ISC: Confidential

November 1, 2017

Our file #: 2017-G-0204

Colin Craig
516 – 96th Avenue SE
Calgary, Alberta T2J 0G9

Subject: Final Response to FOIP Request

This is in response to your request for access to information to The City of Calgary, in accordance with the *Freedom of Information and Protection of Privacy Act* (FOIP Act).

Please find enclosed paper records responsive to your request. This office will not provide additional copies of these records.

The enclosed records are released under your access to information request. However, some of the records requested contain information that is excepted from disclosure under the FOIP Act. Where the information excepted from disclosure constitutes only a portion of individual records, the specific section which applies will appear on the individual page(s).

Additionally, the records listed below have been withheld in their entirety under the appropriate section of the FOIP Act:

Record Number or Range	Applicable Section(s)
City of Calgary FOIP pages: 0001-0016	'Non-Responsive'
City of Calgary FOIP pages: 0036-0055	s.16(1) – Disclosure Harmful to Business Interests of a Third Party

Section 65 of the FOIP Act provides that an applicant may make a written request to the *Office of Information and Privacy Commissioner* (OIPC) of Alberta to review this decision. You have 60 days from the date of this notice to request a review. A request for review is sent to:

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The *Request for Review* form is available under the Resources tab on the Commissioner's website www.oipc.ab.ca or you can call 1-888-878-4044 to request a copy.

Section 67(1) of the FOIP Act requires the OIPC to provide a copy of a request for review to The City of Calgary and other parties who may be affected by the review. Please ensure that the request for review does not contain information that you do not wish to share.

For all future correspondence or inquiries, I may be reached at 403-476-4117 or by email at eugene.mcgarrigle@calgary.ca.

Sincerely,

Eugene McGarrigle,
Corporate FOIP Officer
City Clerk's
City of Calgary

MORRISON HERSHFIELD

REPORT

McMahon Stadium: Structural and Mechanical Assessment

Calgary, Alberta

Presented to:

John Haverstock
Manager

McMahon Stadium Society
1817 Crowchild Trail NW, T2M 4R6

Report No. 3160006 November 18, 2015

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Morrison Hershfield | Suite 300, 6807 Railway Street S.E., Calgary, AB T2H 2V6, Canada | Tel 403 246 4500 Fax 403 246 4220 | morrisonhershfield.com

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1. INTRODUCTION

Morrison Hershfield (MH) was commissioned by McMahon Stadium Society (MSS) to prepare an assessment of select areas of the existing stadium to identify the likely maintenance and repair works required to keep the stadium operational for the next 25-30 years.

Areas that were reviewed were:

1. The Stadium Precast and Cast in Place Concrete Elements
2. The two (2) main kitchens
3. West Stand Press Boxes/Sky Boxes
4. East Stand Super Suite
5. Masonry walls of the concessions and ticketing within the concourse
6. Amateur Sports Building
7. Light Towers
8. Elevator Tower
9. Underground Sanitary and Storm Piping with in the concourse and parking lots

The areas not reviewed were:

1. Administration building
2. Coaches Offices
3. Stampeders Administration
4. O.V.C Centre
5. The sound clusters towers, cabling and cluster itself
6. Underground gas and water utilities

With a 25-30 year timeframe for McMahon Stadium operation being discussed, we believe that the short term preventative maintenance measures proposed in this report will extend the usable life expectancy of the structure.

The table at the end of the report shows a proactive approach to structural and mechanical repairs and increased capital expenditures on select items. This increase in spending over the next 5 years will allow currently minor issues to be resolved in the short term and allow for a longer operation of the stadium significantly reducing the risk of a potential expensive problem down the road.

The report is not to be considered a full Stadium lifecycle assessment as it only incorporates select structural and mechanical elements noted above. However it can be used to augment the current repair programs and ongoing maintenance requirements.

2. STRUCTURAL REVIEW

2.1 Background Information: Structures

The stadium was built in 1960 but has undergone several significant extensions including those that were built leading up to the Olympics in 1988, and beyond.

The stands comprise a mixture of precast concrete and cast in place concrete columns, raker beams, tie beams, walkway slabs and precast bleachers.

The majority of the structural components of the stands are precast concrete although sections at the north end of the stadium are slab on grade, while sections at the south end are cast in place concrete columns, beams and rakers. Many of the original precast bleachers were replaced in the 1980's with precast concrete elements of a different profile.

In addition to the stands other significant elements include the following:

- Guardrails and safety barriers
- Four sound system towers
- Elevator tower on west side
- Press Boxes/Sky Boxes on the west stand
- Super Suite on the east stand
- Concessions and washrooms below the stands
- Eight steel access stairs to the stands
- Individual and bench seats
- Stampeders Administration building
- Olympic Volunteer Center
- Coach's building

The majority of the structures have pile foundations.

This review does not include the seats, Stampeder's Administration, Olympic Volunteer Center, Coach's Building or the Administration Building.

The ground level surfaces, typically asphalt or concrete, and the perimeter fencing are not included in this review.

2.2 Background Information: Structures Deterioration

Deterioration includes the following:

- Foundation movement (settlement or heave)
- Damage due to thermal movement
- Concrete spalling and delamination
- Steel rusting and freezing of hollow sections
- Damage to connections

2.3 Foundation Movement

No evidence of significant foundation movement has been observed during the last 5 years of annual inspections and we are not aware of any prior to that.

2.4 Thermal Movement

The structures are subject to large temperature changes through the year. If movement is restrained stresses will be induced in structures and the potential for damage exists. The precast, single span bleachers with their large number of joints are relatively tolerant of thermally induced movement. The major concern is that the range of movement causes the joint sealant to fail and allow water ingress to the structures below.

2.5 Concrete Spalling and Delamination

The principal causes of deterioration of above grade concrete structures is reinforcing bar corrosion. The corrosion products occupy a greater volume than the original steel and the expansion pressures cause cracking and delamination. This expansion of the corroded bar and subsequent cracking of the concrete, allows easy access for water to the reinforcing steel and accelerating corrosion.

2.6 Steel Rusting and Freezing of Hollow Sections

Corrosion of steel reduces the cross section area and reduces the factor of safety of steel structures.

At McMahon Stadium the majority of steel is visually exposed and thus inspections are generally effective in identifying corrosion early on thus allowing maintenance before significant loss of cross section occurs.

There is extensive use of structural steel hollow sections at McMahon Stadium in the lighting and sound towers. If these fill with water subsequent freezing can cause distortion of the section. This has occurred in the lighting towers and subsequently drain holes were drilled to allow water to drain out.

2.7 Connections

Various connections exist at McMahon Stadium including:

- Guardrail/ handrail connections to precast concrete bleachers at the north and south ends of the stands
- Guardrail connections to the precast and cast in place concrete at the playing field level
- Steel to concrete connections for the diagonal bracing in the stands
- Steel to concrete connections at the base of the light tower structures

- Steel to concrete connections in the stairs
- Steel to steel connections in the sound towers, light towers and stairs
- Precast concrete beam to column connections in the stands
- Cast in place concrete beam expansion joint connections in the stands structure at sections A, B, X & W.

With the exception of the steel to steel connections the majority of connections are difficult to inspect due to the hidden nature of critical components cast into concrete. Visual signs of widespread distress, severe corrosion of steel or severe cracking of concrete elements, have not been observed to date but the details are such that warning signs prior to failure are unlikely.

The connections are critical structural items and their potential deterioration poses a possible risk to the overall structure if not maintained properly. A visual inspection of the accessible connection points is a very important aspect of the ongoing maintenance at McMahon Stadium. Currently there has not been any evidence of connection deterioration at the points that have been viewed, however it should be noted that not all connections can be viewed due to the inaccessible areas under the stands.

2.8 Recent Maintenance Work

The McMahon Stadium Society has performed inspections and maintenance annually.

Since 2008 the major items of structural deterioration in the concrete columns, rakers and tie beams have been remedied.

In addition remedial work has commenced to the sound towers following inspection in 2015. An inspection of the sound cluster in 2015 revealed no structurally significant defects. We are not aware of the inspection result on the wire ropes and winch mechanism.

Repairs to concrete deterioration of the bleachers, in the upper tier of east stand to sections P, Q and R was commenced in 2015.

Caulking of joints has been ongoing and is critical to keeping water out of the primary structure of the stands. Work has also been performed to collect water from the stands and move it away from the piled foundations.

Work is also ongoing on the steel exit stairs throughout the Stadium.

3. STRUCTURAL RECOMMENDATIONS

3.1 Inspection of Stadium: Structural

Colin Pollard, P.Eng, performed an inspection of the structure on October 21st 22nd and 28th, 2015 looking for structural issues that should be addressed over the next 5-10 years in order to extend the life of the structure by 25-30 years to 2045. We envisage the following works will be required.

3.2 Guard Rails and Hand Rails

The guard rails below row 1 and at the ends of the stands section A, K (above the row 43 walkway), L (above concourse level), M (above concourse level), N (above the row 43 walkway) and X), together with those around the chutes and stair entrances perform a significant safety function. Those at the ends of the stands are connected to embedded pates in the precast bleachers. Details of the connection have not been reviewed in for this assessment however we understand they are available.

There are areas where the connection of the handrail to the concrete elements are showing signs of corrosion and cracking of the concrete. If a 25-30 year timeframe is needed a proactive approach to repairing these items is warranted. An ongoing repair program by McMahon Stadium Society will prevent additional issues.

The guardrails above the chutes and stairs generally appear sound and we recommend annual visual inspection.

3.3 Sound System Towers

The sound system tower inspection of 2015 revealed a few issues needing attention and we understand these have commenced in 2015 with completion expected in 2016.

We recommend a new inspection be performed again in 2020.

3.4 Sound Cluster and Wire Rope

The wire ropes are not part of MH's scope and we are not aware of the next inspection date. The wire ropes and cluster were inspected in 2015.

We recommend the sound cluster be visually inspected again no later than 2020, this may be done by the McMahon Stadium Society.

The inspection of the wire rope and winch mechanism is outside the scope of this report and a specialist's advice on inspection frequency of these elements should be followed.

3.5 Lighting Towers

The condition of the lighting tower structures is generally fair condition with bulged hollow steel sections and corrosion of the steel frame. Significant structural steel repairs were performed in 2009. Vibration of one tower is a concern and consequently we recommend a detailed inspection be performed in 2016 of all 8 towers to identify any additional repairs needed.

Currently the towers are only primed with a clear coat on top of the primer which provides protection to the elements. If an additional 25-30 years of life is required MSS could consider cleaning and painting to provide additional protection.

3.6 Elevator Tower

The tower steelwork appears to be in satisfactory condition with the exception of localized rust at the top of the towers.

We recommend a visual inspection, possibly utilizing rope access techniques, in the next couple of year, possibly 2017 to identify any areas needing repair.

If additional areas of corrosion are noted, painting of the tower can provide a proactive approach to extending its life an additional 25-30 years.

3.7 Press Box and Sky Boxes

The press box and sky box structure appears to be in satisfactory condition in the areas immediately adjacent to the access doors located on the lower level. We visually reviewed the accessible steelwork local to the access doors and did not see any significant issues at this time.

We recommend a visual inspection of all areas be performed in 2020 and at 5 year intervals thereafter, this inspection can be completed by MSS.

3.8 Super Suites

The Super Suite structure appears to be in satisfactory condition in the areas immediately adjacent to the access doors located on the lower level. We visually reviewed the accessible steelwork local to the access doors and did not see any significant issues at this time.

We recommend a visual inspection of all areas be performed in 2020 and at 5 year intervals thereafter, this inspection can be completed by MSS.

3.9 Concession and Washrooms

The masonry walls of the concession and washrooms were viewed. No structurally significant areas of deterioration were noted. It should be noted however that many walls are covered by a plastic advertising film which masks the wall itself. A few narrow cracks were recorded.

The cracked mortar joints should be raked out and repointed. Cracks at movement joints in the stadium should be mastic sealed. We understand that McMahon Stadium Society repaints the masonry walls on a regular basis.

We recommend the painters be asked to record and report any cracks they observe. It would be prudent to have the painter discuss any significant cracking with MSS during the painting of the walls

3.10 Steel Access Stairs

Repainting of the steel stairs is required periodically to lessen the risk of significant corrosion of structural elements, including the floor plates. We understand that a regular program of painting is in place by MSS to ensure the stairs are in satisfactory condition.

We recommend a thorough inspection of all stairs be performed in 2017 with a view to implementing a repair program from 2018 onwards. We anticipate two stairs be treated each year on a rolling basis.

3.11 Precast and Cast in Place Stand Structure

The main frames of the stands comprise concrete columns, raker beams and tie beams. Some of the frames are cast in place whilst others are precast.

Commencing around 2008 substantial structural repairs have been performed to remove delaminated and cracked concrete. Concurrently repairs have been performed on the horizontal joints in the bleachers to control the flow of water from the bleachers. While the concrete repairs will never be complete because deterioration of the concrete structure is ongoing we believe the repairs over the last 7 years have arrested the deterioration significantly.

Test performed by AMEC under the supervision of AECOM in June 2009 reported depths of carbonation at, or close to, the reinforcing steel and elevated levels of chlorides within the structural elements. These tests showed the chloride levels within the concrete are high and the depth of carbonation is significant.

Anti-carbonation coatings do exist and could be applied to the exposed concrete surfaces. However we believe the difficulty in applying it continuously to critical surfaces, for instance the top of raker beams, together with its cost makes its use unattractive. The option of applying a seal coating to exposed faces may be more economically viable. But we believe the cost

effective solution relies on effective sealing of the joints in the bleachers to limit the amount of water penetrating the bleachers, together with control of water that passes through the stands.

Water management on the stands should include collection close to the source and disposal away from existing structures. Additional concrete coatings may be beneficial at select locations.

The use of salt based deicing products is not recommended and alternative effective products should be sourced and used as deicing salts cause significant deterioration to both concrete and reinforcing steel.

Even with the caulking work and water management currently in place, deterioration of the concrete structure will occur.

Consequently we recommended an annual or biannual repair program of crack injection and concrete delaminations be followed. This program may be undertaken by MSS with the proper training from the epoxy injection supplier.

During our walk through in October 2015 we noted plastic film with advertising information had been added to several raker beams over the concourse. Several of these were trapping water between the film, and concrete. This is likely to cause deterioration of the beams in the area of water accumulation.

We believe this approach, combined with periodic visual inspections and local repairs, provides a cost effective long term solution.

3.12 Precast Bleachers and Walkways Elements

Following the repairs to section P, Q and R in 2015 we recommended sections S, T, U and V, above row 43, be treated in 2016. These works are in place to limit water ingress into the stands below and consequently reduce the risk of deterioration in the bleachers and main concrete structure.

MSS should consider the same coating technique to the west stands (upper section C-I) to protect the bleacher and walkway elements as they are of similar age to upper sections P-V. This would also provide some additional protection to the raker and tie beams on the west side of the Stadium.

We recommend the bleachers below concourse level (rows 1-20 +/-) be inspected in 2016. We understand that the bleachers in this area were replaced and the raker beams repaired previously, however the repair is approximately 20 years old and a new inspection is warranted to extend the life another 25-30 years.

Sections of the stand with no or limited access can then be identified for additional monitoring from above or access created if required.

During the recent inspections the walkways in Section A, X, N & K above row 43 have been noted as sagging. Subsequently the shims between the walkway and rear wall were noted as being loose. The cause of the sagging needs to be investigated and remedial works initiated. We do not believe this to be an immediate safety concern and repairs can be implemented in the 2016 off season.

We recommend the investigation be performed in time to initiate remedial work in 2016.

In general the bleacher and walkway precast elements are in satisfactory to fair condition. There are areas of localized deterioration that can be repaired or inspected as part of the yearly repair program. These periodic inspections are required to reduce the risk of unexpected deterioration and allow for repairs in a timely fashion to extend the life of the structure.

As noted in Section 3.11, epoxy injection of cracks in the precast and cast in place elements is a proactive approach to extending the life of the bleachers and walkways. The epoxy injection program should encompass all concrete elements on an as-needed basis.

An area of note should be the fixing of services to the concrete within the stadium. It was noted that most of the fixing brackets are drilled into horizontal and vertical faces of the concrete structure near edges. These newly drilled holes in the current location allow water and salts into the concrete and reinforcing steel causing corrosion and subsequent delamination. A better practice would be to drill or fix the brackets a minimum of 50mm (2in) way from any edge to limit this water and salt ingress. Injecting the holes with epoxy prior to inserting the fixing would also help reduce the chance of water ingress.

It should also be noted that many of the cast in place concrete mid-steps on the pre cast bleacher stairs are showing signs of deterioration. These elements could easily be replaced by removing the damaged step and replacing it with either a precast step or another cast in place step with exterior grade concrete. This could be carried out by MSS personnel as part of the regular maintenance program.

4. MECHANICAL REVIEW

4.1 Background Information: Piping Systems

Much of the sanitary piping in the stadium was installed during the original construction in the early 1960's. This piping is a combination of clay and cast iron, which is over 50 years old. This is significantly past its anticipated service life and failures may be becoming more common.

Causes of piping failure and back-ups of sanitary systems includes the following:

- Channeling of aging cast iron pipes and clay pipe cracks
- Pipe corrosion, calcification and scale
- Tree root intrusion
- Grease accumulation
- Fats, oils and grease

4.2 Channeling of Aging Cast Iron Pipes and Clay Pipe cracks

Sewer systems that were installed under the concrete slab, prior to the early 1970's, were constructed with cast iron. The life span of cast iron pipe is ~25 years. Over time, the bottom of the horizontal pipe "channels" or erodes due to flow of water through the ferrous cast iron pipe. Eventually the pipe channeling wears through and exposes the soil below the pipe, which leads to soil erosion creating voids below the original drainage system that can cause possible foundation settling of the structure above the piping system. This erosion process of the decaying cast iron piping causes clogs, stoppages, and sanitary piping failures.

Clay piping systems were typically utilized under landscaped areas, asphalt road ways, and concrete parking areas. Clay piping systems were not typically used under buildings and structures. Long-term ground settling, tree roots, and pipe erosion/land soil wash out lead to clay pipe failure due to cracking, pipe separation, and soil or tree intrusion.

4.3 Pipe Corrosion, Calcification and Scale

Part of the failure and aging process of sanitary piping also includes corrosion, calcification, and scale build up. To provide temporary relief from drainage clogs, it has been common practice to use high pressure water jetting or de-scalers. This is a short term solution that will extend the life of the pipe until the pipe ultimately fails. The corrosion and scale decrease the interior thickness of the pipe wall. De-scaling the pipe makes the pipe thinner and will over a period of time cause failure of the sanitary piping systems. De-scaling and the continual use of high pressure water jetting will expose holes, cracks and separations that will lead to the total failure and collapse of the sanitary piping systems.

4.4 Tree Root Intrusion

When tree roots or organic matter is found in sanitary drainage system causing blockages and stoppage of flow, it indicates that there are holes, cracks, or separation in the piping system. Any moisture leak from drainage piping systems will eventually attract root intrusion from surrounding plants and trees. Tree roots will travel long distances, even under a building or structure, in search of this moisture.

The smallest hole, crack, or separation will allow roots the size of a human hair to seek out the source of water. These hair sized roots will enter the pipe and grow inside the piping system. As they grow inside the pipe, they expand the hole or crack to allow larger/multiple roots to intrude. Over time the growth of these roots will eventually cause the piping system to fail due to the root movement in and around the sanitary piping system

4.5 Fats, Oil and Grease

Fats, oil and grease (FOG), can build up in a sanitary piping system causing pipe restrictions and blockages. FOG can enter the piping system through wash basins, dish washers, floor drains and water closets. As grease enters into the sanitary piping system it begins to build up and bonds to the inside of the sanitary piping increasing in size eventually creating a blockage in the piping system. Restaurant and food service establishments are among the highest contributors to the buildup of grease in a sanitary piping system. In any facility that incorporates the sale, distribution or preparation of food services, it is a requirement that these facilities have a grease capture system installed to prevent the introduction of grease to the sanitary piping systems.

These systems, also known as grease traps or interceptors, should be maintained on a monthly basis to maintain the reliability of the grease collection systems.

4.6 Recent Maintenance Work

The McMahon Stadium Society has performed inspections and maintenance of the sanitary and storm piping annually. Yearly drain auguring has been maintained to clear the pipes to help eliminate future back up of the sanitary drainage systems in the stadium.

In addition to the yearly maintenance being performed on the sanitary drainage systems, The McMahon Stadium Society has conducted a camera scope of the underground sanitary drainage system in 2012

4.7 Inspection of Stadium Sanitary Systems

Brent Nabozniak, senior mechanical technician of Morrison Hershfield, performed a review of the various drainage systems throughout the stadium on October 22nd, 2015 looking for

possible drainage issues that should be addressed over the next 5 years in order to extend the life of the sanitary systems by 25-30 years to 2045.

4.8 Video Inspection Report September 25 to October 10, 2012

The detailed video inspection report conducted by 'Thuro' which reviewed the sanitary mains was reviewed by Morrison Hershfield to determine the present condition of the underground drainage systems for the McMahon Stadium Society. The following points were determined to be of importance.

Video inspection from man hole 1135 SE corner downstream:

- Roots were found at 6.8 m through pipe joint.
- Roots were found at 11.9 m through pipe joint
- Sealing ring has been damaged at 49.3 m

Video inspection from manhole 1140 SE parking lot downstream:

- A fracture of the piping was noted at 0.7 m
- Multiple fractures were noted at 11.5 m
- Fracture was noted at 125.8 m
- Fracture was noted at 129.6 m
- A hole in the piping was noted at 130.3 m
- A buildup of roots has been noted at pipe connection joint at 131.6 m

Video inspection from manhole 1139 SW of stadium upstream:

- Buildup of roots at 1.2 m, 4.5 m and 7.7 m

Video inspection from manhole 1137 upstream:

- A displaced joint offset was noted at 23.9 m. The survey was abandoned at 24.4m due to displaced joint. Further investigation should be completed to determine the extent of the displaced joint.

Video inspection from manhole 1138 located in the yard downstream:

- A large joint offset was located at 0.5 m
- A large displaced joint offset was noted at 0.8 m.
- A broken pipe was noted at 14.6 m
- Roots were found at 63.3 m, 69.3 m and at 75.5 m through pipe joints

Video inspection from manhole 1140 downstream

- Buildup of roots was noted at 5.3 m
- The main pipe was noted to be broken 17 at 16.7 m
- Dislodged sealing ring was noted at 19.2 m
- The main pipe was noted to be broken 17 at 20.6 m
- Multiple fractures have occurred at 21.8 m
- A fracture has occurred at 26.2 m

We were also informed that a large drop in the sanitary piping system has occurred under the concrete floor slab at the Stampeders Store area. This was also reviewed in the Thuro reports noted above.

The sag that has occurred may be a result of leakage of effluent from the pipe creating a void around the piping system. This void then causes the pipe to become unsupported and movement occurs. The sag is likely continuing as effluent is continually eroding the soil below the pipe and a piping failure may occur.

We have concluded that there are a number of concerns with the sanitary piping system. There was a number of breaks in the piping, multiple fractures, multiple offsets, holes in the piping and joint separations occurring. Root intrusion will continue and for the most part become larger in magnitude as the roots continue to increase the size of the holes and cracks where entering. Broken piping, cracks, separations and fractures are also of concern.

As the sanitary effluent continues to flow through these areas, the possibility of erosion will occur, and voids under and around the piping may cause the piping system to sag eventually leading to collapse and complete failure.

It is strongly recommended that a replacement of the sanitary piping system be undertaken to prevent failure during peak usage of the facility. This replacement may be undertaken during an expansion to the concourse level or on a localized basis.

In the short team we recommend that a video investigation be undertaken of all sanitary and storm piping within the facility limits to ascertain the condition in preparation for repairs.

4.9 Washroom Facilities, Food Vendor Facilities and West Dressing Rooms/Service Rooms.

The sanitary systems in the washroom, food vending and west dressing/service rooms have a combination of ABS, cast iron and copper piping systems. The original washroom facilities are complete with a service chase between the fixtures and exterior walls. It was noted that in this chase, the original piping connections to the main sanitary distribution appears to be original utilizing an oakum piping connection system. These piping systems have exceeded their life expectancy. We understand that McMahon Stadium Society (MSS) repairs these systems on an as needed basis and no major issues have arisen. As the life span of this type of piping has been exceeded complete replacement may be warranted if issues become more frequent.

We recommend that regular inspections of the piping located in the voids be completed by MSS to monitor the condition of these plumbing systems. If failure or major repairs begin to occur, a budget for complete replacement should be included in future expenditures.

Grease interceptors have been installed in the food vendor prep areas to prevent grease from entering the sanitary piping system.

A maintenance program should be included in the capital expenditures budget to clean the interceptors on a regular basis. All piping throughout these areas appear to be accessible and repair and replacement could be completed as failure occurs, extending the life of the piping system past the five year forecast.

It would be prudent for MSS to inspect this system in detail at 5 year intervals or as issues arise.

4.10 Storm Piping Systems

The storm piping system around the main field is a series of catch basins and an underground field drainage system. The main stands storm drainage consists of over land drainage to the main field catch basins.

The upper section of the stands drain water over the bleachers themselves and then to a gutter system or to the main walkway at row 43. This water is then captured in a gutter system installed by MSS over the past several years. This system in turn is piped to the main concourse level and flows over land and is captured by local drains and catch basins. We understand that MSS is in the process of changing the piping of this system to direct the flow outside of the concourse level rather than have the water drain on the asphalt of the concourse.

The concession under the stands are complete with roof drains that are also piped to the main level concourse and also flows over land to local drains and catch basins. It was noted that the ground drainage systems located in the concourse areas are directly connected to the sanitary system rather than the storm system. As per code requirements, all drains located under cover are to be drained to the sanitary system. As this rainwater is actually from the exterior of the stadium one would typically consider it storm water, however not in this situation.

The typical life expectancy of underground sanitary piping systems would be 30 years. It appears that the sanitary system has exceeded its life expectancy.

After review of the video of the storm piping systems in the parking lot areas, it was noted that the piping was in satisfactory condition. We would expect the underground storm piping system in the parking lot areas would remain in service for 15 years or more with minimal maintenance issues.

4.11 Inspection of Stadium: Miscellaneous

4.11.1 Additional Mechanical Systems

We were not contracted to perform a detailed review of the domestic hot water systems or air conditioning system however during the inspection of the facility, the following was noted:

4.11.1.1 Split air conditioning systems for the press boxes.

Due to past experiences, we are aware that the split condensing units for the Press Box/Sky Boxes were replaced approximately 20 years ago. The expected service life of split air conditioning systems is 20 years. Due to the removal of ozone depleting and global warming refrigerants, replacement refrigerants are no longer compatible with existing air conditioning systems. When replacement occurs, complete replacement of the piping, evaporators and condensing units will be required increasing the costs of system replacement. The estimated costs for the replacement would be approximately $5000+ per split air conditioning system.

4.11.1.2 Domestic hot water and hot water storage.

The existing hot water boiler system has also reached the end of its theoretical life expectancy. We were informed that the boiler tubes were recently replaced, extending the life expectancy of this boiler system. Continued maintenance will ensure continued operation of the boiler system.

The storage tanks should provide 30 years of service, and after review it was noted that these tanks may have exceeded their theoretical life expectancy. Annual inspections are being completed as required by local codes. If failure does occur, the costs of replacing the tanks on an emergency basis may be costly.

If replacement is needed, it would be prudent for MSS to determine the most cost efficient and energy savings measures that could be implemented for the stadium.

Attached in Appendix A is a table detailing estimates on costs for areas noted in this report.

If you have any queries please do not hesitate to contact us.

Yours Truly,

Morrison Hershfield Ltd.

Colin M. Pollard, P.Eng., PE., C.Eng., MICE. FIStructE,
Senior Structural Engineer

Brent Nabozniak
Mechanical Technologist

Reviewed By:

Dan Woolfsmith P.Eng AB-BC. PMP. LEED AP
Manager, Buildings and Facilities Engineering, Calgary