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February 3, 2023

File: 101873.001

DS Studio
95 Pelham Avenue
Toronto, Ontario
M6N 1A5

Attention: Leila Emmrys

Re: Grading and Landscaping Plan Review
Proposed Building Addition
100 Terence Matthews Crescent
Ottawa, Ontario

MOLLY SMITH
PLANNER II
PLANNING, REAL ESTATE & ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

APPROVED
By Molly Smith at 3:20 pm, Apr 21, 2023

INTRODUCTION

As requested, this letter provides a grading plan review for the proposed building addition to be located at 100 Terence Matthews Crescent in the City of Ottawa, Ontario.

BACKROUND

GEMTEC Consulting Engineers and Scientists Limited's (GEMTEC's) carried out a geotechnical investigation for the proposed addition. The results of that investigation are provided in our report titled, "Geotechnical Investigation, Proposed Addition, 100 Terence Matthews Crescent, Ottawa, Ontario" dated October 20, 2022 (report number 101873.001).

GEMTEC has been requested to review the plans and details for the development, from a geotechnical perspective, regarding the proposed grade raise fill and tree planting considerations with the recommendations provided in our report. The plans for the proposed addition were provided in the following drawings:

- Drawing No. C101, prepared by McIntosh Perry titled "Site Grading, Drainage, Erosion and Sediment Control Plan", Revision Number 1, dated October 7, 2022; and,
- Drawing No. L1, prepared by GJA Inc. titled "Landscape Plan", Revision Number 3, dated January 6, 2023.

DISCUSSION

Grade Raise Fill

GEMTEC has reviewed the plan titled 'Site Grading, Drainage, Erosion and Sediment Control Plan', in terms of the proposed grade raise fill that will be imported to the site for grading purposes. The intention of the review is to assess the potential for settlement of structures which could occur due to the proposed elevation of grade raise filling above existing ground surface.

The site is underlain by deposits of sensitive silty clay, which have a limited capacity to support loads imposed by grade raise fill material and foundations for the building. The placement of fill material must therefore be carefully controlled so that the stress imposed by the fill material does not result in excessive consolidation of the grey silty clay deposit. The settlement response of the silty clay deposit due to the increase in stress caused by fill material and groundwater lowering is influenced by variables such as the existing effective overburden pressure, the past pre-consolidation pressure for the silty clay, the compressibility characteristics of the silty clay, and the presence or absence of drainage paths, etc. It is well established that the settlement response of silty clay deposits can be significant when the stress increase is above or near the difference between the preconsolidation pressure (P_c) and the existing overburden stress (σ_{vo}').

Based on the results of our previous investigation, the maximum thickness of any grade raise filling should be limited to at most 0.6 metres above original ground surface (i.e., the surface of the native soil, which is below the existing grade). The moist unit weight of the fill material that is used in the vicinity of the structures should be less than 20 kilonewtons per cubic metre after placement and compaction.

Based on a review of the above mentioned drawings, the final finished grades are generally below the maximum allowable, with the exception of the southeast corner of the proposed addition, which has a proposed grade raise of 0.61 metres. This is considered acceptable from a geotechnical point of view since the grade raise exceedance is minor (i.e., 0.01 metres).

Frost Protection for Foundations

All exterior footings should be provided with at least 1.5 metres of earth cover for frost protection purposes. Isolated (unheated) footings that are located in areas that are to be cleared of snow should be provided with at least 1.8 metres of earth cover for frost protection purposes.

The proposed addition is provided with 1.49 metres of earth cover for frost protection. This is less than the minimum requirement of earth cover for frost protection (1.50 metres), however, this is considered acceptable from a geotechnical point of view.

Tree Planting

GEMTEC has reviewed the plan titled ‘Landscape Plan’, which details the proposed tree planting at the site. The intention of the review is to assess the potential for settlement of the foundation that could occur due to water depletion from the deciduous trees adjacent to the proposed addition.

As indicated in our geotechnical report, the site is underlain by silty clay, a material which is known to be susceptible to shrinkage with a change/reduction in moisture content. Research by the Institute for Research in Construction (formerly the Division of Building Research) of the National Research Council of Canada has shown that deciduous trees can cause a reduction of moisture content in the silty clays in the Ottawa area, which can result in significant settlement/damage to nearby buildings supported on shallow foundations.

It is understood that the City of Ottawa Tree Planting Guidelines were created for trees planted within City owned property along new streets within proposed developments, and not for private property. However, it is still a useful guideline for planting trees in silty clay soils adjacent to building foundations.

To minimize the potential for settlement of the foundations, no deciduous trees should be planted closer to any portion of the structure than the ultimate height of the trees. For multiple trees grouped together, this zone should be increased to 1.5 times the trees’ height.

Based on a review of the drawings provided, several deciduous trees are proposed to be planted at the site. GEMTEC is unable to verify the ultimate height of these trees as it is outside of our area of expertise.

Alternatively, according to the City of Ottawa 2017 Tree Planting Guidelines, the tree to foundation setbacks at the site can be reduced to 4.5 metres for small to medium sized trees (i.e., trees with a mature height of less than 14 metres) provided that all the guidelines are met on planting trees near foundations provided in the City of Ottawa Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines.

It should be noted that if trees are planted closer to the foundation than the ultimate height of the tree, there is a risk that settlement and/or distress of the foundations may occur.

CLOSURE

We trust this memorandum provides sufficient information for your present purposes. If you have any questions concerning this information, please do not hesitate to contact our office.

Pat Baxter
Technologist

Alex Meacoe, P.Eng.
Senior Engineer

PB/WAM

Enclosures
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ATTACHMENTS

Soils Review Chart
100 Terence Matthews Crescent

Location	Original Ground Surface (metres)	Proposed Grade at Front (metres)	Proposed USF Grade (metres)	Grade Raise or Cut over Original Ground Surface (metres)	Earth Cover over Footings (metres)	Grade Raise Within Permissible? 0.6 metres
Northwest Corner	101.56	101.69	100.20	0.13	1.49	Yes
Northeast Corner	101.77	101.69	100.20	-0.08	1.49	Yes
East Wall	101.54	101.69	100.20	0.15	1.49	Yes
Southeast Corner	101.08	101.69	100.20	0.61	1.49	No
Southwest Corner	101.13	101.69	100.20	0.56	1.49	Yes
West Wall	101.30	101.69	100.20	0.39	1.49	Yes