August 29, 2017 Reference No. 11131634

Mr. James Frank P.Eng., MBA
Rankin Construction Inc.
222 Martindale Road, Box 1116
St. Catharines, ON L2R 7A3

Dear Mr. Frank:

Re: Geotechnical Desktop Study Addendum
Seismic Site Class
Proposed Seven Storey Condominium Building
57 Lakeport Road, St. Catharines, Ontario

GHD has provided the findings of a desktop study under the cover of a letter dated July 11, 2017 for the proposed condominium development at 57 Lakeport Road (Site or Property), St. Catharines, Ontario. The reader is referred to the GHD letter dated July 11, 2107 for details on the findings of that initial retainer. GHD has since been requested by Rankin Construction Inc. (Rankin) to provide a Seismic Site Class for the proposed development.

The 2012 Ontario Building Code (2012 OBC) requires the assignment of a Seismic Site Class for calculations of earthquake design forces and the structural design based on a two percent probability of exceedance in 50 years. According to the 2012 OBC, the Seismic Site Class is a function of soil profile, and is based on the average properties of the subsoil strata to a depth of 30 m below the ground surface. The 2012 OBC provides the following three methods to obtain the average properties for the top 30 m of the subsoil strata:

- Average shear wave velocity.
- Average Standard Penetration Test (SPT) values (uncorrected for overburden).
- Average undrained shear strength.

A review of the June 29, 2017 Phase II Environmental Site Assessment prepared by GHD and the August 1987 Geotechnical Investigation report prepared by Petco MacCallum 1987 shows that only SPT 'N' data are available. These data are available for soils to depths ranging from 16.5 to 19 m below ground surface, at which depths, bedrock was encountered.

Based on the foregoing, the seismic site class has been assigned based on the Average Standard Penetration Resistance ($\bar{N}$ criteria listed in Table 4.1.8.4.A. of the 2012 OBC, which is reproduced below.

Table 4.1.8.4.A. Site Classification for Seismic Site Response
Forming Part of Sentences 4.1.8.4.(2) and (3)

Column 1	Column 2	Column 3	Column 4	Column 5
		Average Properties in Top 30 m		
Site Class	Ground Profile Name	Average Shear Wave Velocity, $\overline{v}_s$ (m/s)	Average Standard Penetration Resistance $\overline{N}_{60}$	*Soil* Undrained Shear Strength, s_u
A	Hard *rock*	$\overline{v}_s$ > 1500	n/a	n/a
B	*Rock*	760<$\overline{v}_s$ ≤1500	n/a	n/a
C	Very dense *soil* and soft *rock*	360<$\overline{v}_s$ <760	$\overline{N}_{60}$> 50	s_u > 100kPa
D	Stiff *soil*	180<$\overline{v}_s$ <360	15 ≤$\overline{N}_{60}$ ≤50	50 kPa < s_u ≤100 kPa
E	Soft *soil*	$\overline{v}_s$ <180	$\overline{N}_{60}$ < 15	s_u < 50 kPa
		Any profile with more than 3 m of *soil* with the following characteristics: • Plasticity index: PI>20 • Moisture content w ≥40% and • Undrained shear strength: s_u < 25 kPa		
F	Other *soils*(1)	Site-specific evaluation required		

A review of the borehole logs included in the previously cited GHD and Petoc MacCallum reports indicate that the average $\overline{N}_{60}$ values of the soils encountered up to bedrock are generally less than 10. Moreover, evidence indicates that a soil moisture content (w) greater than or equal to 40 percent and undrained shear strength (Su) equal to or less than 25 kPa will likely be encountered in a soil profile greater than 3 m thick below ground surface. In view of this, a Seismic Site Class 'E' should conservatively be used for design purposes.

Sincerely,

GHD



August 29, 2017

Hassan Gilani, M.Sc., P.Eng.

HG/cd/2

CC: Marc Gaudet, P. Eng.