CONCENTRIC
CLIENT-CENTRIC. CHALLENGE DRIVEN.

LONDON, ONTARIO
700 Richmond Street, Suite 307
London, ON N6A 5C7
T 519.452.7700 **F** 519.452.1712
TF 1.866.919.4531

OTTAWA, ONTARIO
2327 St. Laurent Boulevard, Unit 100
Ottawa, ON K1G 4J8
T 613.824.8900 **F** 613.824.8901
TF 1.866.919.4530

WINNIPEG, MANITOBA
1600 Ness Avenue, Unit 300
Winnipeg, MB R3J 3W7
T 204.783.1276 **F** 204.478.4940
TF 1.866.919.4531

SASKATOON, SASKATCHEWAN
3530 Millar Avenue, Unit 400
Saskatoon, SK S7P 0B6
T 306.343.5500 **F** 306.343.3601
TF 1.866.919.8899

IQALUIT, NUNAVUT
P.O. Box 957
Iqaluit, NU X0A 0H0
T 867.979.3300 **F** 867.979.3302
TF 1.866.919.4533

TORONTO, ONTARIO
300 The East Mall, Suite 302
Toronto, ON M9B 6B7
T 647.351.0095 **F** 647.351.0069

COQUITLAM, BRITISH COLUMBIA
1900B Brigantine Drive
Coquitlam, BC V3K 7B5
T 604.553.4057

Our File No. 17-7406

September 6th, 2017

Building 901, City Hall
Box 460
Iqaluit, Nunavut
X0A 0H0

C/O Colliers Project Leaders
Dixon Weir, P.Eng.
1900 City Park Drive, Suite 402
Ottawa, Ontario
K1J 1A3
via email:Dixon.Weir@colliersprojectleaders.com

Attn: Mr. Dixon Weir, P.Eng.

Re: Astro Hill Bridge Iqaluit Condition Assessment

Concentric was retained by the City of Iqaluit to complete a condition assessment of the Astro Hill Bridge located in Iqaluit, Nunavut. This submission outlines the results of the assessment.

BACKGROUND

The Astro Hill Bridge is located in the center of the City at the intersection of Queen Elizabeth Way and Astro Hill Terrace. This bridge provides the only road access to the Astro Hill Complex which includes the Frobisher Inn, office buildings, swimming pool and the Brown Building (Government of Nunavut Offices).

The Astro Hill Bridge is constructed of reinforced, cast in place, concrete. The bridge deck configuration is a suspended flat concrete slab supported on concrete beams which clear span the creek below. The concrete beams are supported on reinforced cast in place concrete abutments with unknown foundations.

Concentric's staff have been periodically monitoring the Astro Hill Bridge since 1997. Concentric was most recently retained in 2012 (Concentric Project No. 12-4410) by the City of Iqaluit to undertake engineering services for the design, tendering, construction supervision and contract administration for localized repairs to the Frobisher Bridge. The repairs included localized through slab and top of slab repairs and were completed in October 2012.

Concentric is not aware of any condition assessments being completed on the Astro Hill Bridge since the localized repairs performed in 2012.

SCOPE OF ASSIGNMENT

The scope of our assignment has included the following activities:

- Review the relevant record documents. These include record drawings, original specifications, if available, and records of any major alterations/changes to the structure or any other systems that may influence the design.
- On-site visual inspection of the bridge superstructure and abutments to assess existing conditions and to identify any visible problems/concerns.
- Review any related exposure conditions and environmental influences.
- Review site specific characteristics and influences.
- Record all relevant observations and document conditions by photograph.
- Prepare a written report summarizing our observations, items of concern, and recommendations.
- Provide preliminary cost estimates, where possible, for recommended repairs.

DESCRIPTION OF STRUCTURE

The Frobisher Bridge is a concrete bridge complete with concrete abutments, beams, and a concrete deck slab. The bridge has an overall length of approximately 13m with a clear span of 12.3m, see photograph 1 in Appendix. The width of the bridge is 9.5m, allowing two-way traffic.

The concrete deck consists of a 200mm thick reinforced suspended slab supported by five (5) 760mm deep by 400mm wide concrete reinforced beams. The beam spacing is approximately 2.1m. The concrete beams are laterally braced at mid-span. Each beam is simply supported at both concrete abutments.

OBSERVATIONS

Concentric visually reviewed the Astro Hill Bridge on August 23rd, 2017. During our onsite inspection, we did not observe any existing conditions that would threaten the immediate safety and/or serviceability of the Astro Hill Bridge.

The following are observations resulting from our site visit:

- The bridge was in fair condition overall.
- Several areas of chipped concrete were identified along the inside face of the concrete walls, likely caused by vehicular impact. See photograph 2 in Appendix.
- Localized horizontal cracking at the interface between an existing concrete patch and the original concrete was observed at the top of the east concrete abutment. See photograph 3 in Appendix.
- Exposed corroded reinforcing steel was observed at localized areas from beneath the bridge located on the underside of the concrete slab.
- Delamination and spalling was observed at localized areas on the underside of the north concrete beam. See photograph 4 in Appendix.
- Localized erosion of the granular fill was observed on the edge of the roadway approaches near the northwest, southwest and southeast corners of the bridge. See photograph 5 in Appendix.

RECOMMENDATIONS

Based on the conditions observed during our site visit, we have the following recommendations for the Astro Hill Bridge:

Short-Term 2017

- Supplementary engineered fill is required on the edge of the roadway approaches near the northwest, southwest and southeast corners of the bridge to combat the localized granular washouts.

A construction budget for the short-term repairs is estimated to be $2,000 plus applicable tax.

Bi-Annual

We recommend that the Astro Hill Bridge be inspected at least every two (2) years in an effort to ensure the bridge is performing to an acceptable standard in terms of public safety, comfort, and long-term serviceability.

A budget for bi-annual inspection is estimated to be $10,000 plus applicable tax.

3-5 Year Repair Program (2021)

- Localized repairs of the concrete curbs (approximately 20m).
- Localized repairs of the concrete abutments (approximately 3m^2).
- Localized repairs of concrete beams (approximately 4 m^2).
- Further engineered fill or better will likely again be required at roadway approaches.

A construction budget for the 3-5 year repair program is estimated to be $85,000 plus applicable tax.

It is the City's prerogative to defer or advance maintenance and/or repairs to their facilities, based on considerations that we may or may not be privy to. An absent or inadequate preventative maintenance program may accelerate deterioration, resulting in repairs being required sooner than projected or anticipated, perhaps at greater cost than originally estimated. Deferment of recommended repairs may also result in collateral deterioration and/or damage, which can inflate repair costs considerably.

LIMITATIONS

Concentric prepared this report for the sole benefit of the City of Iqaluit. This report was prepared exclusively for the purposes, project, and site locations outlined in the report. The report is based on information provided to, or obtained by, Concentric as indicated in the report, and applies solely to site conditions existing at the time of the site investigations. No structural calculations were performed as part of this scope of work.

Concentric is not a professional cost estimator or construction contractor, nor should Concentric's estimates of construction costs be considered equivalent to an estimate prepared by a professional cost estimator or construction contractor. Preparation of a construction cost estimate requires making a number of assumptions as to actual conditions that may be encountered on site. Factors over which we have little or no control include the contractor's methodology, economic volatility, the construction season, inclement weather, and the supply and demand of raw materials, finished goods, and labour. Construction cost estimates are considered budgetary figures only, based on recent industry data and experience on similar projects. The actual costs of construction may vary considerably from what has been estimated.

Should there be any questions, please contact the undersigned.

Yours sincerely,

Concentric Associates International Incorporated

Taylor Rivers, EIT
Designer

Steve Parker, P.Eng.
Lead Project Manager

Appendix A – Photographs

Photograph 1 – Overview of the Astro Hill Bridge

Photograph 2 – Localized damage of the concrete curb/ wall

Photograph 3 – Localized cracking and spalling of concrete abutment. Soil erosion was also noted.

Photograph 4 – Localized delamination of north concrete beam.

Photograph 5- Localized washout at abutment, typical.