PATERSON GROUP

memorandum

re: **Geotechnical Response to City Comments**
Proposed Industrial Redevelopment
135 Cardevco Road – Carp - Ontario

to: Premier Bus Lines Inc. – **Mr. Eric Hochgeschurz**

to: Arbaum Architects – **Ms. Mariana Palos** – marianapalos@arbaum.com

date: June 6, 2023

file: PG6018-MEMO.01 Revision 1

Further to your request and authorization, Paterson Group (Paterson) prepared the following memorandum to provide responses to the geotechnical-related comments from the City of Ottawa listed in the letter dated March 14, 2023 (File Nos. D07-12-22-0173) regarding the proposed industrial redevelopment at the aforementioned site. This memorandum should be read in conjunction with Paterson Geotechnical Report PG6018-1 Revision 2 dated May 9, 2022.

Geotechnical Comments

Comment 12

None of the shallow test pits (1.6 m - 3.5 m) were within the proposed building footprint. As minimum, one borehole is required within the building footprint, advanced to minimum of 6-7 m or to the confirmed bedrock surface. (Please see additional general comments below that do not contribute to deemed incomplete status, for additional consideration).

Response:

Based on the available drawings and our observations at the time of our geotechnical investigation, the subject site was occupied by an existing warehouse building, and the proposed warehouse addition will be constructed within the southern portion of the existing building, to replace and existing portion of the warehouse which is to be demolished. Therefore, the test hole locations were selected and distributed in a manner to provide general coverage of the subject site taking into consideration the existing site features (i.e., the existing building at the location of the proposed building addition) and underground utilities as well as the nature of the proposed building addition and our extensive knowledge of the soils within the subject area based on our geotechnical experience. Based on that, the proposed program consisting of test holes within the subject site is considered adhering to the City of Ottawa guideline for building addition, and the number and depth of the excavated test holes completed on site are sufficient from a geotechnical perspective to provide information regarding the subgrade conditions at founding level for the proposed building addition.

Comment 13

No soil laboratory testing methods or findings have been provided (related to soil physical and chemical properties), as per Section 2.8 Laboratory Testing of the City Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa", 1st Edition, September 2007, Golder Associates.

Response:

Paterson completed field and laboratory testing, including visual and tactile evaluation on the encountered and retrieved soil samples at different depths in the excavated test pits. Please refer to Soil Profile and Test Data sheets in Appendix 1 in our Geotechnical Report PG6018-1 Revision 1 dated October 19, 2022. In addition, one soil sample was tested for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The completed laboratory tests are considered sufficient from a geotechnical perspective for the encountered soils and the proposed building addition at the subject site.

Comment 14:

No infiltration/percolation testing was provided for SWM & septic field design, due to a highly vulnerable aquifer and groundwater recharge area present on site, as advised/informed during the pre-application consultation.

Response:

This comment will be addressed under a separate cover by the hydrogeological engineer.

Comment 15:

In section 5.4 of the report (Design for Earthquakes), Seismic Liquefaction was not adequately addressed. Rationale and investigation details are required, as per Section 3.3.3 of the Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa", 1st Edition, September 2007, Golder Associates.

Response:

Based on the results of the investigation, type of soil encountered, depth to the long-term groundwater table and insitu compactness, the soils were found to be compact to very dense and are therefore not susceptible to liquefaction from a geotechnical perspective. Discussion about liquefaction potential has been added to the revised report.

Comment 16:

There are proposed retaining walls on site, however no retaining walls/geotechnical considerations are provided in the report; please also investigate if slope stability considerations apply.

Response:

It is understood that the design of retaining walls will be done by others and is outside the scope of the geotechnical report. However, Paterson can provide a design for retaining walls if requested. For slope stability analysis, the ground surface at the subject site is generally flat and slopes gently from approximate geodetic elevation 119.3 to 118.5 at the west and east sides, respectively. In addition, there is no watercourse noted within the proximity of the subject site. Therefore, no slope stability analysis is required for the subject development.

Comment 19:

Section 2.3 of the City Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa", 1st Edition, September 2007, Golder Associates states that "the groundwater level condition observed in test pits may not represent the stabilized condition, unless it is left open for an extended period of time". However, the submitted report states, in Section 4.3 that the long term expected groundwater table is between 2-3 m and it was determined during the investigation on November 12, 2021, when the test pits were advanced.

Stabilized long term groundwater level estimate is required.
Also, as requested during the pre-application consultation, the representative GWT level needs to be derived from the springtime investigation.

Response:

The encountered soils are generally permeable. Therefore, the seasonal high groundwater level is anticipated to match the long-term groundwater table within the silty sand deposit at the subject site based on the above-noted observations. It should be noted that the high permeability of the deposit influences the infiltration amounts associated with precipitation events and spring snow melt. Therefore, the majority of the water from precipitation events and spring melt end up sheet draining towards drainage ditches. Therefore, the long-term groundwater table (pre-development condition) can be found approximately 2 to 3 m below existing grade at the subject site and the spring high water level is not required from a geotechnical perspective.

Comment 20:

While advancing the requested borehole within the building footprint, soil conditions need to be noted and if sensitive marine clays are found, exhaustive analysis will be necessary. Investigation of clays should be undertaken with vane shear testing, Atterberg limits testing (shrinkage, plastic limit, liquid limit, plasticity index), grain size distribution, grade raise restriction, consolidation, compaction sensitivity, remolded strength and liquefaction analysis - amongst others, as per City Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa", 1st Edition, September 2007, Golder Associates.

Response:

Based on our review of the geological information in the area and on the findings of this investigation, as well as our extensive experience in the area, sensitive marine clays are not encountered at the subject site. Furthermore, and based on our review of the available grading plans, it is understood that no significant changes to the existing grades are required. Therefore, no permissible grade raise restriction is required to be defined for the subject site in view of the building addition which will generally match the demolished building. Based on the above discussion, additional testing at the subject site is not required from a geotechnical perspective.

Comment 21:

Associated Liquefaction considerations need to be investigated as well. Liquefaction or any potential for the, relatively, rapid lowering of shear strength of soils, for any soil type, requires rationale. Any uncommon perspectives relied on by the report, shall be provided to the City, as full copies and such documents shall have unequivocal concurrence with the reporting, or perspective proposed.

Response:

Refer to our response for comment 20 above.

Comment 22:

Sulphate content of 0.1% is stated but no chemical laboratory testing data was included in the report.

Response:

The results of the analytical testing are included in Appendix 1 of our report. Reference should be made to Appendix 1 in our Geotechnical Report PG6018-1 Revision 2 dated May 9, 2023.

Comment 23:

Thin soils, sensitive marine clays and karst topography were anticipated on site, but no such conditions have been investigated (shallow test pits) or discussed in the undertaken investigation. Bedrock depth was assumed to be 5 to 10 m below ground surface, based on geological mapping, not actual boreholes. No grade raise restrictions have been provided.

Response:

Refer to our response to Comment 20. In addition, relatively shallow bedrock was confirmed in the area from adjacent sites. The test hole logs have been added to the revised report.

Comment 24:

In section 5.4 of the report (Design for Earthquakes), Seismic Design was not adequately addressed. Rationale is required, as per Section 3.3.3 of the Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa", 1st Edition, September 2007, Golder Associates.

Response:

Refer to our response on Comment 21.

Comment 25:

No boreholes have been provided in the area near the proposed septic bed and GWT elevation might be of concern due to highly vulnerable aquifer onsite; infiltration and long-term groundwater protection might be of concern and this relates to the Hydrogeological terrain analysis findings based on the geotechnical investigation.

Response:

This comment will be addressed under a separate cover by the hydrogeological engineer.

Comment 26:

No specific information is provided regarding protection of the structural integrity of the existing building due to potential ground movement and vibration, as it pertains to the excavation directly adjacent to its foundation for the proposed building foundation.

The likely depth of the required excavation directly adjacent to the existing building needs to be estimated.

Please evaluate if temporary slope instability is invoked, as a result of the above-mentioned construction activity.

Response:

Based on the encountered soils and the anticipated depth of excavation, bedrock removal is not anticipated for the subject site. Therefore, vibration monitoring is not a concern from a geotechnical perspective.

Where excavation below existing footings is anticipated, reference should be made to Section 5.3 Foundation Design, for a discussion regarding the lateral support zone of existing footings. The required lateral support zone of 1.5H:1V for all footings should be protected. Where the lateral support zone of 1.5H:1V for the existing footings can not be provided, then underpinning of the existing footing can be done.

Comment 27:

Conclusion of Section 6.7 of the report appears to state two contradicting statements one of which identifies "none-corrosive" and the other "slightly aggressive corrosive" environment. It is not clear what impact it will have on design elements.

Response:

The corrosion potential of soils is evaluated based on a set of applicable tests (chlorides, pH, and resistivity). These tests are not necessarily comparable and they each have different thresholds. A soil with a relatively low resistivity (indicating potential corrosive environment) can still have a chlorides content and/or pH values which are below the designated thresholds for corrosive environment. The soil will be considered corrosive, if one of any of the tests indicates a corrosive environment. For this site, precautions for a non-aggressive to slightly aggressive corrosive environment (as determined by the resistivity test results) need to be put in place where deemed necessary by the civil engineer.

Comment 28:

Handling of excess soils needs to be specified in more detail in a prescriptive way to provide disposal options and testing requirements, as per latest provincial guidelines.

Response:

Excess Soil Management for the site will be governed by the requirements of O.Reg. 406/19. If the expected small volume of excess soil generated from the excavation of the footings (approximately 150m^3) cannot be managed on-site, it will be removed for beneficial reuse off-site. Given the anticipated small volume of less than 2,000m^3, the project will be exempt from the following: registering a notice in the Excess Soil Registry, developing a tracking system to track each load of excess soil during its transportation and deposit, and having a Qualified Person complete an assessment of past uses, soil sampling and analysis plan and/or an excess soil destination report. It is understood that the client will engage an environmental consultant prior to construction to complete due diligence sampling for the minimum parameter analyses outlined in the Soil Rules document, to confirm the quality of the excess soil meets the excess soil quality standards (ESQS) for the receiving site (to be determined), in accordance with O.Reg. 406/19.

We trust that the current submission meets your immediate requirements.

Best Regards,

Paterson Group Inc.

May 9, 2023

Zubaida Al-Moselly, P.Eng.

Maha Saleh, M.A.Sc., P.Eng.