patersongroup memorandum

consulting engineers

re: **Geotechnical Review Comments**
Proposed Athletic Recreation Complex
Algonquin College - Woodroffe Campus - Ottawa

to: Colliers Project Leaders - **Mr. Philip Belanger** - philip.belanger@colliersprojectleaders.com

date: September 16, 2019

file: PG4624-MEMO.02

Further to your request and authorization, Paterson Group (Paterson) prepared a follow up commentary based on a geotechnical review of test pits excavated at the subject site to assess subsurface conditions.

Groundwater

In the geotechnical report, Paterson stated the following:

"Based on these observations, the long-term groundwater level is anticipated at a **4 to 5 m depth**."

Based on the observations on September 11, 2019, the above long term groundwater levels were confirmed. Glacial till was encountered at a depth of approximately 4.5 m at this location. Therefore, a water suppression system will not be required. Paterson suggests the following:

- ❏ During the excavation program, groundwater can be easily managed with conventional pumping.
- ❏ Footings can be poured directly on the native soil which is directly or indirectly on the glacial till deposit.
- ❏ A perimeter drainage system can handle water infiltration adjacent to foundation walls. Therefore, one or two inlet points along the footing will suffice to direct infiltration water to the sump pit in the basement area or to a storm sewer outlet based on gravity flow.
- ❏ An underfloor drainage system will be required below the basement floor to manage groundwater. It's expected that a spacing of 9 m will be acceptable.
- ❏ A composite drainage layer will be required for the exterior vertical face of the foundation walls for the partial basement area.

Fill Areas Below the Proposed Founding Elevation

For the western portion of the site, there is an existing fill layer that extends to depths up to 3.5 to 4 m below the existing grade. The fill consists of a silty clay material most likely from site sources from previous developments. The fill material is relatively compact and behaved similar to the native silty clay at depth. The following options are available for constructing in the fill areas:

Option A – Extend Footings to the Native Soil

Extending the footings to the native soil is a significant undertaking. Although this is an option, it's considered unfeasible and will most likely not be undertaken.

Option B – Lean Concrete Filled Trenches

Option B consists of excavating for foundations using a conventional approach. If native soil is not encountered, deepen the excavation trench vertically for strip and pad footings (approximately the same dimensions of the footings) and fill the open trench with lean concrete. Please footing on the concrete filled trench at the proposed founding elevation. Although this is a viable option, there will be a cost associated with filling with lean concrete. The advantage is that most of the existing fill can remain in place and settlements will be similar to placing footings on native material.

Option C – Remove 600 mm of Fill below the Proposed Footings and Fill with OPSS Granular B Type II

Similar to Option B, the fill material, when encountered, will be subexcavated to a depth of at least 600 mm below the proposed founding elevation and approximately 600 mm beyond the exterior sides of the footings. The subexcavated area can be backfilled with OPSS Granular B Type II, placed in 300 mm lifts and compacted to 98% of the material's standard Proctor maximum dry density. This should be the least costly option. However, due to the fill layer remaining below the engineered fill, the area may be subjects to slightly increased settlements (estimated 35 mm total and 25 mm differential).

Bearing Resistance Values (Basement)

For the basement portion of the building within the eastern portion of the development, it's expected that the depth of the foundation will be approximately 5.3 m below the existing grade. The proposed foundation will encounter the dense glacial till deposit at depths ranging from 4.5 to 6 m below the existing grade. Footings can be founded directly or indirectly (lean concrete filled trenches extending to the glacial till deposit) using the following design criteria:

- ❏ Footings placed on the glacial till deposit or concrete filled trenches extending to the dense glacial till depopsit can be designed using the bearing resistance value at serviceability limit states (SLS) of **250 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **400 kPa**.

- ❏ An undisturbed soil bearing surface consists of a surface from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, wether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

- ❏ The above noted bearing resistance value at SLS will be subjected to total and differential settlements of 25 and 20 mm, respectively.

We trust that this information satisfies your requirements.

Best Regards,

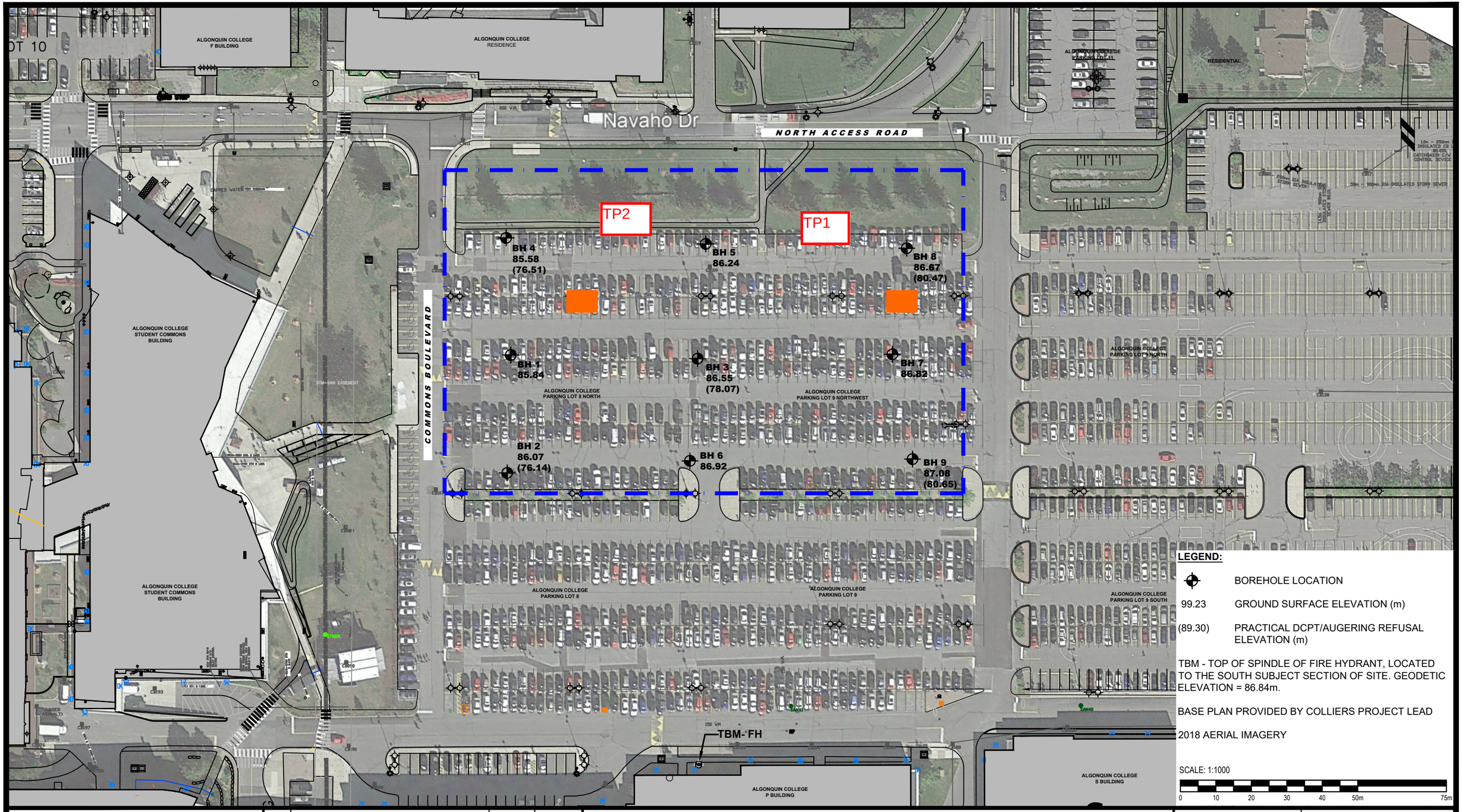
Paterson Group Inc.

Carlos P. Da Silva, P.Eng., ing., QP_{ESA}

TP1 - Excavated to approximately 5 m below the existing grade. Minor water infiltration during the excavation program.

Groundwater observed after 30 minutes in TP1 at a depth of approximately 4.2 m.

TP-2 - Silty clay fill is relatively compact and similar to native soil. Native silty clay deposit encountered at approximately 3.2 m depth.



LEGEND:

⌖	BOREHOLE LOCATION
99.23	GROUND SURFACE ELEVATION (m)
(89.30)	PRACTICAL DCPT/AUGERING REFUSAL ELEVATION (m)

TBM - TOP OF SPINDLE OF FIRE HYDRANT, LOCATED TO THE SOUTH SUBJECT SECTION OF SITE. GEODETIC ELEVATION = 86.84m.

BASE PLAN PROVIDED BY COLLIERS PROJECT LEAD

2018 AERIAL IMAGERY

SCALE: 1:1000

0 10 20 30 40 50m 75m

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NO.	REVISIONS	DATE	INITIAL
1	GROUND SURFACE ELEVATIONS CONVERTED TO GEODETIC	05/31/2019	FA

COLLIERS PROJECT LEADERS

GEOTECHNICAL INVESTIGATION - PROPOSED ATHLETIC RECREATION COMPLEX (ARC)
ALGONQUIN COLLEGE - WOODROFFE AVENUE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1000	Date: 09/2018
Drawn by: RCG	Report No.: PG4624-1
Checked by: RG	Dwg. No.: PG4624-1
Approved by: DJG	Revision No.: 1

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