

APPENDIX A



Crosier Kilgour & Partners Ltd.

CONSULTING STRUCTURAL ENGINEERS

September 13, 2013

Our File No. 2013-0861

City of Winnipeg
Planning, Property and Development Department
Urban Design Division
15-30 Fort Street
Winnipeg, MB
R2C 4X5

Attention: Mr. Ken McKim

Dear Ms. Russell:

**Re: 5 Rue Des Meurons.
King George Pool Investigation**

We conducted a site review on Wednesday September 11, 2013 to investigate the concrete condition of the pool structure. The investigation included a thorough visual inspection, along with hammer/chain sounding of the exterior pool structure including the pool bottom, walls, and deck surrounding the pool. The mechanical services tunnel under the deck around the periphery of the pool was also reviewed. The wading pool and deck located north of the swimming pool was also visually reviewed at the time of this survey.

A limited drawing set was provided for our review in advance of our inspection which indicates that the pool was designed and constructed in 1978. The structural system for the main pool and deck consists of a cast-in-place concrete tank, supported on piles to resist differential settlement. A structural slab is provided around the exterior deck which covers a mechanical services tunnel.

Regarding the wading pool however, the drawings indicate the concrete structure to consist of a thickened slab-on-grade; that is, the self-weight of the concrete and superimposed live loads are transferred through the concrete and into the underlying compacted sub-grade. The wading pool is therefore considered to be non-structural.

The following is a synopsis of our findings, with repair recommendations and approximate cost estimates associated with such repairs. Photographs of significant observations are appended for clarity.

- In general, the pool tank, deck and wall structure for the main pool is in fairly good condition considering the age of the structure.
- The bottom tank slab had 2 locations of concrete delamination totaling approximately 2 square feet, and minor cracking that the existing coat(s) of paint continue to bridge, suggesting that they are of the non-moving variety. One crack across the width of the tank had been routed and caulked in the past and appeared to be adhered and performing.



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- The walls of the pool showed no signs of delamination or deterioration.
- The “Pour Joint” between the pool deck and the top of the pool wall has separated around the pool perimeter, and has been hand patched with a cementitious repair material. The repair material is de-bonded around most of the perimeter of the pool, and appears to be a yearly maintenance item when the pool is re-commissioned and painted for use (Refer to Photograph #1) each summer. The concrete itself appears to be sound, which would suggest that a system of stitching the two surfaces back together with dowels and epoxy may be a logical repair method. Holes are drilled at regular intervals intersecting the deck and wall and steel reinforcing dowels are epoxy grouted into the drill holes.
- The pool deck has 16 areas of delamination. One area on the north deck by the male change room. One area on the east deck. Six areas on the south deck and 8 areas on the west deck (Note: one area of repair totals 200 square feet on the west side (Refer to photograph #2). The chain/hammer sounding survey was difficult to establish depths and or types of repair required due to the existing deck coating. Some repairs maybe de-bonded membrane coating while others maybe concrete and membrane repairs (Refer to photograph #3). In total approx. 250 square feet of repair is required with an approximate cost of \$70.00 per square foot. (Includes concrete and membrane repairs.)
- The pool mechanical tunnel walls, ceiling and floor are in generally good condition. No significant evidence of differential movement is indicated.
- The concrete deck soffit was observed to have minimal to no signs of concrete deterioration and minor evidence of delamination (due to penetrations for grounding wires) and cracking. (Refer to Photographs #4 and #5).
- The inside tunnel wall was also observed to be in generally good condition, however it was typical to observe evidence of water leakage known as efflorescence at most locations where a concrete block-out contains a pool scupper or a pool jet line, and at locations of pipe intrusions into the concrete wall (Refer to photograph #6).
- Regarding the wading pool basin and apron deck, the system is a slab on grade construction system. The overall condition was quite good considering again the age of the facility and the fact that the concrete is a grade supported system. Cracking was evident throughout but not serious, and had been sealed with caulking to prevent additional intrusion of moisture (Refer to photographs #7 and #8). No evidence of significant differential movement was observed indicating that the integral weeping tile system is likely retained operational status.

To summarize, the structural condition of the pool was generally good, particularly in consideration of the age of the facility. Concrete repairs are required along the tank bottom (two locations), and apron deck (sixteen locations). Normally when estimating these types of repairs we allow a 15 – 20% increase in the area due to growth caused by corroded reinforcing and or concrete that was not yet sounding delaminated.

The continuous “pour joint” at the deck slab/pool wall interface appears to be a failed cold joint, versus a delamination plane. Thus, it does not appear that removal and replacement is warranted. Rather, we would dowel the sections together and inject the gap with structural grade epoxy to re-connect the two concrete



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sections. The separation or joint is sealed on both sides with epoxy paste and injection ports are placed on the exterior crack at regular intervals.

Once the surface seal has cured, liquid epoxy resin is injected into the ports and allowed to travel from port to port indicating that the entire gap is filled and the two surfaces are bonded together. After the epoxy injection resin is cured the exterior seal would be removed by grinding to the original concrete surface. The approximate costs for this style of repair including access would be \$85.00 per lineal foot.

The tunnel walls and soffit presently do not require any significant structural intervention.

It appears that the pool apron deck and pool floor had been shotblasted to remove built up paint and coatings in the not too distant past. Therefore the existing layers of paint on the pool floor and walls is just starting to become a potential issue for entrapping moisture which could cause freeze thaw damage during the swing seasons. The pool apron deck appears to have a membrane style of coating installed for protection. Once concrete repairs and reinstallation of membrane have been completed on the repair areas a new layer of UV resistant top coat may be advisable for continued membrane protection and aesthetic continuity.

Immediate repair requirements to the concrete tank floor, walls and deck therefore should be budgeted for \$56,000.00. Coating systems vary significantly in cost depending upon properties. We recommend a budget of \$8.00 to \$10.00 per square foot, thus, another \$10,000.00 should be budgeted for membrane repairs.

Implementing the above concrete repairs should effectively extend and provide a reasonable service life for the pool structure. However, please be advised the within five to 10 years, another round of concrete repairs should be budgeted, including the tunnel walls. Accurate cost projections are difficult to provide without historical repair histories but it is unlikely that the cost would be less than the present requirements.

Finally, please be advised that our assessment is based on a limited visual examination of representative portions of this structure which were exposed and could be examined. We cannot warrant any different conditions that may exist but which are covered by finishes or other materials, or were not observed during our review. It should be further acknowledged that our evaluation is based on the present condition only and that we cannot guarantee that future movement, deterioration, or duress will not occur.



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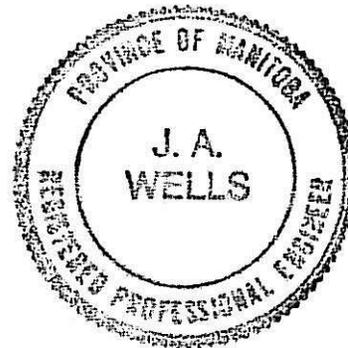
We trust the above provides the information you require. If however, you have any questions or require clarification, please call.

Yours truly,

Reviewed by:

Gord Gunnlaugson

John A. Wells, M. Sc., P. Eng.





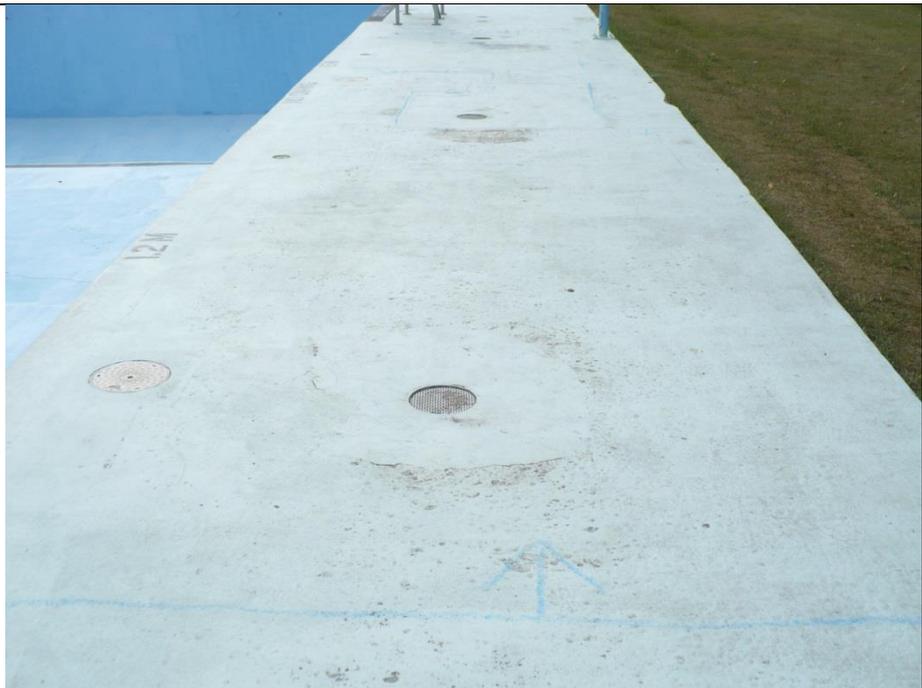
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Photograph #1:
Repair area between pool
wall and deck slab cold
joint.



Photograph #2:
Large area of repair on west
pool apron deck.





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Photograph #3:
Freeze thaw damage on
pool apron deck



Photograph #4:
Ceiling spall around ground
wire penetration.





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Photograph #5:
Soffit crack under pool deck
showing evidence of
leakage.



Photograph #6:
Efflorescence from scupper
and pipe penetrations.





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Photograph #7:
Wading pool and deck;
sealed cracks were generally
intact indicating no
significant differential
movement.



Photograph #8:
Wading pool and deck,
again, no significant
evidence of differential
movement was observed.

