May 27, 2016

City of Ottawa
110 Laurier Avenue West
Ottawa, Ontario
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Attn.: Lorraine Stevens, MCIP, RPP
Planner, Development Review, Rural

Re: Crains' Construction Pit and Quarry Geotechnical Report (0PP-10-8260)

This letter has been prepared in support of the Official Plan Amendment, and the Zoning By-Law amendment submitted concurrently to the City of Ottawa, by McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) for the proposed Crains' Construction Pit and Quarry. The proposed pit and quarry is to be located at 7731 Fernbank Road in the former Township of Goulbourn, Ottawa, Ontario. The legal description of the property is Lot 11, Concession 10, Geographic Township of Goulbourn, now in the City of Ottawa. This letter has been prepared to discuss the geotechnical conditions of the proposed site, also to provide a general description on the quality of available natural rock source for the proposed aggregate production.

This letter is intended to demonstrate that the rock is of suitable quality to use for aggregate materials.

In 2015, Geofirma Engineering Ltd., acting as a sub-consultant for McIntosh Perry, submitted a hydrogeology and modelling study of the proposed pit and quarry area. This study made use of five boreholes that had been previously drilled within the site boundaries (advanced to approximately 30 metres depth), as well as a series of 20 test pits. Additionally, cores from three of the existing boreholes (BH3, BH4 and BH5) were made available for review by Geofirma staff during their investigation. Please refer to the 2015 Geofirma Hydrology and Modelling Study (including with OPA and ZBA submission) for photographs of the core samples.

In addition to historic boreholes, during the course of Geofirma's study, four additional wells were completed onsite. These new wells were advanced using an air hammer, therefore no core was collected. Rock chips were logged for lithographic characteristics of the bedrock. Three of these wells (TW13-01, TW13-02, and TW13-03) were completed to depths between 30.5 and 35.1 mbgs, which coincides with the projected quarry floor. The fourth well, TW13-04, was completed to 15.3 m below ground surface, and used as a monitoring well to monitor groundwater drawdown during pumping tests from nearby private water-wells.

Surficial geology (overburden) in the area has been defined as primarily coarse-textured glaciomarine deposits, described as brown sand with gravel. These deposits are relatively thin on-site, ranging from 0 - 5.3 m in depth, with an average depth to bedrock of 1.9 m. The subject property also has several elevated, ancient beach ridges and near shore bars. (OGS, 2014; Geofirma, 2013; Golder Associates, 2004; Houle Chevrier, 2003; MPCE, c. 2001) Based on the results of the analysis, an average of 3.1% of the sample was passed through a 0.075 mm

sieve, and 100% of the sample passed through a 150 mm sieve. This defines the aggregate as 'Granular B Type I' (Houle Chevrier, 2003)

The bedrock beneath the site consists of alternating layers of Paleozoic sedimentary rocks, namely limestone and dolostone. These rocks are of the Ottawa and Simcoe Groups, specifically the Shadow Lake formation. The Shadow Lake formation is general described as silty to sandy dolostone with shaly partings and thin interbeds of calcareous quartz sandstone. Based on geotechnical investigations, bedrock was encountered in on-site monitoring wells between 0 – 2.4 m below ground surface. Observations based on the three on-site cores (BH3, BH4 and BH5) show that generally, fracture spacing increases with depth, indicating that rock quality increases with depth. Evidence of calcite infilling and iron staining was noted on some fracture surfaces. The rock chips logged by Geofirma during installation of a series of monitoring well were logged for lithological characteristics. These results show similar finding to previous reports; the bedrock is primarily interbedded limestone and silty dolostone, and finely crystalline limestone with shale partings.

Sedimentary rocks such as dolomite or hard limestone generally make good sources of crushed stone. However observed shale partings are expected to be soft, friable, and even expansive and result in poor aggregate, although the unsuitable material can be separate if appropriate extraction procedure is in place. Based on visual assessment of the rock photo logs, the Rock Quality Designation (RQD) improves and percentage of unsuitable partings reduces with depth.

The above-noted overburden and bedrock formations are considered of economic value for extraction (MNR, 2014; OGS, 2014; Geofirma, 2013). The samples that have been logged demonstrate the proposed pit and quarry has the potential to produce useful aggregate meeting the specifications of OPSS.PROV 1004 - Miscellaneous Aggregate, and OPSS.MUNI 1010 – Base, Subbase, Select Subgrade and Backfill Material. These specifications describe aggregate including but are not limited to:

- clear stone,
- gabion stone,
- granular sheeting,
- mortar sand
- rip-rap
- truck arrester bed aggregate
- winter sand
- granular B
- SSM

Without chemical analysis, it cannot be determined if the quarried material is suited for use in specialty concrete mixes. Aggregate resistance to abrasion and sulphate attack shall be determined before being used for pavement mixes.

The estimated volumes of aggregate are:

Overburden (pit operation) = 1.3 million m^3

Bedrock (quarry operation) = 12.5 million m^3

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,

McIntosh Perry Consulting Engineers Ltd.

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