October 19, 2017

Loudoun County
Dept. of Transportation and Capital Infrastructure
209 Gibson Street
Leesburg, Virginia 20176

Attention: Ms. Sandy Hunter, AIA, LEED AP
Design Manager

Reference: Addendum No. 1 to Subsurface Exploration and Geotechnical Evaluation
LOVETTSCVILLE COMMUNITY CENTER RENOVATION
57 East Broad Way, Lovettsville, Virginia
Specialized Engineering Project No. 146110

Dear Ms. Hunter:

Specialized Engineering performed a subsurface exploration and geotechnical evaluation for the proposed Lovettsville Community Center Renovation project in Lovettsville, Loudoun County, Virginia in 2014 (Specialized Engineering Project No. 146110 dated May 26, 2014). At the time our report was prepared, the design of the stormwater management (SWM) facility consisted of a generalized location of a proposed detention facility (dry pond) with no additional details about the design of the pond at that time. However, soil borings were drilled in the general area of the proposed SWM facility. We understand the design of the stormwater management facilities has been finalized and we have been provided a copy of the civil plans for the project, dated August 25, 2017, prepared by Timmons Group. This addendum has been prepared to address the design and construction of SWM facility and should be considered as an integral part of our geotechnical report.

I- PROJECT DESCRIPTION

The proposed stormwater management pond is located in the northwest corner of the property. The basin is L shaped, with dimensions of approximately 240 feet by 175 feet, with the long axis parallel to the northwest border of the property and the short axis parallel to the northeast border of the property. The bottom of the proposed basin is at El. 482.14 feet and the top of the embankment is at El. 489.50 feet. The existing surface grades in the area of the proposed SWM pond vary from a high of El. 493 feet in the southwest area of the pond to a low of El. 488 feet in the northwest corner of the pond. Based on the proposed grading plan cuts of up to about 6 feet will be required to excavate the basin area and shallow fills of up to about 1.5 feet will be required for the embankment. The outlet structure will include a 48 inch RCP riser connected to a 24 inch RCP outfall pipe. The invert of the riser will be at El. 482.14 feet with the top of the
riser at El. 486.40 feet. The riser will have a 2.5-inch diameter, 30 hour drawdown, orifice with an invert of El. 482.14 and a 10-year weir at El. 485.60 feet. The riser will be supported on a concrete base extending 3 feet below the bottom of the basin.

II- SUBSOIL CONDITIONS

Two test Borings, B-11 and B-12, we drilled within the footprint of the proposed SWM pond and were extended to refusal depths of 6.5 feet and 9.1 feet below existing grades, respectively, corresponding refusal elevations El. 482.5 feet and El. 481.9 feet. Approximately 2 inches of topsoil was encountered at the boring locations. Fill or possible fill was encountered at the two boring locations and extended to depths of 2.5 feet to 5 feet below existing grades. Below the topsoil, two (2) natural soil/rock strata representative of the underlying geologic formation were encountered in the test borings. The fill and two (2) natural soil/rock strata are briefly described hereunder:

MAN-PLACED FILL

As stated above, possible fill materials were encountered below topsoil and extended to depths ranging from 2.5 feet to 5 feet below existing grades. The fill at these locations consisted of orangish brown sandy silts with rock fragments. The standard penetration test (SPT) “N” values within the fill materials ranged from 5 blows per foot (bpf) to 26 bpf, generally indicating relative densities ranging from loose to medium dense. The fill was classified as undocumented fill due to the absence of placement records.

STRATUM I – RESIDUAL SOILS

Stratum I was encountered below the fill in two test borings drilled and extended to refusal depths ranging from 6.5 feet to 9.1 feet below existing grades. The residual soils of this stratum generally consist of light brown silty sands and sandy silts and gravelly sand (USCS Designations: ML and SP) with rock fragments. The Standard Penetration test (SPT) “N” values within the soils of Stratum I ranged from 5 bpf to 26 bpf, generally indicating relative densities ranging from loose to medium dense.

STRATUM II – WEATHERED ROCK

Spoon and/or auger refusal, which generally defines rock/bedrock, was encountered in the two (2) borings at depths ranging from 6.5 feet to 9.1 feet below the existing ground surface grades, corresponding to elevations El. 482.5 feet and El. 481.9 feet.

The description of subsurface conditions presented above is of a generalized nature, provided to highlight the major soil strata encountered. The test boring logs included in the original report should be reviewed for specific information regarding the individual test locations. The stratification lines shown on the test boring logs represent the conditions only at the actual test locations. Variations may occur and should be
expected between test locations. The stratification lines represent the approximate boundary between subsurface materials and the actual transition may be gradual.

GROUNDWATER CONDITIONS

Groundwater was not encountered during the drilling operations in any of the two (2) test borings drilled. Due to safety concerns, the test borings were backfilled immediately upon completion of drilling and accordingly the 24-hour groundwater level readings were not obtained.

The groundwater observations presented in this report were recorded at the time of our field activities. Fluctuation in groundwater levels should be anticipated. We recommend that the Contractor determine the actual groundwater levels at the time of construction to determine groundwater impact on the proposed construction procedure.

III- GEOTECHNICAL EVALUATION

The data developed during this study indicate that the subsoil and groundwater conditions are generally adaptable for the proposed stormwater management facility provided the recommendations presented hereafter are followed.

The proposed elevation of basin is El. 482.14 feet while rock was encountered in the borings at El. 482.5 feet and 481.9 feet. Therefore, rock excavation is not anticipated unless rock is encountered at a higher elevation at other parts of the site, which we believe is not likely. Accordingly, excavations during the excavation of the pond can generally be achieved with conventional earth-moving equipment (dozers, pans and hoes) to the anticipated excavation depths. However, ripping and/or hoe-ramming of weathered rock may be required if rock is encountered at isolated locations in the pond area.

Encountering groundwater is not anticipated during the construction of SWM pond. However, perched water maybe anticipated at different elevations during excavations, especially if the work is performed during wetter months or following prolonged periods of heavy precipitation. It is our opinion that conventional dewatering measures such as diversion ditches, interceptor drains and sump

The data developed during this study indicate that the subsoil, rock and groundwater conditions are generally suitable for the construction of stormwater management pond provided that the facilities are designed and constructed in accordance with Chapter 5: “Water Resource Management” of Loudoun County FSM and the most currently adopted “Virginia Stormwater Management Handbook”.

The soils of Stratum I and Stratum II, except layers of soils with LL>40 and PI>20, may be suitable for use in engineered fills, subject to moisture adjustment and approval of the Geotechnical Engineer of Record.
IV- RECOMMENDATIONS

A stormwater management pond (BMP facility) has been recently designed by Timmons Group. The design drawings indicates that the principal spillway consists of a single, 36-foot long, 24-inch diameter, reinforced concrete pipe that conforms to ASTM C-361 specifications. The dam embankment is planned with 3H: 1V slopes. The pertinent pond and water surface elevations (W.S.E) are as follows:

<table>
<thead>
<tr>
<th>Pond Basin</th>
<th>482.14 feet, Mean Sea Level (MSL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Dam Embankment</td>
<td>489.50 feet, MSL</td>
</tr>
<tr>
<td>2-Year W.S.E.</td>
<td>485.25 feet, MSL</td>
</tr>
<tr>
<td>10-Year W.S.E.</td>
<td>486.34 feet, MSL</td>
</tr>
<tr>
<td>100-Year W.S.E.</td>
<td>487.43 feet, MSL</td>
</tr>
</tbody>
</table>

If any of the noted information is incorrect or has changed, please inform Specialized Engineering so that we may review the geotechnical data and amend the recommendations presented in this report, if deemed appropriate.

SITE PREPARATION

The site preparation and placement of fill should be in accordance with Section 5.1 SITE PREPARATION AND EARTHWORK of the geotechnical report. It should be noted that possible fill materials were encountered below the topsoil and extended to depths ranging from 2.5 feet to 5 feet below existing grades at the two test boring locations drilled in the area of the SWM pond. Deeper fill may exist at other areas of the site. It may be necessary to remove any soft/loose soils, wherever encountered in the SWM pond embankment. If soft/loose soils are found, the area should be undercut to a suitable undisturbed subgrade as recommended by the geotechnical engineer and replaced with controlled in accordance with Section 5.1 of the geotechnical report.

RISER STRUCTURE

Supporting the shallow foundations of the riser structure on controlled structural fill or the residual soils are considered adequate for the support of the riser structure. The footings may be sized and designed on the basis of allowable bearing pressures not exceeding 2,500 psf. The geotechnical engineer should observe and approve the soil conditions at the bottom of the footing excavations (subgrade) for suitable bearing.

The depth of the footing subgrade should be at least 2.5 feet below the adjacent exterior finished grade for protection against frost heave.

Because of possible variations in subsurface conditions and related bearing capacity, the excavation for the riser structure foundation should be observed and approved by the geotechnical engineer. Water, and possibly some loose soil, may collect in the excavation as a result of surface precipitation and near ground surface seepage. Therefore:
Water, loose soil and soil softened by water should be removed from the bottom of the foundation excavations before placing concrete.

Excavations the riser structure foundation should not be left open for long periods. If the concrete cannot be placed due to inclement weather conditions or any other unforeseen circumstances, then the bottom of the foundation excavations should be protected by undercutting 3 inches and placing a 3-inch thick lean-mix concrete work mat immediately upon approval and before reinforcing steel is placed.

Backfill around and above the foundation should satisfy the controlled fill requirements described in the previous section 5.1 ‘Site Preparation’.

**Principal Spillway**

As stated before, the plans indicate that the principal spillway consists of a single, 36-foot long, 24-inch diameter reinforced concrete low-head pressure pipe that conforms to ASTM C-361 specification. In addition, the pipe sections will be connected with watertight gasketed joints. To minimize the potential for excess seepage along the exterior of the outlet pipe, we recommend that a concrete cradle be placed below the pipe from the riser pipe to a distance of two-thirds of its total length. The cradle should be at least 12 inches thick, with the pipe embedded into the cradle a depth of 0.5 times the pipe diameter. The cradle should be placed directly on top of undisturbed natural soils and should extend up to a level equal to or above the spring line of the pipe. The last one-third of the outlet pipe should be constructed with a 12-inch gravel drainage layer and 12-inch filter layer surrounding the pipe on all sides. The gravel drainage layer should meet the requirements of VDOT Designation No. 7 (ASTM C-33) coarse aggregate, and the filter layer should meet the requirements of VDOT fine aggregate grading “A” sand (ASTM C-33 fine concrete aggregate). The gravel filter should be wrapped around with a non-woven geotextile (AOS #70), to reduce the possibility of fine particle infiltration into the gravel filter.

To minimize seepage through the embankment, two antiseep collars 5.5 feet by 5.5 should be placed around the principal spillway.

**Embankment Slopes**

The embankment slopes of 3H: 1V as shown on the site plans can be maintained provided that the material used to construct the embankment and the placement method (Compaction) are in accordance with Section 5.1 SITE PREPARATION AND EARTHWORK of the geotechnical report.
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Lovettsville, VA

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This addendum has been prepared to address the design and construction of SWM facility and should be considered as an integral part of our geotechnical report. If you have any questions concerning this addendum or require additional assistance on the project, please do not hesitate to contact us.

Respectfully submitted,
Specialized Engineering

[Signature]
Ira L. Helms, PG, PE
Principal

[Stamp]
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Principal

Specialized Engineering
An Employee-Owned Company