patersongroup memorandum

consulting engineers

re:	**Geotechnical Response to Peer Review Comments** **Proposed High-Rise Building** **1040 Somerset Street West - Ottawa**
to:	Claridge Homes - **Mr. Vincent Dénommé** - vincent.denomme@claridgehomes.com
date:	August 12, 2021
file:	PG2674-MEMO.09

Paterson Group Inc. (Paterson) prepared the current memo to provide our responses to the geotechnical peer review comments in the letter entitled “Peer-Review of Geotechnical Report and Shoring Plans” prepared by DST Consulting Engineers Inc. (DST) and dated June 14, 2021. This memo should be read in conjunction with the current Geotechnical Investigation Report (Paterson Group Report PG2674-2 Revision 3 dated August 12, 2021).

Responses to the comments regarding the shoring design will be provided by others in a separate letter.

Geotechnical Investigation Report - Comment 1

Comment: *The shoring designs and Section 2.0 of the Geotechnical Investigation report indicate 7 to 9 levels of underground parking or to an approximate elevation near 40.9 masl. Only one borehole, BH1-20, was advanced to this depth. The majority of the other boreholes performed during previous investigations in 2012, 2014, and 2015 did not confirm the rock surface or investigate the subsurface conditions down to the proposed foundation depth. Thus, there are currently insufficient boreholes to adequate depths to fully characterize the bedrock given the capacities required, the proposed tie backs and rock excavation depths below the shoring. Therefore, DST recommends additional boreholes to confirm the depth of the bedrock and bedrock quality.*

Response: A supplemental geotechnical investigation has been completed which included 2 additional boreholes extending to approximate depths of 25.5 and 27.1 m. An update to the Geotechnical Investigation Report (Paterson Group Report PG2674-2 Revision 3 dated August 12, 2021) has been prepared which includes the Soil Profile and Test Data sheets from these additional boreholes.

Geotechnical Investigation Report - Comment 2

Comment: *Although the existing underground infrastructure in the area of the proposed excavation are mentioned in the Geotechnical Investigation and have been identified on Drawing C-08 of the shoring design, a complete construction impact assessment for these utilities has not yet been provided, which is recommended to estimate the anticipated and allowable settlement, and assess the allowable vibration limits specific to the existing utilities.*

Response: Refer to the Construction Methodology Report for the Protection of City Infrastructure (Paterson Group Memo PG2674-MEMO.07 dated June 14, 2021) which provides a complete construction impact assessment, allowable settlement, and allowable vibration limits for the 1,372 mm C301 watermain located in the vicinity of the subject site.

Geotechnical Investigation Report - Comment 3

Comment: *There are two recommended factored ULS values provided, 4 MPa and 6 MPa. It is understood that the use of 6 MPa will be based on confirmatory 1.5 m probe holes to be performed during construction. It is recommended that Designers pre-prepare alternate footing designs for 4 MPa in the case that such conditions are encountered.*

Response: Yes, the designers will also prepare a footing schedule based on bearing resistance values of 4 MPa under ULS conditions.

Geotechnical Investigation Report - Comment 4

Comment: *The seismic "Site Class A" is based on the presented shear wave velocity on Figures 2 and 3 and pages 15 and 16 of the report along a single test line along Breezehill Avenue only. This alignment is outside of the building footprint and is oriented along a single axis only. Consideration should be given to evaluation of the shear-wave velocity profile down to at least the proposed footing and anchors elevations and along a separate orientation to confirm the Site Class at the footing level and towards the existing neighboring slope.*

Response: The existing seismic shear wave velocity test calculated the bedrock velocity using the main refractor wave velocity. Given the bedrock surface is located at approximate geodetic elevation 49 m, and the underside footing elevations are anticipated at approximate geodetic elevations of 42 to 43 m, the main refractor velocity is considered a conservative estimate of the bedrock velocity due to the increasing quality of the bedrock with depth. It should be noted that as bedrock quality increases, the bedrock shear wave velocity also increases.

Further, the bedrock velocity calculated at this site is generally consistent with the bedrock velocities that we have calculated at nearby sites, such as at 900 Albert Street, which is located approximately 200 m north of the subject site and which also has limestone bedrock with interbedded shale seams.

The existing seismic shear wave velocity test was also completed only 1.5 to 2.5 m west of the proposed building footprint, and is considered representative of the conditions at the 1040 Somerset Street West site. Therefore, additional seismic shear wave velocity testing is not considered to be required.

Geotechnical Investigation Report - Comment 5

Comment 5: *The report includes slope stability evaluations under both static and seismic conditions for the west slope of the O-Train corridor indicating only a marginal safety factor against potential instability under the static condition. More detailed evaluation of the impact of the proposed construction methodology such as proposed dewatering, installation of sheet piles and tie backs, and equipment travel or operation on the stability of the existing and proposed slopes is therefore recommended.*

Response: For the permanent condition, once construction has been completed, the proposed development will not induce new loads on the existing slope, as the new walkway along the eastern boundary of the site will be cantilevered over the slope.

For the temporary condition during construction, dewatering is not expected due to the use of steel sheet piles as the temporary shoring system along the east side of the excavation. However, even in the event that some dewatering was to occur during the construction period, this would only act to improve the factor of safety of the slope.

Other construction activities such as sheet pile installations, tieback installations, and equipment travel are not expected to negatively the existing slope stability.

Geotechnical Investigation Report - Comment 6

Comment: *The Geotechnical Investigation recommends that the existing bridge abutment should be investigated. This additional investigation is required to ensure the bridge is not undermined. If the shoring intercepts the zone of influence of the bridge, then the shoring will need to be designed to accommodate, or underpinning used, and/or applicable monitoring implemented.*

Response: The existing bridge abutment will be investigated at the start of construction, and if the temporary shoring system intercepts the zone of influence of the bridge, then the design of temporary shoring system will be revised to account for this, and applicable monitoring would be implemented.

Geotechnical Investigation Report - Comment 7

Comment: *The Geotechnical Investigation recommends that the 1372 mm PCCP watermain be monitored using inclinometers and hand surveying within valve chambers. However, no valve chambers appear to be located adjacent to the Site. Given the proximity of the waterman to the shoring wall, and the tie backs proposed below the watermain, DST recommends that the watermain monitoring include utility monitoring points placed directly on top of the watermain with the use of settlement rods for direct reading. Additionally, vibration monitors should be placed on the utility itself. Review and Alert limits for the settlement monitoring and vibration monitoring will need to be aligned to the sensitivity of the utility based on the construction impact assessment recommended above. Such monitoring should be specified in a formal Risk Management Plan prepared by a Professional Engineer.*

Response: In lieu of inclinometers, 2 utility monitoring points will be installed directly on top of the 1,372 mm diameter watermain, adjacent to the western boundary of the site subject site. Further, the vibration monitors can also be setup directly on the 1,372 mm diameter watermain.

Refer to the *Construction Methodology Report for the Protection of City Infrastructure* (Paterson Group Memo PG2674-MEMO.07 dated June 14, 2021) for the specific settlement and vibration criteria for this watermain.

Geotechnical Investigation Report - Comment 8

Comment: *Due to the anticipated blasting and the adjacent infrastructure, an assessment of sensitive receptors should be performed within 150 m of the Site.*

Response: Paterson has recommended a pre-construction survey for structures within 75 m of the subject site. If the City of Ottawa requires a larger radius for the pre-construction survey in the Delegated Authority Report (DAR), then the scope will be adjusted accordingly.

Geotechnical Investigation Report - Comment 9

Comment: *Long-term lowering of the groundwater at this Site is a concern. The Geotechnical Investigation requires a bento-mat installed on the rock face to ensure a water-tight bathtub design. This design detail requires significant detailing to address specific areas such as the rock ledge, the shoring and whalers, and the tie backs. If the installation and/or detailing is not done properly, this will have long-term settlement affects on surrounding structures due to lowering of the groundwater. As this is a critical item, DST recommends that this installation be inspected and certified by a Quality Verification Engineer (QVE) as part of proposed construction monitoring.*

Response: Waterproofing and foundation drainage details for the bedrock ledge are provided on Sketch SK 1 in Appendix 2 of the updated Geotechnical Investigation Report (Paterson Group Report PG2674-2 Revision 3 dated August 12, 2021) and are also attached following this memo.

Above the bedrock ledge, the temporary shoring system will be setback 1 m from the bedrock face. Therefore, above the bedrock, where the walers and tieback anchors will be located, it is anticipated that the waterproofing and foundation drainage will be installed directly against the exterior of the concrete foundation wall, and not using a blind-side application directly against the temporary shoring system. Therefore, specific detailing of the waterproofing and drainage board installations around walers, tieback anchors, etc. is not applicable.

Paterson will make regular inspections during the installation of the waterproofing system in order to ensure conformance with our recommendations.

We trust that this information satisfies your immediate requirements.

Paterson Group Inc.

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Claridge Homes
Proposed High-Rise Building
1040 Somerset Street West - Ottawa, ON
SK1 - Foundation Drainage
Transition Detail from Blind
Side to Double Sided Pour

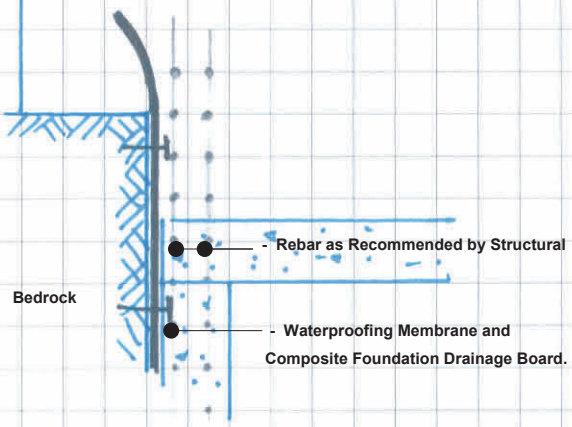
Job No.: PG2674

Date: August 12, 2021

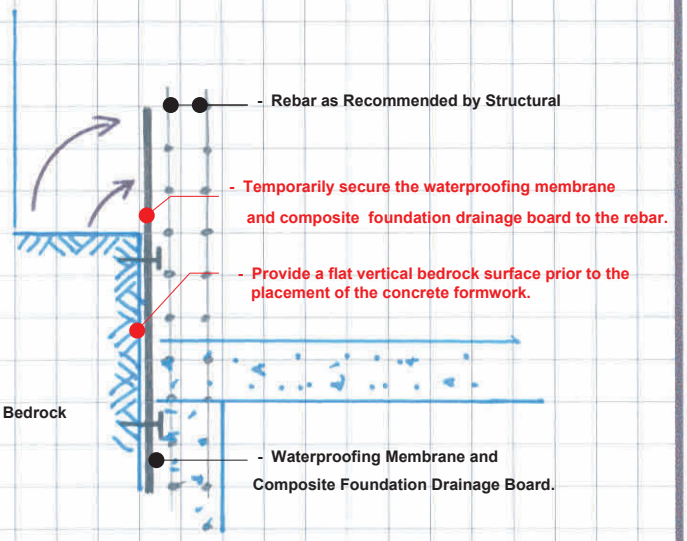
Page:

SK1a

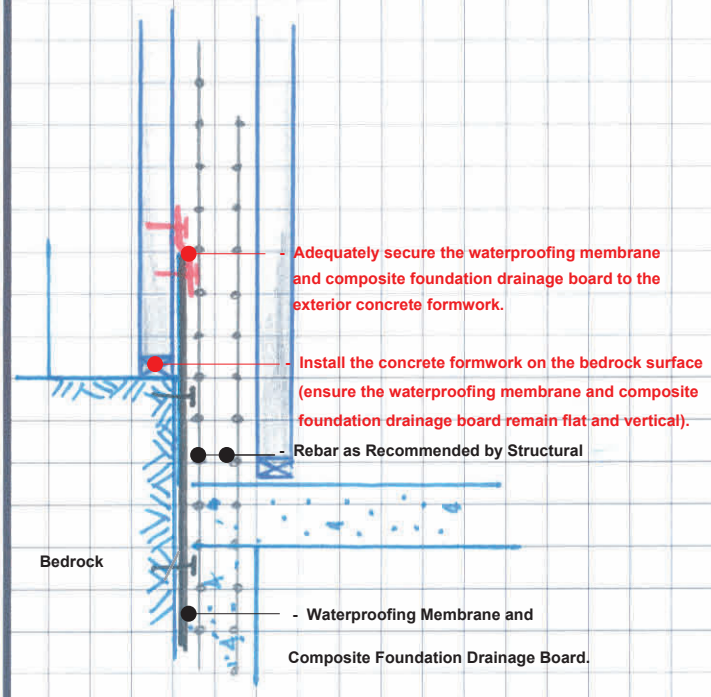
- Precaution must be taken at the transition zone between the blind side and double sided pour to maintain a relatively flat exterior surface for installation of the waterproofing membrane and composite foundation drainage board.



SK1b



SK1c



SK1d