### APPLICATION FOR SITE PLAN REVIEW

**NOTICE TO APPLICANT:** Applications for Site Plan review by the Planning Commission must be submitted to the City of Berkley Building Department in **substantially complete form** at least 30 days prior to the Planning Commission’s meeting at which the application will be considered. The application must be accompanied by the data specified in the Zoning Ordinance, including fully dimensioned site plans, plus the required review fees.

The Planning Commission meets the fourth Tuesday of the month at 7:00pm in the Council Chambers at the City of Berkley City Hall, 3338 Coolidge Hwy, Berkley, MI 48072.

### TO BE COMPLETED BY APPLICANT:

I (We), the undersigned, do hereby respectfully request Site Plan Review and provide the following information to assist in the review:

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Quality Roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicant</td>
<td>Michael Klar</td>
</tr>
<tr>
<td>Mailing Address</td>
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<tr>
<td>Telephone</td>
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<tr>
<td>Email</td>
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</tbody>
</table>

Property Owner(s), if different from Applicant: L & L Developments

| Mailing Address               |               |
| Telephone                     |               |
| Email                         |               |

Applicant's Legal Interest in Property: Future Tenant

### LOCATION OF PROPERTY:

| Street Address                | 3916 Eleven Mile Road, Berkley, MI 48237 |
| Nearest Cross Streets         | Cummings                                    |
| Sidewell Number(s)            | 25-18-353-030 and 25-18-353-027            |
PLEASE COMPLETE THE FOLLOWING CHART:

<table>
<thead>
<tr>
<th>Type of Development</th>
<th>Number of Units</th>
<th>Gross Floor Area</th>
<th>Number of Parking Spaces On Site</th>
<th>Number of Employees on Largest Shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attached Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>686 G, 481 U</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
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<tr>
<td>Industrial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Retail</td>
<td>5724 G, 2837 U</td>
<td>19</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

PROFESSIONALS WHO PREPARED PLANS:

A. Name: Stucky Vitale Architects
   Mailing Address: [Redacted]
   Telephone: [Redacted]
   Email: [Redacted]
   Design Responsibility (engineer, surveyor, architect, etc.): Architect

B. Name: Nowak and Fraus
   Mailing Address: [Redacted]
   Telephone: [Redacted]
   Email: [Redacted]
   Design Responsibility: Civil Engineer

SUBMIT THE FOLLOWING:

1. Fifteen (15) individually folded copies of the site plans, measuring 24" x 36", sealed by a registered architect, engineer, or surveyor.
2. A pdf file of the site plans, submitted to the Community Development Director.
3. Proof of property ownership (title insurance policy or registered deed with County stamp).
4. Review comments or approval received from County, State or Federal agencies that have jurisdiction over the project, including, but not limited to:
   - Road Commission for Oakland County
   - MI Dept. of Transportation
   - Oakland County Health Division
   - MI Dept. of Environment, Great Lakes & Energy

Updated 07.01.2021
PLEASE NOTE: The applicant, or a designated representative, MUST BE PRESENT at all scheduled meetings, or the Site Plan may be tabled due to lack of representation.

Failure to provide true and accurate information on this application shall provide sufficient grounds to deny approval of a Site Plan Application or to revoke any permits granted subsequent to the site plan approval.

We encourage applicants to make a presentation of the proposed project to the Planning Commission and City Council, as appropriate. To assist in this effort, we have available for your use at meetings a projector, laptop computer and screen. This will allow the Planning Commission and audience to be fully engaged so they can give your project the attention it deserves. Planning Commission meetings are recorded and televised.

PROPERTY OWNER’S APPROVAL: (Initial each line)

[ ] I hereby authorize the employees and representatives of the City of Berkley to enter upon and conduct an inspection and investigation of the above-referenced property.

APPLICANT’S ENDORSEMENT: (Initial each line)

[ ] All information contained therein is true and accurate to the best of my knowledge.

[ ] I acknowledge that the Planning Commission will not review my application unless all information in this application and the Zoning Ordinance has been submitted. I further acknowledge that the City and its employees shall not be held liable for any claims that may arise as a result of acceptance, processing or approval of this site plan application.

[ ] I hereby acknowledge that if engineering or other reviews are required, additional fees must be submitted. Should the review fees be greater than the required minimum, sufficient additional charges will be imposed to satisfy the additional review fees. All fee obligations must be satisfied prior to permit approval.

If an application is withdrawn more than three (3) weeks prior to the meeting date, 90% of the fee will be refunded. If the application is withdrawn less than three (3) weeks prior to the meeting, no refund will be given.
Michael Klar
Signature of Applicant
Applicant Name (Print)

3/25/2022
Date

Linus Drogs
Signature of Property Owner Authorizing this Application
Date

Linus Drogs
Property Owner Name (Print)

OFFICE USE ONLY
Received 3/28/22 Reception # 00069704 Meeting Date Case # PSP-04-22
Fees: Site Plan Review $600 Façade Change: $200 Revision: $300
Extension $200 Engineering: Multi-family $1,500 + $30/unit
Escrow (New construction) $1,000 Commercial $1,000

Updated 07.01.2021
January 11, 2020

Mr. Steve E. Duczynski II  
Schostak Brothers & Company  
17800 Laurel Park Drive North  
Suite 200C  
Livonia, Michigan 48152  

Transmitted via e-mail: duczynskis@schostak.com (PDF File)

RE: Geotechnical Evaluation Report  
Quality Roots Site Improvements  
3916 Eleven Mile Road  
Berkley, Michigan  
SME Project 085599.00

Dear Mr. Duczynski:

We have completed the geotechnical evaluation for the Quality Roots Site Improvements project in Berkley, Michigan. This report presents the results of our observations and analyses, and our geotechnical engineering recommendations based on the information disclosed by the borings.

We appreciate the opportunity to be of service. If you have questions or require additional information, please contact me.

Sincerely,

SME

Joel W. Rinkel, PE  
Group Leader – Geotechnical Services
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**APPENDIX A**  
BORING LOCATION DIAGRAM (FIGURE NO. 1)  
BORING LOG TERMINOLOGY  
BORING LOGS (B1 THROUGH B4)  

**APPENDIX B**  
IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT  
GENERAL COMMENTS  
LABORATORY TESTING PROCEDURES
1. INTRODUCTION

This report presents the results of the geotechnical evaluation performed by SME for the Quality Roots Site Improvements project. We performed this evaluation in general accordance with the scope of services outlined in SME Proposal No. P03621.20, dated November 18, 2020. Our services for this evaluation were authorized by Schostak Brothers & Company (Schostak).

To assist with our evaluation and preparation of this report, Schostak provided SME a drawing titled, “ALTA/NSPS Land Title / Topographic Survey,” (Sheet No. 1) with latest revision date of April 14, 2020, prepared by NF Engineers, Inc (NFE).

1.1 SITE CONDITIONS

The project site consists of an existing commercial property located at 3916 W. 11 Mile Road in Berkley, Michigan. The approximate location of the site is depicted on the Location Map inset on the Boring Location Diagram (Figure No.1) included in Appendix A.

The site consists of several adjoining land parcels (Lot Nos. 274 – 277 and 279) bisected by a 16-foot wide public alleyway. Included in the site is a commercial building, pavements (drive lane, parking, and dumpster pad), and grass-covered areas. The commercial building is a single-story structure with a footprint area of 5,674 square-feet and finished floor elevation of 688.35 feet. A relatively small shed (under 500 square-feet) is located on the northern portion of the site. An aerial image depicting recent site conditions is provided below, for reference.

FIGURE NO. 1 – SITE AERIAL MARCH 14, 2020

Based on our review of the topographic information illustrated on the referenced topographic survey, existing surface grades vary between approximate elevations 687 and 688 feet across the site.
1.2 PROJECT DESCRIPTION

The project consists of repurposing the site for continued commercial usage, including new pavements and dumpster enclosure. We understand a permeable pavement system is desirable. The new enclosure will be a relatively small (under 750 square-feet) single-story slab-on-grade structure. Based on the existing ground surface levels, we anticipate cuts and fills of less than 1 foot will be required to achieve final subgrade levels. Please contact SME if these design assumptions are incorrect.

2. EVALUATION PROCEDURES

2.1 FIELD EXPLORATION

SME completed four hand auger borings (B1 through B4) at the site on November 25, 2020. The borings were advanced to depths of 6 to 10 feet below existing grades. The approximate as-drilled boring locations are shown on Figure No. 1.

NFE determined the planned number and locations of the borings. SME located the planned borings in the field referencing existing site features. SME retained a private underground locating service (GPRS) to review a 10-foot radius around the proposed boring locations using a ground penetrating radar unit as well as an electromagnetic line locator. The final boring locations were adjusted as needed from the planned locations to maintain an appropriate distance from existing utilities. SME estimated the existing surface elevations at the as-drilled boring locations to the nearest 1-foot using available topographic data shown on the referenced drawing.

The hand augers were then advanced using a 2-inch diameter bucket auger in conjunction with Dynamic Cone Penetrometer (DCP) testing. The pavement at the borings B3 and B4 was cored by FMG Concrete Cutting, Inc. prior to advancing the boreholes. The DCP test consisted of dropping a 10-pound slide hammer that falls 24 inches and drives a rod with a 1-1/8 inch conical tip into the subgrade. Portions of the recovered auger cuttings were sealed in glass jars.

Groundwater level observations in the boreholes were recorded during drilling and immediately after completion of drilling. The boreholes were backfilled with auger cuttings after completion and collection of groundwater readings. Therefore, long-term groundwater observations are not available from the borings. Borings located in pavement areas were capped with asphalt cold patch after backfilling.

Soil samples recovered from the field exploration were returned to the SME laboratory for further observation and testing.

2.2 LABORATORY TESTING

The laboratory testing program consisted of visual soil classification on recovered samples in general accordance with ASTM D-2488. Moisture content and hand penetrometer tests were performed on portions of cohesive samples obtained. Loss-On-Ignition (LOI) tests were performed on samples of the existing fill suspected of containing organic material. The Laboratory Testing Procedures in Appendix B provides descriptions of the laboratory tests performed. Based on the laboratory testing, we assigned a group symbol to the various soil strata encountered based on the Unified Soil Classification System (USCS).

Upon completion of the laboratory testing, we prepared boring logs including the soil descriptions, penetration resistances, pertinent field observations, the results of the laboratory testing, and the existing ground surface elevations. The boring logs are included in Appendix A. Explanations of symbols and terms used on the boring logs are provided on the Boring Log Terminology sheet included in Appendix A.

Soil samples are normally retained in our laboratory for 60 days and are then disposed, unless instructed otherwise.
3. SUBSURFACE CONDITIONS

3.1 SOIL CONDITIONS

The soil conditions encountered at the boring locations generally consisted of surficial materials (pavement or topsoil) overlying existing fill underlain by natural clays extending to the explored depths. A generalized summary of the materials encountered at the boring locations, beginning at the existing ground surface and proceeding downward, is provided below.

STRATUM 1 – SURFICIAL MATERIALS

Topsoil ranging from about 2 to 3 inches in thickness was present at borings B1 and B2 performed at the north end of the site. Asphalt ranging from about 2 to 3-1/2 inches in thickness was present at borings B3 and B4 performed in pavement areas closer to the commercial building.

STRATUM 2 – EXISTING FILL

The existing fill consisted of clay soils containing interbedded sand layers and extended to depths of 2 to 5 feet below existing grades at the boring locations. The existing clay fill exhibited stiff to very stiff consistencies with undrained shear strengths ranging from 1.5 to 3.5 kips-per-square-foot (ksf) and had moisture contents ranging from 13 to 23 percent. Some of the existing fill appeared to contain organics. The existing sand fill was generally encountered in a medium dense to dense condition with DCP values ranging from 18 to greater than 50 blows-per-half-foot. Layers of buried topsoil were encountered within the existing fill. LOI tests performed on obtained samples of the existing fill indicated organic contents of 3.6 and 6.0 percent.

STRATUM 3 – NATURAL CLAYS

Natural clays were encountered underlying the existing fill and extended to the explored depths. Interbedded sand layers were encountered within the overall cohesive soil profile. The natural clays exhibited medium to very stiff consistencies with undrained shear strengths ranging from 1.0 to 3.5 kips-per-square-foot (ksf) and had moisture contents ranging from 14 to 21 percent.

GENERAL NOTES

Consider thickness measurements of surficial materials reported on the boring logs approximate since mixing of the surficial materials with the underlying subgrade can occur while advancing the augers, and it is difficult to measure the thickness of surface materials in small-diameter boreholes. Therefore, if more accurate surficial material thickness measurements are required, we recommend performing additional evaluations such as additional pavement cores and hand auger borings or test pit excavations.

It is sometimes difficult to distinguish between fill and natural soils based on samples and cuttings from small-diameter boreholes, especially when portions of the fill do not contain man-made materials, debris, topsoil or organic layers, and when the fill appears similar in composition to the local natural soils. Therefore, consider the delineation of fill described above and on the appended boring logs approximate only. A more comprehensive evaluation of the extent and composition of the existing fill could be made by reviewing former site topography plans and by observing test pit excavations.

The soil profile described above and included on the boring logs are generalized descriptions of the conditions encountered. The stratification depths described above and shown on the logs are intended to indicate a zone of transition from one soil type to another. They are not intended to show exact depths of change from one soil type to another. The soil descriptions are based on visual classification of the soils encountered. Soil conditions may vary between or away from the boring locations. Please refer to the boring logs for the soil conditions at the specific locations.
3.2 GROUNDWATER CONDITIONS

Groundwater was encountered in borings B1 and B4 performed for this evaluation. Groundwater was encountered in boring B1 at about 8 feet below existing grades during drilling and measured at about 9 feet below existing grades upon completion (corresponding to approximate elevation 681 and 680 feet, respectively). Groundwater was encountered in boring B4 at about 1 feet below existing grades during drilling and measured at about 3.5 feet below existing grades upon completion (corresponding to approximate elevation 687 and 684.5 feet, respectively).

The encountered groundwater at boring B1 was present within sand seams interbedded within the natural clay soils. At boring B4 the encountered groundwater is considered perched within the existing fill overlying the less permeable natural clay soils. In cohesive soils (i.e., clays and clayey silts), a long time may be required for the groundwater level in the borehole to reach an equilibrium position. Therefore, the use of groundwater observation wells (piezometers) can be necessary to more accurately determine the hydrostatic groundwater level within soil profiles containing clays.

Expect hydrostatic groundwater levels/elevations to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater conditions indicated by the borings represent conditions at the time the readings were taken. The groundwater levels at the time of construction may vary from those conditions noted on the boring logs. If more information regarding groundwater levels at this site is required, then we recommend performing additional subsurface assessment(s).

4. ANALYSIS AND RECOMMENDATIONS

Based on the soil borings, subsurface conditions are favorable for the proposed improvements provided that proper engineering controls, and proper construction methods, are properly incorporated, implemented and completed. The site is predominantly clayey, so stormwater infiltration into the subgrade is not practical. Rather, an engineered system would be required to control water from precipitation, surface runoff, perched groundwater, etc. Soil strength appears generally adequate for support of the proposed improvements, provided the subgrade is properly prepared during construction.

Refer to the following comments and recommendations for the proposed improvements for this project.

4.1 SITE PREPARATION AND EARTHWORK

Site preparation is expected to consist of removal of the existing surficial materials (e.g., pavements, topsoil, etc.), building elements, buried slabs/obstructions, and other site features, compaction of the subgrade using large vibratory rollers, placement of engineered fill, and then the commencement of below-grade construction. Detailed recommendations are provided below.

4.1.1 EXISTING FILL CONSIDERATIONS

We consider the existing fill to be undocumented since we do not have information on the origin of the fill, including data on placement and compaction. For foundation construction, due to the variabilities associated with undocumented existing fill and the depth of the existing fill, we recommend the existing fill be removed (i.e., undercut) to bear directly on suitable natural clay, or be widened and backfilled with engineered fill as needed to re-establish the design foundation bearing elevation. Refer to Section 4.2 of this report for information.
Regarding (non-critical) floor slabs and pavements, the existing fill can be considered for support of grade slabs and pavements provided the Owner accepts an elevated risk for poor performance (e.g. settlement, cracking) of slabs/pavements constructed over the existing fill. This risk can be reduced via proper subgrade preparation and evaluation during construction (as described below) and provided site grades are raised no more than one foot above the existing ground surface. We recommend retaining SME to provide construction materials services to verify proper subgrade preparation methods, and to further test the existing subgrade, to mitigate this risk.

Typical construction practice is to construct pavements and non-critical (and lightly-loaded) floor slabs over existing (compacted, relatively inorganic, minimal debris, non-expansive, non-reactive) fill, provided the fill is properly prepared during construction. However, it is the Owner’s responsibility to make decisions on how to address existing fill and other soil/groundwater related conditions. For example, if the Owner is not willing to accept the risk for poor performance from the existing fill, then the existing fill must be undercut beneath the entire zone of influence of the proposed improvements and replaced with engineered fill. While this option would be costly, we would be pleased to provide additional recommendations for mass removal and replacement of the existing fill soils if requested. The existing fill had organic contents of 3.6 and 6.0 percent for the tested samples. Organic contents greater than about 4.0 percent are generally considered elevated and at risk for post-construction settlement, particularly if the organic containing soils are near (e.g. within two feet of) design final grades. If the existing fill will remain in-place for support of floor slabs, further evaluation of the existing fill during construction must be conducted by SME. Further evaluation includes observing the condition of the existing fill in hand-auger borings or shallow test pits, testing the existing fill several feet below the subgrade surface using a cone penetrometer, observing the condition of the existing fill in the sides of the foundation excavations, and observing the response of the surface of the existing fill when subjected to a proofroll. Suspect existing fill materials observed during the evaluation and testing need be further evaluated by performing additional hand-auger borings and/or test pits and the contractor need to be prepared to assist SME, as needed. Existing fill to remain in-place must be of sufficient strength and free of deleterious materials such as excessive debris and organics. The risk for additional settlement after construction increases when the poorly compacted fill soils are left in-place and are not sufficiently improved, or when debris-laden fills are left in-place and the debris collapses in on itself (or the surrounding soil migrates into the gaps between the debris) over time. Unsuitable existing fill unable to be improved in-place shall be removed (i.e., undercut) and replaced with engineered fill placed and compacted per the requirements outlined in Section 4.1.4 of this report.

The recommendations provided in the following report sections are based on the assumption existing fill will be undercut beneath foundations, SME will be retained to provide construction materials services, the Owner accepts the risks of poor performance of the floor slab, and suitable existing fill will remain in-place and be used to support floor slabs. Please contact SME if our assumptions are incorrect so we can update our report as necessary.

### 4.1.2 SITE SUBGRADE PREPARATION

Following demolition of the existing site features, including removal of existing pavements, topsoil, and unsuitable materials, the underlying subgrade is expected to consist of mixed clay and sand fill soils. Completely remove existing buried structural elements associated with previous construction at the site from within the proposed development areas and backfill with engineered fill. Reroute existing utilities outside of the proposed development areas and backfill with engineered fill.

After stripping and removal of unsuitable materials, and making cuts to design subgrade levels, the exposed subgrade needs to be uniformly compacted using large construction equipment, as the fill and natural soil conditions near the surface varied in condition/consistency. Take care during compaction not to damage nearby existing structures and underground utilities. As predominantly silty and clayey soil conditions are expected, we recommend using large, sheepfoot vibratory rollers for the compaction operations. We recommend at least several passes be made with the compaction equipment. In some areas, moisture conditioning and/or undercutting may be necessary to enhance the effectiveness of the compaction operation.
After compaction, we recommend the exposed subgrade be proofrolled in the presence of SME. Proofroll using a fully-loaded, tandem-axle dump truck or other similar pneumatic-tire construction equipment. Improve areas of unsuitable (e.g., loose) subgrade revealed during proofrolling by compacting in-place, if feasible. Soils unable to be suitably improved in-place must be removed (undercut) and replaced with engineered fill.

We recommend performing proofroll test(s) on a regular basis throughout the site earthwork operations. The purpose for the proofroll tests are to verify compaction and subgrade stability prior to placement of additional fill/pavements/slabs, etc. As subgrade conditions can change due to changes in weather, traffic, or other factors, we recommend placing the new fill/pavements/slabs soon after a successful proofroll test. We also recommend evaluating the intensity and type of proofrolling on a case-by-case basis. For example, when proofrolling engineered fill subgrade that has been uniformly placed and properly compacted (and remains in an undisturbed condition), wheel spacing of about 10 to 20 feet is typically acceptable. For proofrolling subgrade where compaction is relatively unknown, wheel spacing of less than one foot (e.g. continuous coverage; and possibly multiple passes) may be necessary to assist with the compaction process while performing the proofroll test.

The subgrade soils are sensitive to disturbance when exposed to water. If the subgrade is exposed to water, it may be necessary to improve the disturbed subgrade or remove and replace the soils with engineered fill, crushed aggregate or crushed concrete. Placement of crushed aggregate or crushed concrete, possibly with a geotextile for separation, is a traditional treatment to protect subgrades.

In the case of more severe subgrade disturbance, particularly if the construction will occur during the winter and early spring months, chemical stabilization of the subgrade could be considered. SME can provide additional information about chemical stabilization using lime or cement, if desired.

After the exposed subgrade is evaluated (as described above) and improved as necessary, engineered fill may be placed on the exposed subgrade to establish final design subgrade levels. See Section 4.1.4 of this report for materials and compaction requirements for engineered fill.

### 4.1.3 ENGINEERED FILL REQUIREMENTS

Fill placed within structural areas, including utility trench backfill, must be an approved material, free of frozen soil, organics, construction debris, over-sized materials, reactive/expansive materials, or other unsuitable materials. Compact fill placed in structural areas to a minimum of 95 percent of the maximum dry density determined in accordance with the Modified Proctor test. Spread fill in level layers with a loose thickness appropriate for the type of equipment used to obtain compaction. Thinner lifts will be required in confined spaces, when clay/clayey fill is used, and where compaction is achieved with hand-operated equipment. Sand fill can be compacted with a smooth-drum vibratory roller or vibratory plate compactors, including either walk-behind types or plate compactors mounted on a backhoe or excavator (i.e., hoe-pac). Clay fill can be compacted with sheepsfoot rollers, or large pneumatic tire construction equipment (e.g. fully loaded front-end loader) at a moisture content between the optimum and two percent below the optimum.

Based on the information from the borings, portions of the existing fill encountered at the boring locations are considered suitable for reuse as site engineered fill provided the material meets the requirements in the previous paragraph and is at a suitable moisture content for compaction. The on-site clays, and wet sands, will likely require moisture conditioning (i.e., aeration and drying) to achieve suitable moisture levels for proper compaction. We do not recommend reusing asphalt millings as engineered fill directly below new pavements; however, some asphalt millings (e.g. 50/50 mix with inorganic soil) could be reused below the proposed aggregate base level in the proposed pavement areas. Also, we recommend limiting the organic content of any general engineered fill soils to less than 4 percent. Aggregate bases and/or leveling courses must be inorganic.
The site clays (with a USCS designation of “CL”) and sands with silt contents in excess of 10 percent (with USCS designations of “SM” and “SP-SM”) will be difficult to compact in confined areas, such as in utility trenches and foundation excavations, where smaller, walk-behind type compaction equipment is used. Do not use clayey and silty soils as engineered fill where drainage is required. Clayey and silty soils can be used as engineered fill in open areas where compaction is achieved with large equipment and where moisture conditioning is feasible. During wetter/colder periods of the year when moisture conditioning of the clayey and silty soils will likely not be feasible, we expect it will be necessary to import granular fill to the site and waste the clayey and silty soils on non-structural areas of the site.

In utility trenches or foundation excavations, and in other areas where compaction is accomplished primarily by smaller plate compaction equipment, we recommend an approved granular material containing relatively low amounts of silt or clay, such as MDOT Class II granular material, be used as backfill. Thinner lift sizes may be required to achieve the required dry density in areas where smaller compaction equipment is used. We also recommend MDOT Class II granular material be used in areas requiring drainage or where the fill will serve as a capillary separation. The soils encountered in the borings, at locations and within depths where cuts are anticipated, are not expected to meet the gradational requirements of MDOT Class II granular material. Therefore, we anticipate soils conforming to MDOT Class II granular material will need to be imported to the site.

Coarse crushed aggregate used to backfill undercuts or to stabilize subgrades must consist of a well-graded crushed natural aggregate or crushed concrete ranging from 1 to 3 inches in nominal size with no more than 7 percent by weight passing the No. 200 sieve. In cases where granular engineered fill will be placed over the crushed aggregate, top the surface of the coarse crushed material with a layer of at least 6 inches of dense-graded aggregate, such as MDOT 21AA, or covered with a suitable non-woven geotextile, to prevent migration of the granular materials into the coarser crushed aggregate.

For trenches and other excavations, we recommend the upper 18 inches of backfill consist of soils that are similar with the surrounding subgrade. The purpose for this is to limit mixing of different soil types near final subgrade levels.

4.2 SHALLOW FOUNDATIONS

Support the proposed dumpster enclosure on shallow spread foundations bearing on suitable natural clays, or on engineered fill placed over suitable natural clays. Use a maximum net allowable soil bearing pressure of 2,000 pounds per square-foot (psf) for design of shallow foundations bearing on suitable soils as described above. According to boring B1, suitable natural soils are anticipated to be encountered at/near design foundation bearing levels. The design net allowable soil bearing pressure will achieve a global safety factor of three or more (for general shear failure).

Once each foundation area is exposed, SME must observe and test the foundation subgrades to verify suitable bearing conditions are present. Existing fill was encountered to a depth of about 3 feet below existing grades at boring B1 performed in the enclosure footprint. Assuming foundations will bear at frost depth (i.e., at 3.5-feet below final grades), we anticipate the existing fill will be removed during foundation excavation and undercutting will not be required. If present, undercut unsuitable soils encountered in foundation areas that are not able to be improved in-placed to expose underlying suitable soils. Foundations can then be constructed to bear directly at this lower level where suitable subgrade is encountered, or the design foundation bearing level can be reestablished using engineered fill or crushed aggregate placed as backfill in the undercut excavation. Where backfilling to the design foundation bearing level is performed, extend the undercut excavation to remove unsuitable soils laterally on a two vertical to one horizontal slope from the edge of the foundation. Please refer to the following Typical Foundation Undercutting Diagram.
Situate foundations a minimum of 42 inches below final site grade in unheated areas for protection against frost action during normal winters. Protect the foundations and proposed bearing soils from freezing during construction if work occurs in the winter months.

Slope back foundation excavations and form the foundations to maintain vertical foundation sides. Remove caved soils from the foundation bearing surfaces before placing concrete. Place foundation concrete as soon as practical after foundation excavations have been completed and the design bearing pressure verified to reduce the potential for disturbance of the foundation subgrade.

For bearing capacity and settlement considerations, design continuous (wall) foundations with a minimum width of 16 inches and isolated (column) foundations with a minimum dimension of 30 inches. Given the higher anticipated loads for the parking structure, we expect the design bearing pressure may govern the size of the foundation.

We estimate total settlement for shallow spread or continuous foundations using the recommended maximum net allowable bearing pressure and bearing on suitable soils, as described above, to be 1 inch or less and differential settlements to not exceed about one-half the total settlement for similarly loaded foundations. We base the settlement estimates on the available boring information, the estimated structural loads, our experience with similar structures and soil conditions, and field verification of suitable bearing soils by SME.

### 4.3 INFILTRATION CONSIDERATIONS

The existing fill soils and the underlying natural clays at this site are essentially impermeable with respect to a precipitation event. While there are some granular soils interbedded within the existing clayey fill, the granular soils contained an appreciable amount of soil fines (silt, clay), indicating relatively low infiltration characteristics. In addition, the granular fill soils are likely limited in lateral extent and, accordingly, infiltration rates into the existing fill are anticipated to decrease with time and storm intensity as the void spaces within the granular soils would quickly become saturated. Accordingly, the existing soil profile at this site is judged to have extremely limited infiltration capacity and is considered unreliable for design of a permeable pavement system and/or a stormwater infiltration system.

The use of a permeable pavement at this site will require an engineered system (e.g. open graded aggregate with a storm water outlet). For stormwater runoff, it may be possible to temporarily store some of the stormwater in an engineered system before being discharged into the stormwater collection system. Or, an underground stormwater basin is also an option for stormwater detention.
4.4 PERMEABLE PAVER RECOMMENDATIONS

Permeable pavers are being considered for a portion of this project. Based on the relatively impervious existing subgrade, a layer of coarse crushed stone will be required as the aggregate base and leveling course for this site. For separation purposes, a layer of heavy-duty geotextile fabric (e.g. Mirafi 180N, or approved equal) will be required between the crushed stone and the surrounding subgrade.

We recommend aggregate base/leveling course below the permeable pavers consist of at least 12 inches of MDOT 6A crushed (and washed) stone below three inches of MDOT 17A crushed (and washed) stone. Peastone is another option in lieu of the 17A crushed stone, provided the difficulties with properly placing/compacting rounded peastone can be addressed during construction. Prior to placing the 6A crushed stone, it will be critical to properly compact, proofroll, and then fine-grade the existing subgrade so that the existing subgrade surface drains toward the designated low-point(s) at the stormwater collection location(s). This will also help maintain a uniform thickness of crushed stone for added subgrade stability.

It will be important to thoroughly, and uniformly, compact the crushed stone so it is stable under construction traffic. Any disturbed crushed stone will need to be thoroughly recompressed prior to paver placement. We recommend an SME representative be onsite during the compaction operations so that subgrade compaction can be documented and recommendations regarding compaction can be made in the field at the time of the compaction process.

When considering storage capacity of stormwater in the crushed stone layer, we recommend using a porosity value of 0.2. The hydraulic gradient within the crushed stone layer (between stormwater point(s) of entry, and point(s) of discharge) will also need to be considered when designing for stormwater storage capacity. For extreme stormwater events, it may also be practical to temporarily store some stormwater above the paver surface for a short period of time.

It is important to note that, as with any permeable pavement system, any water that freezes below the pavers has the potential to result in undesirable frost-heave on the paver system. In some cases, weather conditions may cause significant frost-heave to occur before the stormwater can travel through the crushed stone and offsite via the stormwater discharge outlet(s). For pavers that experience frost heave, the pavers can be releveled (and the subgrade recompressed) once the frost subsides. In general, the thicker the crushed stone layer, the less likely that frost-heave would be a concern. However, a permanent heat-melt system below the exterior pavements would be required to prevent the subgrade (and overlying pavers/pavements) from freezing.

We recommend using only rigid piping (e.g. schedule 40 PVC, or better) below the proposed pavements at this site. The crushed stone backfill increases the potential for installation damage to piping. Also, we recommend including a filter sock around any perforated rigid piping.

We recommend using pavers that are specifically manufactured for use as an exterior permeable paver system in a northern climate. Permeable pavers will need to be at least three inches thick, and have a design compressive strength of at least 8,000 psi. Permeable pavers will also need to have a functioning permeable joint material. Also, edge restraints will be required to prevent lateral shifting of the pavers. In addition, we recommend pavers be designed for relatively ‘flat’ surfaces (e.g. less than 2 percent slopes) to limit the potential for additional lateral shifting. Expect some lateral shifting of the pavers to occur if the edge(s) of the pavers are also the low spot(s) in the paver surface and are not restrained by a rigid pavement/structure.

Regular maintenance is required for a permeable paver system. It is important to keep drainage pathways open, and abundant, so that stormwater can quickly travel below the pavers and to the stormwater discharge outlet(s).
4.5 CONSTRUCTION CONSIDERATIONS

The contractor must take precautions to protect nearby existing buildings, pavements, and utilities during construction. Exercise care during the excavating and compacting operations so excessive vibrations do not cause settlement of nearby existing buildings, pavements, and utilities, and to avoid undermining existing utilities, floor slabs, or foundations when performing excavations for the proposed construction.

Significant groundwater seepage is not expected to be encountered in site excavations. However, seepage from precipitation, surface runoff, perched groundwater sources, or other events could be encountered above this elevation. Control water accumulations in excavations above the groundwater level using standard sump pit and pumping procedures. Utilize a working surface of either crushed aggregate or crushed concrete to protect the exposed subgrade where seepage is encountered.

Remove ponded surface water and prevent run-off from reaching foundation excavations and areas of prepared subgrade. Establish positive surface drainage at the onset of construction to mitigate the potential for subgrade disturbance.

The existing fill at this site will be sensitive to disturbance when trafficked, especially when these soils become wet. If the subgrade is disturbed, it will be necessary to disc, aerate, and recollapse the disturbed existing fill, or to remove and replace the disturbed soils with engineered fill, crushed aggregate, or crushed concrete. To protect areas of prepared subgrade from disturbance and to create dependable haul routes and material laydown areas, placement of crushed aggregate or crushed concrete, possibly with a geotextile for separation, could be required.

The contractor must provide safely sloped excavations or adequately constructed and braced shoring systems in accordance with federal, state and local safety regulations for individuals working in an excavation exposing them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, use appropriate shoring to resist the extra pressure due to the superimposed loads.

Handling, transportation and disposal of excavated materials and groundwater need to be performed in accordance with applicable environmental regulatory requirements.

5. SIGNATURES

Report Prepared By:

Jeremy S. Wahlstrom
Project Engineer

Report Reviewed By:

Joel W. Rinkel, PE
Group Leader – Geotechnical Services
APPENDIX A
BORING LOCATION DIAGRAM (FIGURE NO. 1)
BORING LOG TERMINOLOGY
BORING LOGS (B1 THROUGH B4)
### Unified Soil Classification and Symbol Chart

#### Coarse-Grained Soil
- **Clean Gravel** (Less than 5% fines)
- **Gravel**
  - More than 50% of coarse fraction larger than No. 4 sieve size
- **Silty gravel; gravel**
- **Gravel with fines** (More than 12% fines)
- **Silty sand; sand**
- **Sandstone**
- **Peat and other highly organic soil**

#### Fine-Grained Soil
- **Clean Sand** (Less than 5% fines)
- **Sand**
  - 50% or more of coarse fraction smaller than No. 4 sieve size
- **Sandy soil; clay**
- **Clay**
- **Silty soil; silt**
- **Siltstone**
- **Highly organic soil**
  - Peat and other highly organic soil

#### Other Material Symbols
- **Topsoil**
- **Void**
- **Sandstone**
- **Asphalt Concrete**
- **Glacial Till**
- **Siltstone**
- **Aggregate Base**
- **Coal**
- **Limestone**
- **Portland Cement Concrete**
- **Shale**
- **Fill**

### Laboratory Classification Criteria

<table>
<thead>
<tr>
<th>GW</th>
<th>D&lt;sub&gt;10&lt;/sub&gt;</th>
<th>D&lt;sub&gt;30&lt;/sub&gt;</th>
<th>D&lt;sub&gt;60&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>Not meeting all gradation requirements for GW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| GM | Atterberg limits below “A” line or PI less than 4 |
| GC | Atterberg limits above “A” line with PI greater than 7 |
| SC | Atterberg limits above “A” line with PI greater than 7 |

### Visual Manual Procedure

When laboratory tests are not performed to confirm the classification of soils exhibiting borderline classifications, the two possible classifications would be separated with a slash, as follows:

For soils where it is difficult to distinguish if it is a coarse or fine-grained soil:
- **SC/CL** (CLAYEY SAND to SANDY LEAN CLAY)
- **SM/ML** (SILTY SAND to SANDY SILT)
- **Gc-GC** (CLAYEY GRAVEL to GRAVELY LEAN CLAY)
- **GM/ML** (SILTY GRAVEL to GRAVELY SILT)

For soils where it is difficult to distinguish if it is sand or gravel, poorly or well-graded sand or gravel; silt or clay; or plastic or nonplastic silty or clay:
- **SP/GP or SW/GW** (SAND with GRAVEL to GRAVEL with Sand)
- **SC/GC** (CLAYEY SAND to CLAYEY Silt)
- **SM/GM** (SILTY SAND to SILTY GRAVEL with Sand)
- **SW/SP** (SAND or Silt with GRAVEL)
- **GP/GW** (GRAVEL or GRAVEL with Sand)
- **SC/GM** (CLAYEY SAND to CLAYEY Silt)
- **GM/GC** (SILTY to CLAYEY GRAVEL)
- **CL/ML** (SILTY CLAY to Silt)
- **ML/CL** (CLAYEY Silt to Silt)

### Drilling and Sampling Abbreviations

- **2ST** – Shelby Tube – 2” O.D.
- **3ST** – Shelby Tube – 3” O.D.
- **AS** – Auger Sample
- **GS** – Grab Sample
- **LS** – Liner Sample
- **NR** – No Recovery
- **PM** – Pressuremeter
- **RC** – Rock Core diameter, N.I. size, except where noted
- **SB** – Split Barrel Sample 1-3/8” I.D., 2” O.D., except where noted
- **VS** – Vane Shear
- **WS** – Wash Sample

### Depositional Features

- **Parting** – as much as 1/16 inch thick
- **Seam** – 1/16 inch to 1/2 inch thick
- **Layer** – 1/2 inch to 12 inches thick
- **Stratum** – greater than 12 inches thick
- **Pocket** – deposit of limited lateral extent
- **Lenticular deposit** – less than 1/16 inch thick
- **Hardpan/Till** – an unstratified, consolidated or cemented mixture of clay, silt, sand and/or gravel, the size and shape of the constituents vary widely
- **Lacustrine** – soil deposited by lake water
- **Motilled** – soil irregularly marked with spots of different colors that vary in number and size
- **Varved** – alternating partings or seams of silt and/or clay
- **Concretionary** – one or less per foot of thickness
- **Interbedded** – stratification or beds of rock lying between or alternating with other strata of a different nature

### Classification Terminology and Correlations

#### Cohesionless Soils

<table>
<thead>
<tr>
<th>Relative Density</th>
<th>N&lt;sub&gt;p&lt;/sub&gt; (N-Value) (Blows per foot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>0 to 4</td>
</tr>
<tr>
<td>Loose</td>
<td>5 to 10</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>11 to 30</td>
</tr>
<tr>
<td>Dense</td>
<td>31 to 50</td>
</tr>
<tr>
<td>Very Dense</td>
<td>51 to 80</td>
</tr>
<tr>
<td>Extremely Dense</td>
<td>Over 81</td>
</tr>
</tbody>
</table>

#### Cohesive Soils

<table>
<thead>
<tr>
<th>Consistency</th>
<th>N&lt;sub&gt;p&lt;/sub&gt; (N-Value) (Blows per foot)</th>
<th>Undrained Shear Strength (kips/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Silt</td>
<td>&lt;2</td>
<td>0.25 or less</td>
</tr>
<tr>
<td>Soft</td>
<td>2 - 4</td>
<td>0.25 to 0.50</td>
</tr>
<tr>
<td>Medium</td>
<td>5 - 8</td>
<td>&gt; 0.50 to 1.0</td>
</tr>
<tr>
<td>Silt</td>
<td>9 - 15</td>
<td>&gt; 1.0 to 2.0</td>
</tr>
<tr>
<td>Very Silt</td>
<td>16 - 30</td>
<td>&gt; 2.0 to 4.0</td>
</tr>
<tr>
<td>Hard</td>
<td>&gt; 30</td>
<td>&gt; 4.0 or greater</td>
</tr>
</tbody>
</table>

Standard Penetration 'N'-Value = Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split barrel sampler, except where noted. N60 values as reported on borings represent raw N-values corrected for hammer efficiency only.
Sample AS5 was too disturbed to perform shear strength testing.
Loss-On-Ignition (LOI) test performed on Sample SB2 indicates an organics content of about 6.0 percent.

NOTES: 1. The indicated stratification lines are approximate. The in-situ transitions between materials may be gradual.
2. The colors depicted on the symbolic profile are solely for visualization purposes and do not necessarily represent the in-situ colors encountered.
Sample AS1 was too disturbed to perform shear strength testing. Sample AS2 moisture content and shear strength tests were performed on a clay layer.
3 1/2 inches of ASPHALT PAVEMENT
FILL- Fine to Medium SAND- Trace Silt & Gravel- Brown- Moist to Wet- Medium Dense (SP)

FILL- TOPSOIL- Fine to Medium SILTY SAND- Occasional Clay Layers- Dark Brown- Moist-Medium Dense (SM)

FILL- Moist to Wet- Brown & Gray- Stiff- Medium Dense (Sc/Cl)

LEAN CLAY- Trace Sand & Gravel- Occasional Sand Seams- Brown & Gray- Very Stiff (CL)

END OF BORING AT 6.0 FEET.

Loss-On-Ignition (LOI) test performed on Sample SB2 indicates an organics content of about 3.6 percent.
APPENDIX B
IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT
GENERAL COMMENTS
LABORATORY TESTING PROCEDURES
Important Information about This Geotechnical-Engineering Report

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

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for This Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared solely for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:
- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. Read and refer to the report in full.

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:
- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, always inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. The geotechnical engineer who prepared this report cannot accept
responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related to This Report Are Professional Opinions
Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent
The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations only after observing actual subsurface conditions exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.

This Report Could Be Misinterpreted
Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:
• confer with other design-team members;
• help develop specifications;
• review pertinent elements of other design professionals’ plans and specifications; and
• be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance
Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, but be certain to note conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, only from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and be sure to allow enough time to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely
Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include 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 personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated subsurface environmental problems have led to project failures. If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold
While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. Geotechnical engineers are not building-envelope or mold specialists.
GENERAL COMMENTS

BASIS OF GEOTECHNICAL REPORT
This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design and/or evaluation of this project. If the project plans, design criteria, and other project information referenced in this report and utilized by SME to prepare our recommendations are changed, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or approved in writing by our office.

The discussions and recommendations submitted in this report are based on the available project information, described in this report, and the geotechnical data obtained from the field exploration at the locations indicated in the report. Variations in the soil and groundwater conditions commonly occur between or away from sampling locations. The nature and extent of the variations may not become evident until the time of construction. If significant variations are observed during construction, SME should be contacted to reevaluate the recommendations of this report. SME should be retained to continue our services through construction to observe and evaluate the actual subsurface conditions relative to the recommendations made in this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering. Specifically, field logs are prepared during the field exploration that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the report logs. The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

REVIEW OF DESIGN DETAILS, PLANS, AND SPECIFICATIONS
SME should be retained to review the design details, project plans, and specifications to verify those documents are consistent with the recommendations contained in this report.

REVIEW OF REPORT INFORMATION WITH PROJECT TEAM
Implementation of our recommendations may affect the design, construction, and performance of the proposed improvements, along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so that the issues are understood and applied in a manner consistent with the owner’s budget, tolerance of risk, and expectations for performance and maintenance.

FIELD VERIFICATION OF GEOTECHNICAL CONDITIONS
SME should be retained to verify the recommendations of this report are properly implemented during construction. This may avoid misinterpretation of our recommendations by other parties and will allow us to review and modify our recommendations if variations in the site subsurface conditions are encountered.

PROJECT INFORMATION FOR CONTRACTOR
This report and any future addenda or other reports regarding this site should be made available to prospective contractors prior to submitting their proposals for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. If the selected contractor encounters subsurface conditions during construction, which differ from those presented in this report, the contractor should promptly describe the nature and extent of the differing conditions in writing and SME should be notified so that we can verify those conditions. The construction contract should include provisions for dealing with differing conditions and contingency funds should be reserved for potential problems during earthwork and foundation construction. We would be pleased to assist you in developing the contract provisions based on our experience.

The contractor should be prepared to handle environmental conditions encountered at this site, which may affect the excavation, removal, or disposal of soil; dewatering of excavations; and health and safety of workers. Any Environmental Assessment reports prepared for this site should be made available for review by bidders and the successful contractor.

THIRD PARTY RELIANCE/REUSE OF THIS REPORT
This report has been prepared solely for the use of our Client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in the project, unless specifically allowed by SME in writing. SME also is not responsible for the interpretation by other parties of the geotechnical data and the recommendations provided herein.
LABORATORY TESTING PROCEDURES

VISUAL ENGINEERING CLASSIFICATION

Visual classification was performed on recovered samples. The appended General Notes and Unified Soil Classification System (USCS) sheets include a brief summary of the general method used visually classify the soil and assign an appropriate USCS group symbol. The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various strata on the boring logs appended to this report. The soil descriptions developed from visual classifications are sometimes modified to reflect the results of laboratory testing.

MOISTURE CONTENT

Moisture content tests were performed by weighing samples from the field at their in-situ moisture condition. These samples were then dried at a constant temperature (approximately 110º C) overnight in an oven. After drying, the samples were weighed to determine the dry weight of the sample and the weight of the water that was expelled during drying. The moisture content of the specimen is expressed as a percent and is the weight of the water compared to the dry weight of the specimen.

HAND PENETROMETER TESTS

In the hand penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength (based on the hand penetrometer test) presented on the boring logs is reported in units of kips per square-foot (ksf).

TORVANE SHEAR TESTS

In the Torvane test, the shear strength of a low strength, cohesive soil sample is estimated by measuring the resistance of the sample to a torque applied through vanes inserted into the sample. The undrained shear strength of the samples is measured from the maximum torque required to shear the sample and is reported in units of kips per square-foot (ksf).

LOSS-ON-IGNITION (ORGANIC CONTENT) TESTS

Loss-on-ignition (LOI) tests are conducted by first weighing the sample and then heating the sample to dry the moisture from the sample (in the same manner as determining the moisture content of the soil). The sample is then re-weighed to determine the dry weight and then heated for 4 hours in a muffle furnace at a high temperature (approximately 440º C). After cooling, the sample is re-weighed to calculate the amount of ash remaining, which in turn is used to determine the amount of organic matter burned from the original dry sample. The organic matter content of the specimen is expressed as a percent compared to the dry weight of the sample.

ATTERBERG LIMITS TESTS

Atterberg limits tests consist of two components. The plastic limit of a cohesive sample is determined by rolling the sample into a thread and the plastic limit is the moisture content where a 1/8-inch thread begins to crumble. The liquid limit is determined by placing a ½-inch thick soil pat into the liquid limits cup and using a grooving tool to divide the soil pat in half. The cup is then tapped on the base of the liquid limits device using a crank handle. The number of drops of the cup to close the gap formed by the grooving tool ½ inch is recorded along with the corresponding moisture content of the sample. This procedure is repeated several times at different moisture contents and a graph of moisture content and the corresponding number of blows is plotted. The liquid limit is defined as the moisture content at a nominal 25 drops of the cup. From this test, the plasticity index can be determined by subtracting the plastic limit from the liquid limit.
Passionate People Building and Revitalizing our World
QUALITY ROOTS | BERKLEY
PROVISIONING CENTER
3916 ELEVEN MILE ROAD
BERKLEY, MI 48237

QUALITY ROOTS - RETAIL
SECOND FLOOR
= 686 SF
EXISTING (TENANT B) - BUSINESS
OFF STREET PARKING REQUIREMENTS
(USEABLE FLOOR AREA):
SEC. 138-217 BERKLEY ORDINANCE
FIRST FLOOR
= 2,837 SF
· OFFICE: 102 SF
· RECEIVING ROOM: 236 SF
· TRANSACTION AREA: 394 SF
· SHOWROOM: 1,672 SF
· WAITING ROOM: 375 SF
· CHECK IN: 58 SF
2,837/ 225 = 12.61 = 13 PARKING STALLS
SECOND FLOOR
= 481 SF
· OFFICE: 300 USF
481/225 = 2.14 = 3 PARKING STALLS
13 + 3 = 16 PARKING STALLS
SEC. 138-268 BERKLEY ORDINANCE: PARKING CREDIT
Bicycle parking may be used to reduce the number of required
off-street parking spaces. Existing developments may elect to reduce
the required off-street parking by two car parking spaces by providing
four bicycle parking spaces (i.e., by installing two inverted U, loop
style, or other approved style of bicycle rack).
REQUIRED PARKING = 16 - 2 = 14 SPACES
PROVIDED PARKING = 19 SPACES
City of Berkley, Oakland County, Michigan
SITE PLAN DOCUMENTS
Prepared For Quality Roots
PART OF THE SW 1/4 OF SECTION 18, CITY OF BERKLEY, OAKLAND COUNTY, MICHIGAN

PROJECT NAME: Quality Roots
Berkley

LEGAL DESCRIPTION - PER TITLE COMMITMENT
LAND SITUATED IN THE CITY OF BERKLEY, COUNTY OF OAKLAND, STATE OF MICHIGAN, DESCRIBED AS FOLLOWS:
LOTS 274, 275, 276, 277 AND 279, THOMAS PARK, ACCORDING TO THE PLAT THEREOF, AS RECORDED IN LIBER 29 OF PLATS, PAGE 19, OAKLAND COUNTY RECORDS.

ADDRESS: 3916 W 11 MILE ROAD, BERKLEY, MI 48072
TAX ID NUMBER: 25-18-353-030 (LOTS 274-277)
25-18-353-027 (LOT 279)

OWNER: Schostak Brothers & Company Inc.
CONTACT: Stephen J. Duranek
Tel: (248) 262-1000 (Office)
Tel: (248) 357-8272 (Direct)

DEVELOPER: Quality Roots
PROJECT NAME: Quality Roots
Berkley

ARCHITECT: Stucky Vitale Architects
CONTACT: Andrew J. Darkef
P: (248) 546-6700
C: (248) 227-5880

CIVIL ENGINEER / LANDSCAPE ARCHITECT: NOWAK & FRAUS ENGINEERS
ADDRESS: 46777 Woodward Ave.
Pontiac, MI 48342-5032
Tel: (248) 332-7931
Fax: (248) 332-8257
CONTACT: Paul Tulikangas, PE
Tel: (248) 332-7931
Fax: (248) 332-8257

OWNER: Schostak Brothers & Company Inc.
CONTACT: Stephen E. Duczynski
Tel: (248) 262-1000 (Office)
Tel: (248) 357-6272 (Direct)

CIVIL/LANDSCAPE SHEET INDEX
C0 Cover Sheet
C1 Project Information
C2 Overall Site Plan
C3 Demolition Plan
C4 Paving & Grading Plan
C5 Utility and Storm Water Management Plan
C6 Soil Erosion Control Plan
C7 Notes & Details Plan
C8 Landscape Plan
C9 Site Plan
C10 Location Map

PROJECT NAME: Quality Roots
Berkley

N & F JOB NO. RC560-02
CIVIL ENGINEERS
LAND SURVEYORS
LAND PLANNERS
NOWAK & FRAUS ENGINEERS
46777 Woodward Ave.
Pontiac, MI 48342-5032
Tel: (248) 332-7931
Fax: (248) 332-8257
WWW.NOWAKFRAUS.COM

KNOW WHAT’S BELOW
CALL BEFORE YOU DIG.
BENCHMARK

CAUTION!!

(66' R.O.W.) W. 11 Mile Road
(60' R.O.W.) Cummings Ave.
16' Public Alley

CAUTION!!

B-1
B-2
B-3
B-4

PAVING LEGEND

LEGEND

Overall Site Plan

SCALE:

Part of the SW 1/4 of Section 18
T.1N., R.11E.,
City of Berkley,
Oakland County, Michigan

Know what's below
Call before you dig.

R

3916 11 Mile Road
Berkley, MI 48072-1005

Quality Roots
Quality Roots Berkley

NOWAK & FRAUS ENGINEERS
46777 Woodward Ave.
Pontiac, MI 48342-5032
Tel. (248) 332-7931
Fax.  (248) 332-8257
WWW.NOWAKFRAUS.COM

03-04-22  CLIENT REVIEW
03-25-22  site plan submittal
04-19-22  site plan resubmittal #1

P. Tulikangas
P. Tulikangas
P. Tulikangas

Location Map

RESERVED

PARKING

18"

TYPICAL R7-8 BARRIER FREE

PARKING SIGN DETAIL

VAN

6"

12"

HOOP BIKE RACK

TO ACCEPT BIKE RACK INSTALLATION

95% MOD. PROC.

ON 4" COMP. SAND AS SHOWN.

COMP. SUBGRADE TO

4" CONC. SLAB THICKENED

P. Tulikangas
P. Tulikangas
P. Tulikangas

POWDER COATED BIKE LOOP.

COLOR SHALL BE BLACK.

EXPANSION JOINT W/ SEALANT- SEE SPECS.

C

L

MFR:

FINISH OR APPROVED SUBSTITUTE.

MODEL NO. U910-IG W/ TGIC POWDER COAT
MADRAX
(800) 722-8546

ENGAN-TOOLEY- DOYLE AND ASSOC., INC.
AVAILABLE THRU:

NTS

EXISTING SITE DATA
PROPOSED SITE DATA
LEGAL DESCRIPTION - PER TITLE COMMITMENT

PROJECTION:
City of Berkley,
Oakland County, Michigan

SHUT
Overall Site Plan
General Note

1. SEE SCHEDULE FOR LUMINARE MOUNTING HEIGHT
2. CALCULATIONS ARE SHOWN IN FOOTCANDLES AT 0’ - 0’
3. LIGHTING ALTERNATIVES REQUIRE NEW PHOTOGRAPHIC CALCULATION AND RESUBMISSION TO CITY FOR APPROVAL.

THE ENGINEER AND/OR ARCHITECT MUST DETERMINE APPLICABILITY OF THE LAYOUT TO EXISTING / FUTURE FIELD CONDITIONS. THIS LIGHTING STUDY REPRESENTS ALUMINUM LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER’S LUMINARES MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, AMBIENT TEMPERATURE, WIND, AND OTHER VARIABLE FIELD CONDITIONS. MOUNTING HEIGHTS INDICATED ARE FROM GROUND AND/OR FLOOR UP.

These lighting calculations are not a substitute for independent engineering analysis of lighting system suitability and safety. The engineer and/or architect is responsible for reviewing for integrity, safety, and glare issues.

Unless exempt, project must comply with lighting controls requirements defined in ASHRAE 90.1-2013. For specific information contact GBA Controls Group at ASQGBASE@GASSERUSA.COM or 734-266-6705.

This drawing was generated from an electronic image for estimation purposes only. Layout to be verified on field by others.

Mounting height is measured from grade to face of fixture. Pole height should be calculated as the mounting height plus base height.

Statistics

<table>
<thead>
<tr>
<th>Description</th>
<th>Symbol</th>
<th>Avg</th>
<th>Max</th>
<th>Min</th>
<th>Max/Min</th>
<th>Avg/Min</th>
<th>Avg/Max</th>
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<tbody>
<tr>
<td>Grade</td>
<td>+</td>
<td>3.1</td>
<td>11.6</td>
<td>0.2</td>
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<td>15.5</td>
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<td>14.5</td>
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<tr>
<td>Grade</td>
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<td>4.1</td>
<td>0.3</td>
<td>13.71</td>
<td>4.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

**LUME-01-RGB**

D-Series S1

Q-Tran

**Lithonia Lighting**

DSX0 LED P6 40K T5W 4IN LDN, 4000K, 1000LM, CLEAR, MATTE DIFFUSE REFLECTOR, 80CRI  @ 1000mA.

Q-LUME-1-RGB-WSC-DRY-RGB-ALL-SO-ENC-TL
DEMO NOTE:
ALL EXISTING VENEER MATERIALS TO BE COMPLETELY REMOVED TO THE EXISTING CMU SUBSTRATE (TYP)

DEMO NOTE:
ALL EXISTING GLASS BLOCK TO BE REMOVED PREPARE OPENING FOR NEW INFILL OR WINDOWS - REFER TO NEW WORK PLANS/ELEVS. (TYP)

DEMO NOTE:
ALL EXISTING MANSARD ROOFS & FINISHES TO BE REMOVED TO THE EXISTING CMU SUBSTRATE (TYP)

SCALE:
EXIST. SOUTH ELEVATION - REFERENCE
3/16" = 1'-0"

SCALE:
EXIST. WEST ELEVATION - REFERENCE
3/16" = 1'-0"

SCALE:
EXIST. NORTH ELEVATION - REFERENCE
3/16" = 1'-0"

SCALE:
EXIST. EAST ELEVATION - REFERENCE
3/16" = 1'-0"

SCALE:
EXIST. PHOTO - REFERENCE
3/16" = 1'-0"
EXISTING FINISH GRADE
ELEV. 100'-0"

T.O. CANOPY
ELEV. 109'-8"

T.O. PARAPET (H.P.)
ELEV. 118'-2"

EXISTING BLOCK WALL TO HAVE MURAL STATING "I LOVE BERKLEY BECAUSE ..." MURAL TO BE APPROVED BEFORE WORK COMMENCES

EXISTING GLASS BLOCK TO REMAIN IF IN GOOD CONDITION

NEW BUILT PARAPET WALL CLADDED WITH LOCALLY SOURCED WOOD VENEER

NEW STOREFRONT WITH LOW-E GLAZING

NEW PRE-FINISHED ALUM SUN SHADE CANOPY

EXISTING BLOCK WALL AND BLOCK PIERS TO BE PAINTED WITH EXTERIOR MASONRY STAIN/PAINT

NEW SCUPPERS TO FEED NEW RAIN BARRELS

NEW BUILT PARAPET WALL CLADDED WITH LOCALLY SOURCED WOOD SIDING VENEER PANELS

NEW STOREFRONT WINDOW WITH LOW-E GLAZING

NEW SIGNAGE TO MEET CITY SIGN ORDINANCE FOR WALL SIGNS 94-7 (H) OTHER REGULATIONS

NEW HM INSULATED SERVICE DOOR

NEW STOREFRONT ENTRY DOOR, W/ LOW-E GLAZING

NEW STOREFRONT GLASS WINDOW ASSEMBLY, CLEAR LOW-E GLASS

NEW ROOF TOP WIND SYSTEM. SYSTEM TO BE IN COMPLIANCE WITH CHAPTER 138, ARTICLE III, DIVISION 2.5 (WIND ENERGY)

NEW ROOF TOP MECHANICAL UNITS W/ SCREENING IN COMPLIANCE W/ CHAPTER 138, ARTICLE III, DIVISION 1.5, SEC. 138-7