

APPENDIX A



Crosier Kilgour & Partners Ltd.

CONSULTING STRUCTURAL ENGINEERS

June 21, 2013

Our File No. 2013-0588

McGowan Russell Group Inc.
825 St. Joseph St.
Winnipeg, MB
R2H 3A8

Attention: Susan Russell

Dear Ms. Russell:

**Re: 550 Dale Blvd.
Westdale Pool Investigation**

We conducted a site review on Tuesday June 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.

No drawings for the pool structure were available for our review; however, the structural system consists of a cast-in-place concrete tank, presumably supported on piles to resist differential settlement. A structural slab is provided around the exterior deck which covers a mechanical services tunnel. We could not confirm the age of the pool structure but estimate the concrete to be in excess of 40 years old.

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 structure itself is in fairly good condition considering the age of the structure.
- The bottom tank slab had no discernible delamination, and minor cracking that the existing coats of paint continue to bridge, suggesting that they are of the non-moving variety.
- The walls of the pool only showed signs of delamination along what would be the normal water line. See Photograph #1. The north wall had 6 locations of repair totaling +/- 45 square feet.
- The south wall had 7 locations of delamination totaling +/- 20 square feet and 3 locations on the west wall totaling 7 +/- square feet. This totals 72 square feet of repair area minimum 3 inches deep.
- The "Pour Joint" between the pool deck and the top of the pool wall has separated around the pools perimeter, see Photograph #2. 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.



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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 had two small areas of delamination one on the east deck and the other on the south deck. In total approx. 2 square feet of repair is required with an approximate cost of \$60.00 per square foot. (based on completing with other repairs (i.e. no mobilization costs)
- The pool mechanical tunnel walls, ceiling and floor are in generally good condition. No significant evidence of differential movement are indicated.
- The outside tunnel wall and concrete deck soffit were observed to have no signs of concrete deterioration or evidence of leaking. There was no delamination or cracking observed in the outside wall and soffit. (Refer to Photograph #3).
- The inside tunnel wall was also observed to be in generally good condition, however it was typical to observe evidence of water leaking 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. Also in several locations, efflorescence was observed coming from the top of the wall at the pour line, where the top deck is cast on top of the inner wall.
- It was also typical to observe concrete deterioration that appeared to be caused by continued freeze/thaw cycles of the wall structure at the edge of the pour line around the entire perimeter of the pool; refer to photograph #4. There was only one area of delamination noted (+/- 2.0 ft²) and it is located in the middle of the North wall at the top of the wall directly under the pour line. The freeze/thaw deteriorated area when hammer tested appeared to be sound for the present.

To summarize, the structural condition of the pool was generally good. However, there is visual evidence of cumulative freeze-thaw deterioration. Concrete repairs are clearly required along the tank bottom, walls, and deck. 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 approximate costs for this type of repair are \$150.00 per square foot and would include accessing the area (i.e. scaffold) saw-cutting the perimeter, hammer excavating the deteriorated material to a sound substrate, surface preparation (sandblasting), forming, and infilling. Thus, present areas exhibiting delamination would be removed and infilled with repair mortar.

The continuous “crack” 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 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.



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Regarding repairs, the tunnel walls presently do not require any significant structural intervention. However, there is clearly evidence of freeze-thaw related deterioration to the walls which will continue to progress. Given the visual indicators, one would assume that repairs may be required to the tunnel walls in the next 5 to 10 years. This repair would be quite extensive because the top 12 -18 inches (approx.) of the supporting wall for the deck would be completely removed and would be completed in sections to maintain the support of the deck structure. An approximate cost for this repair would be \$500.00 to \$700.00 per lineal foot considering the extent of the repair and future costs.

The multiple coating layers are entrapping moisture in the swing-seasons and aggravating freeze-thaw deterioration. We therefore recommend that consideration be given to blasting the concrete to remove residual coatings followed by supply and installation of a new coating system.

Immediate repair requirements to the concrete tank floor, walls and deck therefore should be budgeted for \$50,000.00. Coating systems vary significantly in cost depending upon properties. We recommend a budget of \$5.00 to \$10.00 per square foot.

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.

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:
Delaminated area (blue
chalk outline) on pool wall.



Photograph #2:
Pour line separation
between deck and pool
wall.





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Photograph #3:
Mechanical tunnel – outside
wall on left.



Photograph #4:
Mechanical tunnel – pool
wall – efflorescence and
freeze/thaw cracking.

