Values for the building, and decrease the air infiltration into the building. As part of the ECM we also recommend installing a low-e ceiling over the ice surface.
- ***Refrigeration Plant Upgrade*** – We recommend installing controls and heat reclaim on the existing refrigeration plant. It is anticipated reclaimed heat can be used for preheating domestic and flood water heating.
- ***Exit Sign Replacement*** – We recommend replacing the current 15 W exit signs with .8 W LED Exit signs.
- ***HVAC Controls –*** We recommend installing a DDC Control system for the heating zones throughout the building to provide better control over heating / cooling during unoccupied times.

### 5.4.1 Building Envelope Upgrade

The majority of the building envelope was installed in the 1970s, with an area at the rear of the building being added on in the 1980s. All areas of metal siding were observed to be in poor condition, and were estimated to have an insulation value of approximately R-12, with the exception of the newer area which was estimated to be R-17. The roof was not observed, but is assumed to be in similar condition with respect to insulation values. We have estimated the R-Value of the roof to be approximately 17.

In addition to the exterior walls and roof, there were a number of doors on all elevations and the building has no windows.

Due to the current condition of the exterior walls / roof, as described in the capital plan, as well as the assumed R-Value, we recommend replacing the exterior walls and roof, as well as exterior doors with better insulated components to reduce air infiltration and increase insulation. This will reduce the cooling load required by the ice sheet in the fringe months, as well as reduce energy consumption in heated zones during the winter months.

For the purposes of this model, we have upgraded the R-Values of the exterior walls from an estimated R-12 (R-17 in the newer section) to approximately R-32 (4” insulated panel), and the roof from an estimated R-17 (R-20 in the newer section) to R-32 as well. Door R-Values were increased marginally. However, we have included an upgrade to the weather stripping which should significantly reduce air infiltration into the building, as well as the refrigeration load in the fringe months.

In addition to the above envelope upgrades, we also recommend installing a Low-E ceiling above the ice sheet to further reduce the load on the refrigeration system, and to add to the overall brightness of the arena.

#### *Savings Summary – Building Envelope Upgrade*

The total energy savings will be approximately 126,000 kWh of electricity per year. The cost savings potential has been estimated at $8,550 per year with a project cost of approximately $170,000 resulting in a simple payback of **20 years.**

### 5.4.2 Refrigeration Plant Upgrade

The current refrigeration plant is reported to be original to the construction of the Arena (1972). While it was reported that various components such as the chiller have been replaced recently and it appears to be well maintained, other components are nearing

the end of their useful life (EUL) and plans should be made for its replacement. Replacement of the existing plant with one that will perform essentially at the efficiency of the existing plant is contained in the capital plan. However, due to the rising costs of energy, it is recommended that the City consider augmenting the design with a focus on maximizing efficiency opportunities. Specifically, the refrigeration plant replacement will be an opportunity to specify high performance components and ancillary equipment, and to recover heat from the compressor system which can then be used to supplement the production of flood and domestic hot water, provide space heating, preheat incoming ventilation make-up air, or provide heat to a snow pit. While there will be periods when there will be heat in excess of that required for such purposes, a system of heat storage could be designed or the size of the cooling unit can be decreased.

Motors, pumps and drives can be redesigned to more closely meet the requirements of the more energy efficient Arena. Floating head temperature controls on the compressors improve their coefficient of performance. Brine headers can be better insulated and the overall system can be equipped with controls that manage operations to maximize energy savings and minimize demand charges while providing ice temperatures that are appropriate for each of the Arena user groups.

We recognize that additional efficiencies are possible in the design of the new refrigeration plant and ancillary systems that are only quantifiable through a detailed engineered design that is beyond the scope of this project. The savings described below are for the foregoing recommendation and they too may vary from the actual savings after the design is completed.

To achieve the above mentioned savings, a complete plant replacement would likely be necessary, however due to the large cost the payback period is excessive. However, we recommend that, as a minimum, the City install heat recovery to preheat flood and domestic hot water, an ice temperature sensor and an ice plant control system. We anticipate that a heat recovery system preheating water for the current oil-fired hot water heating system will recover the equivalent of approximately 64,000 kWh of energy from the cooling system and the control system will save a minimum of 78,000 kWh per year as well as some incidental demand charge savings. These savings estimates are for budget purposes only and will have to be confirmed during the design of the heat recovery system.

#### *Savings Summary – Refrigeration Plant*

Considering only the heat recovery system, The total energy savings will be approximately 6,000 L of #2 fuel oil from the flood water boiler, and approximately 78,000 kWh of electricity per year. The cost savings potential has been estimated at $9,000 per year with a project cost of approximately $60,000 resulting in a simple payback of **6.7 years.**

### 5.4.3 Over-Ice Lighting Retrofit

The ice sheet is illuminated by 46 – 6 lamp T8 florescent fixtures. These fixtures operate approximately 16 hours per day when the ice sheet is in and were installed in 2009. For this report, we have investigated replacing these fixtures with 6 lamp high output T5 fixtures.

Both T8 and T5, 6 lamp fixtures provide greater control of the lighting levels above the ice either by turning on 2, 4 or 6 of the lamps or installing dimmable ballasts. This will

give the building operators better control over the illumination levels to meet each rental's needs. In addition to having better control over lighting levels, the T5 fixtures are still operational if 2 to 4 of their lamps burn out as are T8 fixtures.

The T8 lamps have an expected useful life of 20,000 – 30,000 hours whereas T5 High Output (T5HO) lamps have an expected useful life of 30,000 to 42,000 hours.

As the T8 fixtures are new, it would not be cost effective to replace them at this time. However, by replacing the current above-ice lighting with T5HO fixtures a marginal saving can be realized of approximately 3000 kWh. The energy consumption values used in modeling this fixture are approximate, and are not design values. A lighting design study may indicate that the Arena may be effectively lit with fewer than the current 46 fixtures by going to T5HO lights, thus producing additional savings. It is expected that the savings will thus vary slightly if the ECM is pursued, and savings may be further increased by installing a design that allows for more precise lighting control to more closely match the required lighting for each Arena activity.

Unfortunately the simple pack back period suggests that a complete conversion to T5 lighting is not favourable. However individual light replacements completed as part of regular operations and maintenance practices can be effective in the long run.

***Savings Summary – Over-Ice Lighting Retrofit***

The total potential energy savings will be approximately 3,000 kWh per year. The energy cost savings have been estimated at $500 per year with a project cost of approximately $20,000 resulting in a simple payback of **40 years. As a result this is not a favourable ECM.**

### 5.4.4 Lighting Retrofit

During the site visit, it was observed that the building was lit with a combination of 34W T12 and 32W T8 fluorescent fixtures. We modeled the retrofit of these fixtures with T5 lights, and the retrofit was deemed to be not feasible. Although the initial analyses of replacing the existing fixtures with lower wattage units shows a reasonable pay back, when the heating system is taken into account, the payback is approximately 95 years. This is due to the decreased heat output of the more efficient lamps which is made up by an increase of electricity consumption or fuel usage in the heating system. It is generally more cost effective to supply and manage the building temperatures via the HVAC system rather than generating heat through the lighting system.

Although a complete replacement may not make financial sense if considering only the straight payback from energy savings, we do recommend replacing individual ballasts and lamps with more efficient T5 fixtures as they fail, as well as installing occupancy sensors where possible. The replacements will result in consistency of T5 lighting throughout the building that will simplify management of replacement lamps and reduce maintenance costs due to the longer life of the lamps. A recent study by Efficiency NB shows that the fluorescent light market has been essentially transformed to T8 and T5, and there are indications that replacement lamps for T12 lighting will become more difficult and expensive to access.

### 5.4.5 Exit Sign Replacement

The emergency lighting throughout the Arena consists of approximately 4 single and double-sided incandescent EXIT signs which are rated at 15 W and are illuminated 24

hours a day, year round. These lights thus consume over 650 kWh of electricity each year. Current Light Emitting Diode (LED) EXIT signs consume 95% less electricity (approximately .8 W per unit), and their installation would result in a total consumption of 35 kWh over the year. However, as with the light systems above, the decrease in heat generated by the incandescent light bulbs must be made up by the heating system. By adjusting for this, a total of $55 will be saved annually.

In addition to the energy cost savings, these units are rated for up to 100,000 hours, and it is not expected they will require significant maintenance for approximately 10 years, resulting in considerable savings in replacement bulbs and maintenance time compared to the current incandescent types.

A relatively new EXIT sign product is also available that may be suitable for the Arena. These are photoluminescent signs that require no external power source. The City may want to check with the local building inspector as to whether these would be appropriate substitutes. The savings would be slightly greater and the maintenance and disposal costs lower with this product.

***Savings Summary – EXIT Sign Replacement***

The total energy savings will be approximately 500 kWh. The cost savings have been estimated at $55 per year with a project cost of approximately $500 resulting in a simple payback of **9.1 years**.

### 5.4.6 HVAC Controls

Based on the current schedule, we recommend implementing temperature setbacks in the heated areas during unoccupied periods by installing programmable thermostats throughout the heated areas of the building. This will change the operating schedule of the HVAC system from unreliable manual setbacks to a semi-controlled system where HVAC set points can be matched to operating schedules and rental schedules. In addition to washroom fans, two of the dressing rooms have dehumidification units installed. It is assumed that they operate on a humidistat under the control of the building manager.

In areas such as the change rooms, which have 5 kW heaters controlled by dials on the sides of the units, we anticipate savings as the heaters will no longer be accidentally left on or adjusted by unauthorized users.

In addition, we recommend timers be installed on the washroom and change room exhaust fans.

***Savings Summary – HVAC Controls***

The total energy savings will be approximately 20,000 kWh of electricity per year. The cost savings potential has been estimated at $1360 per year with a project cost of approximately $1,800 resulting in a simple payback of **1.5 years.**

## 5.5 Summary of Recommended ECM

The above measures will result in an approximate total of cost saving of $18,965 before taxes in energy savings per year, producing a simple payback of 12.25 years. Total cost savings are based on energy savings only and are calculated based on the rates stated

in the energy consumption section. The savings will differ from this estimate depending on future rates charged by NS Power.

The recommended ECM are summarized below.

| Energy Management Measure | Project Cost (CAD) | Fuel Savings (kWh) | Fuel Savings (GJ) | Cost Savings (CAD) | Simple Payback (Years) |
|---|---|---|---|---|---|
| Building Envelope Upgrade Premium | $170,000 | 126,000 | | $8,550 | **19.88** |
| Refrigeration Plant Upgrade to include Heat Recovery | $60,000 | 78,000 | 230 | $9,000 | **6.67** |
| Exit Sign Retrofit | $500 | 500 | - | $55 | **9.09** |
| HVAC Control | $1,800 | 20,000 | | $1,360 | **1.50** |
| ***Total*** | ***$232,300*** | ***103,000*** | ***230*** | ***$18,965*** | **12.25** |

If all these ECM are implemented at the same time, it is expected that they will complement each other and paybacks will be decreased.

It is also noted that with all of these ECM, significant components are at or near the end of the EUL and will require replacement in the immediate to near term. As a result, the actual payback periods for incorporating these ECM with the other recommended building reinvestments considerably reduces the simple payback periods for these ECM. The savings will also be greater and the payback decreased if the arena use increases from the current 17 hours per day.

## 5.6 Natural Gas

At the time of the site visit the local natural gas supplier was in the process of installing supply lines in the area of the facility. While natural gas can provide significant monetary savings it is not as efficient as electricity. It is however more efficient than fuel oil with less environmental impact. At the time the oil fired flood water boilers reach the end of their expected useful life it is recommended that a natural gas boiler be investigated. Typically a natural gas boiler can run at 90% efficiency and the cost per GJ of heat produced is approximately 20 - 30% less than fuel oil.

## 5.7 Other Considerations

Electric motors, fans, pumps and the drives that connect them are all becoming more efficient. Our analysis did not detect that the Arena should undergo a major overhaul of this equipment. However, the HRM may wish to adopt a policy of ensuring that the replacement of such components is examined closely and that the most energy efficient (Energy Star® rated, for example) replacement components are specified.

Water, and the energy used to heat it, can be saved by ensuring the ice resurfacing equipment is properly filled (no overflows) and that sink taps are fitted with aerators. Additional water can be saved by replacing toilets and urinals with low flow models as when they require replacement or if the washrooms are undergoing a major refit.

# 6 Opinion of Probable Costs and FCI

## 6.1 Capital Plan

The Probable Cost Estimates provide the basis for development of a 25 year base Capital Plan for the Arena. The Capital Plan has been populated into the EECP-T. The EECP-T is made available free of charge to CMEL clients for their use. It was originally developed by CMEL for Efficiency New Brunswick for distribution to New Brunswick municipalities. The EECP-T`s objective was to assist municipalities to develop a capital plan that clearly identifies the benefit of incorporating energy efficiency projects. It also shows the advantages of considering replacement or upgrading projects in an integrated manner so as to achieve the greatest benefits in terms of reduced annual building ownership costs. One component of the EECP-T is its ability to identify building components that may need to be repaired in the near future and to integrate those costs with an associated energy efficiency initiative so as to reduce overall costs and improve the payback period for the energy efficiency initiative.

The end product of the Capital Plan is an approach to maintaining a Facility Condition Index (FCI) that will help ensure the continued reliable functionality of a building for years to come while controlling costs. As part of this project CMEL has populated a copy of the EECP-T with the data gained from the site visit and resulting calculations and analysis.

The purpose of having populated software such as the EECP-T is that it is readily manipulated and will allow the HRM to continuously refine it to meet its objectives. As part of the asset management strategy, CMEL would recommend that HRM set a target FCI for each Arena and determine a target building life expectancy. Since the EECP-T is readily edited capital cost estimates can be refined and as newer technologies become available they can be easily and quickly modelled in the software to evaluated overall facility impact. All of these variables can be tracked and analysed. The EECP-T also has the added functionality to identify the immediate five year plan prioritized as per the priority setting of each component or system.

The basic EECP-T input and output sheets are presented in **Appendix A.**

The populated version of this base Capital Plan has been provided, along with additional instruction and advice, to HRM separately. It forms the main product of this project and is supported by this document which discusses the facilities' condition at a specific time.

## 6.2 Capital Plan Recommendations

The assessment of the Gray Memorial Arena property and building were completed on August 26th, 2010. At the time of the assessment the site appeared to be in fair overall condition with aged exterior envelope infrastructure; however the building appears to be very well maintained in operable condition. The structural components of the building appeared to be in good condition with no structural deficiencies observed or reported. A number of the building components will require replacement during the evaluation period that include but is not limited to the roof, exterior cladding and doors, dasherboards, mechanical and ventilation systems, electrical switchgear, fire alarm panel, localized sprinkler piping replacement and cyclical replacement of the ice resurfacer.

Further study should be conducted for accessibility and barrier free operations throughout the facility.

## 6.3 Energy Audit Recommendations (ECM)

By implementing the above measures the Gray Memorial Arena may realize a total cost savings of approximately $18,965 before taxes in energy savings per year. By combining the above measures with the capital plan items these savings can be used to further fund other projects and reduce the overall FCI of the building. The major projects which will affect future funding and the resulting FCI are replacing the building envelope, refrigeration plant and the above ice lighting. In addition to reducing energy consumption, the majority of these measures reduce the overall operations and maintenance requirement of the building, and allow the building operators to better meet the needs of the community.

The recommended ECM are summarized below:

| Energy Management Measure | Project Cost (CAD) | Fuel Savings (kWh) | Fuel Savings (GJ) | Cost Savings (CAD) | Simple Payback (Years) |
|---|---|---|---|---|---|
| Building Envelope Upgrade Premium | $170,000 | 126,000 | | $8,550 | **19.88** |
| Refrigeration Plant Upgrade to include Heat Recovery | $60,000 | 78,000 | 230 | $9,000 | **6.67** |
| Exit Sign Retrofit | $500 | 500 | - | $55 | **9.09** |
| HVAC Control | $1,800 | 20,000 | | $1,360 | **1.50** |
| ***Total*** | ***$232,300*** | ***103,000*** | ***230*** | ***$18,965*** | **12.25** |

## 6.4 Facility Condition Index (FCI) Definition

The Facility Condition Index (FCI) is a metric often used for benchmarking in the real estate industry. It is used to assess the current and projected condition of a building asset. By definition, the FCI is defined as the ratio of the Accumulated Deferred Maintenance (ADM) costs to the Current Building Replacement Value (CRV). The FCI can be defined in terms of the following equation:

$$\text{Facility Condition Index (FCI)} = \frac{\text{Accumulated Deferred Maintenance (ADM)}}{\text{Current Building Replacement Value (CRV)}}$$

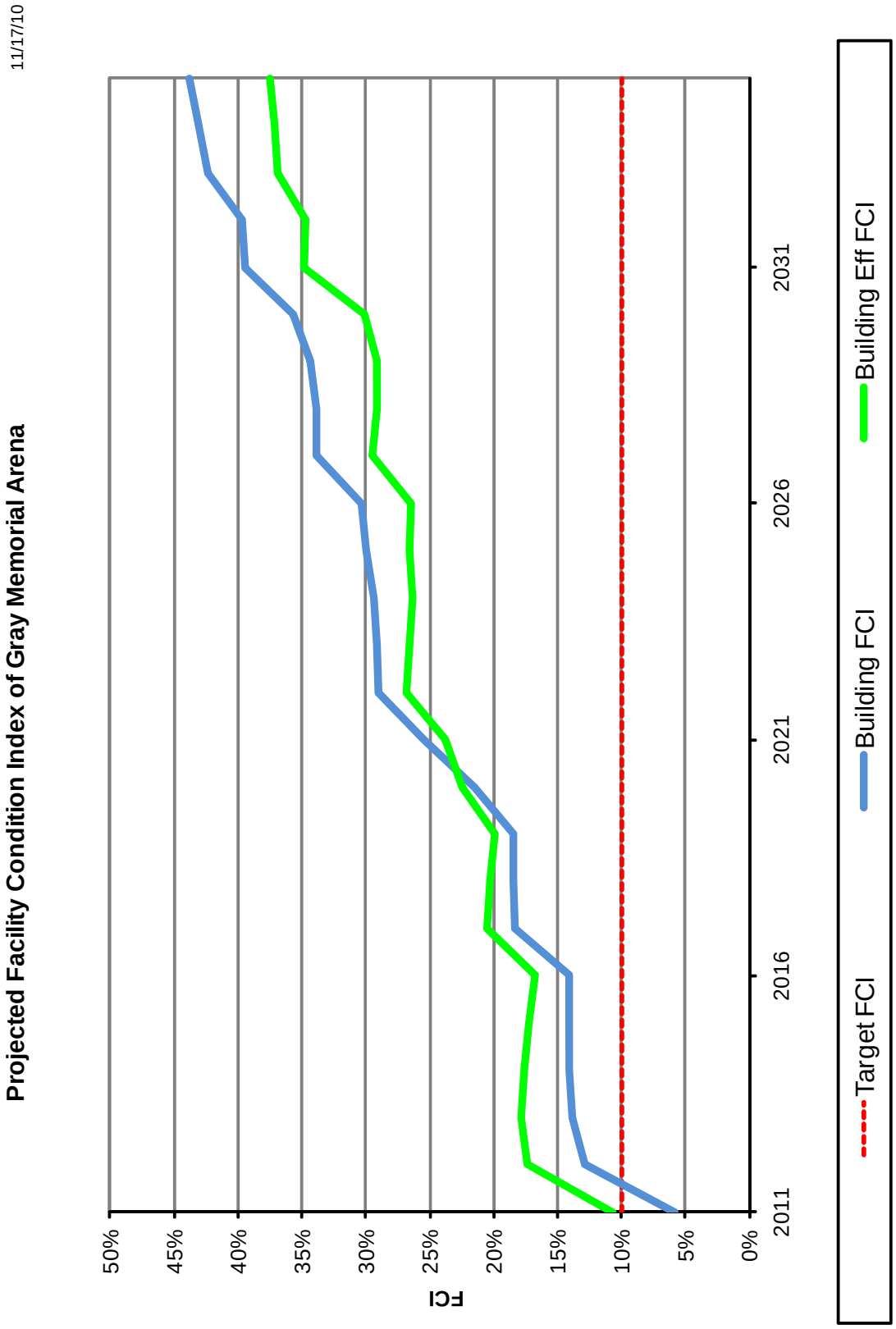
Building condition is often defined in terms of the FCI. Industry standards for FCI's are as follows:

| FCI | Remark |
|---|---|
| **0-5%** | excellent to good condition |
| **5-10%** | good to fair condition |
| **>10%** | fair to poor condition |

Overall the lower the FCI the better the condition of the buildings and the lower the risk that an unexpected recapitalization issue will arise which could result in a specific building shutdown. As the portfolio FCI increases, the buildings are in increasingly poor

condition as the backlog of replacement of building components rises. It is difficult to detail the exact affect on a portfolio of buildings of decreasing the overall FCI by several points. The affect by building will also differ based on the current backlog relating to that building.

The FCI Comparison Graph as presented below shows the current and projected FCI of the Gray Memorial Arena **with and without completing energy efficiency projects**. In this way the potential benefits of completing the recommendations from an Energy Audit can be compared with continuing 'status quo' capital planning. In essence the goal is to find energy efficiencies that will help fund other building requirements in an effective manner. Although this may result in similar or slightly higher capital expenditures in the short term, improvements in the overall condition of the building can be achieved in the long term.


11/17/10
Projected Facility Condition Index of Gray Memorial Arena
FCI
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
2011
2016
2021
2026
2031
Target FCI
Building FCI
Building Eff FCI

# 7 Limitations

This report may not be relied upon by any other person or entity without the express written consent of Capital Management Engineering Limited and Halifax Regional Municipality. Any other parties that rely or make decisions based on this report do so solely at their own risk.

Capital Management Engineering makes no warranties, whether written or oral, statutory, expressed or implied, in connection with the services provided, including, without limitation, any warranty of fitness for any particular purpose or use with respect to the property or building components and systems.

Capital Management Engineering's cumulative liability for all claims relating to this report or the services provided shall not exceed the total amount of all fees actually paid for this report.

The opinions of cost are intended for global budgeting purposes only. Actual costs for recommended work can only be determined after preparation of tender documents, detailing the site restrictions, effects and or restrictions on ongoing operations of the building and requirements associated with the construction schedule.

The recommendations made in this report are based on the visual observations made by the assessor during the site assessment and are limited to the areas of the site and building that were observed and accessible during the assessment. Concealed, inaccessible and un-observed areas may be in a different condition than what is reported herein. During the site assessment the assessor will attempt to verify any additional information provided by the site contact. However, in many cases the information will be relied upon and presented without field verification.

# 8 Closure

Capital Management Engineering Limited is pleased to present this report and the accompanying electronic version of the base capital plan to HRM. The findings presented suggest a strategic long term view to managing municipal assets and will provide HRM with the tools to support the development and definition of an Arena strategy for the constituents of HRM.

# Appendix A -
# Gray Memorial Arena Capital Plan

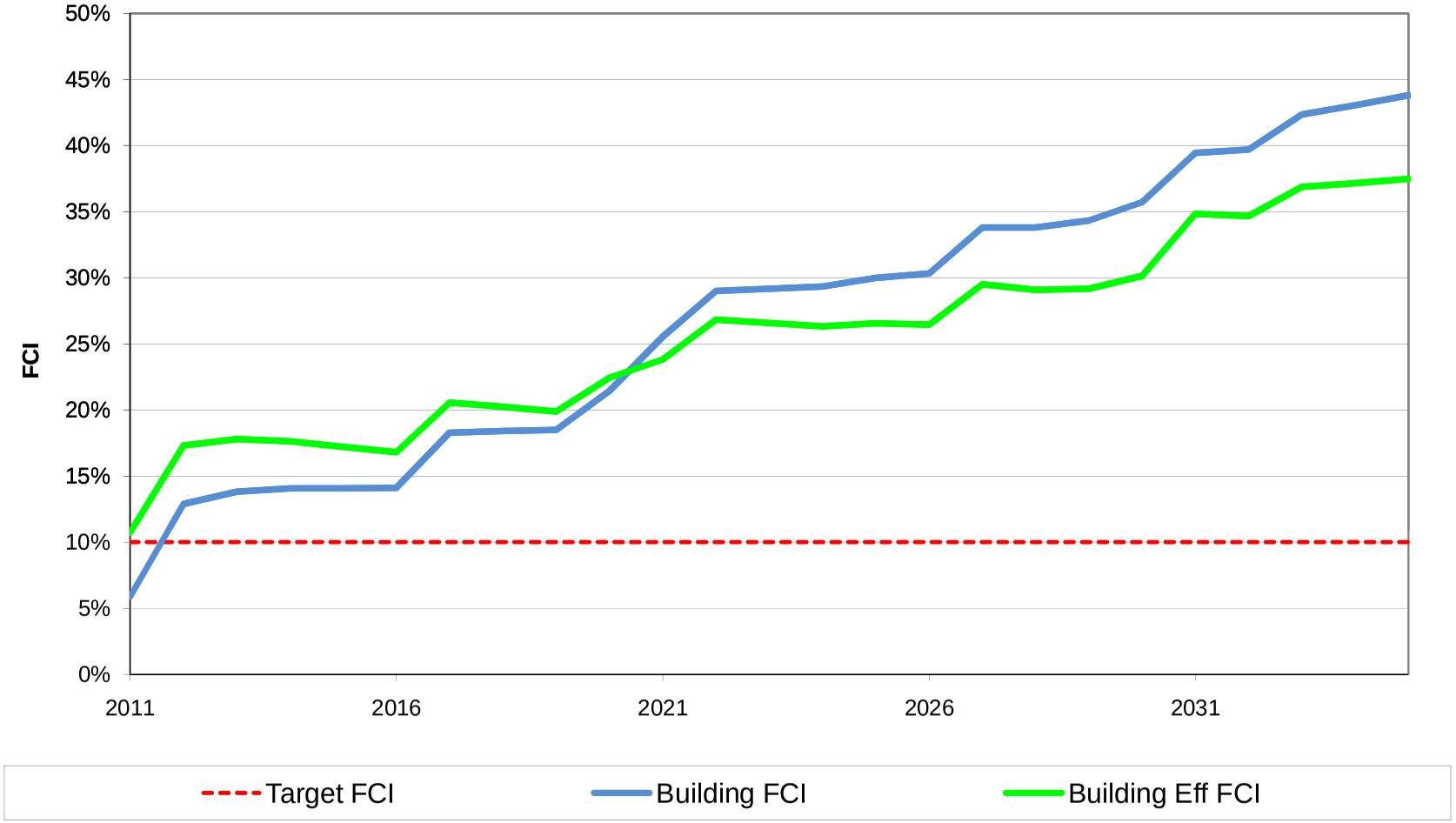
# General Building Information Worksheet

| | |
|---|---|
| Building Name | Gray Memorial Arena |
| Civic Address | 10 Monique Avenue |
| Municipality, City | Dartmouth |
| Primary Use / Building Type | Arena |
| Primary Units | Square Foot |
| Building Area Square Foot | 27,800 |
| Replacement Cost per Square Foot | $ 159 |
| Building Replacement Cost | $ 4,406,300 |
| Year of Construction or Major Renovation | 1972 |
| Start Year | 2011 |
| Current Year | 2010 |
| Target FCI | 10% |
| Soft Costs (%) | 0% |
| Interest Rate | 3.50% |
| Inflation Rate | 2.50% |

| **Asset Definition Columns** | |
|---|---|
| 1 | Site Work |
| 2 | Structure |
| 3 | Roof |
| 4 | Architecture Exterior |
| 5 | Architecture Interior |
| 6 | Mechanical |
| 7 | Electrical |
| 8 | Life Safety / Fire Suppression |
| 9 | Specialty Systems |

## Projected Facility Condition Index of Gray Memorial Arena

11/17/10



## Energy Audit Worksheet

| Project | Year to Complete Energy Project | Expected Useful Life (EUL) | Capital Plan Item | Cost of Project | Payback Years | Savings Realized Per Year Based on Project Completion | % to Apply to Capital Projects Going forward | Total $ Available Per Year | Year Funding from Savings Becomes Available |
|---|---|---|---|---|---|---|---|---|---|
| Building Envelope Upgrade | 2011 | 35 | Metal Siding - Main Building | $ 170,000 | 20.0 | $ 8,500 | 100% | $ 8,500 | 2012 |
| Refrigeration Plant Upgrade | 2011 | 20 | | $ 60,000 | 6.7 | $ 9,000 | 100% | $ 9,000 | 2012 |
| Exit Sign Retrofit | 2011 | 10 | | $ 500 | 9.0 | $ 55 | 100% | $ 55 | 2011 |
| HVAC Controls | 2011 | 20 | | $ 1,800 | 1.5 | $ 1,360 | 100% | $ 1,360 | 2011 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

# Project Output Sheet for Period from 2010 to 2015

| | | | | | Decision Parameters | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Component** | **Recapitalization Detail** | **Year of Replacement** | **Expected Useful Life (EUL)** | **Current Age** | **Life Safety** | **O&M Impact** | **Impact to Business** | **Utility** | **Vision** | **Total** | **Total Cost** |
| Exterior NSPI Transformer | Installation of impact protection for transformer | 2011 | 30 | 1 | Yes | No | Yes | High | Yes | 4 | $ 2,500 |
| Back Flow Preventer | Install back flow preventer on main incoming water line | 2011 | 25 | 0 | Yes | No | Yes | Normal | Yes | 3 | $ 2,500 |
| Tennis Courts | Replacement of 2 courts | 2011 | 20 | 39 | Yes | No | No | Normal | Yes | 2 | $ 84,000 |
| Sprinkler Piping | Repair/Localized replacement allowance | 2014 | 5 | 39 | Yes | Yes | No | Normal | No | 2 | $ 3,500 |
| Ice Plant - Compressors | Replacement of compressors | 2012 | 25 | 39 | No | Yes | Yes | High | Yes | 4 | $ 60,000 |
| Ice Resurfacer | Cyclical replacement at end of useful life | 2011 | 10 | 10 | No | Yes | Yes | High | Yes | 4 | $ 80,000 |
| Metal Roof - Arena | Replace metal roof at end of useful life | 2012 | 30 | 39 | No | No | Yes | High | Yes | 3 | $ 229,500 |
| Wood Siding | Replace wood siding | 2012 | 25 | 39 | No | Yes | Yes | Normal | Yes | 3 | $ 3,500 |
| Overhead Door | Replace east elevation overhead door at end of useful life | 2014 | 15 | 31 | No | Yes | Yes | Normal | Yes | 3 | $ 4,000 |
| Overhead Door - Zamboni Room | Replacement of overhead door to Zamboni Room | 2014 | 15 | 21 | No | Yes | Yes | Normal | Yes | 3 | $ 1,500 |
| Ice Plant - 75 hp Motor | Cyclical replacement of motor | 2012 | 25 | 24 | No | Yes | Yes | High | No | 3 | $ 11,000 |
| Asphalt Paving - Resurface | Allowance for resurfacing of asphalt paved parking area | 2011 | 15 | 39 | No | No | Yes | High | No | 2 | $ 75,000 |
| Switchgear | Allowance for partial replacement | 2013 | 40 | 39 | No | Yes | Yes | Normal | No | 2 | $ 40,000 |
| Building Envelope Upgrade | as per recommendations from Energy Audit | 2011 | 35 | NA | No | Yes | NA | High | NA | 2 | $ 170,000 |
| Refrigeration Plant Upgrade | as per recommendations from Energy Audit | 2011 | 20 | NA | No | Yes | NA | High | NA | 2 | $ 60,000 |
| Exit Sign Retrofit | as per recommendations from Energy Audit | 2011 | 10 | NA | No | Yes | NA | High | NA | 2 | $ 500 |
| HVAC Controls | as per recommendations from Energy Audit | 2011 | 20 | NA | No | Yes | NA | High | NA | 2 | $ 1,800 |
| Asphalt Roadway - Secondary | Repair allowance for as required repairs | 2016 | 7 | 2 | No | No | No | High | No | 1 | $ 1,000 |
| Fuel Oil Storage Tank - Roth | Replacement of Roth tank at ten year intervals | 2014 | 10 | 7 | No | Yes | No | Normal | No | 1 | $ 3,000 |
| Fuel Oil Storage Tank - Flood Water | Replacement of tank at ten year intervals | 2012 | 10 | 9 | No | Yes | No | Normal | No | 1 | $ 2,000 |
| Chain Link Fencing | Replacement of aged fencing | 2011 | 25 | 39 | No | No | No | Normal | No | 0 | $ 10,182 |

# *Building Component Summary Worksheet*

| | | | | | | | | Decision Parameters | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Component | Recapitalization Detail | Year of Installation or Repair | Expected Useful Life (EUL) | Current Age | Theoretical Remaining Useful Life (RUL) | Useful Life Corrected For Observations | Year of Replacement | Life Safety | O&M Impact | Impact to Business | Utility | Vision | Total | Type of event (Cyclic/Single) | Unit | Quantity | Unit Cost | Total Cost |
| **Site Work** | | | | | | | | | | | | | | | | | | |
| **Asphalt Paving - Resurface** | Allowance for resurfacing of asphalt paved parking area | 1972 | 15 | 39 | -24 | 0 | 2011 | No | No | Yes | High | No | 2 | Single | LS | 1 | $ 75,000.00 | $ 75,000 |
| **Asphalt Paving - Repair** | Asphalt paving repair allowance | 2011 | 7 | 0 | 7 | 7 | 2018 | No | No | Yes | High | No | 2 | Cyclical | LS | 1 | $ 5,000.00 | $ 5,000 |
| **Asphalt Roadway - Secondary** | Repair allowance for as required repairs | 2009 | 7 | 2 | 5 | 5 | 2016 | No | No | No | High | No | 1 | Cyclical | LS | 1 | $ 1,000.00 | $ 1,000 |
| **Chain Link Fencing** | Replacement of aged fencing | 1972 | 25 | 39 | -14 | 0 | 2011 | No | No | No | Normal | No | 0 | Single | Lft | 520 | $ 19.58 | $ 10,182 |
| **Chain Link Fencing** | Replacement at end of remaining useful life | 2011 | 25 | 0 | 25 | 24 | 2035 | No | No | No | Normal | No | 0 | Cyclical | Lft | 650 | $ 19.58 | $ 12,727 |
| **Playground Equipment** | Replacement of playground equipment | 2005 | 10 | 6 | 4 | 9 | 2020 | Yes | No | No | Normal | Yes | 2 | Cyclical | LS | 1 | $ 50,000.00 | $ 50,000 |
| **Tennis Courts** | Replacement of 2 courts | 1972 | 20 | 39 | -19 | 0 | 2011 | Yes | No | No | Normal | Yes | 2 | Cyclical | Ea. Ct. | 2 | $ 42,000.00 | $ 84,000 |
| **Structure** | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| **Roof** | | | | | | | | | | | | | | | | | | |
| **Metal Roof - Arena** | Replace metal roof at end of useful life | 1972 | 30 | 39 | -9 | 1 | 2012 | No | No | Yes | High | Yes | 3 | Cyclical | ft² | 25,500 | $ 9.00 | $ 229,500 |
| **Metal Roof - Addition** | Replace metal roof at end of useful life | 2006 | 30 | 5 | 25 | 24 | 2035 | No | No | Yes | High | Yes | 3 | Cyclical | ft² | 2,300 | $ 9.00 | $ 20,700 |
| **Architecture Exterior** | | | | | | | | | | | | | | | | | | |
| **Metal Siding - Main Building** | **Replace metal siding at end of remaining useful life** | **1972** | **30** | **39** | **-9** | **10** | **2021** | **No** | **Yes** | **Yes** | **Normal** | **Yes** | **3** | **Cyclical** | **ft²** | **13,000** | **$ 7.75** | **$ 100,750** |
| **Metal Siding - Addition** | Replace metal siding at end of remaining useful life | 2004 | 30 | 7 | 23 | 23 | 2034 | No | Yes | Yes | Normal | Yes | 3 | Cyclical | ft² | 2,500 | $ 7.75 | $ 19,375 |
| **Wood Siding** | Replace wood siding | 1972 | 25 | 39 | -14 | 1 | 2012 | No | Yes | Yes | Normal | Yes | 3 | Cyclical | ft² | 500 | $ 7.00 | $ 3,500 |
| **Main and Secondary Entrance Doors** | Replacement at end of remaining useful life | 2005 | 25 | 6 | 19 | 19 | 2030 | Yes | Yes | Yes | Normal | Yes | 4 | Cyclical | Ea | 8 | $ 1,350.00 | $ 10,800 |
| **Overhead Door** | Replace east elevation overhead door at end of useful life | 1980 | 15 | 31 | -16 | 3 | 2014 | No | Yes | Yes | Normal | Yes | 3 | Cyclical | Ea | 1 | $ 4,000.00 | $ 4,000 |
| **Overhead Door - Zamboni Room** | Replacement of overhead door to Zamboni Room | 1990 | 15 | 21 | -6 | 3 | 2014 | No | Yes | Yes | Normal | Yes | 3 | Cyclical | Ea | 1 | $ 1,500.00 | $ 1,500 |
| **Architecture Interior** | | | | | | | | | | | | | | | | | | |
| **Rubber Flooring** | Replace rubber flooring at end of useful life | 2007 | 15 | 4 | 11 | 11 | 2022 | No | No | Yes | Normal | Yes | 2 | Cyclical | ft² | 3,900 | $ 25.35 | $ 98,865 |
| **Dasherboards** | Replace boards at end of useful life | 1972 | 25 | 39 | -14 | 6 | 2017 | Yes | Yes | Yes | High | Yes | 5 | Cyclical | LS | 1 | $ 175,000 | $ 175,000 |

# *Building Component Summary Worksheet*

| | | | | | | | | Decision Parameters | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Component | Recapitalization Detail | Year of Installation or Repair | Expected Useful Life (EUL) | Current Age | Theoretical Remaining Useful Life (RUL) | Useful Life Corrected For Observations | Year of Replacement | Life Safety | O&M Impact | Impact to Business | Utility | Vision | Total | Type of event (Cyclic/Single) | Unit | Quantity | Unit Cost | Total Cost |
| **Mechanical** | | | | | | | | | | | | | | | | | | |
| **Domestic Water Piping** | Allowance for localized repairs as required | 1972 | 5 | 39 | -34 | 6 | 2017 | No | No | No | Normal | No | 0 | Cyclical | LS | 1 | $ 3,000.00 | $ 3,000 |
| **Back Flow Preventer** | Install back flow preventer on main incoming water line | 2011 | 25 | 0 | 25 | 0 | 2011 | Yes | No | Yes | Normal | Yes | 3 | Cyclical | Ea | 1 | $ 2,500.00 | $ 2,500 |
| **Electric Hot Water Heater** | Replace hot water heater at end of useful life | 2002 | 15 | 9 | 6 | 6 | 2017 | No | Yes | No | Normal | No | 1 | Cyclical | Ea | 1 | $ 1,500.00 | $ 1,500 |
| **Showers - Change Rooms A and B** | Replace showers at end of useful life | 2004 | 20 | 7 | 13 | 13 | 2024 | No | Yes | No | Normal | No | 1 | Cyclical | Ea | 4 | $ 250.00 | $ 1,000 |
| **Hot Water Storage Tanks** | Replacement of tank at end of useful life | 2004 | 25 | 7 | 18 | 18 | 2029 | No | Yes | No | Normal | No | 1 | Cyclical | Ea | 1 | $ 1,250.00 | $ 1,250 |
| **Hot Water Boiler - Addition** | Replacement of Burnham boiler at end of useful life | 2004 | 25 | 7 | 18 | 18 | 2029 | No | Yes | Yes | Normal | Yes | 3 | Cyclical | Ea | 1 | $ 12,500.00 | $ 12,500 |
| **Fuel Oil Storage Tank - Roth** | Replacement of Roth tank at ten year intervals | 2004 | 10 | 7 | 3 | 3 | 2014 | No | Yes | No | Normal | No | 1 | Cyclical | Ea | 1 | $ 3,000.00 | $ 3,000 |
| **Oil Fired Boiler - Flood Water** | Replacement of boiler at end of useful life | 1995 | 25 | 16 | 9 | 9 | 2020 | No | Yes | Yes | High | Yes | 4 | Cyclical | Ea | 1 | $ 12,500.00 | $ 12,500 |
| **Hot Water Tanks - Flood Water** | Replacement of tanks at end of useful life | 2009 | 25 | 2 | 23 | 23 | 2034 | No | Yes | Yes | High | Yes | 4 | Cyclical | Ea | 2 | $ 2,500.00 | $ 5,000 |
| **Fuel Oil Storage Tank - Flood Water** | Replacement of tank at ten year intervals | 2002 | 10 | 9 | 1 | 1 | 2012 | No | Yes | No | Normal | No | 1 | Cyclical | Ea | 1 | $ 2,000.00 | $ 2,000 |
| **Ventilation** | Replace exhaust fan, $CO_2$ sensor and exhaust/intake louvers | 2003 | 20 | 8 | 12 | 12 | 2023 | Yes | Yes | Yes | Normal | No | 3 | Cyclical | LS | 1 | $ 6,500.00 | $ 6,500 |
| **Coin Operated Radiant Heaters** | Replacement at end of useful life | 2005 | 20 | 6 | 14 | 14 | 2025 | No | Yes | No | Low | No | 0 | Cyclical | Ea | 2 | $ 2,000.00 | $ 4,000 |
| **Ice Plant - Cooling Tower** | Replacement of 90 ton cooling tower at end of useful life | 2002 | 20 | 9 | 11 | 11 | 2022 | No | Yes | Yes | High | Yes | 4 | Cyclical | Ea | 1 | $ 48,000.00 | $ 48,000 |
| **Ice Plant - Compressors** | Replacement of compressors | 1972 | 25 | 39 | -14 | 1 | 2012 | No | Yes | Yes | High | Yes | 4 | Cyclical | Ea | 2 | $ 30,000.00 | $ 60,000 |
| **Ice Plant - 75 hp Motor** | Cyclical replacement of motor | 1987 | 25 | 24 | 1 | 1 | 2012 | No | Yes | Yes | High | No | 3 | Cyclical | Ea | 1 | $ 11,000.00 | $ 11,000 |
| **Ice Plant - 75 hp Motor** | Cyclical replacement of motor | 2000 | 25 | 11 | 14 | 14 | 2025 | No | Yes | Yes | High | No | 3 | Cyclical | Ea | 1 | $ 11,000.00 | $ 11,000 |
| **Ice Plant - 25 hp Motors** | Cyclical replacement of motors | 1995 | 25 | 16 | 9 | 9 | 2020 | No | Yes | Yes | High | Yes | 4 | Cyclical | Ea | 2 | $ 3,000.00 | $ 6,000 |
| **Ice Plant - Chiller** | Replacement of chiller at end of useful life | 2002 | 25 | 9 | 16 | 16 | 2027 | No | Yes | Yes | High | | 3 | Cyclical | Ea | 1 | $ 150,000.00 | $ 150,000 |
| **Ice Plant - Brine Piping** | Allowance for localized repairs as required | 1972 | 8 | 39 | -31 | 6 | 2017 | No | Yes | No | Normal | No | 1 | Cyclical | LS | 1 | $ 5,000.00 | $ 5,000 |
| **Dehumidifiers** | Replacement of two dehumidifiers at end of useful life | 2000 | 20 | 11 | 9 | 9 | 2020 | No | Yes | No | Normal | No | 1 | Cyclical | Ea | 2 | $ 31,000.00 | $ 62,000 |
| **Coin Operated Radiant Heaters** | Replacement at end of useful life | 2005 | 20 | 6 | 14 | 14 | 2025 | No | Yes | No | Low | No | 0 | Cyclical | Ea | 2 | $ 2,000.00 | $ 4,000 |
| **Electrical** | | | | | | | | | | | | | | | | | | |
| **Switchgear** | Allowance for partial replacement | 1972 | 40 | 39 | 1 | 2 | 2013 | No | Yes | Yes | Normal | No | 2 | Cyclical | LS | 1 | $ 40,000 | $ 40,000 |
| **Interior Lighting** | Replacement of T8 lighting at end of useful life | 2008 | 25 | 3 | 22 | 22 | 2033 | No | Yes | Yes | Normal | No | 2 | Cyclical | ft² | 27,800 | $ 4.00 | $ 111,200 |
| **Exterior NSPI Transformer** | Installation of impact protection for transformer | 2010 | 30 | 1 | 29 | 0 | 2011 | Yes | No | Yes | High | Yes | 4 | Single | LS | 1 | $ 2,500 | $ 2,500 |
| **Life Safety / Fire Suppression** | | | | | | | | | | | | | | | | | | |
| **Fire Alarm Panel and Emergency Lighting** | Allowance to Replace Fire Alarm Panel and Emergency Battery Backup lighting | 2000 | 25 | 11 | 14 | 15 | 2026 | Yes | No | No | Normal | No | 1 | Cyclical | Ea | 1 | $ 15,000.00 | $ 15,000 |
| **Sprinkler Piping** | Repair/Localized replacement allowance | 1972 | 5 | 39 | -34 | 3 | 2014 | Yes | Yes | No | Normal | No | 2 | Cyclical | LS | 1 | $ 3,500.00 | $ 3,500 |
| **Specialty Systems** | | | | | | | | | | | | | | | | | | |
| **Ice Resurfacer** | Cyclical replacement at end of useful life | 2001 | 10 | 10 | 0 | 0 | 2011 | No | Yes | Yes | High | Yes | 4 | Cyclical | Ea | 1 | $ 80,000 | $ 80,000 |
| **Energy Capital Replacements** | | | | | | | | | | | | | | | | | | |
| **Building Envelope Upgrade** | as per recommendations from Energy Audit | NA | 35 | NA | NA | NA | 2011 | No | Yes | NA | High | NA | 2 | Cyclical | LS | 1 | $ 170,000.00 | $ 170,000 |
| **Refrigeration Plant Upgrade** | as per recommendations from Energy Audit | NA | 20 | NA | NA | NA | 2011 | No | Yes | NA | High | NA | 2 | Cyclical | LS | 1 | $ 60,000.00 | $ 60,000 |
| **Exit Sign Retrofit** | as per recommendations from Energy Audit | NA | 10 | NA | NA | NA | 2011 | No | Yes | NA | High | NA | 2 | Cyclical | LS | 1 | $ 500.00 | $ 500 |
| **HVAC Controls** | as per recommendations from Energy Audit | NA | 20 | NA | NA | NA | 2011 | No | Yes | NA | High | NA | 2 | Cyclical | LS | 1 | $ 1,800.00 | $ 1,800 |
| | | | | | | | | | | | | | | | | | | |

## *Cash Flow Analysis Output Sheet*

| Component | Recapitalization Detail | Type of event (cyclic/single) | Year of Installation or Repair | Expected Useful Life (EUL) | Useful Life Corrected For Observations | Year of Replacement | Unit Cost | Total Cost | Year 1 2011 | Year 2 2012 | Year 3 2013 | Year 4 2014 | Year 5 2015 | Year 6 2016 | Year 7 2017 | Year 8 2018 | Year 9 2019 | Year 10 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site Work** | | | | | | | | | | | | | | | | | | |
| Asphalt Paving - Resurface | Allowance for resurfacing of asphalt paved parking area | Single | 1972 | 15 | 0 | 2011 | $ 75,000 | $ 75,000 | $ 75,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Asphalt Paving - Repair | Asphalt paving repair allowance | Cyclical | 2011 | 7 | 7 | 2018 | $ 5,000 | $ 5,000 | $ 5,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ 5,000 | $ - | $ - |
| Asphalt Roadway - Secondary | Repair allowance for as required repairs | Cyclical | 2009 | 7 | 5 | 2016 | $ 1,000 | $ 1,000 | $ - | $ - | $ - | $ - | $ - | $ 1,000 | $ - | $ - | $ - | $ - |
| Chain Link Fencing | Replacement of aged fencing | Single | 1972 | 25 | 0 | 2011 | $ 20 | $ 10,182 | $ 10,182 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Chain Link Fencing | Replacement at end of remaining useful life | Cyclical | 2011 | 25 | 24 | 2035 | $ 20 | $ 12,727 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Playground Equipment | Replacement of playground equipment | Cyclical | 2005 | 10 | 9 | 2020 | $ 50,000 | $ 50,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 50,000 |
| Tennis Courts | Replacement of 2 courts | Cyclical | 1972 | 20 | 0 | 2011 | $ 42,000 | $ 84,000 | $ 84,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Site Work Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ 174,182 | $ - | $ - | $ - | $ - | $ 1,000 | $ - | $ 5,000 | $ - | $ 50,000 |
| **Site Work Summary** | | | | | | | | | $ 174,182 | $ - | $ - | $ - | $ - | $ 1,000 | $ - | $ 5,000 | $ - | $ 50,000 |
| **Roof** | | | | | | | | | | | | | | | | | | |
| Metal Roof - Arena | Replace metal roof at end of useful life | Cyclical | 1972 | 30 | 1 | 2012 | $ 9 | $ 229,500 | $ - | $ 229,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Metal Roof - Addition | Replace metal roof at end of useful life | Cyclical | 2006 | 30 | 24 | 2035 | $ 9 | $ 20,700 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Roof Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ 229,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Roof Summary** | | | | | | | | | $ - | $ 229,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Exterior** | | | | | | | | | | | | | | | | | | |
| <<Metal Siding - Main Building >> | Replace metal siding at end of remaining useful life | Cyclical | 1972 | 30 | 10 | 2021 | $ 8 | $ 100,750 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Metal Siding - Addition | Replace metal siding at end of remaining useful life | Cyclical | 2004 | 30 | 23 | 2034 | $ 8 | $ 19,375 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Wood Siding | Replace wood siding | Cyclical | 1972 | 25 | 1 | 2012 | $ 7 | $ 3,500 | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Main and Secondary Entrance Doors | Replacement at end of remaining useful life | Cyclical | 2005 | 25 | 19 | 2030 | $ 1,350 | $ 10,800 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Overhead Door | Replace east elevation overhead door at end of useful life | Cyclical | 1980 | 15 | 3 | 2014 | $ 4,000 | $ 4,000 | $ - | $ - | $ - | $ 4,000 | $ - | $ - | $ - | $ - | $ - | $ - |
| Overhead Door - Zamboni Room | Replacement of overhead door to Zamboni Room | Cyclical | 1990 | 15 | 3 | 2014 | $ 1,500 | $ 1,500 | $ - | $ - | $ - | $ 1,500 | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Exterior Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ 3,500 | $ - | $ 5,500 | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Exterior Summary** | | | | | | | | | $ - | $ 3,500 | $ - | $ 5,500 | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Interior** | | | | | | | | | | | | | | | | | | |
| Rubber Flooring | Replace rubber flooring at end of useful life | Cyclical | 2007 | 15 | 11 | 2022 | $ 25 | $ 98,865 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Dasherboards | Replace boards at end of useful life | Cyclical | 1972 | 25 | 6 | 2017 | $ 175,000 | $ 175,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ 175,000 | $ - | $ - | $ - |
| **Architecture Interior Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ - | $ - | $ - | $ 175,000 | $ - | $ - | $ - |
| **Architecture Interior Summary** | | | | | | | | | $ - | $ - | $ - | $ - | $ - | $ - | $ 175,000 | $ - | $ - | $ - |

## *Cash Flow Analysis Output Sheet*

| Component | Recapitalization Detail | Type of event (cyclic/single) | Year of Installation or Repair | Expected Useful Life (EUL) | Useful Life Corrected For Observations | Year of Replacement | Unit Cost | Total Cost | Year 11 2021 | Year 12 2022 | Year 13 2023 | Year 14 2024 | Year 15 2025 | Year 16 2026 | Year 17 2027 | Year 18 2028 | Year 19 2029 | Year 20 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site Work** | | | | | | | | | | | | | | | | | | |
| Asphalt Paving - Resurface | Allowance for resurfacing of asphalt paved parking area | Single | 1972 | 15 | 0 | 2011 | $ 75,000 | $ 75,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Asphalt Paving - Repair | Asphalt paving repair allowance | Cyclical | 2011 | 7 | 7 | 2018 | $ 5,000 | $ 5,000 | $ - | $ - | $ - | $ - | $ 5,000 | $ - | $ - | $ - | $ - | $ - |
| Asphalt Roadway - Secondary | Repair allowance for as required repairs | Cyclical | 2009 | 7 | 5 | 2016 | $ 1,000 | $ 1,000 | $ - | $ - | $ 1,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ 1,000 |
| Chain Link Fencing | Replacement of aged fencing | Single | 1972 | 25 | 0 | 2011 | $ 20 | $ 10,182 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Chain Link Fencing | Replacement at end of remaining useful life | Cyclical | 2011 | 25 | 24 | 2035 | $ 20 | $ 12,727 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Playground Equipment | Replacement of playground equipment | Cyclical | 2005 | 10 | 9 | 2020 | $ 50,000 | $ 50,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 50,000 |
| Tennis Courts | Replacement of 2 courts | Cyclical | 1972 | 20 | 0 | 2011 | $ 42,000 | $ 84,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Site Work Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ 1,000 | $ - | $ 5,000 | $ - | $ - | $ - | $ - | $ 51,000 |
| **Site Work Summary** | | | | | | | | | $ - | $ - | $ 1,000 | $ - | $ 5,000 | $ - | $ - | $ - | $ - | $ 51,000 |
| **Roof** | | | | | | | | | | | | | | | | | | |
| Metal Roof - Arena | Replace metal roof at end of useful life | Cyclical | 1972 | 30 | 1 | 2012 | $ 9 | $ 229,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Metal Roof - Addition | Replace metal roof at end of useful life | Cyclical | 2006 | 30 | 24 | 2035 | $ 9 | $ 20,700 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Roof Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Roof Summary** | | | | | | | | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Exterior** | | | | | | | | | | | | | | | | | | |
| <<Metal Siding - Main Building >> | Replace metal siding at end of remaining useful life | Cyclical | 1972 | 30 | 10 | 2021 | $ 8 | $ 100,750 | $ 100,750 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Metal Siding - Addition | Replace metal siding at end of remaining useful life | Cyclical | 2004 | 30 | 23 | 2034 | $ 8 | $ 19,375 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Wood Siding | Replace wood siding | Cyclical | 1972 | 25 | 1 | 2012 | $ 7 | $ 3,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Main and Secondary Entrance Doors | Replacement at end of remaining useful life | Cyclical | 2005 | 25 | 19 | 2030 | $ 1,350 | $ 10,800 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 10,800 |
| Overhead Door | Replace east elevation overhead door at end of useful life | Cyclical | 1980 | 15 | 3 | 2014 | $ 4,000 | $ 4,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 4,000 | $ - |
| Overhead Door - Zamboni Room | Replacement of overhead door to Zamboni Room | Cyclical | 1990 | 15 | 3 | 2014 | $ 1,500 | $ 1,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 1,500 | $ - |
| **Architecture Exterior Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 5,500 | $ 10,800 |
| **Architecture Exterior Summary** | | | | | | | | | $ 100,750 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 5,500 | $ 10,800 |
| **Architecture Interior** | | | | | | | | | | | | | | | | | | |
| Rubber Flooring | Replace rubber flooring at end of useful life | Cyclical | 2007 | 15 | 11 | 2022 | $ 25 | $ 98,865 | $ - | $ 98,865 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Dasherboards | Replace boards at end of useful life | Cyclical | 1972 | 25 | 6 | 2017 | $ 175,000 | $ 175,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Interior Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ 98,865 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Interior Summary** | | | | | | | | | $ - | $ 98,865 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |

## *Cash Flow Analysis Output Sheet*

| Component | Recapitalization Detail | Type of event (cyclic/single) | Year of Installation or Repair | Expected Useful Life (EUL) | Useful Life Corrected For Observations | Year of Replacement | Unit Cost | Total Cost | Year 21 2031 | Year 22 2032 | Year 23 2033 | Year 24 2034 | Year 25 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site Work** | | | | | | | | | | | | | |
| Asphalt Paving - Resurface | Allowance for resurfacing of asphalt paved parking area | Single | 1972 | 15 | 0 | 2011 | $ 75,000 | $ 75,000 | $ - | $ - | $ - | $ - | $ - |
| Asphalt Paving - Repair | Asphalt paving repair allowance | Cyclical | 2011 | 7 | 7 | 2018 | $ 5,000 | $ 5,000 | $ - | $ 5,000 | $ - | $ - | $ - |
| Asphalt Roadway - Secondary | Repair allowance for as required repairs | Cyclical | 2009 | 7 | 5 | 2016 | $ 1,000 | $ 1,000 | $ - | $ - | $ - | $ - | $ - |
| Chain Link Fencing | Replacement of aged fencing | Single | 1972 | 25 | 0 | 2011 | $ 20 | $ 10,182 | $ - | $ - | $ - | $ - | $ - |
| Chain Link Fencing | Replacement at end of remaining useful life | Cyclical | 2011 | 25 | 24 | 2035 | $ 20 | $ 12,727 | $ - | $ - | $ - | $ - | $ 12,727 |
| Playground Equipment | Replacement of playground equipment | Cyclical | 2005 | 10 | 9 | 2020 | $ 50,000 | $ 50,000 | $ - | $ - | $ - | $ - | $ - |
| Tennis Courts | Replacement of 2 courts | Cyclical | 1972 | 20 | 0 | 2011 | $ 42,000 | $ 84,000 | $ 84,000 | $ - | $ - | $ - | $ - |
| **Site Work Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ 84,000 | $ 5,000 | $ - | $ - | $ 12,727 |
| **Site Work Summary** | | | | | | | | | $ 84,000 | $ 5,000 | $ - | $ - | $ 12,727 |
| **Roof** | | | | | | | | | | | | | |
| Metal Roof - Arena | Replace metal roof at end of useful life | Cyclical | 1972 | 30 | 1 | 2012 | $ 9 | $ 229,500 | $ - | $ - | $ - | $ - | $ - |
| Metal Roof - Addition | Replace metal roof at end of useful life | Cyclical | 2006 | 30 | 24 | 2035 | $ 9 | $ 20,700 | $ - | $ - | $ - | $ - | $ 20,700 |
| **Roof Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ - | $ 20,700 |
| **Roof Summary** | | | | | | | | | $ - | $ - | $ - | $ - | $ 20,700 |
| **Architecture Exterior** | | | | | | | | | | | | | |
| <<Metal Siding - Main Building >> | Replace metal siding at end of remaining useful life | Cyclical | 1972 | 30 | 10 | 2021 | $ 8 | $ 100,750 | $ - | $ - | $ - | $ - | $ - |
| Metal Siding - Addition | Replace metal siding at end of remaining useful life | Cyclical | 2004 | 30 | 23 | 2034 | $ 8 | $ 19,375 | $ - | $ - | $ - | $ 19,375 | $ - |
| Wood Siding | Replace wood siding | Cyclical | 1972 | 25 | 1 | 2012 | $ 7 | $ 3,500 | $ - | $ - | $ - | $ - | $ - |
| Main and Secondary Entrance Doors | Replacement at end of remaining useful life | Cyclical | 2005 | 25 | 19 | 2030 | $ 1,350 | $ 10,800 | $ - | $ - | $ - | $ - | $ - |
| Overhead Door | Replace east elevation overhead door at end of useful life | Cyclical | 1980 | 15 | 3 | 2014 | $ 4,000 | $ 4,000 | $ - | $ - | $ - | $ - | $ - |
| Overhead Door - Zamboni Room | Replacement of overhead door to Zamboni Room | Cyclical | 1990 | 15 | 3 | 2014 | $ 1,500 | $ 1,500 | $ - | $ - | $ - | $ - | $ - |
| **Architecture Exterior Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ 19,375 | $ - |
| **Architecture Exterior Summary** | | | | | | | | | $ - | $ - | $ - | $ 19,375 | $ - |
| **Architecture Interior** | | | | | | | | | | | | | |
| Rubber Flooring | Replace rubber flooring at end of useful life | Cyclical | 2007 | 15 | 11 | 2022 | $ 25 | $ 98,865 | $ - | $ - | $ - | $ - | $ - |
| Dasherboards | Replace boards at end of useful life | Cyclical | 1972 | 25 | 6 | 2017 | $ 175,000 | $ 175,000 | $ - | $ - | $ - | $ - | $ - |
| **Architecture Interior Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ - | $ - |
| **Architecture Interior Summary** | | | | | | | | | $ - | $ - | $ - | $ - | $ - |

## *Cash Flow Analysis Output Sheet*

| Component | Recapitalization Detail | Type of event (cyclic/single) | Year of Installation or Repair | Expected Useful Life (EUL) | Useful Life Corrected For Observations | Year of Replacement | Unit Cost | Total Cost | Year 1 2011 | Year 2 2012 | Year 3 2013 | Year 4 2014 | Year 5 2015 | Year 6 2016 | Year 7 2017 | Year 8 2018 | Year 9 2019 | Year 10 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mechanical** | | | | | | | | | | | | | | | | | | |
| Domestic Water Piping | Allowance for localized repairs as required | Cyclical | 1972 | 5 | 6 | 2017 | $ 3,000 | $ 3,000 | $ - | $ 3,000 | $ - | $ - | $ - | $ - | $ 3,000 | $ - | $ - | $ - |
| Back Flow Preventer | Install back flow preventer on main incoming water line | Cyclical | 2011 | 25 | 0 | 2011 | $ 2,500 | $ 2,500 | $ 2,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Electric Hot Water Heater | Replace hot water heater at end of useful life | Cyclical | 2002 | 15 | 6 | 2017 | $ 1,500 | $ 1,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ 1,500 | $ - | $ - | $ - |
| Showers - Change Rooms A and B | Replace showers at end of useful life | Cyclical | 2004 | 20 | 13 | 2024 | $ 250 | $ 1,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Hot Water Storage Tanks | Replacement of tank at end of useful life | Cyclical | 2004 | 25 | 18 | 2029 | $ 1,250 | $ 1,250 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Hot Water Boiler - Addition | Replacement of Burnham boiler at end of useful life | Cyclical | 2004 | 25 | 18 | 2029 | $ 12,500 | $ 12,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Fuel Oil Storage Tank - Roth | Replacement of Roth tank at ten year intervals | Cyclical | 2004 | 10 | 3 | 2014 | $ 3,000 | $ 3,000 | $ - | $ - | $ - | $ 3,000 | $ - | $ - | $ - | $ - | $ - | $ - |
| Oil Fired Boiler - Flood Water | Replacement of boiler at end of useful life | Cyclical | 1995 | 25 | 9 | 2020 | $ 12,500 | $ 12,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 12,500 |
| Hot Water Tanks - Flood Water | Replacement of tanks at end of useful life | Cyclical | 2009 | 25 | 23 | 2034 | $ 2,500 | $ 5,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Fuel Oil Storage Tank - Flood Water | Replacement of tank at ten year intervals | Cyclical | 2002 | 10 | 1 | 2012 | $ 2,000 | $ 2,000 | $ - | $ 2,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ventilation | Replace exhaust fan, CO2 sensor and exhaust/intake louvers | Cyclical | 2003 | 20 | 12 | 2023 | $ 6,500 | $ 6,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Coin Operated Radiant Heaters | Replacement at end of useful life | Cyclical | 2005 | 20 | 14 | 2025 | $ 2,000 | $ 4,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Cooling Tower | Replacement of 90 ton cooling tower at end of useful life | Cyclical | 2002 | 20 | 11 | 2022 | $ 48,000 | $ 48,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Compressors | Replacement of compressors | Cyclical | 1972 | 25 | 1 | 2012 | $ 30,000 | $ 60,000 | $ - | $ 60,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 75 hp Motor | Cyclical replacement of motor | Cyclical | 1987 | 25 | 1 | 2012 | $ 11,000 | $ 11,000 | $ - | $ 11,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 75 hp Motor | Cyclical replacement of motor | Cyclical | 2000 | 25 | 14 | 2025 | $ 11,000 | $ 11,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 25 hp Motors | Cyclical replacement of motors | Cyclical | 1995 | 25 | 9 | 2020 | $ 3,000 | $ 6,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 6,000 |
| Ice Plant - Chiller | Replacement of chiller at end of useful life | Cyclical | 2002 | 25 | 16 | 2027 | $ 150,000 | $ 150,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Brine Piping | Allowance for localized repairs as required | Cyclical | 1972 | 8 | 6 | 2017 | $ 5,000 | $ 5,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ 5,000 | $ - | $ - | $ - |
| Dehumidifiers | Replacement of two dehumidifiers at end of useful life | Cyclical | 2000 | 20 | 9 | 2020 | $ 31,000 | $ 62,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 62,000 |
| Coin Operated Radiant Heaters | Replacement at end of useful life | Cyclical | 2005 | 20 | 14 | 2025 | $ 2,000 | $ 4,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Mechanical Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ 2,500 | $ 76,000 | $ - | $ 3,000 | $ - | $ - | $ 9,500 | $ - | $ - | $ 80,500 |
| **Mechanical Summary** | | | | | | | | | $ 2,500 | $ 76,000 | $ - | $ 3,000 | $ - | $ - | $ 9,500 | $ - | $ - | $ 80,500 |
| **Electrical** | | | | | | | | | | | | | | | | | | |
| Switchgear | Allowance for partial replacement | Cyclical | 1972 | 40 | 2 | 2013 | $ 40,000 | $ 40,000 | $ - | $ - | $ 40,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Interior Lighting | Replacement of T8 lighting at end of useful life | Cyclical | 2008 | 25 | 22 | 2033 | $ 4 | $ 111,200 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Exterior NSPI Transformer | Installation of impact protection for transformer | Single | 2010 | 30 | 0 | 2011 | $ 2,500 | $ 2,500 | $ 2,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Electrical Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ 2,500 | $ - | $ 40,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Electrical Summary** | | | | | | | | | $ 2,500 | $ - | $ 40,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Life Safety / Fire Suppression** | | | | | | | | | | | | | | | | | | |
| Fire Alarm Panel and Emergency Lighting | Allowance to Replace Fire Alarm Panel and Emergency Battery Backup lighting | Cyclical | 2000 | 25 | 15 | 2026 | $ 15,000 | $ 15,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Sprinkler Piping | Repair/Localized replacement allowance | Cyclical | 1972 | 5 | 3 | 2014 | $ 3,500 | $ 3,500 | $ - | $ - | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ 3,500 | $ - |
| **Life Safety / Fire Suppression Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ 3,500 | $ - |
| **Life Safety / Fire Suppression Summary** | | | | | | | | | $ - | $ - | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ 3,500 | $ - |
| **Specialty Systems** | | | | | | | | | | | | | | | | | | |
| Ice Resurfacer | Cyclical replacement at end of useful life | Cyclical | 2001 | 10 | 0 | 2011 | $ 80,000 | $ 80,000 | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Specialty Systems Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Specialty Systems Summary** | | | | | | | | | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Energy Capital Replacements** | | | | | | | | | | | | | | | | | | |
| <<Building Envelope Upgrade>> | as per recommendations from Energy Audit | Cyclical | NA | 35 | NA | 2011 | $ 170,000 | $ 170,000 | $ 170,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| <<Refrigeration Plant Upgrade>> | as per recommendations from Energy Audit | Cyclical | NA | 20 | NA | 2011 | $ 60,000 | $ 60,000 | $ 60,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| <<Exit Sign Retrofit>> | as per recommendations from Energy Audit | Cyclical | NA | 10 | NA | 2011 | $ 500 | $ 500 | $ 500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| <<HVAC Controls>> | as per recommendations from Energy Audit | Cyclical | NA | 20 | NA | 2011 | $ 1,800 | $ 1,800 | $ 1,800 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Energy Capital Replacements Summary** | | | | | | | | | $ 232,300 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |

## *Cash Flow Analysis Output Sheet*

| Component | Recapitalization Detail | Type of event (cyclic/single) | Year of Installation or Repair | Expected Useful Life (EUL) | Useful Life Corrected For Observations | Year of Replacement | Unit Cost | Total Cost | Year 11 2021 | Year 12 2022 | Year 13 2023 | Year 14 2024 | Year 15 2025 | Year 16 2026 | Year 17 2027 | Year 18 2028 | Year 19 2029 | Year 20 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mechanical** | | | | | | | | | | | | | | | | | | |
| Domestic Water Piping | Allowance for localized repairs as required | Cyclical | 1972 | 5 | 6 | 2017 | $ 3,000 | $ 3,000 | $ - | $ 3,000 | $ - | $ - | $ - | $ - | $ 3,000 | $ - | $ - | $ - |
| Back Flow Preventer | Install back flow preventer on main incoming water line | Cyclical | 2011 | 25 | 0 | 2011 | $ 2,500 | $ 2,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Electric Hot Water Heater | Replace hot water heater at end of useful life | Cyclical | 2002 | 15 | 6 | 2017 | $ 1,500 | $ 1,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Showers - Change Rooms A and B | Replace showers at end of useful life | Cyclical | 2004 | 20 | 13 | 2024 | $ 250 | $ 1,000 | $ - | $ - | $ - | $ 1,000 | $ - | $ - | $ - | $ - | $ - | $ - |
| Hot Water Storage Tanks | Replacement of tank at end of useful life | Cyclical | 2004 | 25 | 18 | 2029 | $ 1,250 | $ 1,250 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 1,250 | $ - |
| Hot Water Boiler - Addition | Replacement of Burnham boiler at end of useful life | Cyclical | 2004 | 25 | 18 | 2029 | $ 12,500 | $ 12,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 12,500 | $ - |
| Fuel Oil Storage Tank - Roth | Replacement of Roth tank at ten year intervals | Cyclical | 2004 | 10 | 3 | 2014 | $ 3,000 | $ 3,000 | $ - | $ - | $ - | $ 3,000 | $ - | $ - | $ - | $ - | $ - | $ - |
| Oil Fired Boiler - Flood Water | Replacement of boiler at end of useful life | Cyclical | 1995 | 25 | 9 | 2020 | $ 12,500 | $ 12,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Hot Water Tanks - Flood Water | Replacement of tanks at end of useful life | Cyclical | 2009 | 25 | 23 | 2034 | $ 2,500 | $ 5,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Fuel Oil Storage Tank - Flood Water | Replacement of tank at ten year intervals | Cyclical | 2002 | 10 | 1 | 2012 | $ 2,000 | $ 2,000 | $ - | $ 2,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ventilation | Replace exhaust fan, CO2 sensor and exhaust/intake louvers | Cyclical | 2003 | 20 | 12 | 2023 | $ 6,500 | $ 6,500 | $ - | $ - | $ 6,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Coin Operated Radiant Heaters | Replacement at end of useful life | Cyclical | 2005 | 20 | 14 | 2025 | $ 2,000 | $ 4,000 | $ - | $ - | $ - | $ - | $ 4,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Cooling Tower | Replacement of 90 ton cooling tower at end of useful life | Cyclical | 2002 | 20 | 11 | 2022 | $ 48,000 | $ 48,000 | $ - | $ 48,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Compressors | Replacement of compressors | Cyclical | 1972 | 25 | 1 | 2012 | $ 30,000 | $ 60,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 75 hp Motor | Cyclical replacement of motor | Cyclical | 1987 | 25 | 1 | 2012 | $ 11,000 | $ 11,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 75 hp Motor | Cyclical replacement of motor | Cyclical | 2000 | 25 | 14 | 2025 | $ 11,000 | $ 11,000 | $ - | $ - | $ - | $ - | $ 11,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 25 hp Motors | Cyclical replacement of motors | Cyclical | 1995 | 25 | 9 | 2020 | $ 3,000 | $ 6,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Chiller | Replacement of chiller at end of useful life | Cyclical | 2002 | 25 | 16 | 2027 | $ 150,000 | $ 150,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ 150,000 | $ - | $ - | $ - |
| Ice Plant - Brine Piping | Allowance for localized repairs as required | Cyclical | 1972 | 8 | 6 | 2017 | $ 5,000 | $ 5,000 | $ - | $ - | $ - | $ - | $ 5,000 | $ - | $ - | $ - | $ - | $ - |
| Dehumidifiers | Replacement of two dehumidifiers at end of useful life | Cyclical | 2000 | 20 | 9 | 2020 | $ 31,000 | $ 62,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Coin Operated Radiant Heaters | Replacement at end of useful life | Cyclical | 2005 | 20 | 14 | 2025 | $ 2,000 | $ 4,000 | $ - | $ - | $ - | $ - | $ 4,000 | $ - | $ - | $ - | $ - | $ - |
| **Mechanical Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ 53,000 | $ 6,500 | $ 4,000 | $ 24,000 | $ - | $ 153,000 | $ - | $ 13,750 | $ - |
| **Mechanical Summary** | | | | | | | | | $ - | $ 53,000 | $ 6,500 | $ 4,000 | $ 24,000 | $ - | $ 153,000 | $ - | $ 13,750 | $ - |
| **Electrical** | | | | | | | | | | | | | | | | | | |
| Switchgear | Allowance for partial replacement | Cyclical | 1972 | 40 | 2 | 2013 | $ 40,000 | $ 40,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Interior Lighting | Replacement of T8 lighting at end of useful life | Cyclical | 2008 | 25 | 22 | 2033 | $ 4 | $ 111,200 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Exterior NSPI Transformer | Installation of impact protection for transformer | Single | 2010 | 30 | 0 | 2011 | $ 2,500 | $ 2,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Electrical Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Electrical Summary** | | | | | | | | | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Life Safety / Fire Suppression** | | | | | | | | | | | | | | | | | | |
| Fire Alarm Panel and Emergency Lighting | Allowance to Replace Fire Alarm Panel and Emergency Battery Backup lighting | Cyclical | 2000 | 25 | 15 | 2026 | $ 15,000 | $ 15,000 | $ - | $ - | $ - | $ - | $ - | $ 15,000 | $ - | $ - | $ - | $ - |
| Sprinkler Piping | Repair/Localized replacement allowance | Cyclical | 1972 | 5 | 3 | 2014 | $ 3,500 | $ 3,500 | $ - | $ - | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ 3,500 | $ - |
| **Life Safety / Fire Suppression Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ 3,500 | $ - | $ 15,000 | $ - | $ - | $ 3,500 | $ - |
| **Life Safety / Fire Suppression Summary** | | | | | | | | | $ - | $ - | $ - | $ 3,500 | $ - | $ 15,000 | $ - | $ - | $ 3,500 | $ - |
| **Specialty Systems** | | | | | | | | | | | | | | | | | | |
| Ice Resurfacer | Cyclical replacement at end of useful life | Cyclical | 2001 | 10 | 0 | 2011 | $ 80,000 | $ 80,000 | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Specialty Systems Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Specialty Systems Summary** | | | | | | | | | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Energy Capital Replacements** | | | | | | | | | | | | | | | | | | |
| <<Building Envelope Upgrade>> | as per recommendations from Energy Audit | Cyclical | NA | 35 | NA | 2011 | $ 170,000 | $ 170,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| <<Refrigeration Plant Upgrade>> | as per recommendations from Energy Audit | Cyclical | NA | 20 | NA | 2011 | $ 60,000 | $ 60,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| <<Exit Sign Retrofit>> | as per recommendations from Energy Audit | Cyclical | NA | 10 | NA | 2011 | $ 500 | $ 500 | $ 500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| <<HVAC Controls>> | as per recommendations from Energy Audit | Cyclical | NA | 20 | NA | 2011 | $ 1,800 | $ 1,800 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Energy Capital Replacements Summary** | | | | | | | | | $ 500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |

## *Cash Flow Analysis Output Sheet*

| Component | Recapitalization Detail | Type of event (cyclic/single) | Year of Installation or Repair | Expected Useful Life (EUL) | Useful Life Corrected For Observations | Year of Replacement | Unit Cost | Total Cost | Year 21<br>2031 | Year 22<br>2032 | Year 23<br>2033 | Year 24<br>2034 | Year 25<br>2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mechanical** | | | | | | | | | | | | | |
| Domestic Water Piping | Allowance for localized repairs as required | Cyclical | 1972 | 5 | 6 | 2017 | $ 3,000 | $ 3,000 | $ - | $ 3,000 | $ - | $ - | $ - |
| Back Flow Preventer | Install back flow preventer on main incoming water line | Cyclical | 2011 | 25 | 0 | 2011 | $ 2,500 | $ 2,500 | $ - | $ - | $ - | $ - | $ - |
| Electric Hot Water Heater | Replace hot water heater at end of useful life | Cyclical | 2002 | 15 | 6 | 2017 | $ 1,500 | $ 1,500 | $ - | $ 1,500 | $ - | $ - | $ - |
| Showers - Change Rooms A and B | Replace showers at end of useful life | Cyclical | 2004 | 20 | 13 | 2024 | $ 250 | $ 1,000 | $ - | $ - | $ - | $ - | $ - |
| Hot Water Storage Tanks | Replacement of tank at end of useful life | Cyclical | 2004 | 25 | 18 | 2029 | $ 1,250 | $ 1,250 | $ - | $ - | $ - | $ - | $ - |
| Hot Water Boiler - Addition | Replacement of Burnham boiler at end of useful life | Cyclical | 2004 | 25 | 18 | 2029 | $ 12,500 | $ 12,500 | $ - | $ - | $ - | $ - | $ - |
| Fuel Oil Storage Tank - Roth | Replacement of Roth tank at ten year intervals | Cyclical | 2004 | 10 | 3 | 2014 | $ 3,000 | $ 3,000 | $ - | $ - | $ - | $ 3,000 | $ - |
| Oil Fired Boiler - Flood Water | Replacement of boiler at end of useful life | Cyclical | 1995 | 25 | 9 | 2020 | $ 12,500 | $ 12,500 | $ - | $ - | $ - | $ - | $ - |
| Hot Water Tanks - Flood Water | Replacement of tanks at end of useful life | Cyclical | 2009 | 25 | 23 | 2034 | $ 2,500 | $ 5,000 | $ - | $ - | $ - | $ 5,000 | $ - |
| Fuel Oil Storage Tank - Flood Water | Replacement of tank at ten year intervals | Cyclical | 2002 | 10 | 1 | 2012 | $ 2,000 | $ 2,000 | $ - | $ 2,000 | $ - | $ - | $ - |
| Ventilation | Replace exhaust fan, CO2 sensor and exhaust/intake louvers | Cyclical | 2003 | 20 | 12 | 2023 | $ 6,500 | $ 6,500 | $ - | $ - | $ - | $ - | $ - |
| Coin Operated Radiant Heaters | Replacement at end of useful life | Cyclical | 2005 | 20 | 14 | 2025 | $ 2,000 | $ 4,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Cooling Tower | Replacement of 90 ton cooling tower at end of useful life | Cyclical | 2002 | 20 | 11 | 2022 | $ 48,000 | $ 48,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Compressors | Replacement of compressors | Cyclical | 1972 | 25 | 1 | 2012 | $ 30,000 | $ 60,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 75 hp Motor | Cyclical replacement of motor | Cyclical | 1987 | 25 | 1 | 2012 | $ 11,000 | $ 11,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 75 hp Motor | Cyclical replacement of motor | Cyclical | 2000 | 25 | 14 | 2025 | $ 11,000 | $ 11,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - 25 hp Motors | Cyclical replacement of motors | Cyclical | 1995 | 25 | 9 | 2020 | $ 3,000 | $ 6,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Chiller | Replacement of chiller at end of useful life | Cyclical | 2002 | 25 | 16 | 2027 | $ 150,000 | $ 150,000 | $ - | $ - | $ - | $ - | $ - |
| Ice Plant - Brine Piping | Allowance for localized repairs as required | Cyclical | 1972 | 8 | 6 | 2017 | $ 5,000 | $ 5,000 | $ - | $ - | $ 5,000 | $ - | $ - |
| Dehumidifiers | Replacement of two dehumidifiers at end of useful life | Cyclical | 2000 | 20 | 9 | 2020 | $ 31,000 | $ 62,000 | $ - | $ - | $ - | $ - | $ - |
| Coin Operated Radiant Heaters | Replacement at end of useful life | Cyclical | 2005 | 20 | 14 | 2025 | $ 2,000 | $ 4,000 | $ - | $ - | $ - | $ - | $ - |
| **Mechanical Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ 6,500 | $ 5,000 | $ 8,000 | $ - |
| **Mechanical Summary** | | | | | | | | | $ - | $ 6,500 | $ 5,000 | $ 8,000 | $ - |
| **Electrical** | | | | | | | | | | | | | |
| Switchgear | Allowance for partial replacement | Cyclical | 1972 | 40 | 2 | 2013 | $ 40,000 | $ 40,000 | $ - | $ - | $ - | $ - | $ - |
| Interior Lighting | Replacement of T8 lighting at end of useful life | Cyclical | 2008 | 25 | 22 | 2033 | $ 4 | $ 111,200 | $ - | $ - | $ 111,200 | $ - | $ - |
| Exterior NSPI Transformer | Installation of impact protection for transformer | Single | 2010 | 30 | 0 | 2011 | $ 2,500 | $ 2,500 | $ - | $ - | $ - | $ - | $ - |
| **Electrical Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ 111,200 | $ - | $ - |
| **Electrical Summary** | | | | | | | | | $ - | $ - | $ 111,200 | $ - | $ - |
| **Life Safety / Fire Suppression** | | | | | | | | | | | | | |
| Fire Alarm Panel and Emergency Lighting | Allowance to Replace Fire Alarm Panel and Emergency Battery Backup lighting | Cyclical | 2000 | 25 | 15 | 2026 | $ 15,000 | $ 15,000 | $ - | $ - | $ - | $ - | $ - |
| Sprinkler Piping | Repair/Localized replacement allowance | Cyclical | 1972 | 5 | 3 | 2014 | $ 3,500 | $ 3,500 | $ - | $ - | $ - | $ 3,500 | $ - |
| **Life Safety / Fire Suppression Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ - | $ - | $ - | $ 3,500 | $ - |
| **Life Safety / Fire Suppression Summary** | | | | | | | | | $ - | $ - | $ - | $ 3,500 | $ - |
| **Specialty Systems** | | | | | | | | | | | | | |
| Ice Resurfacer | Cyclical replacement at end of useful life | Cyclical | 2001 | 10 | 0 | 2011 | $ 80,000 | $ 80,000 | $ 80,000 | $ - | $ - | $ - | $ - |
| **Specialty Systems Summary Excluding Projects Replaced by Energy Efficiency Improvements** | | | | | | | | | $ 80,000 | $ - | $ - | $ - | $ - |
| **Specialty Systems Summary** | | | | | | | | | $ 80,000 | $ - | $ - | $ - | $ - |
| **Energy Capital Replacements** | | | | | | | | | | | | | |
| <<Building Envelope Upgrade>> | as per recommendations from Energy Audit | Cyclical | NA | 35 | NA | 2011 | $ 170,000 | $ 170,000 | $ - | $ - | $ - | $ - | $ - |
| <<Refrigeration Plant Upgrade>> | as per recommendations from Energy Audit | Cyclical | NA | 20 | NA | 2011 | $ 60,000 | $ 60,000 | $ 60,000 | $ - | $ - | $ - | $ - |
| <<Exit Sign Retrofit>> | as per recommendations from Energy Audit | Cyclical | NA | 10 | NA | 2011 | $ 500 | $ 500 | $ 500 | $ - | $ - | $ - | $ - |
| <<HVAC Controls>> | as per recommendations from Energy Audit | Cyclical | NA | 20 | NA | 2011 | $ 1,800 | $ 1,800 | $ 1,800 | $ - | $ - | $ - | $ - |
| **Energy Capital Replacements Summary** | | | | | | | | | $ 62,300 | $ - | $ - | $ - | $ - |

# Cash Flow Summary Output Sheet

| Gray Memorial Arena | Year 1<br>2011 | Year 2<br>2012 | Year 3<br>2013 | Year 4<br>2014 | Year 5<br>2015 | Year 6<br>2016 | Year 7<br>2017 | Year 8<br>2018 | Year 9<br>2019 | Year 10<br>2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Site Work** | $ 174,182 | $ - | $ - | $ - | $ - | $ 1,000 | $ - | $ 5,000 | $ - | $ 50,000 |
| **Structure** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Roof** | $ - | $ 229,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Exterior** | $ - | $ 3,500 | $ - | $ 5,500 | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Interior** | $ - | $ - | $ - | $ - | $ - | $ - | $ 175,000 | $ - | $ - | $ - |
| **Mechanical** | $ 2,500 | $ 76,000 | $ - | $ 3,000 | $ - | $ - | $ 9,500 | $ - | $ - | $ 80,500 |
| **Electrical** | $ 2,500 | $ - | $ 40,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Life Safety / Fire Suppression** | $ - | $ - | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ 3,500 | $ - |
| **Specialty Systems** | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **TOTAL for Gray Memorial Arena** | $ 259,182 | $ 309,000 | $ 40,000 | $ 12,000 | $ - | $ 1,000 | $ 184,500 | $ 5,000 | $ 3,500 | $ 130,500 |

# Facility Condition Calculation Output Sheet

| Gray Memorial Arena | Year 1<br>2011 | Year 2<br>2012 | Year 3<br>2013 | Year 4<br>2014 | Year 5<br>2015 | Year 6<br>2016 | Year 7<br>2017 | Year 8<br>2018 | Year 9<br>2019 | Year 10<br>2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Balance Carried from Previous Year** | $ - | $ 259,182 | $ 568,182 | $ 608,182 | $ 620,182 | $ 620,182 | $ 621,182 | $ 805,682 | $ 810,682 | $ 814,182 |
| **Anticipated Annual Recap Requirement** | $ 259,182 | $ 309,000 | $ 40,000 | $ 12,000 | $ - | $ 1,000 | $ 184,500 | $ 5,000 | $ 3,500 | $ 130,500 |
| **Soft Costs** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Total Anticipated Requirements** | $ 259,182 | $ 568,182 | $ 608,182 | $ 620,182 | $ 620,182 | $ 621,182 | $ 805,682 | $ 810,682 | $ 814,182 | $ 944,682 |
| **Capital Funding** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Operational Costs** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Maintenance Costs** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Loan Payments** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Building Replacement Value** | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 |
| **Amount of Deferred Maintenance** | $ 259,182 | $ 568,182 | $ 608,182 | $ 620,182 | $ 620,182 | $ 621,182 | $ 805,682 | $ 810,682 | $ 814,182 | $ 944,682 |
| **Annual Cost of Ownership** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **FCI** | 5.88% | 12.89% | 13.80% | 14.07% | 14.07% | 14.10% | 18.28% | 18.40% | 18.48% | 21.44% |

# Cash Flow Summary Output Sheet

| Gray Memorial Arena | Year 11 2021 | Year 12 2022 | Year 13 2023 | Year 14 2024 | Year 15 2025 | Year 16 2026 | Year 17 2027 | Year 18 2028 | Year 19 2029 | Year 20 2030 | Year 21 2031 | Year 22 2032 | Year 23 2033 | Year 24 2034 | Year 25 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site Work** | $ - | $ - | $ 1,000 | $ - | $ 5,000 | $ - | $ - | $ - | $ - | $ 51,000 | $ 84,000 | $ 5,000 | $ - | $ - | $ 12,727 |
| **Structure** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Roof** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 20,700 |
| **Architecture Exterior** | $ 100,750 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 5,500 | $ 10,800 | $ - | $ - | $ - | $ 19,375 | $ - |
| **Architecture Interior** | $ - | $ 98,865 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Mechanical** | $ - | $ 53,000 | $ 6,500 | $ 4,000 | $ 24,000 | $ - | $ 153,000 | $ - | $ 13,750 | $ - | $ - | $ 6,500 | $ 5,000 | $ 8,000 | $ - |
| **Electrical** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 111,200 | $ - | $ - |
| **Life Safety / Fire Suppression** | $ - | $ - | $ - | $ 3,500 | $ - | $ 15,000 | $ - | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ 3,500 | $ - |
| **Specialty Systems** | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 80,000 | $ - | $ - | $ - | $ - |
| **TOTAL for Gray Memorial Arena** | $ 180,750 | $ 151,865 | $ 7,500 | $ 7,500 | $ 29,000 | $ 15,000 | $ 153,000 | $ - | $ 22,750 | $ 61,800 | $ 164,000 | $ 11,500 | $ 116,200 | $ 30,875 | $ 33,427 |

# Facility Condition Calculation Output Sheet

| Gray Memorial Arena | Year 11 2021 | Year 12 2022 | Year 13 2023 | Year 14 2024 | Year 15 2025 | Year 16 2026 | Year 17 2027 | Year 18 2028 | Year 19 2029 | Year 20 2030 | Year 21 2031 | Year 22 2032 | Year 23 2033 | Year 24 2034 | Year 25 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Balance Carried from Previous Year** | $ 944,682 | $ 1,125,432 | $ 1,277,297 | $ 1,284,797 | $ 1,292,297 | $ 1,321,297 | $ 1,336,297 | $ 1,489,297 | $ 1,489,297 | $ 1,512,047 | $ 1,573,847 | $ 1,737,847 | $ 1,749,347 | $ 1,865,547 | $ 1,896,422 |
| **Anticipated Annual Recap Requirement** | $ 180,750 | $ 151,865 | $ 7,500 | $ 7,500 | $ 29,000 | $ 15,000 | $ 153,000 | $ - | $ 22,750 | $ 61,800 | $ 164,000 | $ 11,500 | $ 116,200 | $ 30,875 | $ 33,427 |
| **Soft Costs** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Total Anticipated Requirements** | $ 1,125,432 | $ 1,277,297 | $ 1,284,797 | $ 1,292,297 | $ 1,321,297 | $ 1,336,297 | $ 1,489,297 | $ 1,489,297 | $ 1,512,047 | $ 1,573,847 | $ 1,737,847 | $ 1,749,347 | $ 1,865,547 | $ 1,896,422 | $ 1,929,849 |
| **Capital Funding** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Operational Costs** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Maintenance Costs** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Loan Payments** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Building Replacement Value** | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 |
| **Amount of Deferred Maintenance** | $ 1,125,432 | $ 1,277,297 | $ 1,284,797 | $ 1,292,297 | $ 1,321,297 | $ 1,336,297 | $ 1,489,297 | $ 1,489,297 | $ 1,512,047 | $ 1,573,847 | $ 1,737,847 | $ 1,749,347 | $ 1,865,547 | $ 1,896,422 | $ 1,929,849 |
| **Annual Cost of Ownership** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **FCI** | 25.54% | 28.99% | 29.16% | 29.33% | 29.99% | 30.33% | 33.80% | 33.80% | 34.32% | 35.72% | 39.44% | 39.70% | 42.34% | 43.04% | 43.80% |

# Cash Flow Summary Output Sheet - Including Efficiency Projects

| Gray Memorial Arena | Year 1 2011 | Year 2 2012 | Year 3 2013 | Year 4 2014 | Year 5 2015 | Year 6 2016 | Year 7 2017 | Year 8 2018 | Year 9 2019 | Year 10 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Site Work** | $ 174,182 | $ - | $ - | $ - | $ - | $ 1,000 | $ - | $ 5,000 | $ - | $ 50,000 |
| **Structure** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Roof** | $ - | $ 229,500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Exterior** | $ - | $ 3,500 | $ - | $ 5,500 | $ - | $ - | $ - | $ - | $ - | $ - |
| **Architecture Interior** | $ - | $ - | $ - | $ - | $ - | $ - | $ 175,000 | $ - | $ - | $ - |
| **Mechanical** | $ 2,500 | $ 76,000 | $ - | $ 3,000 | $ - | $ - | $ 9,500 | $ - | $ - | $ 80,500 |
| **Electrical** | $ 2,500 | $ - | $ 40,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Life Safety / Fire Suppression** | $ - | $ - | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ 3,500 | $ - |
| **Specialty Systems** | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Energy Capital Replacements** | $ 232,300 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **TOTAL for Gray Memorial Arena** | $ 491,482 | $ 309,000 | $ 40,000 | $ 12,000 | $ - | $ 1,000 | $ 184,500 | $ 5,000 | $ 3,500 | $ 130,500 |

# Facility Condition Calculation Output Sheet - Including Efficiency Projects

| Gray Memorial Arena | Year 1 2011 | Year 2 2012 | Year 3 2013 | Year 4 2014 | Year 5 2015 | Year 6 2016 | Year 7 2017 | Year 8 2018 | Year 9 2019 | Year 10 2020 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Balance Carried from Previous Year** | $ - | $ 472,567 | $ 762,652 | $ 783,737 | $ 776,822 | $ 757,907 | $ 739,992 | $ 905,577 | $ 891,662 | $ 876,247 |
| **Anticipated Annual Recap Requirement** | $ 491,482 | $ 309,000 | $ 40,000 | $ 12,000 | $ - | $ 1,000 | $ 184,500 | $ 5,000 | $ 3,500 | $ 130,500 |
| **Soft Costs** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Total Anticipated Requirements** | $ 491,482 | $ 781,567 | $ 802,652 | $ 795,737 | $ 776,822 | $ 758,907 | $ 924,492 | $ 910,577 | $ 895,162 | $ 1,006,747 |
| **Capital Funding** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Operations Cost** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Maintenance Cost** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Operational Savings** | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 |
| **Loan Payments** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Building Replacement Value** | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 |
| **Amount of Deferred Maintenance** | $ 472,567 | $ 762,652 | $ 783,737 | $ 776,822 | $ 757,907 | $ 739,992 | $ 905,577 | $ 891,662 | $ 876,247 | $ 987,832 |
| **Annual Cost of Ownership** | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) |
| **FCI** | 10.72% | 17.31% | 17.79% | 17.63% | 17.20% | 16.79% | 20.55% | 20.24% | 19.89% | 22.42% |

# Cash Flow Summary Output Sheet - Including Efficiency Projects

| Gray Memorial Arena | Year 11 2021 | Year 12 2022 | Year 13 2023 | Year 14 2024 | Year 15 2025 | Year 16 2026 | Year 17 2027 | Year 18 2028 | Year 19 2029 | Year 20 2030 | Year 21 2031 | Year 22 2032 | Year 23 2033 | Year 24 2034 | Year 25 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Site Work** | $ - | $ - | $ 1,000 | $ - | $ 5,000 | $ - | $ - | $ - | $ - | $ 51,000 | $ 84,000 | $ 5,000 | $ - | $ - | $ 12,727 |
| **Structure** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Roof** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 20,700 |
| **Architecture Exterior** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 5,500 | $ 10,800 | $ - | $ - | $ - | $ 19,375 | $ - |
| **Architecture Interior** | $ - | $ 98,865 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Mechanical** | $ - | $ 53,000 | $ 6,500 | $ 4,000 | $ 24,000 | $ - | $ 153,000 | $ - | $ 13,750 | $ - | $ - | $ 6,500 | $ 5,000 | $ 8,000 | $ - |
| **Electrical** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 111,200 | $ - | $ - |
| **Life Safety / Fire Suppression** | $ - | $ - | $ - | $ 3,500 | $ - | $ 15,000 | $ - | $ - | $ 3,500 | $ - | $ - | $ - | $ - | $ 3,500 | $ - |
| **Specialty Systems** | $ 80,000 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 80,000 | $ - | $ - | $ - | $ - |
| **Energy Capital Replacements** | $ 500 | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ 62,300 | $ - | $ - | $ - | $ - |
| **TOTAL for Gray Memorial Arena** | $ 80,500 | $ 151,865 | $ 7,500 | $ 7,500 | $ 29,000 | $ 15,000 | $ 153,000 | $ - | $ 22,750 | $ 61,800 | $ 226,300 | $ 11,500 | $ 116,200 | $ 30,875 | $ 33,427 |

# Fac Facility Condition Calculation Output Sheet - Including Efficiency Projects

| Gray Memorial Arena | Year 11 2021 | Year 12 2022 | Year 13 2023 | Year 14 2024 | Year 15 2025 | Year 16 2026 | Year 17 2027 | Year 18 2028 | Year 19 2029 | Year 20 2030 | Year 21 2031 | Year 22 2032 | Year 23 2033 | Year 24 2034 | Year 25 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Balance Carried from Previous Year** | $ 987,832 | $ 1,049,417 | $ 1,182,367 | $ 1,170,952 | $ 1,159,537 | $ 1,169,622 | $ 1,165,707 | $ 1,299,792 | $ 1,280,877 | $ 1,284,712 | $ 1,327,597 | $ 1,534,982 | $ 1,527,567 | $ 1,624,852 | $ 1,636,812 |
| **Anticipated Annual Recap Requirement** | $ 80,500 | $ 151,865 | $ 7,500 | $ 7,500 | $ 29,000 | $ 15,000 | $ 153,000 | $ - | $ 22,750 | $ 61,800 | $ 226,300 | $ 11,500 | $ 116,200 | $ 30,875 | $ 33,427 |
| **Soft Costs** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Total Anticipated Requirements** | $ 1,068,332 | $ 1,201,282 | $ 1,189,867 | $ 1,178,452 | $ 1,188,537 | $ 1,184,622 | $ 1,318,707 | $ 1,299,792 | $ 1,303,627 | $ 1,346,512 | $ 1,553,897 | $ 1,546,482 | $ 1,643,767 | $ 1,655,727 | $ 1,670,239 |
| **Capital Funding** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Operations Cost** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Maintenance Cost** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Operational Savings** | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 | $ 18,915 |
| **Loan Payments** | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| **Building Replacement Value** | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 | $ 4,406,300 |
| **Amount of Deferred Maintenance** | $ 1,049,417 | $ 1,182,367 | $ 1,170,952 | $ 1,159,537 | $ 1,169,622 | $ 1,165,707 | $ 1,299,792 | $ 1,280,877 | $ 1,284,712 | $ 1,327,597 | $ 1,534,982 | $ 1,527,567 | $ 1,624,852 | $ 1,636,812 | $ 1,651,324 |
| **Annual Cost of Ownership** | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) | $ (18,915) |
| **FCI** | 23.82% | 26.83% | 26.57% | 26.32% | 26.54% | 26.46% | 29.50% | 29.07% | 29.16% | 30.13% | 34.84% | 34.67% | 36.88% | 37.15% | 37.48% |

# Appendix B -
# Gray Memorial Arena Photo Log



Oblique Aerial Photography courtesy of Pictometry. Flown July 2006


Oblique Aerial Photography courtesy of Pictometry. Flown July 2006

HALIFAX
REGIONAL MUNICIPALITY

HRM Property and Buildings

# Gerald B. Gray Arena

## 10 Monique Ave, Dartmouth

District 9 PID: 00062604



0 25 50 Metres

0 50 100 150 Feet

**Photo 1:** Asphalt Parking Area

**Photo 2:** Asphalt Roadway at Rear of Building

**Photo 3:** Playground Equipment

**Photo 4:** Damaged Playground Equipment

**Photo 5:** Tennis Court

**Photo 6:** Concrete Stairwell and Walkway

**Photo 7:** South Elevation, Building Exterior.

**Photo 8:** Asphalt Roadway, Pad Mounted Transformer and Cooling Tower

**Photo 9:** Dressing Room Addition of South Elevation


**Photo 10:** Main Entrance on West Elevation

**Photo 11:** Partial West Elevation

**Photo 12:** Main Entrance Metal Doors

**Photo 13:** Overhead Door

**Photo 14:** Overhead Door for Zamboni

**Photo 15:** Metal Access Door for Mechanical Room Building Addition

**Photo 16:** Unprotected NSPI Pad Mounted Transformer


**Photo 17:** Ice Surface Atop a Concrete Slab on Grade.

**Photo 18:** Bleachers with Radiant Heaters

**Photo 19:** Rubber Mat Flooring, Dasher Boards, and Interior Finishes

**Photo 20:** Dasher Board Gate

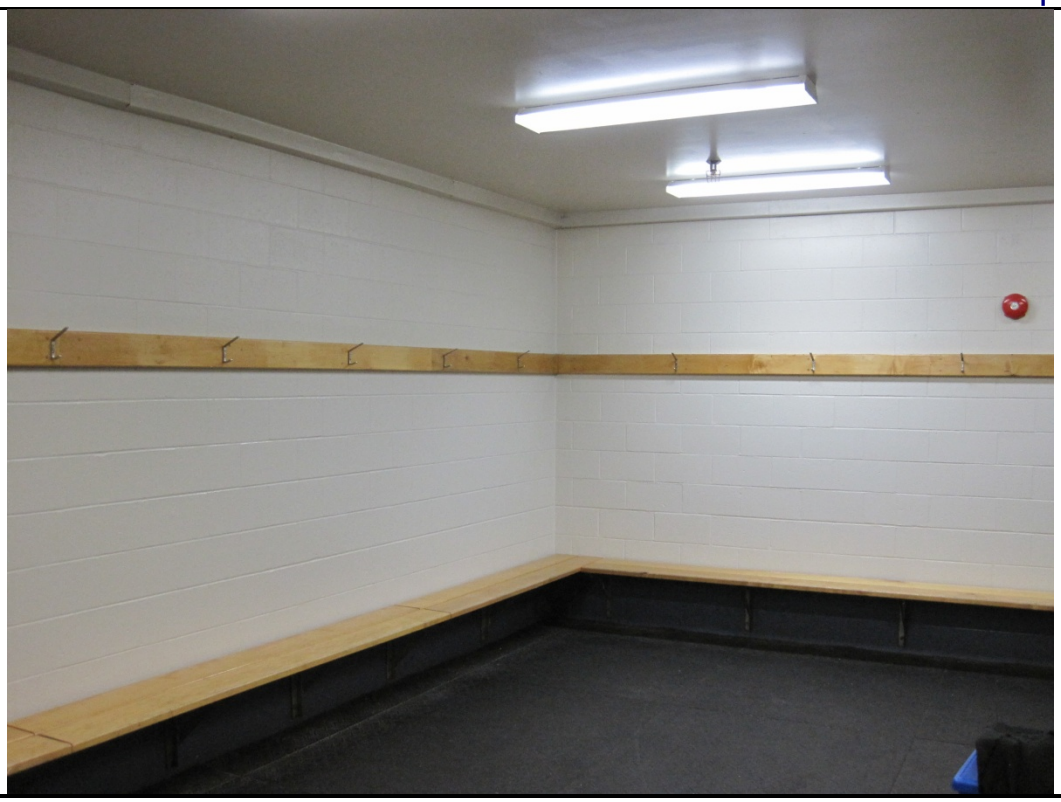


**Photo 21:** Typical Dressing Room Finishes


**Photo 22:** Main Water Line

**Photo 23:** Typical Urinal Fixtures


**Photo 24:** Oil Fired Boiler (In Addition Mechanical Room) Services Addition Only In-Floor Radiant Heat


**Photo 25:** Indirect Fired Hot Water Heater (In Additional Mechanical Room)


**Photo 26:** Roth Fuel Oil Tank For the (In Additional Mechanical Room)


**Photo 27:** Flood Water Boiler

**Photo 28:** Exterior Fuel Oil Tank for Flood Water Boiler


**Photo 29:** Ice Plant Cooling Tower

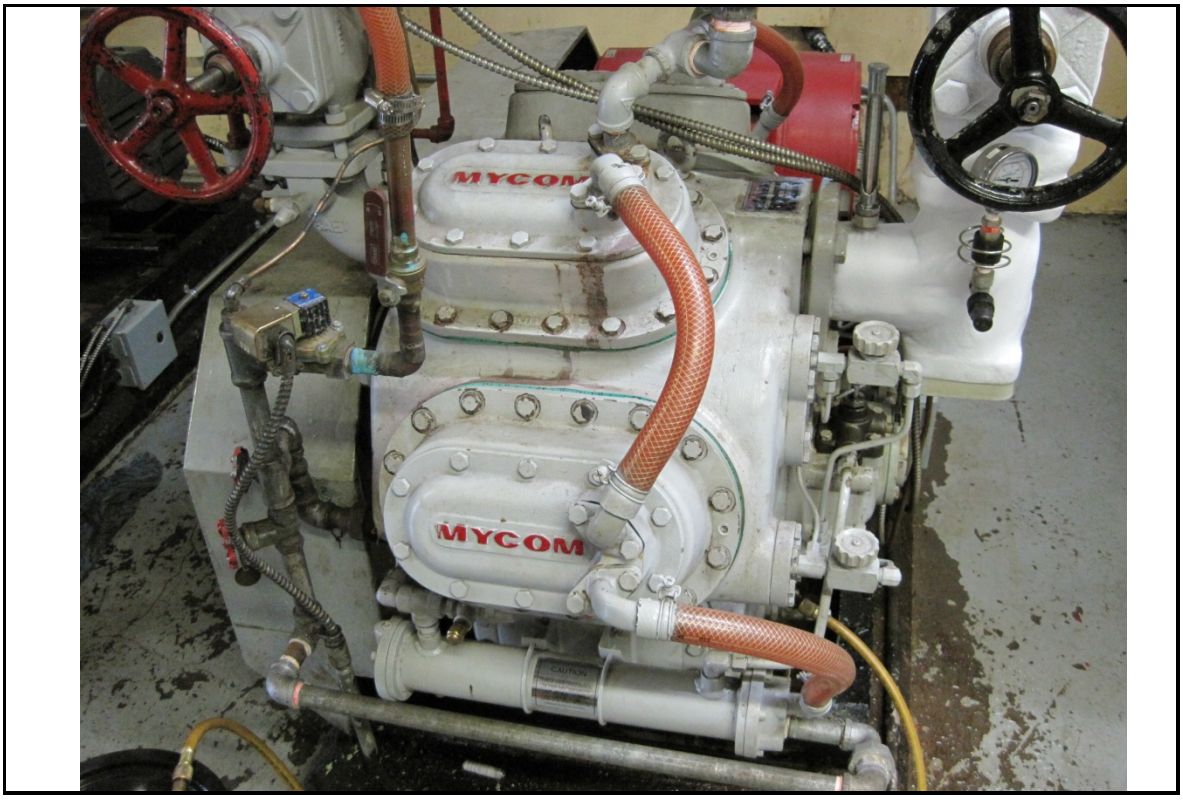



**Photo 30:** Ice Plant Compressor

**Photo 31:** Ice Plant Chiller

**Photo 32:** Radiant Tube Heaters

**Photo 33:** Dehumidification Unit


**Photo 34:** $CO_2$ Monitor


**Photo 35:** Main Electrical Switchgear


**Photo 36:** Fire Extinguisher with Current Inspection Tags


**Photo 37:** Sprinkler Tree


**Photo 38:** Ice Resurfacer (Zamboni)

# Appendix C -
# Gray Memorial Arena Site Assessment Sheets

## BUILDING - SITE CONDITION ASSESSMENT (PAGE 1)

**HRM Building ID:**

**Building of Interest:**

Building Name: Gray Memorial Arena

Also Known As: Gray Memorial Arena | PID: 00062604

Civic #: 10 | Street: Monique Avenue

Community: Dartmouth | Postal Code: B3A 4G7

Urban ☐ Suburban ☐ Rural ☐

**Trees:**

# Hardwood: Multiple — Good ■ Okay ☐ Poor ☐

# Softwood: Multiple — Good ■ Okay ☐ Poor ☐

# Shrubs/Bushes: Multiple — Good ■ Okay ☐ Poor ☐

**Flowers & Plantings:**

Approximate SqFt: | Condition: Good ☐ Okay ☐ Poor ☐

**Landscaping:**

Description: Landscaping consists of predominately of grassed areas | Condition: Good ■ Okay ☐ Poor ■

**Parking Lot / Driveway:**

| Section | Location | Area (SqFt) | # Catch Basins | Curb Material | Deficiency | Priority | Notes |
|---|---|---|---|---|---|---|---|
| 1 | North Side of Building | 22000 | 1 | none | 2,4 | | Poor Condition |
| 2 | Driveway from Monique Ave | 1200 | 0 | Asphalt | | | Fair condition |
| 3 | Roadway from Farthington D | 9500 | 0 | None | | | Good condition newly installed |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |

*Deficiencies: 1. Heavily Patched 2. Aligatoring 3. Fissures 4. Bumps & Pot Holes 5. Broken / Missing Curbs*

# Parking Spots: 65 Est | Condition of Pavement Markings: Good ☐ Okay ■ Poor ☐

**Sidewalks:**

| Section | Location | Area (SqFt) | Material | Deficiency | Priority | Notes |
|---|---|---|---|---|---|---|
| 1 | Monique Ave and Farthington | 3000 | Concrete | | | HRM Responsibility |
| 2 | | | | | | |
| 3 | | | | | | |

## BUILDING - SITE CONDITION ASSESSMENT (PAGE 2)

**HRM Building ID:**

**Lighting:** # Poles: 1 | # Lights: 2 | Notes: Aged, reported to be operable

**Fencing:**

| Section | Length | Type | Notes |
|---|---|---|---|
| 1 | 520 | Wood ☐ Chain Link ■ Other | At end of life |
| 2 | 650 | Wood ☐ Chain Link ■ Other | Good Condition |
| 3 | | Wood ☐ Chain Link ☐ Other | |

**Sheds:**

| Shed | Size | Material | Notes |
|---|---|---|---|
| 1 | | | None |
| 2 | | | |
| 3 | | | |

**Other Features:** (Check Applicable)

| | | | | | |
|---|---|---|---|---|---|
| Skate Park ☐ | | Basketball ☐ | | Playground ■ | |
| Playground Equipment: | Play Structure ■ | Basic Equipment ☐ | Estimated Value: | 50000 | |
| Sports Field ☐ | | Bleachers ☐ | | Dugouts ☐ | |
| Pond ☐ | | River/Lake ☐ | | Swimming Pool ☐ | |
| Other: Tennis Court (double) | | Other: | | Other: | |

**Site Exposures:** (Provide photos for each)

| | | | |
|---|---|---|---|
| North Side | Civic Roadway | Distance Away | 50 |
| South Side | Residential | Distance Away | 150+ |
| East Side | Residential | Distance Away | 250 |
| West Side | Civic Roadway | Distance Away | 130 |

**Notes & Observations:**

At the time of the site visit the asphalt parking areas appeared to be in fair to poor condition with numerous areas of settlement, alligator/longitudinal cracking and evidence of past localized repairs. Asphalt paving typically has an expected useful life of fifteen years depending on the frequency of use, maintenance and quality of the original installation. In addition this can be further extended with ongoing localized repairs and minor replacements completed on an as required basis.

The secondary asphalt paved roadway appeared to be in good condition and it was reported that the roadway was installed in 2009 on top of an existing gravel roadway. Typically asphalt paved roadways have an expected useful life of fifteen to twenty years depending on the quality of the original installation and amount/frequency of use.

The site fencing was observed to vary in condition from poor to good condition. The majority of the fencing was observed to be corroded and at, or nearing, the end of its remaining useful life. A section of the fencing fronting on to Monique appeared to have been recently replaced and is in good condition. Typically chain link fencing has an expected useful life of twenty to twenty five years. Based on the observed condition it is expected that the deteriorated fencing will require replacement in the near future.

**Assessed By:** CMEL

**Date:** August 26, 2010

## BUILDING - GENERAL ASSESSMENT (PAGE 1)

**HRM Building ID:**

**Building of Interest:**

Building Name: Gray Memorial Arena

Also Known As: Gray Memorial Arena | PID: 00062604

Civic #: 10 | Street: Monique Avenue

Community: Dartmouth | Postal Code: B3A 4G7

**Replacement Cost:**

Building Cost: $ | Additional Fixed Improvement Cost: $

Total Replacement Cost: $ 4406300 *RS Means 26

**Basic Characteristics:**

Year of Construction: 1972 | (or) Estimated Age:

# Floors Above Ground: 2 | # Floors Below Ground: 0 | Total # Floors: 2

| Floor | SqFt | Notes |
|---|---|---|
| 5+ | | |
| 4 | | |
| 3 | | |
| 2 | 1167 | 2 Mezzanines |
| 1 (Ground Level) | 26633 | Main Arena, Change Rooms and addition |
| B1 | | |
| B2+ | | |

Total SqFt: 27800

# Elevators: 0 | Are Certificates Up To Date? Yes ☐ No ☐ | Notes:

Heritage Property? Yes ☐ No ■ | Heritage #:

**Construction:**

Roof: *(see Roofing Assessment Form)*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Foundation: | Slab ☐ | Pile ☐ | Crawl Space ☐ | T-Shaped ■ | Other | | Notes | Assumed |
| Material: | Wood ☐ | Concrete ■ | Cement Block ☐ | Stone ☐ | Other | | Notes | Assumed |
| Interior Walls: | Wood ☐ | Metal ☐ | Concrete ■ | Stone ☐ | Other | | Notes | Concrete Block, wood |
| Insulation: | Fibreglass ■ | Plastic (polystyrene) ☐ | Unknown ☐ | | Other | | Notes | Assumed |
| Exterior Walls: | Wood ☐ | Metal ■ | Concrete ■ | Stone ☐ | Other | | Notes | Concrete Block |
| Insulation: | Fibreglass ■ | Plastic (polystyrene) ☐ | Unknown ☐ | | Other | | Notes | Assumed |
| Floors: | Wood ☐ | Metal ☐ | Concrete ■ | Stone ☐ | Other | | Notes | |
| Windows: | Single Glazed ☐ | Double Glazed ☐ | | | Other | | Notes | None |

## BUILDING - GENERAL ASSESSMENT (PAGE 2)

**HRM Building ID:**

### Building Additions:

| Addition | Location | Area (SqFt) | Date of Addition | Description of Space |
|---|---|---|---|---|
| 1 | Southeest side of building | 1800 | 2004 | Changing room addition |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |

Estimated Value of Additions: Not Reported

### Occupancy:

Ownership / Usage: HRM Owned/HRM Occupied ■ HRM Owned/Rented or Leased ☐ Rented or Leased ☐

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ☐ Correctional | | % | ☐ Museum | | % | ☐ Residential | | % |
| ☐ Fire Station | | % | ☐ Art Gallery | | % | ☐ Retail | | % |
| ☐ Police Station | | % | ☐ Bus Terminal | | % | ☐ Offices | | % |
| ☐ Library | | % | ☐ Ferry Terminal | | % | ☐ Manufacturing | | % |
| ☐ School | | % | ☐ Maintenance Depot | | % | ☐ Salt Dome | | % |
| ☐ Community Centre | | % | ☐ Recycling Facility | | % | ☐ Storage | | % |
| ☐ Event Centre | | % | ☐ Composting Facility | | % | ☐ Parking Structure | | % |
| ☐ Recreation Facility | | % | ☐ Waste Facility | | % | ☐ Vacant | | % |
| ☐ Arena | 100 | % | ☐ | | % | ☐ | | % |

Are there flammable liquids used on site? Yes ■ No ☐ Notes: Fuel oil and propane

Is smoking permitted inside the building? Yes ☐ No ■

Are there any sleeping quarters? Yes ☐ No ■ Are they used? Yes ☐ No ☐ By whom?

Does the building include: Daycare ☐ Eldercare ☐ Before/After School Program ☐

Bar - Full Time ☐ Bar - Occasional ☐ Arena ■

### Protection:

Water Supply: Well ☐ City ■ Cistern (non P) ☐

Are Automatic Sprinklers Present? Yes ■ No ☐ Percentage of Building: 100 %

Are Heat/Smoke Detectors Present? Yes ■ No ☐ Wired ■ Battery ☐ Percentage of Building: 100 %

Are the Sprinkler/Heat/Smoke Alarms Monitored? Yes ■ No ☐ By Whom?

Distance to Nearest Fire Station/Hall: 1.5 km Is it a Volunteer Dept? Yes ☐ No ■

Is there a Fire Hydrant(s) Within 250 feet of Building? Yes ■ No ☐

Are Fire Extinguishers Present Throughout? Yes ■ No ☐ How Many? 6 Certificates Up To Date? Yes ■ No ☐

Is there a Burglary Alarm? Yes ☐ No ■ Monitored? Yes ☐ No ☐ By Whom?

Burglary Alarm Is: Wired ☐ Battery ☐

Is there a Generator? Yes ☐ No ■ Is the Generator: Wired ☐ On Site ☐

Are there Security Cameras? Yes ☐ No ■ Monitored? Yes ☐ No ☐ By Whom?

Is there a Watchman Service? Yes ☐ No ■ Monitored? Yes ☐ No ☐ By Whom?

## BUILDING - GENERAL ASSESSMENT (PAGE 3)

**HRM Building ID:**

**Septic/Sewer:** Underground Septic Storage ☐ Septic Field/Bed ☐ Municipal Service ■ Notes

**UST Info:**

Does the Property Operate Underground Storage Tanks (USTs)? Yes ☐ No ■

Has the Property Operated USTs in the Past? Yes ☐ No ☐

| Tank | Size | Is the Tank: | | Contents | Age | Material |
|---|---|---|---|---|---|---|
| 1 | | Active ☐ | Inactive ☐ | | | |
| 2 | | Active ☐ | Inactive ☐ | | | |
| 3 | | Active ☐ | Inactive ☐ | | | |

Are UST Inventory Records Maintained? Yes ☐ No ☐ Where are they Stored?

Is Tank Upgrade/Testing Info Available? Yes ☐ No ☐ Where is it Stored?

Do Tank Removal Reports Exist? Yes ☐ No ☐ Where are they Stored?

Was Remediation ever Required at these Tanks? Yes ☐ No ☐

Have there been any Reports of Leaks or Spills? Yes ☐ No ☐

Any Leaks or Spills When the Tank was Removed? Yes ■ No ■

**AST Info:**

Does the Property Operate Above Ground Storage Tanks (ASTs) Yes ■ No ☐

Has the Property Operated ASTs in the Past? Yes ■ No ☐

Is the AST Located Inside or Outside the Building? Inside ■ Outside ■

| Tank | Size | Is the Tank: | | Contents | Age | Material |
|---|---|---|---|---|---|---|
| 1 | 1040 l | Active ■ | Inactive ☐ | Fuel Oil | 6 | Plastic - Interior Tank |
| 2 | 1126 | Active ■ | Inactive ☐ | Fuel Oil | 9 | Fiberglass |
| 3 | | Active ☐ | Inactive ☐ | | | |

Are AST Inventory Records Maintained? Yes ☐ No ☐ Where are they Stored? Unknown

Is Tank Upgrade/Testing Info Available? Yes ☐ No ☐ Where is it Stored? Unknown

Are there any Reported or Documented Records of Release, Spills or Remedial History Yes ☐ No ■

Are there any Signs of Spillage Related to the AST? Yes ☐ No ☑

Are ASTs Protected from Vehicular Impact? Yes ☑ No ☐

**Notes & Observations:**

**Assessed By:** CMEL **Date:** August 26, 2010

## BUILDING - MECHANICAL EQUIPMENT ASSESSMENT (PAGE 1)

**HRM Building ID:**

**Building of Interest:**

Building Name: Gray Memorial Arena
Also Known As: Gray Memorial Arena
PID: 00062604
Civic #: 10
Street: Monique Avenue
Community: Dartmouth
Postal Code: B3A 4G7

**Energy Source:**

Furnace Oil ■ Heavy Oil ☐ Propane ☐ Electric ■ Natural Gas ☐ Geothermal ☐
Other:
Notes:

**Heating Units:**

| Unit | HP | Fuel | Manufacturer | Age | Notes |
|---|---|---|---|---|---|
| 1 | | oil | Burnham | 6 | In floor radiant heating for changing rooms |
| 2 | | Elect | Varies | Varies | Elect Unit Heaters |
| 3 | | Oil | Kerr | 15 | Flood water |
| 4 | | | | | |

**% Building Served By:**

| | | | | | |
|---|---|---|---|---|---|
| HW Radiators | % | Steam Radiators | % | Electric | 5 % |
| HW Baseboard Radiators | % | In-Floor Heat | 5 % | Hot Air | % |
| Geothermal | % | Rooftop & Elect | % | | % |

**Cooling Units:**

| Unit | Tons | Manufacturer | VFD | Model | Year | DX | CW | Tower |
|---|---|---|---|---|---|---|---|---|
| 1 | | | ☐ | | | ☐ | ☐ | ☐ |
| 2 | | | ☐ | | | ☐ | ☐ | ☐ |
| 3 | | | ☐ | | | ☐ | ☐ | ☐ |
| 4 | | | ☐ | | | ☐ | ☐ | ☐ |

Window Units #:

**Ventilation - Central, Exhaust, Kitchen Units:**

| AHU# | Manufacturer | VFD | Cooling? | Heating? | Model | Year | Cfm @ Pressure | Heat Recovery | Humidity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | ☐ | ☐ | ☐ | | | | | ☐ |
| 2 | | ☐ | ☐ | ☐ | | | | | ☐ |
| 3 | | ☐ | ☐ | ☐ | | | | | ☐ |
| 4 | | ☐ | ☐ | ☐ | | | | | ☐ |
| 5 | | ☐ | ☐ | ☐ | | | | | ☐ |
| 6 | | ☐ | ☐ | ☐ | | | | | ☐ |

## BUILDING - MECHANICAL EQUIPMENT ASSESSMENT (PAGE 2)

**HRM Building ID:**

**Exterior Grills/Louvers:**

| # | Condition |
|---|---|
| 1 | Intake and Exhaust in Arena. Reported to be in good condition |
| 2 | |
| 3 | |
| 4 | |

**Water:**

Domestic HW Tank 1: Age: 8 Size: 30 g x 1
Source of Heat: Elect

Domestic HW Tank 2: Age: 6 Size: 60 g x 1
Source of Heat: Boiler

Domestic HW Tank 3: Age: 1 Size: 60 g x 1
Source of Heat: Boiler - Flood Water

Domestic HW Tank 4: Age: 1 Size: 60g x 1
Source of Heat: Boiler - Flood Water

Number of Heat Pumps: 0 Notes

Number of Washrooms: Male 2 Female 2 Unisex 1
Toilets 7 Urinals 2 Waterless WC Showers 4 Sinks 7

**Kitchen:**

Are there Kitchen Facilities? Yes ☐ No ■

Does it Contain a Fryer? Yes ☐ No ☐ Stove? Yes ☐ No ☐

**Major Equipment:**

| # | Equipment | Fuel Source | # | Equipment | Fuel Source |
|---|---|---|---|---|---|
| 1 | | | 11 | | |
| 2 | | | 12 | | |
| 3 | | | 13 | | |
| 4 | | | 14 | | |
| 5 | | | 15 | | |
| 6 | | | 16 | | |
| 7 | | | 17 | | |
| 8 | | | 18 | | |
| 9 | | | 19 | | |
| 10 | | | 20 | | |

## BUILDING - MECHANICAL EQUIPMENT ASSESSMENT (PAGE 3)

**HRM Building ID:**

**Air Compressors:**

| # | Manufacturer | Notes |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |

**Sprinkler Pumps:** Number: HP:

Sprinkler: Wet ☐ Dry ■ Stand Pipes:

**Specialized Equipment (Fire Dept, Rink, Pool, Etc):**

The building is provided with minimal heating and ventilation. The building is not provided with cooling.

Heating for the addition (Dressing Room A & B and Referee Change Room) is provided by in floor hot water radiant heat. Hot water is supplied by a Burnham oil fired boiler with a Riello 40 burner. Fuel oil for the boiler is provided from a Roth dual walled fuel oil tank (model #: 1000L) with a capacity of 275 gallons (1,040 litres).

Primary heating for the Dressing Room C and D, public washrooms and office areas is provided by electric unit heaters and or electric baseboard heaters of various manufacture and age. Heating for the Zamboni/equipment room is provided by two electric unit heaters. Flood water is generated by an oil fired Kerr Comet hot water boiler equipped with a Riello Oil fired burner. The boiler supplies hot water to two, sixty gallon Triangle Tube Phase III indirect fired hot water heaters (model #: TR-60). Flood water was reported to be maintained at approximately 180°F during the operating season.

**Notes & Observations:**

The Burnham boiler was reported to be in good overall condition and has an expected useful life of twenty to twenty-five years. Replacement is not expected for fifteen to twenty years.

The Roth fuel oil storage tank appeared to be in fair to good condition. The tank was manufactured in 2004. It was reported that in HRM owned/managed properties that oil storage tanks are typically replaced after ten years of service due to insurance requirements. It is recommended that this be confirmed with regards to dual walled and fibreglass tanks. In keeping with the reported requirement we have allowed for replacement of the tank within five years.

The in floor radiant heating is not expected to require replacement.

The electric unit and baseboard heaters varied in age and condition from good to fair. It was reported that the unit heaters are replaced on an as required basis. Typically unit heaters have an expected useful life of fifteen to twenty years and were reported to be replaced most frequently as

**Assessed By:** CMEL **Date:** August 26, 2010

## BUILDING - ROOFING ASSESSMENT (PAGE 1)

**HRM Building ID:**

**Building of Interest:**

Building Name: Gray Memorial Arena

Also Known As: Gray Memorial Arena | PID: 00062604

Civic #: 10 | Street: Monique Avenue

Community: Dartmouth | Postal Code: B3A 4G7

**Access:** Roof Access: Ladder ☐ Stairs ☐ Others: none

**Roof Sections:**

| Section | Slope | SqFt | Age | Type | Condition (Good/Okay/Poor) | Repairs (None/Some/Many) | Parapet Height | Parapet Condition (Good/Okay/Poor) |
|---|---|---|---|---|---|---|---|---|
| 1 | 2:12 | 28000 | 40 | Metal | G ☐ O ☐ P ■ | Many | | G ☐ O ☐ P ■ |
| 2 | 4:12 | 2300 | 6 | Metal | G ■ O ■ P ☐ | Unknown | | G ☐ O ■ P ☐ |
| 3 | | | | | G ☐ O ☐ P ☐ | | | G ☐ O ☐ P ☐ |
| 4 | | | | | G ☐ O ☐ P ☐ | | | G ☐ O ☐ P ☐ |
| 5 | | | | | G ☐ O ☐ P ☐ | | | G ☐ O ☐ P ☐ |
| 6 | | | | | G ☐ O ☐ P ☐ | | | G ☐ O ☐ P ☐ |
| 7 | | | | | G ☐ O ☐ P ☐ | | | G ☐ O ☐ P ☐ |
| 8 | | | | | G ☐ O ☐ P ☐ | | | G ☐ O ☐ P ☐ |
| 9 | | | | | G ☐ O ☐ P ☐ | | | G ☐ O ☐ P ☐ |
| 10 | | | | | G ☐ O ☐ P ☐ | | | G ☐ O ☐ P ☐ |

**Penetrations & Accessories:**

| Section | Plumbing Vent Stacks | HVAC | Drains | Curbs | Electrical | Scuppers | Ladders | Other |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |

Notes: Roofing not accessible during site visit

## BUILDING - ROOFING ASSESSMENT (PAGE 2)

**HRM Building ID:**

### Deficiencies:

| Section | SqFt | Deficiencies | Notes |
|---|---|---|---|
| 1 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 2 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 3 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 4 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 5 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 6 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 7 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 8 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 9 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |
| 10 | | Shingles Missing ☐ Cracks ☐ Bad Flashing ☐ Bubbles/Blisters ☐ Delamination ☐ | |

### Skylights:

| Roof Section | Size | Notes | Roof Section | Size | Notes |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

### Gutters:

Notes:

### Notes & Observations:

**Assessed By:** CMEL

**Date:** August 26, 2010