Report of Geotechnical Engineering Investigation

Goodwill

Old Bardstown Road, Louisville, KY

Prepared For:

Goodwill Industries
1325 S 4th Street
Louisville KY 40208

Prepared By:

Arnold Consulting
Engineering Services, Inc.
P.O. Box 1338
Bowling Green, KY 42101

RECEIVED April 13, 2026 Planning and Design 26-DDP-0005

Arnold Consulting Engineering Services, Inc.

P.O. Box 1338
Bowling Green, KY42101

1136 South Park Drive, Suite 201
Bowling Green, KY 42103

Phone (270)780-9445
Fax (270)780-9873

February 15th, 2024

Re: Goodwill Louisville – Old Bardstown Road
Geotechnical Investigation

Attached is the report of our subsurface investigation for the above referenced project. This report includes geotechnical recommendations pertinent to the site development, foundation design, and construction. Also included in the report are detailed logs of the test borings drilled at the proposed project site and the results of laboratory tests performed on samples obtained from the site.

We appreciate the opportunity to perform this geotechnical engineering investigation and are looking forward to working with you during the construction phase of the project. If you have any questions regarding this report or if we may be of any additional assistance regarding any geotechnical aspect of the project, please do not hesitate to contact me.

Sincerely,

Arnold Consulting Engineering Services, Inc.

Wesley Poynter, P.E.

Jeff Arnold, P.E.
Principal

Mathew A. Dettman, P.E.

TABLE OF CONTENTS

REPORT OF GEOTECHNICAL ENGINEERING INVESTIGATION

Goodwill Louisville
Old Bardstown Road

1.0 PROJECT DESCRIPTION AND DESIGN CONSIDERATIONS

The purpose of this investigation was to determine the general near surface and subsurface conditions within the project area. The investigation is also intended to develop the geotechnical engineering recommendations necessary for the design and construction of the development. This was achieved by drilling borings to explore the subsurface soil and ground water conditions. Laboratory tests were performed on selected representative soil samples from the borings to evaluate the soil properties.

The proposed project involves the construction of a Goodwill store located on Old Bardstown Road, in Louisville, KY. The construction will also include associated parking and drive aisles. The structural loads have not been defined as of this date but are anticipated to be less than 80 kips and 3 kips per lineal foot for columns and walls, respectively. If structural loads are determined to be greater than this, ACES should be contacted for this may impact our foundation recommendations. It should be noted that 2 additional future lots were explored and the recommendations contained herein apply to all 3 lots.

We developed the exploration scope and have based our recommendations upon the above stated design criteria. This report contains the results of our findings, an engineering interpretation of these results with respect to the available project information, and recommendations to aid in the design and construction of the proposed development.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 Site Conditions

At the time of our investigation, the subject property was an undeveloped, relatively flat tract of land. The property is bounded by the following: Fairmont Road to the south, Old Bardstown Road to the west, commercial property to the north, and Bardstown Road to the east.

2.2 Exploration and Testing

Our interpretation of the subsurface conditions is based upon 15 borings completed on February 2nd, 2024, at the locations shown on the Boring Location Map in Appendix A. The boring locations shown were located in the field with a handheld GPS device.

The soil test borings were performed with a track mounted drill rig, which utilized continuous flight auger drilling methods to advance the boreholes. Representative soil samples were obtained by means of the split-barrel sampling procedure in general accordance with ASTM Specification D-1586 using an auto drive hammer. In this procedure, a 2-inch O.D., split-barrel sampler is driven into the soil 18-24 inches by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through the last 12-inch interval (Blows per foot-bpf) is termed the Standard Penetration Test (SPT) N-value and is indicated for each sample on the boring logs. This value indicates the consistency of cohesive soils and relative density of cohesionless soils.

The drill crew maintained a field log of the soils encountered in the borings. After recovery, each sample was removed from the sampler and visually classified. Representative portions of each sample were then sealed and brought to our office for examination and laboratory testing to measure fundamental engineering characteristics. Each soil sample was classified on the basis of texture, plasticity, and approximate grain size in accordance with the Unified Soil Classification

System. The group symbols for each soil type are indicated in the parentheses following the soil descriptions on the boring logs. The soils were grouped into major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in-situ, the transitions may be gradual. The laboratory test results are presented on the boring logs and in the appendix.

2.3 Subsurface Conditions

The borings initially penetrated little to no topsoil. Topsoil is typically composed of a blend of silts, sands, and clays, with varying amounts of organic matter. Underlying the surficial layer, a very soft to hard brown silty clay was encountered. Auger refusal was encountered in all but one of the borings at depths ranging from 1 to 8 feet below existing grade. Boring 6 was drilled in a proposed parking area and terminated at a depth of 5 feet with no refusal. Auger refusal is generally assumed to be on the bedrock surface, however other subsurface conditions can cause refusal such as shot rock fill or an isolated rock “floater”. It should be noted that outcropping rock can be seen along the property line adjacent to Old Bardstown Road which indicates refusal is likely bedrock in this case. To definitively know what is causing refusal, test pits would need to be excavated, which was beyond the scope of this investigation. Reference Appendix A for more details.

Pockets of soft soils were encountered in some of the borings. It is common in heavily vegetated areas and areas with shallow bedrock to have soft soils both near the ground surface and near the bedrock surface. The recommendations in Section 4 provide methods to address soft soils if encountered during mass grading and foundation excavations.

2.4 Groundwater

Groundwater was not observed in the borings beneath the existing ground elevations during drilling procedures. All soil borings were backfilled with soil excavated from each soil boring subsequent to completing tests and checking for groundwater.

The term groundwater pertains to any water that percolates through the soil found on site. This includes any overland flow that permeates through a given depth of soil, perched water, and water that occurs below the “water table”, a zone that remains saturated and water-bearing year-round. It should be recognized that fluctuations in the groundwater level should be expected over time due to variations in rainfall, other environmental or physical factors as well as site conditions associated with the adjacent drainage ditches or basins. The true static groundwater level can only be determined through observations made in cased holes over a long period of time, the installation of which was beyond the scope of this investigation.

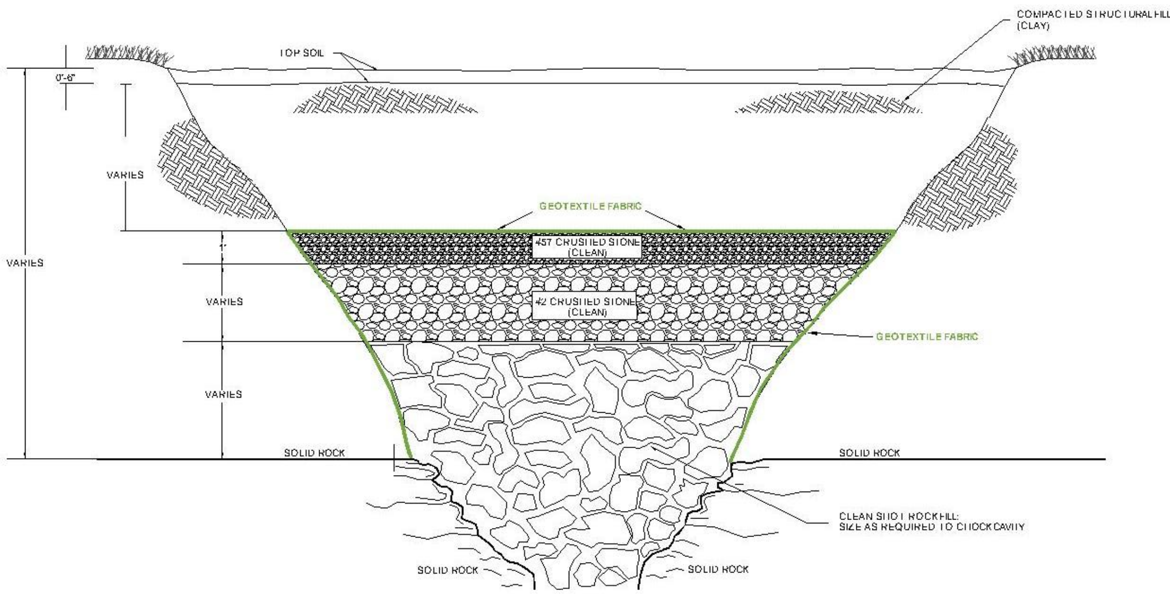
3.0 DESIGN RECOMMENDATIONS

3.1 Basis

Our recommendations are based on data presented in this report, which include soil borings, laboratory testing, and our experience with similar projects. Subsurface variations that may not be indicated by a dispersive exploratory test boring program can exist on any site. If such variations or unexpected conditions are encountered during construction, or if the project information is incorrect or changed, we should be informed immediately since the validity of our recommendations may be affected.

3.2 Karst Considerations

No visible **surface** anomalies were identified on the site, however sites located within this geologic setting are susceptible to sinkhole activity. It is common for incipient karst features to develop during site grading operations and they can be best explored with heavy earthmoving equipment. Typical repairs consist of excavating the feature to bedrock and stabilizing the area with rock and a geotextile fabric. The drawing below shows the components of a typical repair, however specific details will depend on the size and depth of the feature.



TYPICAL SINKHOLE REPAIR
(N.T.S.)

While state-of-the-art geophysical techniques allow us improved capabilities in identifying potential karst features, they are not infallible and essentially any area underlain by soluble limestone is subject to some degree of risk associated with incipient or future karst activity. Nevertheless, it is our opinion that the site can be developed, and the degree of risk associated with sinkhole development is no greater at this site than any other site in this geologic setting. We offer the following recommendations to reduce the potential for future sinkhole development:

- Control storm water drainage during and after earthwork operations by properly grading the site to promote complete and rapid runoff of surface water away from construction areas and avoid the ponding of water on the site.

- Locate detention/retention ponds as far as practical from the building

- Construct underground plumbing systems in a leak-proof manner

- To the extent practicable, provide ditches or pipes for discharge of storm water

- Evaluate any area of suspected sinkhole development, such as areas of abnormally thick topsoil deposits, depressed areas, and locations of soil collapse or voids within the overburden

- Where incipient sinkholes are detected, perform remedial treatment as recommended by our geotechnical engineer based on the actual conditions encountered

Our experience indicates that undetected sinkholes are more likely to appear during construction when site drainage patterns have been altered. Therefore, particular care should be taken during grading to check for surface indications of sinkhole activity.

3.3 Foundation Recommendations

Due to the anticipated structural loading, the proposed structure could be supported on shallow spread and strip foundation elements. Once the site has been prepared in accordance with **Section 4.1 Site Preparation** of this report, the foundations can be designed to bear on soil (either native clay or structural fill) **or** bedrock, but not both within the same structure.

<u>All Foundations Bearing on Native Soils / Structural Fill</u>

Foundation elements bearing on native clay soils or structural fill should be proportioned using a net allowable soil bearing pressure not exceeding **2,000 psf**. In using the above net allowable soil bearing pressures, the weight of the foundation and backfill over the foundation need not be considered. Hence, only load applied at or above the minimum finished grade adjacent to the footing need be used for dimensioning the foundations. Each new foundation should be positioned so it does not undercut or induce significant pressure on adjacent foundations; or the underlying soils supporting these foundations; otherwise the stress overlap must be considered in the design.

All exterior foundations and foundations in unheated areas should be located at a depth of at least 24 inches below final exterior grade, or at the appropriate frost depth in accordance with local building codes, whichever is deeper. However, interior foundations in heated areas can bear at depths of approximately 18 inches below the finished floor. We recommend that strip footings be at least 24 inches wide and column footings be at least 24 inches by 24 inches. All footings should be at least a minimum thickness of 12 inches.

If bedrock is encountered above or at footing bearing elevation, we recommend over excavating a minimum of twelve (12) inches of rock below footing bearing elevation and backfilling the area with properly compacted structural fill to provide a uniform bearing surface. An ACES representative should verify with a probe rod that a minimum of twelve inches of soil separates the bedrock surface and bottom of footing elevation in areas where bedrock is anticipated to be close to the bottom of footing elevation.

Every effort should be made to pour foundations the same day they are excavated. If this is not done, the excavations can be disturbed by rain, sloughing of the sides of the excavation, excessive drying, and other situations that could negatively impact the performance of the foundation system.

The foundation excavations should be dry, clean, and free of any deleterious materials or loose soil. For proper performance at the recommended bearing pressure, foundations must be constructed in compliance with the recommendations for footing excavation and inspection that are discussed in Section **4.2 Foundation Excavations** of this report.

Based on the expected loading and previous experience with the soils in this region, the total foundation settlement should not exceed approximately 1 inch and that differential settlement should not exceed 70 percent of the total foundation settlement. It should be noted that this does not include any settlement associated with karst-related activity, which is unpredictable. Most of this settlement may take place rapidly as loads are imposed during construction and during the placement of site fill.

<u>All Foundations Bearing on Bedrock</u>

Foundation elements bearing on bedrock should be designed for a bearing capacity of **25,000 psf**. The bottom of each foundation excavation should be inspected prior to the placement of reinforcing steel and concrete.

All exterior foundations and foundations in unheated areas should be located at a depth of at least 24 inches below final exterior grade, or at the appropriate frost depth in accordance with local building codes, whichever is deeper. However, interior foundations in heated areas can bear at depths of approximately 18 inches below the finished floor. We recommend that strip footings be at least 24 inches wide and column footings be at least 24 inches by 24 inches. All footings should be at least a minimum thickness of 12 inches. If the excavations are greater than 5 feet deep, proper bracing of the excavation should be provided to allow for drilling of the test holes, cleaning of the bearing surface, and inspection.

The foundation excavations should be dry, clean, and free of any deleterious materials or loose soil and the footings poured directly on the bedrock surface. For proper performance at the recommended bearing pressure, foundations must be constructed in compliance with the recommendations for footing excavation and inspection that are discussed in Section **4.2 Foundation Excavations** of this report.

In addition, it is acceptable to pour the foundations using two pours; the first pour being placed on the exposed bedrock and brought to the bearing elevation of 24 inches below finished grade, and the second to complete the foundation. Alternatively, the foundations can be poured in one full depth pour. Over excavation of footings cannot be backfilled with aggregate. The pour sequencing should be confirmed with the Structural Engineer for proper placement of reinforcing steel.

With the structure bearing on rock, some elastic deformation of the rock could occur under very heavy loads, it is anticipated that the settlement will be negligible. It should be noted that this does not include any settlement associated with karst-related activity, which is unpredictable. It should also be noted that extreme care should be taken to make sure all foundation excavations are clean, as dry as feasible, and poured directly on the clean bedrock surface.

3.4 Slabs-on-Grade

Once the site is prepared in accordance with **Section 4.1 Site Preparation** of this report, the subgrade soils will be suitable for floor slab support. We recommend that all floor slabs be designed as “floating”, that is, fully ground supported and not structurally connected to walls or foundations. This is to minimize the possibility of cracking and displacement of the floor slab because of differential movements between the slab and the foundation. Although the movements are estimated to be within the tolerable limits for the structural safety, such movements could be detrimental to the slabs if they were rigidly connected to the foundations.

The building floor slabs should be supported on a minimum 4-inch thick compacted layer of free draining granular material, such as #57 stone, bearing on suitably prepared subgrade (refer to **Section 4.0 Construction Considerations**). The granular base course is expected to help distribute loads and equalize moisture conditions beneath the slab. All slabs should be liberally jointed and designed with the appropriate reinforcement for the anticipated loading conditions. A vapor barrier beneath the floor slab should be utilized.

3.5 Modulus of Subgrade Reaction

Provided that a minimum of 4 inches of a crushed stone base is placed below the floor slab, a modulus subgrade reaction, “K_{30}”, value of 75 pounds per cubic inch (pci), is recommended for the design of ground supported floor slabs. It should be noted that the “K_{30}” modulus is based on a 30-inch diameter plate load.

3.6 Lateral Earth Pressures

Walls that retain soil and are unrestrained and free to move at the top will most likely experience active earth pressures. If an active lateral earth pressure condition exists, an active earth pressure coefficient (K_a) of 0.33 and an equivalent fluid pressure of 40 pounds per cubic foot acting against the wall should be used for design purposes. In addition, a uniformly distributed lateral load of 10 times the height of the wall (10H psf) should be added acting against the wall to account for minor construction loads.

Walls that retain soil and are restrained from moving at the top will most likely experience at rest earth pressures. If an at rest lateral earth pressure condition exists, an active earth pressure coefficient (K_0) of 0.50 and an equivalent fluid pressure of 60 pounds per cubic foot acting against the wall should be used for design purposes. In addition, a uniformly distributed lateral load of 10 times the height of the wall (10H psf) should be added acting against the wall to account for minor construction loads.

Any structural element that exerts a lateral load into the soil will experience passive earth pressures. If a passive lateral earth pressure condition exists, an active earth pressure coefficient (K_p) of 2.0 and an equivalent fluid pressure of 240 pounds per cubic foot acting against the wall should be used for design purposes.

These pressures assume a backfill comprised of a **well-graded granular material for a minimum distance of 3 feet immediately against the wall.** In general, the onsite soil **is not** suitable for use as backfill immediately against earth retention walls. The shear resistance against base sliding can be computed by multiplying the minimum normal force on the base of the footing times a coefficient of friction of 0.3 using a minimum factor of safety of 1.5.

Foundations for retaining walls 5 feet or less in height should be designed using bearing pressures provided in section 3.3 Foundation Recommendation. If retaining walls greater than 5 feet in height are to be used on the project that are not part of the primary structure supported by the foundations designed in accordance with the Foundation Recommendations above, please contact our office with specific details of the wall and we can provide appropriate foundation recommendations.

All heavy construction loads such as cranes, vehicles, palleted construction materials, or other such heavy loads should be kept a minimum of 10 feet from the top of the wall during construction. If this is not possible, or if any abnormally heavy loads are anticipated at the top of any type of retaining wall, either permanent or temporary, we should be notified so that the design pressures can be modified properly to account for those loads.

The walls should be designed with an adequate drainage system such that hydrostatic pressures do not build up behind the wall. If hydrostatic pressure due to water build-up against a wall is anticipated, the hydrostatic pressure should be added to the lateral earth pressure. Alternatively, perimeter sub drains may be installed around the walls.

It has been assumed that the static weight per axle of equipment utilized for the compaction of the backfill materials adjacent to the below-grade wall will not exceed 2 tons per axle for non-vibratory equipment and 1 ton per axle for vibratory equipment. All heavy equipment, including compaction equipment heavier than recommended above, should not be allowed closer to the wall (horizontal distance) than the vertical distance from the backfill surface to the bottom of the wall.

3.7 Groundwater Drainage Control

Positive drainage of surface water, including downspout discharge, should be maintained away from structure foundations to avoid wetting, weakening and/or expansion of the foundation soils both during construction and after construction is complete. Additionally, the water and drainage lines should be located such that if any leakage occurs, water will not be readily accessible to foundation or floor slab soils thereby causing damage.

3.8 Seismic Considerations

The IBC and ASCE 7 requires Seismic Site Classification based on the upper 100 feet of a soil profile. This classification can be based on the shear wave velocity method, the unconfined compressive strength method, or most commonly the Standard Penetration Resistance (N-value) method. For this project, the N-value method was used. The current scope of work did not include a boring to a depth of 100 feet, therefore the site class considers that the last stratum encountered continues to the 100-foot depth.

Based on our investigation, we recommend a Seismic Site Class (SSC) of B. It should be noted that to use an SSC of B, the depth to bedrock must be 10 feet or less from the bottom of footing. If grades are changed to where bedrock is greater than 10 feet from the bottom of footing, then an SSC of C is recommended.

3.9 Pavement Design

Our pavement recommendations are derived from experience and anticipated traffic use with similar development projects. The following assumptions are used to develop our recommendations

- CBR value of 3
- The concrete has a 28-day compressive strength of 4,000 psi
- The design life for the pavement is 20 years

Flexible Pavement Sections

We recommend using the following flexible pavement section thicknesses: [1]

Flexible Pavement Design

Pavement Usage	Asphalt Surface Course	Asphalt Binder Course	Mineral Aggregate Base Course[1]
Light Duty	1 ½ inches	2 inches	6 inches
Heavy Duty (Commercial)	1 ½ inches	3 inches	8 inches
Heavy Duty (Industrial)	1 ½ inches	6 inches	10 inches
[1] Mineral aggregate base should be compacted to 95 percent of the maximum dry density as determined by the standard proctor			

All materials and procedures used in pavement construction should conform to the pertinent sections of the latest edition of the State Department of Highway's Standard Specifications for Road and Bridge Construction. The mineral aggregate base should conform to State specifications with the exception that no more than 12% of the mineral should pass the No. D200 mesh sieve, as determined by the wet method. In addition, the mineral aggregate base should be compacted to the minimum density noted above.

Experience has shown that most pavement failures are caused by localized soft spots in the sub grade or inadequate drainage. Proof rolling observed by our geotechnical engineer will help detect the incidence of weak spots in the sub grade, as discussed earlier. However, the civil design must include proper drainage to reduce softening of the sub grade, soil migration, and pumping failures. The pavement surface and sub grade should have a minimum slope of about 2 percent. Constructing concrete pads around catch basins should be considered to accommodate the problems associated with the frequent saturation of the pavements is also recommended. Any isolated areas that experience premature failure should be promptly repaired to prevent widespread problems from occurring.

Rigid Pavement Sections

Heavy Duty (HD) Rigid Pavement consisting of Portland Cement Concrete (PCC) should be used for the loading dock area, dumpster enclosures and other areas open to heavy-duty traffic. Light

Duty (LD) Rigid Pavement should only be used for light duty vehicular parking. The recommended rigid pavement section is provided below:

Rigid Pavement Design

Material	HD Rigid Pavement Section	LD Rigid Pavement Section
PCC Slab	6 inches	5 inches
Crushed Stone	8 inches	5 inches

All exterior concrete exposed to weather should contain 5% +/- 1.5% entrained air to improve durability. The air content should be compatible with the maximum aggregate size and the project location. The pavements should be designed and constructed in accordance with applicable ACI guidelines, including joint spacing. The pavement surface should have a minimum slope of 1 percent. Additional considerations for pavement design and construction are provided below:

- Contraction joints should be sawed as soon as the concrete will allow, typically within 12 hours of concrete placement. The depth of the saw joint should be ¼ of the slab thickness. The joints should be subsequently sealed to reduce surface water infiltration into the prepared subbase. Saw joint spacing should be 10 to 15 feet in both directions.

- Construction joints (excludes saw joints) should be underlain by a non-woven geotextile (about 2 feet wide) to reduce the potential for the upward movement of soils fines through the joints.

- Loading (traffic) must not be allowed until the concrete has achieved at least 85 percent of its design strength.

General Pavement Considerations

Site grading is generally accomplished early in the construction phase. However, as construction proceeds, the sub grade may be disturbed due to utility excavations, construction traffic, or rainfall. As a result, sections of the pavement sub grade may not be suitable for pavement construction and require corrective action. The sub grade should be carefully evaluated at the time of pavement construction by proof rolling with a loaded tandem axle dump truck. Particular attention should be given to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with compacted fill.

The stability of the existing subgrade should be evaluated by proof rolling, as previously discussed. It may be desirable to place the base materials immediately after sub grade elevations are achieved to reduce the potential for moisture content changes.

Maintenance is essential to good long-term performance of both concrete and asphalt pavements. Any distressed areas should be promptly repaired to prevent the failure from spreading due to vehicular loading and infiltration. Cracks and joints should be sealed routinely with a heavy-duty sealer. Additionally, a coal tar seal should be applied as needed for the asphalt pavements. The seal will retard the tendency of asphalt to become brittle and will close small cracks that cannot be repaired otherwise.

3.10 Slopes

All temporary excavations and slopes shall be made in accordance with applicable Occupational Safety and Health Administration (OSHA) Guidelines for sloping and benching.

If the final grading plan includes natural or engineered slopes, all building setbacks from both the top and toe of slope should comply with the applicable building code. The grade and height of the slope will dictate the required setback. In addition, all permanent slopes should be evaluated by the Geotechnical Engineer for long term stability.

4.0 CONSTRUCTION CONSIDERATIONS

4.1 Site Preparation

All areas that will support foundations, floors, pavements, or if required, newly placed structural fill must be properly prepared. All loose surficial soil, topsoil, vegetation, and other unsuitable materials, if encountered, must be removed. Unsuitable materials include: frozen soil, uncontrolled fill, relatively soft or loose material, relatively wet soils, deleterious material, or soils that exhibit a high organic content.

Topsoil was observed at the test boring locations and is anticipated to be encountered on site and will require removal. Although a minimum topsoil stripping depth of 6 inches is **typical**, actual stripping depth should be verified by ACES in the field. The minimum stripping depth will be required to remove any vegetation or organic material at the surface, followed by the potential for additional stripping and/or scarification and recompaction as may be required to achieve subgrade support.

Prior to construction of floor slabs or pavements, or the placement of new structural fill, the exposed subgrade must be proofrolled, typically with a fully loaded tandem axle dump truck, under the observation and direction of an ACES representative. Any area to rut, pump, or deflect excessively should be compacted in-place, scarified and recompacted, or undercut and replaced with structural fill and compacted as specified below.

It should be noted that isolated pockets of soft soils were encountered in the borings. The above referenced proofrolling operations should be considered critical to locate and remediate any near surface soft soils that may be encountered during earthwork operations.

Care must be exercised during grading and fill placement operations. The combination of heavy construction equipment traffic and excess surface moisture can cause pumping and deterioration of the near surface soils. The severity of this potential problem depends to a great extent on the weather conditions prevailing during construction. The contractor must make every effort to control construction traffic and surface water while the subgrade soils are exposed. If rainfall is expected during grading operations, ideally the area will be sloped for drainage and rolled with a smooth drum compacter to minimize water infiltration into the soils. They should avoid repeatedly driving heavy equipment in the same location and provide adequate protection to completed building pad and paving areas with aggregate or some other method to prevent breakdown of the surficial soils. If such problems do arise, the operations in the affected area should be halted and the ACES representative contacted to evaluate the condition.

If the project schedule precludes site grading during optimal weather conditions, our experience shows that typical silty clay soil during wet seasons (i.e., late fall through early spring) has moisture content well above optimum required for compaction. The higher moisture content in the upper soil profile can easily cause degradation of the soil under normal construction traffic. Routine aeration methods do not adequately dry wet soils to meet optimum moisture for compaction under these conditions. During poor weather conditions, lime modification is usually the most cost-effective subgrade stabilization. All soil modification should be performed by a specialty contractor with specific experience in the application of lime or cement stabilization methods.

4.2 Foundation Excavations

Footings in Soil

Upon completion of the foundation excavations and prior to the placement of reinforcing steel, an ACES representative should check the exposed subgrade to confirm that the bearing surface meets the design criteria. These inspections should take place the same day the foundations are poured. Any localized soft or loose soil zones or unsuitable materials encountered at the bearing elevations should be further excavated until adequate support soils are encountered. Over excavation should be in six-inch (6") increments until the allowable bearing capacity is met but no greater than four (4) feet below bottom of footing elevation. The area undercut should be backfilled with structural fill or lean concrete, or the footing can be poured at the excavated depth. The undercut should not be backfilled with an open graded aggregate such as #57 stone as the aggregate will collect and hold water creating a "bathtub" effect directly beneath the bottom of the footings which can significantly reduce the bearing capacity of the underlying soils. Acceptable on-site soils could be used as structural fill beneath footings placed and compacted in accordance with Section 4.3.

If it is necessary to support foundations on structural fill, the fill pad must extend laterally a minimum distance beyond the edge of the footing or foundation system. The minimum structural pad would correspond with a point at which an imaginary line extending downward from the outside edge of the footing at a 1H:2V slope intersects the surface of the natural soils.

Footings in Rock

Upon completion of the foundation excavations and prior to the placement of reinforcing steel, an ACES representative should check the exposed material to confirm that the bearing surface meets the design criteria. Any localized zones of unsuitable materials encountered at the bearing elevations should be further excavated until adequate support materials are encountered. The area undercut should be backfilled with lean concrete, or the footing can be poured at the excavated depth. The undercut should not be backfilled with aggregate.

4.3 Structural Fill and Fill Placement Control

Structural fill, defined as any fill which will support structural loads, should be clean and free of organic material, debris, deleterious materials, and frozen soils. Samples of the proposed fill materials should be tested prior to initiating the earthwork and backfilling operations to determine the classification, the natural and optimum moisture contents, maximum dry density, and overall suitability as a structural fill. Materials to be used as structural fill should meet the following criteria:

- Consist of gravels, sands, silts, and/or lean clays and be classified as CL, ML, SM, SC, SW, SP, GW, GP, GM, or GC (or any combination of these group symbols per the Unified Soil Classification System - USCS)
- A plasticity index of 25 or less
- A Standard Proctor dry density of at least 95 pounds per cubic feet (pcf)
- No particles greater than 4 inches in size.
- If open graded gravels are used as structural fill, they should be separated from sands, silts, and/or clays with a layer of filter fabric.
- If any type of rock fill is to be used to bring a building pad to subgrade elevation, the building pad must be sloped prior to the placement of the rock fill to allow the pad to drain. This is to prevent the rock fill from holding excessive water which can subsequently bleed into footing excavations, causing reduced bearing capacities and construction delays. The low end of the slope must extend beyond the perimeter footing line.
- Shot rock/soil fill
    - Upper 4 feet shall not have rock exceeding 5 inches (softball) in diameter

- Rock beneath the upper 4 feet shall not exceed 12 inches (basketball) in diameter
- Shot rock/soil fill shall not contain more than 40% soil
- If soil fill is to be placed above shot rock fill, filter fabric will be required to separate the material
- If shot rock fill is to be placed above soil fill, filter fabric will not be required

Any variations to these criteria can only be approved by the geotechnical engineer or their representative.

Any on-site soil meeting these criteria is suitable for use as structural fill for the project.

Unacceptable material would include highly plastic “fat” clays (CH) determined to have a high expansion potential or organic soils such as topsoil.

All structural fill beneath floor slabs and foundations should be compacted to at least 98 percent of its maximum Standard Proctor dry density (ASTM D-698). All structural fill beneath sidewalks & exterior slabs, utility trench backfilll, beneath pavement areas and embankments of storm water ponds should be compacted to at least 95 percent of the maximum Standard Proctor dry density. All structural fill beneath landscaped areas should be compacted to at least 90 percent of the maximum Standard Proctor dry density. Care should be taken to maintain the moisture content of the structural fill to +/- 2% of the optimum moisture content.

To achieve the recommended compaction of the structural fill, we suggest that the fill be placed and compacted in layers not exceeding eight (8) inches in loose thickness. All fill placement should be monitored by an ACES representative. Field density testing should be performed in accordance with ASTM D2922, nuclear gauge method. The frequency of testing should produce a minimum of one (1) density test result per 2,500 square feet, per material lift, and as necessary to adequately represent the area and compaction effort.

If an open graded gravel, such as #57 stone, is used as structural fill in any location, it should be compacted using vibratory equipment in lifts not exceeding 12 inches in loose thickness. Density testing is not required; however, the placement and compaction effort should be observed and approved by a representative of our office.

All compaction should be performed with equipment specifically designed for the purpose of compacting soil or rock. Track mounted equipment such as dozers or excavators, or the bucket of an excavator, would not be acceptable for use in compaction.

5.0 LIMITATIONS OF INVESTIGATION

The recommendations provided herein were developed from the information obtained in the test borings, which depict subsurface conditions only at specific locations. Subsurface conditions at other locations may differ from those occurring at the specific test boring sites.

The nature and extent of variations between test borings may not become evident until the time of construction. If variations become evident, it will be necessary to re-evaluate the recommendations of this report after performing on-site observations during construction and noting the characteristics of any variation.

Our professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. This company is not responsible for the independent conclusions, opinions or recommendations made by others based on the field and laboratory data presented in this report.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report or on the soil boring logs regarding vegetation types, odors or staining of soils, or other unusual conditions observed are strictly for the information of our client and the owner.

APPENDIX A

Geotechnical Information

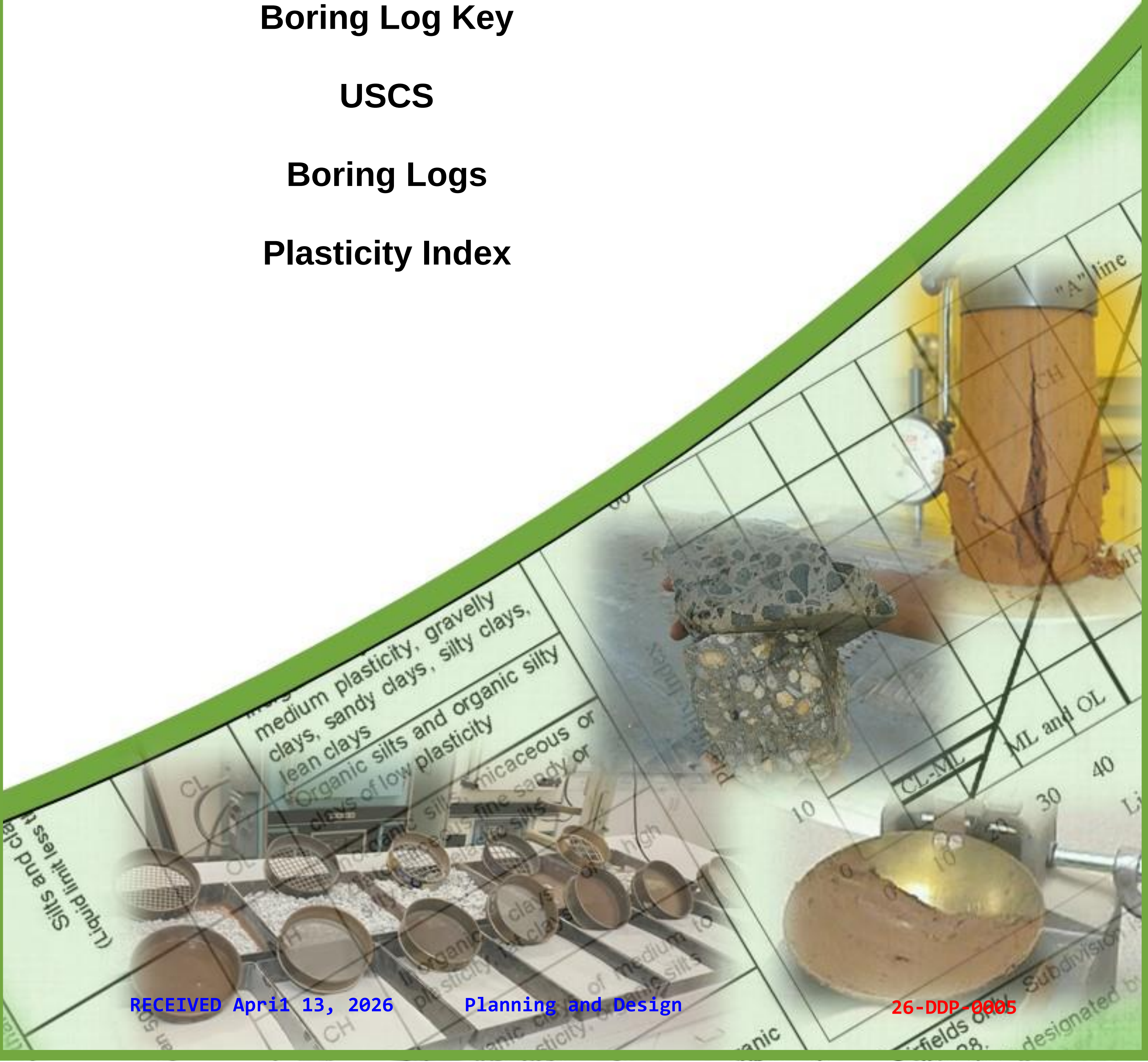
Boring Location Map

Boring Log Key

USCS

Boring Logs

Plasticity Index



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 alight 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 overrely 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

RECEIVED April 13, 2026 Planning and Design 26-DDP-0005

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 prebid 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 disappointments, 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.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone:' 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

ACES

Goodwill - Old Bardstown Rd. Louisville KY Boring Location Map

Boring for current investigation

RECEIVED April 13, 2026

Planning and Design

26-DDP-0005

BORING LOG KEY

Unified Soil Classification System (ASTM D-2487)
Field Classification for Soil Exploration

Grain Size Terminology

Soil Fraction	USCS Symbol*	Particle Size	US Standard Sieve Size
Boulders		>300-mm	>300-mm
Cobbles		75-mm to 300-mm	75-mm to 300-mm
Gravel, Coarse	GW,GP	19-mm to 75-mm	19-mm to 75-mm
Gravel, Fine	GW,GP	4.76mm to 19-mm	#4 to 19-mm
Sand, Coarse	SW,SP	2-mm to 4.76-mm	#10 to #4
Sand, Medium	SW,SP	0.42-mm to 2-mm	#40 to #10
Sand, Fine	SW,SP	0.074-mm to 0.42-mm	#200 to #40
Silt	ML,MH	0.005-mm to 0.074-mm	<#200
Clay	CL,CH	<0.005-mm	<#200
Fill	FL	Any soil mass constructed by man	

Non-Cohesive Soil Density (silt, sand, and gravel)	**Std Penetration** Blows per foot (ASTM D1586)	**Cohesive Soil Consistency** (clay)	**Std Penetration** Blows per foot (ASTM D1586)	**Pocket Penetrometer** Qu (ton/sq ft)
Very Loose	0 to 4	Very Soft	0 to 2	<0.25
Loose	5 to 10	Soft	3 to 4	0.25 to 0.49
Medium Dense	11 to 30	Firm(medium stiff)	5 to 8	0.5 to 0.99
Dense	31 to 50	Stiff	9 to 16	1.0 to 1.99
Very Dense	>50	Hard	17 to 32	2.0 to 4.0

Relative Proportions	Descriptive Term	Percent
	Trace	1 to 10
	Little	11 to 20
	Some	21 to 35
	And	36 to 50

Classification shown on logs are made by visual inspection unless noted by laboratory test

Standard Penetration Test (ASTM D 1586) – Driving a 2" O. D., 1-3/8" I.D., sampler a distance of 3 -6 inch increments with a 140 pound hammer free falling a distance of 30 inches. The blow count from each increment is recorded on the log. The Standard Penetration Resistance (N-blows) is the sum of the blow counts from the second and third increment.

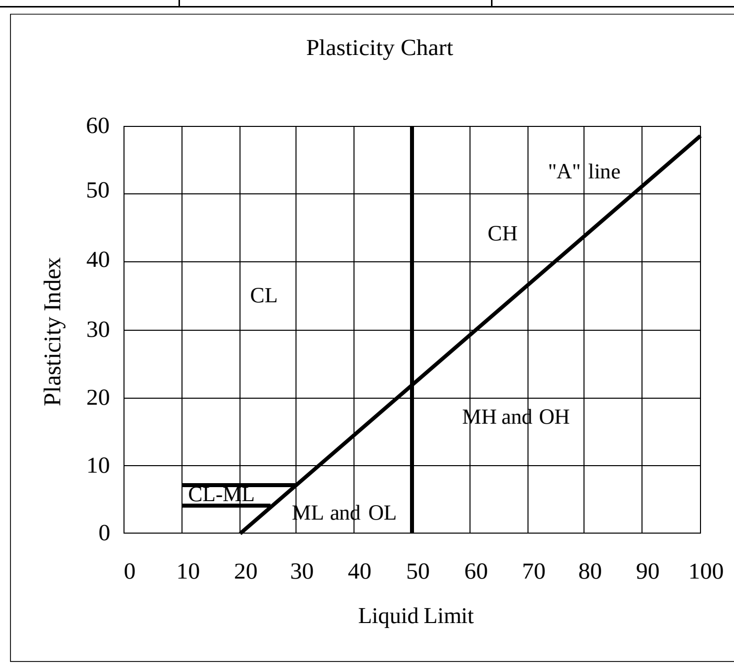
Strata Changes actually visible in the samples are indicated by a solid line on the log. Strata changes inferred from changes between adjoining samples are indicated by a dashed line.

Groundwater observations were made at the times indicated on the log. Permeability of soil strata, weather conditions, site topography, etc., may cause variation in the water levels noted in the logs. Monitoring wells are required for accurate groundwater measurements. The different water levels, i.e., during drilling and upon completion or after 24 hours are noted with different symbols as labeled on the log.

*NOTE: for specific USCS classification details, See ASTM D-2487

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

Major Divisions			Group Symbols		Typical Names	Laboratory Classification Criteria		
Coarse-grained soils (More than half of material is larger than No. 200 Sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent GW, GP, SW, SP; More than 12 percent GM, GC, SM, SC; 5 to 12 percent Borderline cases requiring dual symbols [b]	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2/(D_{10} x D_{60})$ between 1 and 3	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM[a]	d	Silty gravels, gravel-sand mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u				
			GC		Clayey gravels, gravel-sand-clay mixtures		Atterberg limits below "A" line or P.I. less than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines		$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2/(D_{10} x D_{60})$ between 1 and 3	
			SP		Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM[a]	d	Silty sands, sand-silt mixtures		Atterberg limits above "A" line or P.I. less than 4	Limits plotting in CL-ML zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u				
			SC		Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7	
Fine-grained soils (More than half material is smaller than No. 200 Sieve)	Silts and clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	Plasticity Chart (see below)		
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL		Organic silts and organic silty clays of low plasticity			
	Silts and clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH		Inorganic clays of high plasticity, fat clays			
			OH		Organic clays of medium to high plasticity, organic silts			
	Highly Organic soils		Pt		Peat and other highly organic soils			



[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC,well-graded gravel-sand mixture with clay binder. (From Table 2.16 - Winterkorn and Fang, 1975)

Arnold Consulting Engineering Services

BORING LOG

Boring # 1

Project: Goodwill - Bardstown Rd.

Location: Louisville, KY

Drilling Method:	**H.S.A**	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter:	**2-1/4"**	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:			

Depth (ft)	USCS	Material Description	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
0.0		Ground Surface 0" Topsoil									
	CL	Brown silty clay, trace sand	1	1 1 2	3	15		18		Soft	
			2	1 4 3	7	10		20	16	Firm	
			3	2 4 50	54	15		16		Hard	

Auger Refusal encountered at 8 ft.

Depth scale: 1, 5, 10, 15, 20, 25, 30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 2

Project: Goodwill - Bardstown Rd.

Location: Louisville, KY

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:		

Depth (ft) 0.0	USCS	Material Description Ground Surface 0" Topsoil	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
1	CL	Brown silty clay, trace sand	1	2 3 3	6	18		19		Firm	

Auger Refusal encountered at 3-1/2 ft.

5

10

15

20

25

30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 3

Project: Goodwill - Bardstown Rd. | **Location: Louisville, KY**

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:		

Depth (ft) 0.0	USCS	Material Description Ground Surface 0" Topsoil	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
1	CL	Brown silty clay, trace sand	1	1 2 2	4	24		21		Soft	
5			2	1 0 1	1	4		22		V.Soft	
			3	50/3		5		16			

Auger Refusal encountered at 6-1/2 ft.

10

15

20

25

30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

BORING LOG

Boring # 4

Arnold Consulting Engineering Services

Project: Goodwill - Bardstown Rd. | **Location: Louisville, KY**

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:		

Depth (ft)	USCS	Material Description	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
0.0		Ground Surface 0" Topsoil									
1	CL	Brown silty clay, trace sand	1	1 2 50/3		15		22			

Auger Refusal encountered at 2-1/2 ft.

1
5
10
15
20
25
30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

ACES *Arnold Consulting Engineering Services*	**BORING LOG**	**Boring # 5**
	Project: Goodwill - Bardstown Rd.	**Location: Louisville, KY**

Drilling Method: H.S.A	**Boring Started:** 2/2/2024	**Boring Completed:** 2/2/2024
Boring Diameter: 2-1/4"	**Drill Rig Type:** CME 55	**Hammer Type:** Auto-140 lb-30in drop
Groundwater:		

Depth (ft) 0.0	USCS	Material Description Ground Surface 0" Topsoil	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
1	CL	Brown silty clay, trace sand	1	1 1 2	3	18		21		Soft	
			2	50/4		8		23			

Auger Refusal encountered at 4 ft.

5

10

15

20

25

30

Contact Information:

Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 6

Project: Goodwill - Bardstown Rd.

Location: Louisville, KY

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:		

Depth (ft)	USCS	Material Description	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
0.0		Ground Surface 0" Topsoil									
1	CL	Brown silty clay, trace sand	1	1 1 2	3	21		18		Soft	
5			2	2 2 3	5	13		21		Firm	

Boring Terminated at 5 ft.

10

15

20

25

30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 7

Project: Goodwill - Bardstown Rd.

Location: Louisville, KY

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**	
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**	
Groundwater:			

Depth (ft)	USCS	Material Description	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
0.0		Ground Surface 0" Topsoil									
1–5	CL	Brown silty clay, trace sand	1	1 1 1	2	20		22		V.Soft	
			2	1 2 2	4	3		23		Soft	

Boring Terminated at 5 ft.

Depth scale: 1, 5, 10, 15, 20, 25, 30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 8

Project: Goodwill - Bardstown Rd.

Location: Louisville, KY

Drilling Method:	**H.S.A**	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter:	**2-1/4"**	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:			

Depth (ft) 0.0	USCS	Material Description / Ground Surface / 0" Topsoil	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
1–4.5	CL	Brown silty clay, trace sand	1	0 2 44	46	18		17		Hard	
			2	2 50/5		6		22			

Auger Refusal encountered at 4-1/2 ft.

1 5 10 15 20 25 30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 9

Project: Goodwill - Bardstown Rd.

Location: Louisville, KY

Drilling Method:	**H.S.A**	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter:	**2-1/4"**	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:			

Depth (ft) 0.0	USCS	Material Description Ground Surface 0" Topsoil	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
1	CL	Brown silty clay, trace sand									

Auger Refusal encountered at 1 ft.

5

10

15

20

25

30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 10

Project: Goodwill - Bardstown Rd. **Location: Louisville, KY**

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:		

Depth (ft) 0.0	USCS	Material Description Ground Surface 0" Topsoil	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
1	CL	Brown silty clay, trace sand	1	1 2 4	6	17		17		Firm	
			2	50/4		6		22			

Auger Refusal encountered at 4 ft.

5

10

15

20

25

30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

BORING LOG

Boring # 11

Arnold Consulting Engineering Services

Project: Goodwill - Bardstown Rd.		**Location: Louisville, KY**	
Drilling Method:	**H.S.A**	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter:	**2-1/4"**	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:			

Depth (ft) 0.0	USCS	Material Description Ground Surface 0" Topsoil	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
1	CL	Brown silty clay, trace sand	1	1 2 2	4	20		19		Soft	
			2	25 50/1		8		14			

Auger Refusal encountered at 4 ft.

Depth scale: 1, 5, 10, 15, 20, 25, 30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 12

Project: Goodwill - Bardstown Rd. **Location: Louisville, KY**

Drilling Method:	**H.S.A**	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter:	**2-1/4"**	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:			

Depth (ft)	USCS	Material Description	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
0.0		Ground Surface 0" Topsoil									
1	CL	Brown silty clay, trace sand	1	1 2 3	5	19		22		Firm	
			2	50/3		6		12			

Auger Refusal encountered at 4 ft.

Depth scale: 1, 5, 10, 15, 20, 25, 30

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 13

Project: Goodwill - Bardstown Rd.

Location: Louisville, KY

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:		

Depth (ft) 0.0	USCS	Material Description Ground Surface 0" Topsoil	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
1	CL	Brown silty clay, trace sand	1	1 2 3	5	18		23		Firm	

Auger Refusal encountered at 3 ft.

5

10

15

20

25

30

Contact Information:

Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101

Office: 270-780-9445 Email: wpoynter@a-ces.com

BORING LOG

Boring # 14

Arnold Consulting Engineering Services

Project: Goodwill - Bardstown Rd.

Location: Louisville, KY

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:		

Depth (ft)	USCS	Material Description	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
0.0		Ground Surface 0" Topsoil									
1	CL	Brown silty clay, trace sand	1	1 3 4	7	15		22		Firm	

Auger Refusal encountered at 3 ft.

Depth scale (ft): 1, 5, 10, 15, 20, 25, 30

Contact Information:

Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101

Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services

BORING LOG

Boring # 15

Project: Goodwill - Bardstown Rd. | **Location: Louisville, KY**

Drilling Method: H.S.A	**Boring Started: 2/2/2024**	**Boring Completed: 2/2/2024**
Boring Diameter: 2-1/4"	**Drill Rig Type: CME 55**	**Hammer Type: Auto-140 lb-30in drop**
Groundwater:		

Depth (ft)	USCS	Material Description	Samples	Blow Counts	N-Value	Recovery (in)	RQD (%)	Moisture Content (%)	Plasticity Index	Soil Consistency	Remarks
0.0		Ground Surface 0" Topsoil									
	CL	Brown silty clay, trace sand	1	1 2 2	4	21		19		Soft	
			2	50/5		6		16			

Auger Refusal encountered at 4 ft.

Contact Information:
Arnold Consulting Engineering Services, 1136 South Park Drive, Suite 201, Bowling Green, KY 42101
Office: 270-780-9445 Email: wpoynter@a-ces.com

Arnold Consulting Engineering Services, Inc.

P.O. Box 1338
Bowling Green, KY42101

1136 South Park Drive, Suite 201
Bowling Green, KY 42103

Phone (270)780-9445
Fax (270)780-9873

PLASTICITY INDEX

Location	Depth (ft)	LL	PL	PI	Classification	Symbol
B-1	3-½'	32	16	16	CL	●
						■
						▲