Subsurface Exploration & GeotechnicalEvaluation
Lovettsville Community Center Renovation
Lovettsville, VA
Specialized Engineering Project No. 146110

Prepared for:
Loudoun County
Dept of Transportation & Capital Infrastructure
209 Gibson St
Leesburg, VA 20176

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May 26, 2014
May 26, 2014

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

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

Reference:  
Subsurface Exploration and Geotechnical Evaluation  
Engineering Services Contract QQ-01683  
LOVETTSVILLE COMMUNITY CENTER RENOVATION  
57 East Broad Way, Lovettsville, Virginia  
Specialized Engineering Project No. 146110

Dear Ms. Hunter:

**Specialized Engineering** is pleased to submit our final report concerning the subsurface exploration and geotechnical evaluation for the proposed Lovettsville Community Center Renovation project in Lovettsville, Loudoun County, Virginia.

The report explains the exploration procedures, describes the general site and subsurface conditions, and presents evaluations and recommendations relevant to geotechnical considerations for the project. If project characteristics presented in this report are changed, this office should be notified so that the design recommendations may be reviewed and revised, as necessary.

If you have any questions concerning this report or require additional assistance on the project, please do not hesitate to contact us.

Respectfully submitted,

**Specialized Engineering**

[Signature]

Ira L. Helms, PG, PE  
Geotechnical Engineer

Al Nouri, PhD, PE  
Principal
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1.0 EXECUTIVE SUMMARY

Specialized Engineering has completed the subsurface exploration and geotechnical evaluation of the PROPOSED LOVETTSVILLE COMMUNITY CENTER RENOVATION project located in the Lovettsville, Loudoun County, Virginia. The subsurface exploration consisted of drilling a total of twelve (12) test borings across the site, designated, B-1 through B-12, which extended to depths ranging from 6.5 feet to 20 feet below existing site grades. Spoon and/or auger refusal was encountered in six (6) of the twelve (12) borings at depths ranging from 6.5 feet to 18 feet below the existing ground surface grades.

This geotechnical exploration was performed in general accordance with the “Detailed Soil/Site Investigation” of the “Facilities Standard Manual” of Loudoun County.

The data developed during this study indicate that the subsoil and groundwater conditions at the site are generally adaptable for the proposed park development provided the recommendations in the report are followed.

Shallow foundations (continuous and spread footings) are considered adequate for the support of the proposed Community Center replacement building. The footings should be supported on the suitable-bearing natural soils, except moderately to highly plastic soils, or on controlled structural fill placed on suitable natural soils.

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

Excavations during the development of the site can generally be achieved with conventional earth-moving equipment (dozers, pans and hoes) to the anticipated shallow excavation depths. However, ripping and/or hoe-ramming of weathered but dense rock may be required in localized areas where equipment refusal was encountered at shallow depths.

Encountering groundwater is not anticipated during the development of this site. However, perched water should be anticipated at different elevations during foundation excavations and installation of underground utilities, 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 pumps should be adequate.

Recommendations relative to earthwork and the design and construction of foundations, pavements and SWM facilities are presented in the report.

The owner/designer should not rely solely upon the executive summary and must read
and evaluate the entire contents of this report, prior to utilizing our engineering recommendations in the preparation of design and construction documents.
2.0 PROJECT INFORMATION

2.1 AUTHORIZATION

This subsurface exploration and geotechnical evaluation for PROPOSED LOVETTSLVILLE COMMUNITY CENTER RENOVATION projects located in the Lovettsville, Virginia, project was planned and performed in accordance with the scope of services outlined in our proposal No. B14-10372 dated March 4, 2014. Ms. Sandy Hunter, AIA, Design Manager at Loudoun County authorized the work.

2.2 PROJECT DESCRIPTION

We understand that Loudoun County is planning to renovate the Lovettsville Community Center. We have reviewed a proposed site plan prepared by LSY and Timmons Group. We understand the renovation project consists of replacing the existing building with a new one, add new paved parking areas and construct a SWM pond. The proposed new community center building is L-shaped with a footprint area of approximately 14,670 SF and finished floor elevation of 513.00 feet.

Since the project is in the early stages of planning, details relative to the structural concept of the proposed building are not available at this time. Structural loads were not provided to us; however, based on past experience, we anticipate the building will be supported on individual columns and bearing wall footings with loads of up to approximately 160 kips and 4.0 kips per linear foot, respectively.

The proposed SWM pond will be approximately 200 feet long and 60 feet wide. It will likely be a detention (Dry) pond; however, final decision has not been made.

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 appropriate.

2.3 PURPOSE AND SCOPE OF WORK

The scope of services for this study included a site reconnaissance of the project area and the determination of subsurface conditions through field exploration and laboratory testing. The study included an evaluation of the site and subsurface conditions relative to the proposed construction and the preparation of a report of findings. The subsurface exploration was developed to address the following:

- Develop data relative to subsurface soil, rock and groundwater conditions to relevant depths at various locations across the site.

- An evaluation of the data as it relates to the proposed site development.
• Address problem areas, if any, with special reference to seasonal high water table conditions, shallow rock and the presence of highly plastic soils susceptible to shrinkage and swelling associated with changes in the natural moisture contents of these soils.

• Provide an evaluation of the suitability of on-site materials for use as controlled structural fill in building pad and pavement areas. Provide recommendations for site preparation, including placement and compaction of fill soils.

• Provide an assessment of the suitability of in-situ soil formations for providing adequate support of building foundations and pavements.

• Provide geotechnical recommendations related to support the design and construction of the building foundations.

• Provide geotechnical recommendations related to support the design and construction of the SWM facility.

• Provide geotechnical recommendations related to support the design and construction of the proposed parking areas including estimates of CBR values.

• Provide IBC 2009 soil site classification and site seismic response coefficients $S_s$ and $S_1$.

• Comments and recommendations relating to other observed geotechnical conditions, which could impact development.

The scope of our services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of our client. Specialized Engineering did not provide any service to investigate or detect the presence of mold, moisture as related to mold or other biological contaminates in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. As such, Specialized Engineering cannot and shall not be held responsible for the occurrence or recurrence of mold amplification.

2.4 SUBSURFACE EXPLORATION

The subsurface exploration consisted of drilling a total of twelve (12) test borings across the site, designated B-1 through B-12, which extended to depths ranging from 6.5 feet to 20 feet below existing site grades. The test borings were drilled on the site by either track-mounted GeoProbe or truck-mounted CME 45C drill rigs utilizing 2-1/4" I.D. continuous flight hollow-stem augers at the locations shown on the Boring Plan.
extended to the planned depths or to spoon/ auger refusal depths. Spoon and/or auger refusal was encountered in six (6) of the twelve (12) borings at depths ranging from 6.5 feet to 20 feet below the existing ground surface grades. The depths of individual test borings are indicated on the boring logs in the appendices of this report.

Specialized Engineering established the boring locations in the field utilizing measuring tape and existing site features. Ground surface elevations were interpolated from the provided project site plan. The locations and elevations of the soil test borings, therefore, should be deemed accurate to the degree implied by the method used.

Drilling of the test borings and the associated soil sampling were conducted in accordance with the procedures generally recognized and accepted as standard methods of exploration of subsurface conditions related to earthwork and foundation engineering projects. Representative soil samples were obtained by employing split-spoon sampling procedures in general accordance with ASTM D1586 test method. Soil samples obtained from the borings were identified according to boring number and depths, and a representative portion of each sample was sealed in a moisture-tight glass jar to protect against moisture loss. The soil samples from the test borings were subsequently transported to the Specialized Engineering laboratory for visual classification and further evaluation.

The location of the site and the locations of the individual test borings are shown on the Vicinity Map and Test Boring Location Plans provided in APPENDIX A. The findings of the Specialized Engineering test borings are presented on the Test Boring Logs included in APPENDIX B.

2.6 LABORATORY TESTING

Our geotechnical engineer visually classified the soil samples in the laboratory in general accordance with ASTM D 2488. Tests for natural moisture content (ASTM D 2216), Atterberg limits (ASTM D 4318), and percent finer than No. 200 sieve (ASTM D 1140) were conducted on representative jar samples. The laboratory test results are presented in APPENDIX C.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 SITE LOCATION AND DESCRIPTION

The Lovettsville site is located at the northeast section of the intersection of Lovettsville Road and East Broad Way in Lovettsville, Loudoun County, Virginia. The site is approximately 6.5 acres surrounded by gently sloping hills and farm land. The site is generally slopes northwards with a maximum relief on the order of 27 feet.

The site is developed with a community center building surrounded by paved parking areas, a swimming pool and baseball field. An aerial photo of the site is included in
APPENDIX A.

3.2 AREA GEOLOGY

According to the Geologic Map of Loudoun County Virginia (2006), the subject site is located within the Blue Ridge Physiographic Province; specifically within the Mesoproterozoic aged basement rocks that form the core of the Blue Ridge anticlinorium.

Specifically, the eastern half of the site is underlain by biotite granite Gneiss and the western half of the site is underlain by a garnetiferous leucocratic Metagranite. The rocks typically weather to a variable depth of fine-grained residual soils overlying with a relatively abrupt transition to "decomposed rock" (saprolite) or competent rock.

3.3 MAPPED SOILS

Based upon a review of the Loudoun County Soils Map, the area of the proposed renovations of the Lovettsville Community Center is entirely located within the SMU 23B soils as mapped at the project site.

The Eubank loam (SMU 28B) consists of a very deep, well drained loamy soil on undulating and gently sloping uplands; developed in residuum weathered from mixed gneiss, metadiabase, and other metamorphosed granite rocks. These soils are classified with a good potential (Class I) and are present on the higher elevations at the northeast corner of the site.

A soil map, scale 1: 200, of the proposed site is included in APPENDIX A.

3.4 SUBSOIL CONDITIONS

Approximately 2 to 6 inches of topsoil was encountered at the location of eight (8) of the twelve (12) test borings drilled within the areas of the proposed development at the site. Pavement sections consisting of asphalt course, ranging in thickness from 3 to 5 inches, and a granular base course, ranging in thickness from 2 to 12 inches, was encountered at the four (4) remaining test borings. Fill or possible fill was encountered at six (6) of the twelve (12) boring locations. Below the topsoil or pavement section, 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, fill materials were encountered below the pavement section or topsoil in six (6) of the twelve (12) borings 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 fragment. The standard penetration test (SPT) “N” values within the fill materials ranged from 4 blows per foot (bpf) to 14 bpf, generally indicating relative densities ranging from very loose to medium dense. It should be noted that most of the loose fills were encountered in borings that were located within the open field part of the site. The fill was classified as undocumented fill due to the absence of placement records.

**STRATUM I – RESIDUAL SOILS**

Stratum I was encountered, below the topsoil or fill, in all twelve (12) test borings drilled and extended to refusal depths ranging from 6.5 feet to 18 feet in six (6) of the borings or to boring termination depths of 10 feet and 20 feet in the other six (6) borings. The residual soils of this stratum generally consist of yellowish brown, reddish brown, dark brown, and gray silty sands and sandy silts, gravelly sand, clayey sands, clayey silts and elastic silts (USCS Designations: ML, SM, SC, SP, CL and CH) with rock fragments.

The Standard Penetration test (SPT) “N” values within the soils of Stratum I ranged from 4 bpf to 50 bpf, with higher values likely due to the presence of rock fragments. These encountered N-values generally indicate that the relative densities of the granular soils of this stratum range from loose to dense, with the majority being medium dense, while the consistencies of the cohesive soils ranged from soft to very hard, with the majority being medium stiff.

A summary of the results of the laboratory tests performed on representative soil samples from this stratum is presented in **APPENDIX C**.

**STRATUM II – WEATHERED ROCK**

Highly weathered rock was encountered, below the soils of Stratum I in six (6) of the twelve (12) test borings. The Standard Penetration tests within the decomposed to weathered rock of Stratum II resulted in (SPT) “N” values generally ranging from 50 blows per 5 inches of penetration to 50 blows per 1 inch of penetration. Bedrock is usually denser material than the 50 blows per one inch penetration. Spoon and/or auger refusal, which generally defines rock/bedrock, was encountered in six (6) of the twelve (12) borings at depths ranging from 6.5 feet to 18 feet below the existing ground surface grades.

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 appendix 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.
3.5 GROUNDWATER CONDITIONS

Groundwater was not encountered during the drilling operations in any of the twelve (12) 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. Cave-in depth in the borings ranged from 4 to 12 feet below existing grades.

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.

4.0 GEOTECHNICAL EVALUATION

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

Shallow foundations (continuous and spread footings) are considered adequate for the support of the proposed new Community Center building. The footings should be supported on the undisturbed, suitable-bearing natural soils of Stratum I, except moderately to highly plastic clays and elastic silts (LL>40 and PI>20) if encountered, or on controlled structural fill placed on suitable natural soils.

The footings should not be supported on moderately to highly plastic silts or clays (LL>45 and PI>20). These plastic soils, if encountered at or below the foundation grades, should be excavated in their entirety or to a minimum depth of 6 feet below the adjacent exterior finished grades. The footings in the latter case should be embedded at least 4 feet below the adjacent exterior finished grades supported on 2 feet of controlled structural fill placed over the clay layer.

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".

Excavations during the development of the site can generally be achieved with conventional earth-moving equipment (dozers, pans and hoes) to the anticipated shallow excavation depths. However, ripping and/or hoe-ramming of weathered but dense rock may be required in SWM pond area where the recorded N-values were 50 blows for a penetration of 6 inches or less and where equipment refusal was encountered at shallow
depths. Ripping, hoe-ramming or blasting of dense rock may be needed at isolated locations during the excavations for deeper sections of utility lines.

Encountering groundwater is not anticipated during the development of this site. However, perched water should be anticipated at different elevations during foundation excavations and installation of underground utilities, 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 pumps should be adequate.

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.

Due to the moisture sensitive nature of the on-site soils, the presence of standing water and the action of heavy equipment may lead to softening and a general deterioration/weakening of the fine-grained soils. The grading should, therefore, be carried out during a dry season, if at all possible, and in such a way as to promote positive drainage of surface water runoff, and ponding of water shall not be permitted. This should minimize potential problems associated with fine-grained soils although they may not be eliminated. If such problems occur, the geotechnical engineer should be consulted for an evaluation of the conditions.

5.0 RECOMMENDATIONS

5.1 SITE PREPARATION AND EARTHWORK

The following recommendations are intended for the satisfactory performance of the earthwork that may be involved to attain the planned grades across the site.

- Areas to support the building pad, pavement area and other park facilities should be stripped of any vegetation and topsoil. The depth of this excavation is expected to be an average of 6 inches and may differ at the other unexplored areas of the site.

Soft/loose soil, root mats and moderately to highly plastic soils with LL>40 and PI>20, wherever encountered near the planned grades, should be undercut to a suitable undisturbed subgrade as recommended by the Geotechnical Engineer of Record.

If highly plastic soils (LL>40 and PI>20) are encountered at and below the planned subgrade elevations of the pavements for drive lanes and parking areas, the upper 2 feet of the moderately to highly plastic soils (LL>40 and PI>20), should be excavated and replaced with engineered fill consisting of approved soils.
• Following the stripping and excavation of all unsuitable materials, grading operations may proceed. Prior to fill placement, the site should be observed by the Geotechnical Engineer of Record or his qualified representative for proper stripping and preparation for receiving the fill.

• The bottom of the stripped areas should be proof rolled in the presence of the Geotechnical Engineer of Record with at least two (2) passes of a loaded dump truck that has a minimum axle load of 10 tons or similar equipment. All loose and soft areas should be excavated to suitable-bearing subgrade. The excavated materials should be replaced with soils satisfying the controlled fill requirements detailed later in this report. The excavated fills should be evaluated for suitability to be reused by the Geotechnical Engineer of Record or his qualified representative.

• Controlled structural fill placement required to achieve the planned grades within the building pad should extend laterally on all sides beyond the building footprint a minimum distance of 10 feet at the building pad subgrade elevations. The edge of the fill should be placed at a maximum slope of 1H: 1V. The building pads should be prepared by excavation or by placing controlled structural fill to an elevation 10 inches below the floor level of slabs-on-grade. The footings should be excavated after the building areas have been properly prepared.

• Material satisfactory for controlled structural fill should include clean soil or bankrun sand and gravel (GW, GM, and SM). GC and SC materials may be used provided that the density and the liquid limit and plasticity index of the finer fraction of the material satisfy the following limitations:

<table>
<thead>
<tr>
<th>Property</th>
<th>Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Dry Density</td>
<td>≥ 105 pcf</td>
</tr>
<tr>
<td>Liquid Limit (%)</td>
<td>≤ 40</td>
</tr>
<tr>
<td>Plasticity Index</td>
<td>≤ 20</td>
</tr>
</tbody>
</table>

CL and ML materials satisfying the above requirements and limitations may be used with approval of the Geotechnical Engineer of Record. Highly plastic clays and elastic silts (MH, CH) should not be used as controlled fill. The fill materials should be free from topsoil, organics and rock fragments having a major dimension greater than 3 inches.

• The excavated soils of Stratum I, except soils with LL>40 and PI>20, may be suitable for reuse in controlled structural fill, subject to the approval Geotechnical Engineer of Record and moisture adjustments and the maximum dry density requirement specified above. Moisture conditioning of on-site material should be anticipated.

• Fill placement should be in a maximum 8-inch thick, loose, horizontal lifts compacted uniformly with the proper equipment.
• Structural fill required for supporting footings and slabs-on-grade shall be compacted to at least 95 percent of the maximum dry density as determined by ASTM D698 (Standard Proctor). Moisture content of the compacted fill shall be within plus or minus two (±2) percentage points of the optimum moisture content.

• The compaction for the roadways and other paved areas will be governed by the VTM-1 Method (Standard Proctor). The requirements for the degree of compaction should conform to the current VDOT Specifications and the current Loudoun County requirements, and are summarized below:

<table>
<thead>
<tr>
<th>Aggregate Subbase/Base Course Subgrade</th>
<th>90 to 100 percent*</th>
</tr>
</thead>
<tbody>
<tr>
<td>The entire thickness of fill up to 6 inches below the subgrade elevations</td>
<td>100 percent</td>
</tr>
<tr>
<td></td>
<td>95 percent</td>
</tr>
</tbody>
</table>

*As per Section 309.05 of the current VDOT Road and Bridge specifications.

The moisture content of the fill should be within plus or minus two (±2) percentage points of the optimum moisture content.

For proper site preparation, the earthwork should be performed under the supervision of and to the satisfaction of the Geotechnical Engineer of Record.

5.2 BUILDING FOUNDATIONS

As stated earlier, shallow foundations (continuous and spread footings) supported on natural soil of Stratum I or controlled structural fills, provided that the supporting subgrade soils are prepared in accordance with Section 5.1 “Site Preparation And Earthwork”, are considered adequate for the support of the proposed park buildings.

The footings should not be supported on moderately to highly plastic silts or clays (LL>45 and PI>20). These plastic soils, if encountered at or below the foundation grades, should be excavated in their entirety or to a minimum depth of 6 feet below the adjacent exterior finished grades. The footings in the latter case should be embedded at least 4 feet below the adjacent exterior finished grades supported on 2 feet of controlled structural fill placed over the clay layer.

Continuous footings that are partially located in fill and partially in undisturbed soil formation, should be designed as grade beams, 5 feet on either side of the transition. The column footings, in similar circumstances, should be extended into the underlying undisturbed soils.

The footings may be sized and designed on the basis of allowable bearing pressures indicated below, subject to observation of soil conditions at the bottom of footing excavations for suitable soil bearing by the Geotechnical Engineer of Record or his
qualified representative.

<table>
<thead>
<tr>
<th>SOIL CONDITIONS AT SUBGRADE</th>
<th>ALLOWABLE BEARING PRESSURE (psf)</th>
<th>MINIMUM WIDTH OF FOOTINGS (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undisturbed Soil of Stratum I Or Controlled Structural Fill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolated Footings</td>
<td>2,500</td>
<td>30</td>
</tr>
<tr>
<td>Continuous Footings</td>
<td>2,500</td>
<td>18</td>
</tr>
</tbody>
</table>

**DEPTH OF FOOTINGS**

The embedment depth of all footing subgrades is governed by the minimum depth requirements for protection against frost heave in accordance with the 2009 International Building Code. The depth of frost in Loudoun County, Virginia, is approximately 24 to 30 inches. Therefore, we recommend that the bottom of the footings be located at least 30 inches below the lowest adjacent finished exterior grade.

**FOOTING EXCAVATIONS**

Because of possible variations in subsurface conditions and related bearing capacity, all footing excavations and trenches should be observed and approved by the Geotechnical Engineer of Record. Water and possibly some loose soil may collect in the footing excavations 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 footing excavations before placing concrete.

- Footing excavations should not be left open for long periods. If the concrete can not be placed due to inclement weather conditions or any other unforeseen circumstances, the bottom of the footing excavations and trenches should be protected by undercutting 3 inches and placing a 3-inch thick lean-mix concrete (2,000 psi) workmat immediately upon approval and before reinforcing steel is placed.

Backfill around and above the footing should satisfy the controlled fill requirements described in Section 5.1 'Site Preparation and Earthwork'.
5.3 FLOOR SLABS

The following recommendations are intended for the placement of the slab-on-grade.

- Floor slab excavations should be proofrolled and prepared as described under 'Site Preparation and Earthwork'.

- A free-draining granular blanket of crushed stone or gravel should be placed under the floor slab for lateral drainage and as a capillary barrier. The thickness of this blanket should be at least 6 inches.

- A 6-mil thick impermeable plastic membrane (vapor barrier) should be placed directly under the concrete floor slab and over the granular material.

- The entire floor slab area should be reinforced as specified by the structural engineer.

- The column points and periphery walls should be isolated from the floor slab to minimize the possibility of the floor slab cracking due to relative displacement.

- The floor slab should be designed on the basis of modulus of subgrade reaction "k" of not more than 125 psi/inch.

5.4 SWM FACILITY

We understand the designers the Community Center renovations are considering the construction of a conventional SWM pond. At this stage it is not known whether the pond will be a detention (Dry) or retention (Wet) type pond since the SWM facility has not been designed yet.

The data developed during this study indicate that the subsoil, rock and groundwater conditions are generally suitable for the construction of the 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".

5.6 PAVEMENT

The pavement areas should be prepared as recommended in Section 5.1 of this report, “Site Preparation and Earthwork”.

Any loose/soft areas should be undercut to suitable bearing subgrade and replaced with approved fill. If highly plastic soils (LL>40 and PI>20) are encountered at and below the planned subgrade elevations of the pavements for drive lanes and parking areas, the upper 2 feet of the moderately to highly plastic soils (LL>40 and PI>20), should be excavated and replaced with engineered fill consisting of approved soils.
The soil subgrade in the paved areas, including the sidewalk, curb and gutter, and driveway aprons, is recommended to be compacted to at least ninety-five percent (95%) of the maximum dry density as determined by VTM-1 test method up to 6 inches below the planned subgrade elevations for controlled fills. The top 6 inches of the subgrade for natural soils as well as engineered fills should be compacted to one hundred percent (100%) of these values. The moisture content of the subgrade should be within plus or minus two (±2) percentage points of the optimum moisture content.

A CBR value of 3 may be assigned to the on-site soils for preliminary pavement design. It is recommended that the preliminary design CBR value be confirmed through laboratory testing following completion of grading operations when subgrade conditions can be better evaluated. Any necessary adjustments to pavement designs can be made at that time.

Considering traffic loading estimates of similar facilities, the preliminary pavement sections presented below should be considered the minimum recommended thickness for the parking area and drive aisle. Prior to placement of the base course, the Geotechnical Engineer of Record or his qualified representative should observe the subgrade preparation.

<table>
<thead>
<tr>
<th>Pavement Layer</th>
<th>Thickness (Inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphaltic Concrete Surface Course (SM-9.5A)</td>
<td>2.0</td>
</tr>
<tr>
<td>Asphaltic Concrete Base Course (BM-25.0A)</td>
<td>4.0</td>
</tr>
<tr>
<td>Aggregate Base Stone (21A or equivalent)</td>
<td>8.0</td>
</tr>
</tbody>
</table>

All material and methods of placement should conform to the current Virginia Department of Transportation (VDOT) requirements.

The pavement sections are designed for the post construction traffic conditions and on the basis of actual CBR values. Partial construction of the pavement section, a common practice in the industry, is likely to result in pavement and subgrade failure, due to inadequate support capability of an incomplete pavement, heavier than design traffic loads and maneuvering of construction traffic.

5.8 UTILITY TRENCHES AND MANHOLES

The backfill in the utility trenches should conform to the requirements of the Town of Lovettsville and the Facilities Standards Manual of Loudoun County. The existing fill soils excavated from the utility trenches should be observed by the Geotechnical Engineer of Record or his qualified representative for their suitability for use in the trench backfill.
The backfill against the manhole structures should conform to the requirements stated under Section 5.1 'Site Preparation and Earthwork'. The fill material should not have rock fragments larger than 3 inches and each lift should be compacted as specified.

Excavations for utility trenches shall be in accordance with applicable OSHA excavation standards detailed in 29 CFR, Part 1926 and should be adequately protected against sudden cave-in or sloughing by using steel trench boxes.

5.9 SEISMIC CONSIDERATIONS

Based on the subsurface conditions encountered at the site, structural design shall use the following site coefficients for seismic design based on Section 1615 of the International Building Code (2009):

<table>
<thead>
<tr>
<th>Seismic Site Class</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral response acceleration at short periods, $S_s$</td>
<td>0.16</td>
</tr>
<tr>
<td>Spectral response acceleration at 1-second period, $S_1$</td>
<td>0.051</td>
</tr>
<tr>
<td>Site coefficient, $F_A$</td>
<td>1.6</td>
</tr>
<tr>
<td>Site coefficient, $F_y$</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Based on information obtained from our soil test borings and our review and knowledge of local geology, it is our opinion that the potential for liquefaction of the soils at the site due to earthquake activity is relatively low.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 CONSTRUCTION QUALITY CONTROL

To assess that the in-situ soil conditions or those developed during the construction are as anticipated during the design stage, construction control, continuous observation and testing are recommended as follows:

- Potential areas of cut to be used as fill should be sampled and compared to the Standard Proctor, to determine, what if any moisture conditioning is required.

- Controlled fill placement for building pads and pavements should be monitored by the soils technician under the overall supervision of the Geotechnical Engineer of Record.

- All footing and floor slab excavations, preparation of subgrade, placement of aggregate base course, etc., should be carried out under the observation of the Geotechnical Engineer of Record or his qualified representative.
6.2 DEMOLITION OF OLD STRUCTURES

Existing structures, including footings, slabs, basement walls, pavement, etc., if encountered, should be removed from the building pad area including at least 5 feet offset from the building. In addition, the existing pavement should be removed in its entirety. Within the building footprint, all existing uncontrolled fill should be undercut a minimum of 2 feet and any deleterious fills encountered should be removed in their entirety. All soils undercut below the planned grades should be replaced with engineered fill. It is our experience that debris-laden fills are usually encountered in the vicinity of existing structures.

Any demolition of existing building(s) and other structures should be carried out under the observation of the Geotechnical Engineer of Record or his qualified representative.

6.3 RESPONSIBILITY OF DEVELOPER

Review and approval of plans, specifications, and reports by Loudoun County and the Town of Lovettsville with or without recommendations, should in no way relieve the developer of the responsibility for the design, construction and performance of the structures and pavements on the project and damage to surrounding properties.

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its “Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P”. This document was issued to better allow for the safety of workers entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the Contractor could be liable for substantial penalties.

The Contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The Contractor’s “responsible person”, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the Contractor’s safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in all local, state, and federal safety regulations.

We are providing this information solely as a service to our client. Specialized Engineering does not assume responsibility for construction site safety or the Contractor’s or other parties’ compliance with local, state, and federal safety or other regulations.

6.4 CONSTRUCTION OBSERVATIONS

All development and construction work should be performed under the observation of the
7.0 REPORT LIMITATIONS

The recommendations submitted are based on the available subsurface information obtained by Specialized Engineering and preliminary project information furnished by Loudoun County for the proposed project. The sole purpose of this exploration is to determine an appropriate foundation design recommendation. Recommendations contained in this report are based on findings from the relatively limited number of test borings performed. Specialized Engineering’s Professional staff may have adjusted the scope of work proposed based on field conditions, equipment capabilities, client schedule, or any other factor during the course of design. The work adjustments may have been relocation of borings or probes, adjustments in depth of borings or probes, addition or deletion of scope items as deemed prudent at the time of the exploration. Variations in soil conditions between the borings may not become evident until construction. If deviations from the subsurface conditions noted in this report are encountered during construction, that may change the geotechnical foundation recommendation, Specialized Engineering should be notified immediately to determine if changes in the foundation recommendations are required. If Specialized Engineering is not retained to perform these functions, we will not be responsible for the impact of those conditions on the geotechnical recommendations for the project.

Specialized Engineering’s findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No warranties are implied or expressed.

After the plans and specifications are more complete, Specialized Engineering should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations, or perform additional exploration.

The opinions, conclusions and recommendations expressed in this report are based upon the subsurface conditions revealed by our field exploration, laboratory testing, and the result of analyses and studies performed for this project, based on our professional engineer’s interpretation. We are not responsible for interpretations of our findings, or data contained within the report, by others. We recommend the project specification contain a statement indicating that this report is for informational purposes only and should not be considered part of the contract documents. The data contained in this report may not be adequate for the contractor’s purposes, the contractor should make his own tests and analyses prior to bidding. The contractor may not rely on this report to assess field conditions other than the proposed design recommendation. Field conditions may be much more difficult that the contractor anticipates.
This report has been prepared for the exclusive use of Loudoun County and their associated engineering consultants to aid in the evaluation of this site and to assist in the design of the PROPOSED LOVETTSVILLE COMMUNITY CENTER RENOVATION project located in the Lovettsville, Loudoun County, Virginia.
APPENDIX A

VICINITY MAP AND TEST BORING LOCATION PLAN
APPENDIX B

TEST BORING LOGS
RFQ 48770 ATTACHMENT #4

CLIENT: Loudoun County DOT & Infrastructure
PROJECT NUMBER: 146110
DATE STARTED: 5/8/14  COMPLETED: 5/8/14
DRILLING CONTRACTOR: Connelley and Associates Inc.
DRILLING METHOD: 772 ODT Geoprobe 2 1/4"
LOGGED BY: E. Cooney

NOTES:

BOARING NUMBER B-1

PROJECT NAME: Lovettsville Community Center
PROJECT LOCATION: Lovettsville, VA
GROUND ELEVATION: 513 ft  CAVE IN: 8 ft.

GROUND WATER LEVELS:
AT TIME OF DRILLING: ___
AT END OF DRILLING: ___
AFTER DRILLING: Backfilled upon completion

### MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>GRAPHIC LOG</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>495</td>
<td>0</td>
<td></td>
<td>ASPHALT (3&quot;)</td>
</tr>
<tr>
<td>510</td>
<td>5</td>
<td></td>
<td>GRAVEL BASE (12&quot;)</td>
</tr>
<tr>
<td>510</td>
<td>5</td>
<td></td>
<td>FILL: light reddish orange silty sand, fine to coarse grained, some gravel, moist, medium dense</td>
</tr>
<tr>
<td>510</td>
<td>10</td>
<td></td>
<td>GRAVELY SAND (SP): light reddish orange, fine to coarse grained, moist, medium dense</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAMPLE TYPE</th>
<th>SAMPLE NUMBER</th>
<th>RECOVERY %</th>
<th>BLOWS (N VALUE)</th>
<th>S tooth (kst)</th>
<th>% &lt; #200 SIEVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 1</td>
<td>1.0</td>
<td>100</td>
<td>8-4-6 (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS 2</td>
<td>2.5</td>
<td>100</td>
<td>5-6-8 (14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS 3</td>
<td>5.0, 6.5</td>
<td>100</td>
<td>3-5-7 (12)</td>
<td>81.8</td>
<td>15.5</td>
</tr>
<tr>
<td>SS 4</td>
<td>8.5, 10.0</td>
<td>100</td>
<td>3-3-4 (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS 5</td>
<td>13.5, 15.0</td>
<td>100</td>
<td>11-8-8 (16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS 6</td>
<td>16.5, 18.0</td>
<td>100</td>
<td>8-15-15 (30)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Auger refusal at 18.0 feet.
## Boring Number B-2

### Project Information
- **Project Name**: Lovettsville Community Center
- **Project Location**: Lovettsville, VA
- **Ground Elevation**: 512 ft
- **Cave In**: 9 ft

### Ground Water Levels
- **At Time of Drilling**: ---
- **At End of Drilling**: ---
- **After Drilling**: Backfilled upon completion

### Specialized Engineering

**Client**: Loudoun County DOT & Infrastructure

**Project Number**: 148110

**Date Started**: 5/8/14
**Completed**: 5/8/14

**Drilling Contractor**: Connelley and Associates Inc.

**Drilling Method**: CME 45C 2.25" HSA

**Logged By**: E. Cooney

### Material Description

<table>
<thead>
<tr>
<th>Elevation (ft)</th>
<th>Depth (ft)</th>
<th>Graphic Log</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>510</td>
<td>0.0</td>
<td>SS 1</td>
<td>Asphalt (3&quot;)</td>
</tr>
<tr>
<td></td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>505</td>
<td>2.5</td>
<td>SS 2</td>
<td>Gravel Base (12&quot;)</td>
</tr>
<tr>
<td></td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>5.0</td>
<td>SS 3</td>
<td>Gravelly Sand (SP)</td>
</tr>
<tr>
<td></td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>495</td>
<td>8.5</td>
<td>SS 4</td>
<td>Gravelly Sand (SP)</td>
</tr>
<tr>
<td></td>
<td>10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>490</td>
<td>13.5</td>
<td>SS 5</td>
<td>Gravelly Sand (SP)</td>
</tr>
<tr>
<td></td>
<td>15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>485</td>
<td>18.5</td>
<td>SS 6</td>
<td>Some rock fragments</td>
</tr>
<tr>
<td></td>
<td>20.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

End of Boring at 20.0 feet.
### BORING NUMBER B-3

**CLIENT** Loudoun County DOT & Infrastructure  
**PROJECT NUMBER** 148110  
**DATE STARTED** 5/8/14  
**COMPLETED** 5/8/14  
**DRILLING CONTRACTOR** Connelley and Associates Inc.  
**DRILLING METHOD** 772 ODT Geoprobe 2 1/4"  
**LOGGED BY** E. Cooney  
**NOTES**

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>GRAPHIC LOG</th>
<th>MATERIAL DESCRIPTION</th>
<th>SAMPLE TYPE NUMBER</th>
<th>SAMPLE DEPTH</th>
<th>RECOVERY %</th>
<th>BLOW COUNTS (RQD)</th>
<th>S (kPa)</th>
<th>% &lt; #200 SIEVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>510</td>
<td>0.0</td>
<td></td>
<td>TOPSOIL (3&quot;)</td>
<td>SS 1</td>
<td>1.5</td>
<td>100</td>
<td>3-3-3 (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.5</td>
<td></td>
<td>SANDY SILT (ML): light orange, fine to medium grained, some fine gravel, moist, medium stiff</td>
<td>SS 2</td>
<td>4.0</td>
<td>100</td>
<td>3-3-4 (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0</td>
<td></td>
<td>CLAYEY SAND (SC): light orange, fine to coarse grained, trace gravel, moist, loose</td>
<td>SS 3</td>
<td>6.5</td>
<td>100</td>
<td>3-5-11 (16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.5</td>
<td></td>
<td>GRAVELLY SAND (SP): light tannish orange, fine to coarse grained, some silt, moist, medium dense</td>
<td>SS 4</td>
<td>10.0</td>
<td>100</td>
<td>2-3-3 (6)</td>
<td>93.9</td>
<td>40.7</td>
</tr>
<tr>
<td></td>
<td>13.5</td>
<td></td>
<td>Trace of silt</td>
<td>SS 5</td>
<td>15.0</td>
<td>89</td>
<td>5-4-8 (12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.5</td>
<td></td>
<td>Trace of silt</td>
<td>SS 6</td>
<td>20.0</td>
<td>100</td>
<td>12-8-20 (28)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PROJECT NAME** Lovettsville Community Center  
**PROJECT LOCATION** Lovettsville, VA  
**GROUND ELEVATION** 511 ft  
**CAVE IN** 8.5 ft  
**GROUND WATER LEVELS:**  
- **AT TIME OF DRILLING** ---  
- **AT END OF DRILLING** ---  
- **AFTER DRILLING** Backfilled upon completion

---

4845 International Blvd. Suite 104 Frederick, MD 21703 Phone (301)-607-4180/ Fax (301)-662-6122
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (in)</th>
<th>GRAPHIC LOG</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOPSOIL (6&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SANDY SILT (ML): dark reddish brown, fine to coarse grained, with gravel, moist, stiff</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SANDY CLAY (CL): red, fine to coarse grained, trace fine gravel, moist, stiff</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GRAVELLY SAND (SP): light tan, fine to coarse grained, some silt, moist, loose</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medium dense</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAMPLE TYPE</th>
<th>SAMPLE DEPTH</th>
<th>RECOVERY % (RQD)</th>
<th>BLOW COUNTS (N VALUE)</th>
<th>Su (ksf)</th>
<th>% &lt; #200 SIEVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 1</td>
<td>0.0</td>
<td>100</td>
<td>3-4-6</td>
<td></td>
<td>(10)</td>
</tr>
<tr>
<td>SS 2</td>
<td>2.5</td>
<td>0</td>
<td>4-4-6</td>
<td></td>
<td>(10)</td>
</tr>
<tr>
<td>SS 3</td>
<td>5.0</td>
<td>100</td>
<td>3-4-4</td>
<td></td>
<td>(8)</td>
</tr>
<tr>
<td>SS 4</td>
<td>8.5</td>
<td>100</td>
<td>4-4-6</td>
<td></td>
<td>(10)</td>
</tr>
<tr>
<td>SS 5</td>
<td>13.5</td>
<td>100</td>
<td>3-4-4</td>
<td></td>
<td>(8)</td>
</tr>
<tr>
<td>SS 6</td>
<td>18.5</td>
<td>100</td>
<td>4-5-7</td>
<td></td>
<td>(12)</td>
</tr>
</tbody>
</table>

End of Boring at 20.0 feet.

PROJECT NAME: Lovettsville Community Center
PROJECT LOCATION: Lovettsville, VA
GROUND ELEVATION: 514 ft CAVE IN: 10 ft
GROUND WATER LEVELS:
AT TIME OF DRILLING: --
AT END OF DRILLING: --
AFTER DRILLING: Backfilled upon completion
CLIENT: Loudoun County DOT & Infrastructure  
PROJECT NUMBER: 146110  
DATE STARTED: 5/8/14  
COMPLETED: 5/8/14  
DRILLING CONTRACTOR: Connelley and Associates Inc.  
DRILLING METHOD: CME 45C 2.25" HSA  
LOGGED BY: E. Cooney  

**NOTES**

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>GRAPHIC LOG</th>
<th>MATERIAL DESCRIPTION</th>
<th>SAMPLE TYPE NUMBER</th>
<th>SAMPLE DEPTH (ft)</th>
<th>RECOVERY %</th>
<th>BLOWS (PDI)</th>
<th>N VALUE</th>
<th>SU (kst)</th>
<th>% &lt; #200 SIEVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>515</td>
<td></td>
<td></td>
<td><strong>TOPSOIL (2&quot;)</strong> reddish orange, fine</td>
<td>SS 1</td>
<td>0.0</td>
<td>100</td>
<td>4-3-3</td>
<td>(6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>grained, moist, medium stiff</td>
<td>SS 2</td>
<td>1.5</td>
<td>100</td>
<td>3-6-9</td>
<td>(15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SS 3</td>
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<td>100</td>
<td>3-4-2</td>
<td>(6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>510</td>
<td>5</td>
<td></td>
<td></td>
<td>SS 4</td>
<td>4.0</td>
<td>100</td>
<td>12-28-22</td>
<td>(50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.5</td>
<td></td>
<td>ELASTIC SILT (MH): reddish orange,</td>
<td></td>
<td>6.5</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td>fine to coarse grained, and rock</td>
<td></td>
<td>8.5</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.0</td>
<td></td>
<td>fragments, moist, hard</td>
<td></td>
<td>10.0</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Auger Refusal at 11.0 feet.

---

**BOREHOLY NUMBER B-5**  
PROJECT NAME: Lovettsville Community Center  
PROJECT LOCATION: Lovettsville, VA  
GROUND ELEVATION: 516 ft  
CAVE IN:  
GROUND WATER LEVELS:  
AT TIME OF DRILLING:  
AT END OF DRILLING:  
AFTER DRILLING: Backfilled upon completion
CLIENT: Loudoun County DOT & Infrastructure
PROJECT NUMBER: 146110
DATE STARTED: 5/8/14 COMPLETED: 5/8/14
DRILLING CONTRACTOR: Connelley and Associates Inc.
DRILLING METHOD: 772 ODT Geoprobe 2 1/4" LOGGED BY: E. Cooney
NOTES

PROJECT NAME: Lovettsville Community Center
PROJECT LOCATION: Lovettsville, VA
GROUND ELEVATION: 514 ft CAVE IN: 5 ft
GROUND WATER LEVELS:
AT TIME OF DRILLING: --
AT END OF DRILLING: --
AFTER DRILLING: Backfilled upon completion

ELEVATION (ft)

DEPTH (ft) GRAPHIC LOG MATERIAL DESCRIPTION

TOPSOIL (2")
SANDY SILT (ML): light orange, fine to coarse grained, moist, soft
Medium dense

SANDY SILT (ML): light orange, fine to coarse grained, moist, soft
Medium dense

ELASTIC SILT (MH): light orangish red, fine to medium grained, some fine gravel, moist, medium dense

DECOMPOSED ROCK: dark blackish gray fine grained, very dense
Auger Refusal at 13.9 feet.

SAMPLE TYPE NUMBER
SS 1
SS 2
SS 3
SS 4
SS 5

SAMPLE DEPTH (ft)
0.0
1.5
2.5
4.0
5.0
6.5
8.5
10.0
13.5
13.9

RECOVERY %
100
100
100
100
100

BLOW N (RQD)
1-2-1
2-3-4
2-4-5
2-2-2
100

SU (kcf)
(3)
(7)
(9)
(4)

% < #200 SIEVE

SPT N VALUE

PL MC LL

20 40 60 80
**BORING NUMBER B-7**

**PROJECT NAME**: Lovettsville Community Center  
**PROJECT LOCATION**: Lovettsville, VA

**GROUND ELEVATION**: 515 ft  
**CAVE IN**: 6 ft

**GROUND WATER LEVELS:**
- **AT TIME OF DRILLING**:  
- **AT END OF DRILLING**:  
- **AFTER DRILLING**: Backfilled upon completion

---

### NOTES

**CLIENT**: Loudoun County DOT & Infrastructure  
**PROJECT NUMBER**: 146110

**DATE STARTED**: 5/8/14  
**COMPLETED**: 5/8/14

**DRILLING CONTRACTOR**: Connelley and Associates Inc.  
**DRILLING METHOD**: 772 ODT Geoprobe 2 1/4"

**LOGGED BY**: E. Cooney

---

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>MATERIAL DESCRIPTION</th>
<th>SAMPLE TYPE</th>
<th>SAMPLE DEPTH (ft)</th>
<th>RECOVERY (%)</th>
<th>BLOW COUNT (RQD)</th>
<th>SPT N VALUE (V)</th>
<th>S (kN/m)</th>
<th>% &lt;#200 SIEVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>510</td>
<td>5</td>
<td>ASPHALT (5&quot;)</td>
<td>SS</td>
<td>0.0</td>
<td>1.5</td>
<td>100</td>
<td>2-2-2</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GRavel BASE (10&quot;)</td>
<td>SS</td>
<td>2.5</td>
<td>4.0</td>
<td>33</td>
<td>2-2-3</td>
<td>(5)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>SANDY CLAY (CL): light orange, fine to medium grained, moist, medium stiff</td>
<td>SS</td>
<td>5.0</td>
<td>6.5</td>
<td>11</td>
<td>10-6-9</td>
<td>(15)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>SANDY SILT (ML): light reddish orange, fine to medium grained, some fine gravel, moist, very stiff</td>
<td>SS</td>
<td>8.5</td>
<td>10.0</td>
<td>100</td>
<td>8-11-11</td>
<td>(22)</td>
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**End of Boring at 10.0 feet.**
## BORING NUMBER B-8

**CLIENT** Loudoun County DOT & Infrastructure  
**PROJECT NUMBER** 146110  
**DATE STARTED** 5/8/14  
**COMPLETED** 5/8/14  
**DRILLING CONTRACTOR** Connelley and Associates Inc.  
**DRILLING METHOD** 772 ODT Geoprobe 2 1/4"  
**LOGGED BY** E. Cooney  

### NOTES

#### MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>GRAPHIC LOG</th>
<th>MATERIAL DESCRIPTION</th>
<th>SAMPLE TYPE</th>
<th>SAMPLE DEPTH</th>
<th>RECOVERY %</th>
<th>BLOWS (N)</th>
<th>SPT (N) VALUE</th>
<th>% &lt; #200 SIEVE</th>
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<td>505</td>
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<td>21-11-3</td>
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<td>GRAVEL BASE (2&quot;)</td>
<td>SS</td>
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<td>33</td>
<td>3-3-4</td>
<td>(7)</td>
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<tr>
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<td></td>
<td>POSSIBLE FILL: dark brownish orange sandy silt, fine to coarse grained, and gravel, moist, stiff</td>
<td>SS</td>
<td>2.5</td>
<td>100</td>
<td>5-5-6</td>
<td>(11)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GRAVELLY SAND (SP): dark orange, fine to coarse grained, some silt, moist, medium dense</td>
<td>SS</td>
<td>6.5</td>
<td>100</td>
<td>5-5-5</td>
<td>(10)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SS</td>
<td>8.5</td>
<td>100</td>
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End of Boring at 10.0 feet.

---

**PROJECT NAME** Lovettsville Community Center  
**PROJECT LOCATION** Lovettsville, VA  
**GROUND ELEVATION** 506 ft  
**CAVE IN** 3 ft.

**GROUND WATER LEVELS:**

- **AT TIME OF DRILLING** ---
- **AT END OF DRILLING** ---
- **AFTER DRILLING** Backfilled upon completion

---

4845 International Blvd. Suite 104 Frederick, MD 21703 Phone (301)-607-4180/ Fax (301)-682-6122
RFQ 48770 ATTACHMENT #4

CLIENT: Loudoun County DOT & Infrastructure
PROJECT NUMBER: 148110
DATE STARTED: 5/8/14  COMPLETED: 5/8/14
DRILLING CONTRACTOR: Connelley and Associates Inc.
DRILLING METHOD: 772 ODT Geoprobe 2 1/4"
LOGGED BY: E. Cooney

NOTES

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>GRAPHIC LOG</th>
<th>MATERIAL DESCRIPTION</th>
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<tr>
<td>490</td>
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<td>TOPSOIL (6&quot;) light brownish orange sandy silt (ml), fine to coarse grained, some fine gravel, moist, medium stiff</td>
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<tr>
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<td>POSSIBLE FILL: light brownish orange sandy silt (ml), fine to coarse grained, some fine gravel, moist, medium stiff</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SILT (ML): light orange, fine grained, some rock fragments, moist, soft</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>DECOMPOSED ROCK: dark blackish gray fine grained, very dense</td>
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</table>

<table>
<thead>
<tr>
<th>SAMPLE TYPE</th>
<th>SAMPLE DEPTH</th>
<th>RECOVERY %</th>
<th>BLOW N (RBD)</th>
<th>Su (kgs)</th>
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<td>100</td>
<td>1.2</td>
<td>2 (4)</td>
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<td>SS 2</td>
<td>2.5</td>
<td>4.0</td>
<td>100</td>
<td>3.3</td>
<td>4 (7)</td>
</tr>
<tr>
<td>SS 3</td>
<td>5.0</td>
<td>6.5</td>
<td>100</td>
<td>1.2</td>
<td>3 (5)</td>
</tr>
<tr>
<td>SS 4</td>
<td>8.5</td>
<td>8.8</td>
<td>100, 50/4*</td>
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PROJECT NAME: Lovettsville Community Center
PROJECT LOCATION: Lovettsville, VA
GROUND ELEVATION: 490 ft
CAVE IN: 5 ft
GROUND WATER LEVELS:
AT TIME OF DRILLING: —
AT END OF DRILLING: —
AFTER DRILLING: Backfilled upon completion

GEOTECH PLT REVISED 14/11/10 LOVETTSVILLE COMMUNITY CENTER BORINGS GP BORINGS CURRENT 12/16/10 GEOTECH 12/17/14

4845 International Blvd. Suite 104 Frederick, MD 21703 Phone (301)-607-4180/ Fax (301)-662-6122
**RFQ 48770 ATTACHMENT #4**

**BORING NUMBER B-10**

**PROJECT NAME:** Lovettsville Community Center  
**PROJECT LOCATION:** Lovettsville, VA

**GROUND ELEVATION:** 422 ft  
**CAVE IN:** 6 ft

**GROUND WATER LEVELS:**

- **AT TIME OF DRILLING:** ---
- **AT END OF DRILLING:** ---
- **AFTER DRILLING:** Backfilled upon completion

---

**ELEVATION (ft)** | **DEPTH (ft)** | **GRAPHIC LOG** | **MATERIAL DESCRIPTION** | **SAMPLE TYPE** | **SAMPLE DEPTH** | **RECOVERY %** | **BLOW COUNTS** | **Su (kPa)** | **% < 4200 SIEVE** |
---|---|---|---|---|---|---|---|---|---|
490 | 0 | | **TOPSOIL (6")** | SS 1 | 0.0 | 100 | 1-3-4 (7) | | |
490 | 1.5 | | **POSSIBLE FILL:** light brownish orange sandy silt, fine to coarse grained, some fine gravel, moist, medium stiff | SS 2 | 2.5 | 100 | 3-3-2 (5) | | |
490 | 4.0 | | **SILT (ML):** light orange, fine grained, some rock fragments, moist, medium stiff | SS 3 | 5.0 | 100 | 3-2-4 (6) | | |
490 | 6.5 | | | SS 4 | 8.5 | 100 | 7-7-14 (21) | | |

**End of Boring at 10.0 feet.**

---

**GEOCHP-PLS-REVISED 4/10/10 LOVETTSVILLE COMMUNITY CENTER BORINGS 4/10/10 BORINGS, CURRENT 1-2-06-CDT 5/27/14**

---

4845 International Blvd, Suite 104 Frederick, MD 21703 Phone (301)-607-4180/ Fax (301)-662-6122
**BORING NUMBER B-11**

**PROJECT NAME**  Lovettsville Community Center  
**PROJECT LOCATION**  Lovettsville, VA  
**GROUND ELEVATION**  489 ft  
**CAVE IN**  2 ft  

**GROUND WATER LEVELS:**  
**AT TIME OF DRILLING**  --  
**AT END OF DRILLING**  --  
**AFTER DRILLING**  Backfilled upon completion

<table>
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<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>MATERIAL DESCRIPTION</th>
<th>SAMPLE TYPE</th>
<th>SAMPLE DEPTH (ft)</th>
<th>RECOVERY %</th>
<th>BLOWS (SPT N)</th>
<th>SV (Ksf)</th>
<th>% &lt; #200 SIEVE</th>
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<tr>
<td>485</td>
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<td>TOPSOIL (2&quot;)</td>
<td>SS</td>
<td>0.0</td>
<td>100</td>
<td>3-6-4</td>
<td>(10)</td>
<td></td>
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<tr>
<td></td>
<td>1.5</td>
<td>POSSIBLE FILL: light orange silty sand, fine to coarse grained, moist, medium dense</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2.5</td>
<td>SANDY SILT (ML): light orange, fine to coarse grained, with rock fragments, moist, stiff</td>
<td>SS</td>
<td>2.5</td>
<td>100</td>
<td>2-3-3</td>
<td>(6)</td>
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<td>4.0</td>
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<td>SS</td>
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<td>3-7-13</td>
<td>(26)</td>
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<td>5.0</td>
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<td>SS</td>
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<td>100</td>
<td>3-7-13</td>
<td>(26)</td>
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<td>6.5</td>
<td></td>
<td>SS</td>
<td>6.5</td>
<td>100</td>
<td>3-7-13</td>
<td>(26)</td>
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Auger Refusal at 6.5 feet.
**BORING NUMBER B-12**

**PROJECT NAME**: Lovettsville Community Center  
**PROJECT LOCATION**: Lovettsville, VA

**GROUND ELEVATION**: 491 ft  
**CAVE IN**: 4 ft

**GROUND WATER LEVELS**:
- **AT TIME OF DRILLING**: ---
- **AT END OF DRILLING**: ---
- **AFTER DRILLING**: Backfilled upon completion

### MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>GRAPHIC LOG</th>
<th>MATERIAL DESCRIPTION</th>
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<tbody>
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<tr>
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<td>POSSIBLE FILL: light orange sandy silt (ml), fine to coarse grained, moist, medium dense</td>
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<tr>
<td></td>
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<td>PP 1</td>
</tr>
<tr>
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<td></td>
<td>PP 2</td>
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<tr>
<td>485</td>
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<td>GRAVELLY SAND (SP): light orangish tan, fine to coarse grained, little gravel, moist, loose</td>
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<td></td>
<td></td>
<td></td>
<td>PP 3</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>PP 4</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>DECOMPOSED ROCK: dark grayish black</td>
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<td>Auger and Spoon Refusal at 9.1 feet.</td>
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**△ SPT N VALUE △**

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</tr>
<tr>
<td>40</td>
</tr>
<tr>
<td>60</td>
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<td>80</td>
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4845 International Blvd. Suite 104 Frederick, MD 21703 Phone (301)-607-4180/ Fax (301)-662-6122
Appendix C

Laboratory Test Results
<table>
<thead>
<tr>
<th>Borehole</th>
<th>Depth (ft)</th>
<th>Classification</th>
<th>Liquid Limit</th>
<th>Plastic Limit</th>
<th>Plasticity Index</th>
<th>Moisture Content (%)</th>
<th>% &lt; #4 Sieve</th>
<th>% &lt; #200 Sieve</th>
<th>Other Tests</th>
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<td>SP</td>
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<td>B-11</td>
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(V) = Visual Classification USCS
Particle Size Distribution Report

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<th>PERCENT</th>
<th>SPEC. *</th>
<th>PASS? (X=NO)</th>
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</tr>
<tr>
<td>2 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1/2 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/4 in.</td>
<td>100.0</td>
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</tr>
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<td>3/8 in.</td>
<td>96.9</td>
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</tr>
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<tr>
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<th>GRAIN SIZE - mm.</th>
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<tbody>
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<tr>
<td>% Gravel</td>
</tr>
<tr>
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<td>18.2</td>
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Soil Description

Atterberg Limits

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<tr>
<td>LL=</td>
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<td>Pi=</td>
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<td>D50= 0.8543</td>
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<td>D80= 1.2707</td>
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<td>D10=</td>
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<tr>
<td>Cc=</td>
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</table>

AASHTO= MS - 16.4%

Remarks

Location: B-1, S-3
Sample Number: B1. S3
Depth: 5.0' - 6.5'

SPECIALIZED ENGINEERING
Frederick, Maryland

Client: Loudoun County DOT and Infrastructure
Project: Lovettsville Community Center

Project No: 146110

Date: 5-9-14

6728
Particle Size Distribution Report

GF SIZE - mm

<table>
<thead>
<tr>
<th>% +3&quot;</th>
<th>% Gravel</th>
<th>% Sand</th>
<th>% Silt</th>
<th>% Clay</th>
</tr>
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<tbody>
<tr>
<td>0.0</td>
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<th>SPEC. ^ PERCENT</th>
<th>PASS? (X=NO)</th>
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<td></td>
</tr>
<tr>
<td>2 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1/2 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/4 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/8 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#4</td>
<td>93.9</td>
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<td>#40</td>
<td>63.3</td>
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Soil Description

Atterberg Limits

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Coefficients

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Classification

AASHTO

Remarks

Location: B-3, S4
Sample Number: B3, S4
Depth: 8.5' - 10.0'

Date: 5-9-14

SPECIALIZED ENGINEERING
Frederick, Maryland

Client: Loudoun County DOT and Infrastructure
Project: Lovettsville Community Center

Project No: 146110

6728
Particle Size Distribution Report

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENT FINER</th>
<th>SPEC. PERCENT</th>
<th>PASS? (X=NO)</th>
</tr>
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<tbody>
<tr>
<td>3 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1/2 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/4 in.</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/8 in.</td>
<td>95.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#4</td>
<td>85.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#10</td>
<td>73.9</td>
<td></td>
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</tr>
<tr>
<td>#40</td>
<td>51.8</td>
<td></td>
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</tr>
<tr>
<td>#200</td>
<td>33.7</td>
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</table>

Soil Description

Atterberg Limits

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Classification</th>
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<tbody>
<tr>
<td>D90 = 6.4009</td>
<td>AASHTO=</td>
</tr>
<tr>
<td>D60 = 0.3684</td>
<td></td>
</tr>
<tr>
<td>D10 =</td>
<td></td>
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</table>

USCS =

PL =

LL =

DL = 0.7763

Remarks

MS = 22.9%

Location: B-12, S-3
Sample Number: B12, S3
Depth: 5.0' - 6.5'

Date: 5-9-14

SPECIALIZED ENGINEERING
Frederick, Maryland

Client: Loudoun County DOT and Infrastructure
Project: Lovettsville Community Center

Project No: 116110

6728
LIQUID AND PLASTIC LIMITS TEST REPORT

Dashed line indicates the approximate upper limit boundary for natural soils.

SOIL DATA

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SAMPLE NO.</th>
<th>DEPTH</th>
<th>NATURAL WATER CONTENT (%)</th>
<th>PLASTIC LIMIT (%)</th>
<th>LIQUID LIMIT (%)</th>
<th>PLASTICITY INDEX (%)</th>
<th>USCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>B5, S3</td>
<td>5.0' - 6.5'</td>
<td>46.0</td>
<td>37</td>
<td>59</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>B6, S4</td>
<td>8.5' - 10.0'</td>
<td>55.0</td>
<td>59</td>
<td>59</td>
<td>0</td>
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<tr>
<td>▲</td>
<td>B11, S2</td>
<td>2.5' - 4.0'</td>
<td>24.3</td>
<td>25</td>
<td>30</td>
<td>5</td>
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</tr>
</tbody>
</table>
APPENDIX D

ASFE BULLETIN
Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. And no one—not even you—should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client’s goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:
• not prepared for you,
• not prepared for your project,
• not prepared for the specific site explored, or
• completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:
• the function of the proposed structure, as when it’s changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
• elevation, configuration, location, orientation, or weight of the proposed structure,
• composition of the design team, or
• project ownership.

As a general rule, always inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. Do not rely on a geotechnical engineering report whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. Always contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report’s Recommendations Are Not Final

Do not overly rely on the construction recommendations included in your report. Those recommendations are not final, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual
subsurface conditions revealed during construction. The geotechnical engineer who developed your report cannot assume responsibility or liability for the report’s recommendations if that engineer does not perform construction observation.

**A Geotechnical Engineering Report Is Subject to Misinterpretation**

Other design team members’ misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team’s plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

**Do Not Redraw the Engineer’s Logs**

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

**Give Contractors a Complete Report and Guidance**

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report’s accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A probation conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

**Read Responsibility Provisions Closely**

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointed, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

**Geoenvironmental Concerns Are Not Covered**

The equipment, techniques, and personnel used to perform a geoenvironmental study differ significantly from those used to perform a geotechnical study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated environmental problems have led to numerous project failures. If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. Do not rely on an environmental report prepared for someone else.

**Obtain Professional Assistance To Deal with Mold**

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the express purpose of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant. **none of the services performed in connection with the geotechnical engineer’s study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.**

**Rely, on Your ASFE-Member Geotechnical Engineer for Additional Assistance**

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.