NORTHEAST
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November 5, 2013

Project No. H133.00

Ms. Tara Calabrese, AICP
Vice President
Barry S. Porter & Associates
400 Franklin Street
Suite 202
Braintree, MA 02184

SUBJECT: Geotechnical Report Review
Proposed Blackstone Valley Preparatory School
Cumberland, RI

Dear Tara:

Pursuant to our proposal to you dated November 1, 2013, Northeast Geotechnical, Inc. has reviewed the Geotechnical Design Basis Report (GDBR) prepared by Pare Corporation (Pare) of Foxboro, MA for Civic Builders for the proposed Blackstone Valley Preparatory School in Cumberland, RI dated August 2013. We understand that the City of Cumberland, RI has requested this review.

Our review was limited to the GDBR, an Alta Survey plan, an Existing Conditions and Demolition Plan and a Site Plan as provided by Barry S. Porter & Associates. We did not review the samples collected from the test borings referenced in the GDBR nor did we visit the site.

BACKGROUND

The GDBR indicates that the proposed school building site is located at 52 Broad Street in Cumberland, RI between Titus Street to the north and Lusitana Avenue to the south. The 1.3± acre site is currently developed with existing paved tennis courts, basketball court, and street hockey rink. Grass and tree covered landscaped areas also exist.

The GDBR also indicates that the proposed school building will be 2- to 3-stories tall with no basement covering a footprint area of about 18,450 square feet. The finish ground floor level of the proposed building is reported to be at Elevation 76.5 with an elevator pit in the northwest portion of the building established at Elevation 67.5. The existing grading within the proposed building is reportedly between about Elevation 73.5± and Elevation 76.5±.

SUMMARY OF GENERAL SUBSURFACE CONDITIONS

The subsurface conditions at the site were reportedly explored by advancing 14 test borings in July of 2013 to depths of about 6± to 25± feet below existing ground surface where bedrock or "refusal" conditions were encountered as described in the GDBR. Standard penetration testing and limited rock coring are indicated to have been performed as part of the test boring program.

The general subsurface profile was reported to consist of up to about 8.5± feet of existing granular fill overlying up to about 9± feet of naturally deposited glacial outwash sand overlying up to about 9± feet of naturally deposited ground moraine of glacial origin.

Bedrock reportedly consisting of mudstone and sandstone was typically encountered below the soil deposits described above at depths of about 2± to 18± feet below existing ground surface. Up to about 5± feet of the upper zone of the bedrock is described to be weathered.

Groundwater was indicated in 3 of the test borings at depths of about 10± to 15± feet below existing ground surface at the time the borings were performed.

IMPLICATIONS OF SUBSURFACE CONDITIONS

We generally agree with Section 5.0 of the GDBR addressing the implications of the subsurface conditions on the proposed construction. We have a few comments however as follows:

- We agree that the existing on-site soils may be reusable as compacted fill in the proposed building and pavement areas. However, we would add that reuse depends on the moisture content of the soil during construction and the ability of the contractor to maintain the soil at a suitable moisture content to allow proper placement and compaction. The reusable on-site soils should also be free of foreign or organic matter. Oversize cobbles and boulders may also need to be screened from the material prior to re-use. In general, the maximum particle size in the fill should not exceed 2/3 the loose lift thickness.

- We generally agree that groundwater should not have a major impact on construction but we caution that this depends on weather conditions around the time of and during the time of construction and also on the planned depths of excavation. We do not know if deep utility excavations may be planned in addition to the elevator pit. Depending on the depth of excavations and the time of year construction takes place, dewatering could be required and should be planned for.

- Shallow bedrock was not mentioned, but this could have an impact on planned excavations throughout the site including foundations, elevator pits, utilities, etc. Some of the bedrock may be weathered and therefore may be excavatable with conventional hydraulic excavators.

  Hydraulic hammering (hoe-ramming) should be considered first to break up rock that otherwise cannot be excavated with conventional earthwork equipment, given the developed nature of the area surrounding the site. Blasting the rock should be a last resort to avoid the potential negative effects of blast vibration, noise and fly-rock on adjacent structures. Any blasting that is performed on the site should be done so in accordance with all applicable

federal, state and local requirements. Blast vibration monitoring should also be performed during construction.

CONCLUSIONS AND RECOMMENDATIONS

We generally agree with the conclusions and recommendations outlined in the GDBR except as noted above regarding reuse of on-site soils and dewatering and as follows:

- There appears to us to be some conflicting terminology regarding the treatment of the existing fill within the proposed building area. Section 6.1 and 8.2 of the GDBR indicates all of the existing fill should be excavated and replaced with compacted materials within the influence zone of the building footprint. Section 6.1.1 indicates that footings can bear on "improved on-site fill", but this is not defined in the report. Section 6.2 indicates that a combination of "excavate and replace" and "proof compaction" be performed to improve/address the existing fill within the influence zone of the building, but "proof compaction" is not defined. We recommend that Pare clarify how the existing fill should be treated for foundation and slab support.

- The GDBR indicates the use of crushed stone below footings and slabs in wet areas but the stone size is not indicated. We recommend ¾ inch crushed stone be used.

- Bedrock excavation depths are not indicated. We recommend rock be removed to at least 12 inches below the bottom of slabs and footings and be replaced with compacted ¾ inch crushed stone.

- A soil unit weight of 125 pcf is recommended in the GDBR for lateral earth pressure development on retaining walls. We recommend this be increased to 135 pcf. Treatment of existing fill, allowable bearing capacity, rock removal depths, etc. should be addressed for retaining walls.

- The M1.03.0 and M2.01.3 material designations in Section 6.9 of the GDBR appear to be MassDOT designations and not RIDOT Specifications. Should the M.04 designation regarding asphalt pavement be M.03? Pare should confirm the correct designations.

- The GDBR indicates the on-site soils are not anticipated to be prone to disturbance by construction equipment. This may be true during dry weather construction, but if the soils are exposed to enough rain/snow melt, they could become susceptible to disturbance and will need to be protected accordingly.

- The GDBR describes proof-rolling exposed subgrades in a number of sections. We recommend adding that areas observed to be weak or unstable during proofrolling should be excavated and replaced with suitable compacted sand gravel fill.

- Section 7.1 of the GDBR describes site preparation of the building area. Excavation and replacement of the existing fill should be included in this section.

- Porous pavements and porous concrete sidewalks are shown on the project site plans but were not specifically addressed in the GDBR. Pare should confirm that the pavement

recommendations given in the GDBR are applicable to porous pavements and concrete or provide additional recommendations to protect against water build-up underneath these areas, to protect against frost heave/thaw damage and to protect against water infiltrating underneath the proposed building.

We note that the maintenance and performance of porous pavements/concrete can be problematic due to sanding/salting, snow plowing and other winter-related activities and conditions.

Thank you very much for the opportunity to assist you with this phase of the project. Please contact us at 508-598-3510 if you have any questions or if we can be of further assistance.

Sincerely,

NORTHEAST GEOTECHNICAL, INC.

James M. Handanyan, P.E.
Principal Engineer

Glenn A. Olson, P.E.
Principal Engineer