PATERSON GROUP

memorandum

re: **Geotechnical Response to City Comments**
Zoning By-law Amendment Application
6208 Renaud Road, Ottawa, Ontario

to: Novatech Engineering – **Ms. Jordan Jackson** – j.jackson@novatech-eng.com

date: January 4, 2024

file: PG6640-MEMO.01

Further to your request and authorization, Paterson Group (Paterson) prepared the following memorandum to provide geotechnical responses to the City of Ottawa comments related to file No. D02-02-23-0053 dated October 20, 2023.

Geotechnical Response to City Comments

Comment 1.C.1: *In section 4.2, please expand the reporting to include Atterberg limits testing on the fine-grained soils encountered based on section 2.8 of the Geotechnical Investigation and Reporting Guidelines.*

Response: Please refer to Section 4.2 of the Paterson Group Report PG6640-1 Revision 1 dated January 4, 2024. Atterberg limits testing completed on the sites directly adjacent to the subject site and presenting the same soil conditions have been included in the report.

Comment 1.C.2: *In section 4.2, the reporting should include detailed discussion for the results of the Atterberg Limits testing, including the water content measured in the BH 1-23 and BH 2-23, which measured water content more than 80% at 4m depth and below.*

Response: Please refer to Section 4.2 of the Paterson Group Report PG6640-1 Revision 1 dated January 4, 2024. The high water content are indicative of an extra sensitive silty clay deposit. This type of findings is not uncommon in the area studied and does not cause any issues to light residential construction. Special considerations would be required for deep excavation or service installation which are not proposed for this site, except for the servicing connection, discussion for deep trenching is included under Section 6.3.

Comment 1.C.3: *In section 4.2, following comments C1 & C2, the reporting should discuss the liquidity index to estimate the corresponding sensitivity of the soils. Identification of the risks to the proposed development and any recommended mitigative measures should be provided in detail.*

Response: The nearby Atterberg Limits testing measured a liquidity index of 1.2 and 2.2 which is indicative of very sensitive clay. Furthermore, the soil sensitivity values are based on the ratio between shear strength of undisturbed in situ and remoulded soils. The soil sensitivity for silty clays of the subject site is approximately 2.8 based on these recorded values. Our foundation design parameters are calculated based on undrained shear strength values, standard penetration testing and groundwater level with respect to the proposed underside of footing level, which is standard practice in Ottawa for foundation design over sensitive soils. Construction recommendations have been added to Section of 5.2 of the revised report. Please refer to the Paterson Group Report PG6640-1 Revision 1 dated January 4, 2024. Mitigations measures are included in the bearing pressures provided, it will be important during construction to protect the silty clay bearing surface and avoid any disturbance from equipment or foot traffic. A mud slab would be the ideal solution for protection during construction from traffic and wetting or drying disturbance to the bearing surface.

Comment 1.C.4: *In section 5.3, please discuss the findings of the Geotechnical Considerations East Urban Community (Golder Associates, July 2004) which notes that "No grade raise above existing ground is advised within Area 4.". If the permissible grade raise is to be modified from the findings of the aforementioned report, sufficient engineering rationale and calculations will need to be provided in this section to the satisfaction of the City.*

Response: The permissible grade raise was re-evaluated with his site-specific investigation and will supersede the expired Golder report. It should be further clarified that the permissible grade raise restriction noted is a very conservative value, which is expected to be sufficient for the proposed development and anticipated building. Several properties of the silty clay deposit come into effect when calculating permissible grade raise, such as silty clay layer depth, stiffness of the deposit and moisture levels. All of these factors were considered in calculating the permissible grade raise restriction. Paterson completed supplemental and detail investigation and consolidation testing on directly neighbouring sites where a deep silty clay deposit is present and a significant sections of low undrained shear strength values are present. The sites have been developed with the permissible grade raise provided by Paterson at the time of detail design. All the available information concluded that the small permissible grade raise provided in the above noted report would be appropriate. It is important to note that the grade raise is calculated from native ground surface and that any existing fill material on site would be subtracted from the number provided.

Comment 1.C.5: *In BH 1-23, the remoulded shear strength was measured in only one location where the moisture content was measured between 50 and 55%. It is expected that remoulded shear strength measurements in conservative locations, i.e. where the moisture content is above 80%, would be provided. Soils at that depth may be above the liquid limit, and there is potential for significant loss in strength and consolidation when subject to new static or seismic loading conditions.*

Response: Remould values were only obtained at one sampling location due to the vane apparatus moving after the initial undrained shear strength testing, which is common for sensitive silty clays. Once the vane apparatus moves excessively during the testing, a remould value cannot be obtained.

Comment 1.C.6: *In BH 1-23 and BH 2-23, the N value is noted as either 1 or 'P' (assuming P is in reference to 'pass') from approximately 2 metre depth to the end of the borehole. The results of the Standard Penetration Testing should be discussed in the determination of the consistency (section 4.2) and bearing resistance values (section 5.3). In the symbols and terms sheet, an N value below 2 would seem to indicate a very soft or soft consistency. Please include the value of 'P' in the borehole log or legend to confirm.*

Response: The value of "P" noted for the sampling completed at the subject interval refers to "Push" indicates that the split spoon sampler was pushed through the disturbed soil to collect a sample following a vane test. The soil at the subject interval was disturbed due to the completion of the in-situ vane shear test. The consistency and bearing resistance values of cohesive soils (silty clay deposits) is better defined with undrained shear vane values which were collected at the subject sampling intervals.

Comment 1.C.7: *In section 6.4, it is noted that moist (not wet) site-generated silty sand can be reused under certain conditions. Please clarify the conditions for reuse of the silty clay, expected to have high water content in the potential depths where the work will occur.*

Response: As noted in the geotechnical report, site-generated silty clay fill or silty sand with high water content (wet) will be difficult to re-use, as the high-water contents make compacting impractical without an extensive drying period. If the silty clay is saturated, an extensive drying period is required to re-use the excavated silty clay or a subgrade improvement design will be required to allow vehicle traffic over the saturated silty clay during construction. Once in the trench, the saturated silty clay typically exhibits an increase in strength over time due to a reduction in excess pore water pressure. Typically, backfill materials similar to the soils along the excavation's sidewall are recommended to ensure that differential frost heave effects are limited. Please refer to the Paterson Group Report PG6640-1 Revision 1 dated January 4, 2024.

Comment 1.C.8: *In section 6.3, 6.4, and 6.5, please expand the discussion to include the requirements for the risks and mitigation for the proposed excavation to connect to the storm trunk sewer in the right-of-way. The excavation could extend 6 to 7 metres in depth.*

Response: A discussion on temporary shoring has been included to Section 6.3 for support of the deeper excavation. The recommendations noted in Section 6.4 for the installation of the pipes is applicable to the storm sewer. Further discussion has been added to Section 6.5 regarding dewatering of deeper excavation. Please refer to the Paterson Group Report PG6640-1 Revision 1 dated January 4, 2024.

Comment 1.C.9: *Please provide discussion regarding whether the soils are sensitive to moisture depletion and settlement in terms of planting of new trees near foundations and preservation of existing trees around new foundations. Reference should be made to the City's Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines.*

Response: Please refer to Section 6.8 of the Paterson Group Report PG6640-1 Revision 1 dated January 4, 2024. Discussion has been added with regards to soil sensitivity to moisture depletion and settlement in terms of planting of new trees near foundations and preservation of existing trees around new foundations.

We trust that the current submission meets your immediate requirements.

Best Regards,

Paterson Group Inc.

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