



**MTE**

**MTE Consultants**

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MTE File No.: 54716-200

Laura Dewar  
Supervisor, Development Planning  
City of Cambridge  
50 Dickson Street  
Cambridge, ON, N1R 5W8

Dear Laura:

**RE: Geotechnical Peer Review**

MTE Consultants Inc. (MTE) was retained by the City of Cambridge to carry out a geotechnical peer review of two geotechnical reports pertaining to the proposed Preston Springs Condominiums development (hereinafter referred to as the “Site”), located in Cambridge, Ontario.

The site is 1.2 ha in area and is located at 134 and 144 Fountain Street North, 199 Abraham Street and 102 Fountain Street South, in the City of Cambridge. The Site was formerly the Preston Springs Hotel, with two single detached dwellings fronting Fountain Street, and a forested area to the west. The Site is located on the west side of Fountain Street, adjacent to the T-shaped intersection of Fountain Street South, Fountain Street North, and King Street West. The site is bounded by Fountain Street to the east, and adjacent residential properties along Jacob Street to the north, and Abraham Street to the west and south.

It is MTE’s understanding that the site is to be redeveloped into a multi-storey residential development. It is understood that initially (in 2014), the proposed development consisted of a 5-storey residential building, with two levels of underground parking as well as surface parking areas. It is understood that the current design consists of the following:

- Three residential towers varying in height from 22 to 26-storeys;
- A 6-storey podium structure connecting the three towers; and
- Between 1 to 7 levels of underground parking across the Site.

The City of Cambridge has asked MTE to review the following reports that were completed for the Site:

- CVD Geotechnical Report - “**Geotechnical Investigation, Preliminary Assessment, Proposed 5-Storey Apartment Building, Preston Springs Condominiums, 102 Fountain Street South, Cambridge, Ontario**”. Reference No.: 13-09-K01. Prepared for Haastown Group of Companies, by Chung & Vander Doelen Engineering Ltd., dated January 31, 2014.

- CVD Slope Report - “**Supplementary Slope Assessment Report, Preston Springs Condominiums, 102 Fountain Street South, Cambridge, Ontario**”. Reference No.: G22450. Prepared for Haastown Group of Companies, by Chung & Vander Doelen Engineering Ltd., dated October 16, 2023.

The purpose of the peer review is to complete a review of the previously completed investigations and summarize the findings, conclusions, and recommendations of both reports. MTE will assess if the reports were completed to industry standards, and if the conclusions and recommendations contained within the reports are appropriate. MTE will recommend any supplemental geotechnical work which might be required.

## **CVD Geotechnical Report (2014)**

The 2014 geotechnical investigation report provides a general overview of the subsurface conditions at the Site, which is crucial for making informed decisions about foundation design and construction. The CVD Geotechnical Report was classified as “preliminary”, indicating that the purpose of the investigation was to assess the overall feasibility of the proposed development at the site, to be supplemented with future intrusive investigations. As part of the investigation, seven boreholes were advanced at the Site to depths ranging from 2.0 to 12.2 meters below ground surface (mbgs). Each of the boreholes was advanced into the bedrock with the exception of Borehole BH4, which was terminated due to auger refusal on possible bedrock. No bedrock coring was completed during the investigation. The borehole locations were surveyed and referenced to a geodetic datum. A slope stability analysis of the existing and proposed slope profiles was also completed as part of the preliminary investigation. The following are key findings from the CVD Geotechnical Report:

### **Key Findings:**

#### *Site Description:*

The CVD Geotechnical Report describes the majority of the site as consisting of sloping terrains, with up to 23 m of grade changes, and slope lengths of up to approximately 100 m. It notes that the Speed River flood plain is located to the east of the site. The site is described as having extensive tree cover, ground vegetation, as well as tended lawns and bushes. Various landscaping features such as retaining walls and pathways were observed across the site. Minor ponding and drainage pathways were observed along the slope faces. The report notes the presence of a 5-storey building on the site at the intersection of King Street and Fountain Street, as well as two 2-storey residential buildings at the north end of the property. It is understood that all three buildings have been demolished in the years since the report was issued.

#### *Site Stratigraphy:*

Based on the borehole logs provided in the report, the subsurface conditions are consistent with available geological mapping, consisting of either surficial asphalt, topsoil, and/or fill material underlain by clayey silt till followed by limestone bedrock. Occasional sand and gravel deposits were encountered between the clayey silt till deposits and limestone bedrock. In general, the density of the overburden soil deposits increases with depth.

The fill material was generally loose to compact, and moist to saturated.

The majority of the soils encountered consisted of clayey silt till. Based on N-values of 5 to greater than 100 blows per 300 mm of a split spoon sampler, and field pocket penetrometer readings of 130 to over 250 kPa, the clayey silt till deposits have a stiff to hard consistency,

becoming stiffer with depth. In general, based on the results of moisture content testing and Atterberg limits, the clayey silt till is described as Drier Than the Plastic Limit. The aforementioned sand and gravel deposits encountered between the clayey silt till and limestone bedrock were compact to very dense, and moist to saturated at the time of sampling.

Limestone bedrock (or refusal on possible bedrock) was encountered below the native soil deposits at the following depths in mbgs and elevations in meters above sea level (masl). As noted previously, the bedrock was not proven by coring:

Borehole No.	Ground Surface Elevation (masl)	Depth to Bedrock (mbgs)	Bedrock Elevation (masl)
BH 1A	277.8	1.9	275.7
BH 1B	278.2	1.9	276.3
BH 1C	279.1	3.5	275.6
BH 2	275.0	2.4	274.5
BH 3	296.9	11.7	285.2
BH 4	291.2	7.9*	283.3*
BH 5	290.9	11.1	279.8

\*Note: Refusal on possible bedrock

Bedrock was shallower along Fountain Street (Boreholes BH 1A to BH 2) and deeper up slope at Boreholes BH3 to BH5. The bedrock was described in the report as highly weathered, fractured, grey limestone. The report does not refer to geological mapping to confirm the type of bedrock. Based on geological mapping of the underlying bedrock, the site is located at a transition point between the Guelph Formation at the east half of the site, consisting of dolostone, and the Salina Formation at the west half of the site, consisting of dolostone, shale, and evaporites. Dolostone is similar to limestone. The bedrock was not cored, and consequently the exact type of rock cannot be confirmed, and there is no indication of the Rock Quality Designation (RQD) of the bedrock or the unconfined compressive strength of the bedrock.

#### *Groundwater Conditions:*

Groundwater levels range from approximately 0.9 to 3.8 mbgs, as indicated by saturated conditions encountered during drilling, as well as measured within the monitoring wells installed in Boreholes BH 1C, BH 2 and BH 3. The following table provides a summary of the water levels at the site:

Borehole No.	Ground Surface Elevation (masl)	Depth to Saturated Conditions (mbgs)	Elevation of Saturated Conditions (masl)
BH 1A	277.8	Not Encountered	-
BH 1B	278.2	Not Encountered	-
BH 1C*	279.1	2.6	276.5
BH 2*	275.0	3.5	271.5
BH 3*	296.9	3.2	293.7
BH 4	291.2	3.8	287.4
BH 5	290.9	0.9	290.0

\*Note: Measured in the installed monitoring wells

Seasonal fluctuations and perched water table conditions are expected given the relatively impermeable clayey silt till.

#### *Slope Stability Assessment:*

A slope stability assessment was carried out for the existing on-site slope. Three cross sections were analyzed using the Geo-Slope computer analysis program. The Geo-Slope software is considered to be one of the typical industry standard programs for these types of analyses.

The results of the slope stability analyses indicated that the analyzed cross sections had factors of safety against a rotational failure of between 1.55 and 2.95.

This indicates that the slope profiles are stable in their present configuration. Additional analyses were carried out for the proposed cross sections, determining factors of safety of between 1.55 and 2.60, which indicates that the proposed cross sections are stable.

CVD notes that the analyses assume that any existing retaining walls are assumed to be robust and adequate for the existing conditions. They recommend that the condition and suitability of those structures should be determined if they are to be incorporated into the proposed design. The report concludes that the slope is stable and the proposed development (the original design of a 5-storey building) would not adversely affect the stability of the slope, provided it is properly designed and the construction properly staged.

#### *Foundations:*

The report recommended foundations should be placed on the very stiff to hard clayey silt till at minimum depths ranging from 1.5 to 5.3 mbgs. CVD indicates that for preliminary design purposes, footings can be designed for a factored geotechnical resistance at ULS of 600 kPa and a geotechnical resistance at SLS of 400 kPa, based on a maximum differential settlement of 25 mm. CVD recommends advancing additional boreholes to better characterize the depth to a suitable founding subgrade across the site, in particular in the vicinity of Fountain Street.

The CVD Geotech Report recommends the use of Site Classification 'C' for earthquake load and effects in accordance with Table 4.1.8.4.A. of the 2012 Ontario Building Code.

The report also discussed general recommendations for floor slabs, pavements, excavations, and temporary shoring.

### **CVD Slope Report (2023)**

The CVD Slope Report consists of a supplementary letter pertaining to the changes to the proposed development from a 5-storey residential building to the three-tower development described previously. The purpose of the report was to assess if the proposed changes to the development plan will affect the existing slope.

The majority of the report is primarily a brief summary of the original CVD Geotechnical Report, detailing the findings of that investigation. The conclusion of the CVD Slope Report indicates that due to the 70+ m buffer between the Speed River and the toe of the on-site slope, that the site is not subject to the riverine erosion hazard. Further, due to the addition of up to 7 levels of underground parking, the foundations will extend into bedrock and CVD indicates that the bedrock is sufficiently competent to support building loads and will not cause slope instability problems, assuming that properly designed temporary shoring is utilized during construction. The report indicates that access to the site is possible via Abraham Street and Fountain Street for slope maintenance and emergencies and that any possible surficial erosion will be addressed through the site grading plan.

## Conclusions

- The CVD Geotechnical Report was prepared in accordance with industry standards for a preliminary geotechnical investigation.
- The assumed soil parameters used for the slope stability analysis in the CVD Geotech Report were appropriate based on the soil stratigraphy contained in the borehole logs.
- The foundation recommendations and bearing pressures are reasonable and suitable for preliminary design for foundations founded on the overburden soil deposits.
- The ancillary recommendations pertaining to floor slabs, pavements, excavations, and temporary shoring are standard and reasonable but no longer relevant given the changes to the proposed design. Due to the new proposed excavation depths, it is likely that shoring will be required across the site, rather than at select locations as indicated in the CVD Geotechnical Report. Additional investigations and bedrock coring is anticipated to be required to support shoring design.
- The conclusions reached in the CVD Slope Report that the proposed development will not negatively impact the slope stability are reasonable based on the encountered conditions and proposed building layout, however the conclusion that the “bedrock is inherently strong and competent to support building loads” is not sufficient for foundation design and should be supported by additional investigations and bedrock coring.

## Recommendations

- The existing reports, while competently prepared, are insufficient for the revised building designs and additional investigations are required.
- The CVD Geotechnical Report was noted as “preliminary”, and the report itself recommends additional borehole drilling across the site to develop a better understanding of the depth to suitable bearing strata. MTE agrees with this recommendation, and further geotechnical investigation work should be carried out to determine the subsurface conditions at and below the depths of the proposed foundations. Given that the new design will result in the building foundations being constructed on bedrock at an approximate Elevation of 272.4 masl, bedrock coring should be included. Coring should extend to a minimum of 3.0 m below the founding depth, i.e., Elevation 269.4 masl, and unconfined compressive strength testing of the recovered bedrock cores is recommended.
- The proposed building footprint coupled with the underground parking structure will result in the requirement to excavate and remove a substantial quantity of soil and rock material. The feasibility of the extensive excavations required for the proposed design should be evaluated, in particular the removal of bedrock. Analytical testing of the existing overburden soils will likely be required in order to remove the material from the site. It is noted that the movement of excess soil from a project site is regulated under O.Reg. 406/19 and the associated Rules for Soil Management and Excess Soil Quality Standards. The Regulation and Rules have been enacted with various phase in dates between January 2021 and 2025. Depending on the final design of the project, excess soil management may be captured under the Regulation and associated Rules.
- Saturated conditions and shallow groundwater levels measured from 0.9 to 3.5 mbgs may be problematic for construction. It is recommended to carry out a Hydrogeological Assessment at the site to better characterize the groundwater regime at the site, both in

the overburden soils and the limestone bedrock, as well as determine the anticipated dewatering rates during construction.

- MASW seismic testing could be performed on site to possibly increase the seismic site class for design given that the entire building is to be founded on bedrock.

## Limitations

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In addition, it should be recognized that a soil sample represents one distinct portion of a site at the time it is collected, and that the findings of this document are based on conditions as they existed during the period of the investigation. The material in the document reflects our opinions using the information available at the time the document was written. The soil and groundwater conditions between and beyond the boreholes or monitoring wells may differ from those encountered at those locations. Should subsurface conditions arise that are different from those noted herein, MTE should be notified to determine whether or not changes should be made as a result of these conditions.

All of which is respectfully submitted,

## MTE Consultants Inc.



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