Geotechnical Engineering Report

Burger King Restaurant
Grayson, Carter County, KY
July 6, 2021
Terracon Project No. N3215024

Prepared for:
Ampler Development, LLC.
Oklahoma City, OK

Prepared by:
Terracon Consultants, Inc.
Lexington, KY

July 6, 2021

Ampler Development, LLC.
PO Box 721888
Oklahoma City, OK 17603

Attn: Mr. Dan Peyton – Director of Construction & Development
P: (513) 484 0965
E: dpeyton@amplergroup.com

Re: Geotechnical Engineering Report
Burger King Restaurant
765 Carol Malone Blvd
Grayson, Carter County, KY
Terracon Project No. N3215024

Dear Mr. Peyton:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PN3215024 dated May 27, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Isaac T. Hardesty
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STATE OF KENTUCKY
SAMUEL G. GUY
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7/6/2021

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report

Burger King Restaurant
765 Carol Malone Blvd
Grayson, Carter County, KY

Terracon Project No. N3215024

July 6, 2021

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Burger King to be located at 765 Carol Malone Blvd in Grayson, Carter County, KY. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification per IBC
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of (9) nine test borings to depths ranging from approximately 5 to 20 feet below existing site grades.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and/or as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located near the intersection of 765 Carol Malone Blvd in Grayson, Carter County, KY 41143. Coordinates: 38.339658, -82.943687 See **Site Location**
Existing Improvements	The site is currently Brown's Mobile Home Sales. The proposed area of the site is a vacant gravel lot.
Current Ground Cover	The site has an existing asphalt drive with a gravel lot.

Item	Description
Existing Topography	The site is generally sloping down from the West to the East with elevations ranging from about 590 feet to 686 feet.
Geology	Based on our experience in the region and review of geologic maps provided by the Kentucky Geological Survey (KGS) the site consists of shallow fill soils underlain by residual cohesive soils and sandstone of the Pikeville Formation. This formation is comprised of heterogenous and discontinuous sequences of sandstone (mainly lithic arenite), siltstone, including thinly interbedded sandstone and shale, shale, underclay, coal, and minor limestone and ironstone beds or concretions associated with the Pikeville Formation. Further review of the Kentucky Geological Survey (KGS) indicates that the site is in a non-karst area. There are no sinkholes mapped within 1 mile of the project site.

We also collected photographs at the time of our field exploration program. Representative photos are provided in our **Photography Log**.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	We have been provided a site plan by Mr. Dan Peyton, with Ampler Development via an email dated May 25, 2021.
Project Description	The project will be a one-story, approximately 3,010 square-foot building.
Proposed Structure	The project includes a single-story building with a footprint of about 3,010 square feet. The building will be slab-on-grade (non-basement).
Building Construction	The building will be slab-on-grade foundation.
Finished Floor Elevation	Not provided
Maximum Loads	■ Columns: 50 kips ■ Walls: 2 kips per linear foot (klf) ■ Slabs: 250 pounds per square foot (psf)
Grading/Slopes	Grading at this site is anticipated to be minimal (less than +/- 2 feet).
Below-Grade Structures	None anticipated
Free-Standing Retaining Walls	None anticipated
Below-Grade Areas	None anticipated

Item	Description
Pavements	Based on previous work we understand medium duty traffic loading is anticipated. We assume that pavement will consist of a combination of asphalt and concrete pavement section for parking and drive areas. We based our minimum pavement thickness recommendations on a design life of 20 years and 100,000 ESALs. This should be confirmed by the project Civil Engineer.
Estimated Start of Construction	Fall 2021

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Surface**	Asphalt and aggregate base
2	**Fill**	Gravelly lean clay, brown
3	**Cohesive Soils**	Lean clay with silt (CL) and silty clay (CL-ML), very soft to very stiff, light brown and gray

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Water was encountered while drilling in borings B-1 at 8 feet, B-2 at 7 feet, and B-3 at 18.7 feet. Water was observed after drilling operations were completed in borings B-1 at 18 feet, B-4 at 20 feet, and D-1 at 5 feet.

Groundwater level fluctuations should be expected to occur due to seasonal variations in rainfall, runoff and other factors not evident at the time the test borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the attached test boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

Considering the conditions encountered in the borings and our current understanding of the proposed project, the site appears suitable for the proposed construction from a geotechnical standpoint. The near surface, very soft to stiff, soils encountered at this site could become unstable with typical earthwork and construction traffic, especially after precipitation events. The effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, the grading should be performed during the warmer and drier times of the year. If grading is performed during the winter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the **Earthwork** section.

Support of floor slabs and pavements on or above existing fill materials is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill, but can be reduced by following the recommendations contained in this report. To take advantage of the cost benefit of not removing the entire amount of undocumented fill, the owner must be willing to accept the risk associated with building over the undocumented fills following the recommended reworking of the material. Should this be the case, development can be supported on a shallow foundation system.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include clearing and grubbing, excavations, and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation

Prior to placing fill, existing vegetation and root mat should be removed. Complete stripping of the topsoil should be performed in the proposed building and parking/driveway areas. The subgrade should be proofrolled with an adequately loaded vehicle such as a fully-loaded tandem-axle dump truck. The proofrolling should be performed under the direction of the Geotechnical Engineer. Areas excessively deflecting under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer. Such areas should either be removed or modified by stabilizing with an admixture, such as quick or hydrated lime, or similar maybe considered.

Excessively wet or dry material should either be removed or moisture conditioned and recompacted.

Existing Fill

As noted in **Geotechnical Characterization**, all the borings except for B-4 encountered existing fill to depths of 3 feet. The fill appears to have been placed in a controlled manner, but we have no records to indicate the degree of control. Support of footings, floor slabs, and pavements, on or above existing fill soils, is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill will, not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill, but can be reduced by following the recommendations contained in this report.

If the owner elects to construct the footings and floor slabs on the existing fill, the following protocol should be followed. The entire area should be proofrolled with heavy, rubber tire construction equipment, to aid in delineating areas of soft or otherwise unsuitable soil. Once the planned grading has been completed, the area below the footing should be addressed as stated in the **Foundation Construction Considerations**.

If the owner elects to construct pavements on the existing fill, the following protocol should be followed. Once the planned subgrade elevation has been reached the entire pavement area should be proofrolled. Areas of soft or otherwise unsuitable material should be undercut and replaced with either new structural fill or suitable, existing on site materials.

Native Soils

As noted in **Geotechnical Characterization**, below the existing fill, the near surface native soils generally classified as a very soft near the top to stiff lean clay (CL) with depth was observed at all locations except B-1. The moisture content of the native soils ranged from 22 to 49 percent, which based on experience with similar soils, is likely 5 to 20 percent over optimum and will be subject to disturbance (rutting) when exposed to construction related traffic. As such, the contractor selected for this project should expect to moisture condition the near surface soils. This may include mechanical disking to chemical treatment with an admixture such as lime, especially if construction occurs during the cooler wetter periods of the year.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 10 feet of structures, pavements or constructed slopes. General fill is material used to achieve grade outside of these areas. Earthen materials used for structural and general fill should meet the following material property requirements:

Soil Type [1, 3, 4]	USCS Classification	Acceptable Parameters (for Structural Fill)
Low Plasticity, Lean Clay	CL, CL-ML LL<40 and PI<22	All locations and elevations
Granular [2]	GW, GM, GP, GC, SW, SP, SM, SC	All locations and elevations
On-Site Soils	CL, (Cl-ML)	Some onsite soils generally appear suitable for reuse as engineered fill, pending further testing. Deleterious materials (e.g., wood, organic matter, construction debris, etc.) should be removed and not used as engineered fill. Moisture conditioning of the on-site native soils may be required to achieve optimum moisture conditions for placement as engineered fill. [3]

1. Structural and general fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
2. Well graded granular fill shall be similar to KYTC's Dense Graded Aggregate or crushed limestone aggregate. If frost heave is not a concern, limestone screenings or granular material such as sand, gravel, or crushed stone may also be used. Material should be approved by the geotechnical engineer.
3. Any non-durable rock (shales, siltstone, etc.) that is encountered on site and re-used as structural fill should be thoroughly broken down (slaked) to achieve a soil-like consistency.
4. Material classified as CH or MH should not be used as structural fill.

Fill Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as Structural fill
Minimum Compaction Requirements [1, 2]	98% of max. below foundations and within 1 foot of finished pavement subgrade 95% of max. above foundations, below floor slabs, and more than 1 foot below finished pavement subgrade	92% of max.
Water Content Range [1]	Low plasticity cohesive: -2% to +3% of optimum High plasticity cohesive: 0 to +4% of optimum Granular: -3% to +3% of optimum	As required to achieve min. compaction requirements

Item	Structural Fill	General Fill
1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698). 2. If the granular material is a coarse sand or gravel, or of a uniform size, or has a low fines content, compaction comparison to relative density may be more appropriate. In this case, granular materials should be compacted to at least 70% relative density (ASTM D 4253 and D 4254).		

Utility Trench Backfill

For low permeability subgrades, utility trenches are a common source of water infiltration and migration. Utility trenches penetrating beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches, which could migrate below the building. The trench should provide an effective trench plug that extends at least 5 feet from the face of the building exterior. The plug material should consist of cementitious flowable fill or low permeability clay. The trench plug material should be placed to surround the utility line. If used, the clay trench plug material should be placed and compacted to comply with the water content and compaction recommendations for structural fill stated previously in this report.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent

ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

The groundwater table could affect overexcavation efforts, especially for over-excavation and replacement of lower strength soils. A temporary dewatering system consisting of sumps with pumps could be necessary to achieve the recommended depth of over-excavation.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, “Excavations” and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proofroll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. One density and water content test should be performed for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer’s evaluation of subsurface conditions, including assessing variations and associated design changes.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing pressure [1, 2]	2,000 psf (foundations bearing on structural fill)
Required Bearing Stratum [3]	All foundation excavations should bear on at least stiff native lean clay, lean concrete, or new structural fill as described in **Earthwork.**
Minimum Foundation Dimensions	Columns: 30 inches Continuous: 18 inches
Ultimate Passive Resistance [4] **(equivalent fluid pressures)**	350
Ultimate Coefficient of Sliding Friction [5]	0.4
Minimum Embedment below Finished Grade [6]	24 inches
Estimated Total Settlement from Structural Loads [2]	Less than about 1 inch
Estimated Differential Settlement [2, 7]	About 1/2 of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in **Project Description**.
3. Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in the **Earthwork**.
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
6. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
7. Differential settlements are as measured over a span of 50 feet.

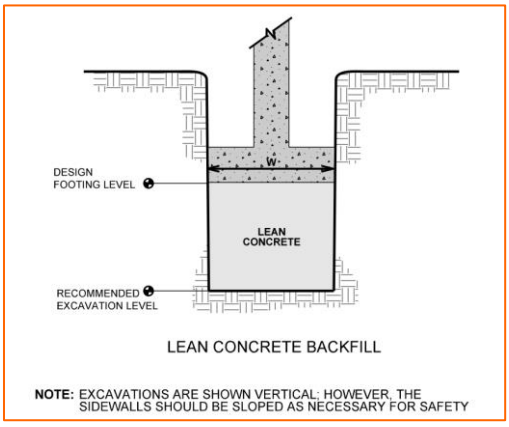
Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the direction of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose

soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

If unsuitable bearing soils below the fill are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. Based on the borings we anticipate suitable bearing at a depth of approximately 5 to 6 feet from existing grade.

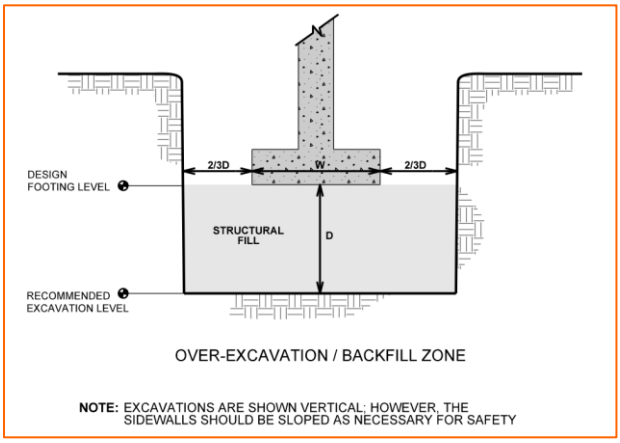
Options to undercut are illustrated on the sketches below.



LEAN CONCRETE BACKFILL

NOTE: EXCAVATIONS ARE SHOWN VERTICAL; HOWEVER, THE SIDEWALLS SHOULD BE SLOPED AS NECESSARY FOR SAFETY

Over-excavation for structural fill placement below footings should be conducted as shown below. The over-excavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in the **Earthwork** section.



OVER-EXCAVATION / BACKFILL ZONE

NOTE: EXCAVATIONS ARE SHOWN VERTICAL; HOWEVER, THE SIDEWALLS SHOULD BE SLOPED AS NECESSARY FOR SAFETY

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is C**. Subsurface explorations at this site were extended to a maximum depth of 20feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

FLOOR SLABS

Depending upon the finished floor elevation, unsuitable, weak, soft to medium stiff soils may be encountered at the floor slab subgrade level. These soils should be replaced with structural fill so the floor slab is supported on at least 3 feet of compacted suitable natural soils or structural fill.

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support [1]	Minimum 6 inches of free-draining crushed aggregate compacted to at least 95% of ASTM D 698 [2, 3] At least 2-feet of new structural fill where soft to medium stiff soils are present.
Estimated Modulus of Subgrade Reaction [2]	100 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.
3. Free-draining granular material should have less than 18% fines (material passing the No. 200 sieve). Other design considerations such as cold temperatures and condensation development could warrant more extensive design provisions.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Settlement of floor slabs supported on existing fill materials cannot be accurately predicted, but could be larger than normal and result in some cracking. Mitigation measures, as noted in **Existing Fill** within **Earthwork**, are critical to the performance of floor slabs. In addition to the mitigation measures, the floor slab can be stiffened by adding steel reinforcement, grade beams and/or post-tensioned elements.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

PAVEMENTS

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

Pavement Design Parameters

Design of Asphaltic Concrete (AC) pavements are based on the procedures outlined in the AASTHO 1993. Design of Portland Cement Concrete (PCC) pavements are based upon American Concrete Institute (ACI) 330; Guide for Design and Construction of Concrete Parking Lots.

A subgrade CBR of 3 was used for the AC pavement designs, and a modulus of subgrade reaction of 89 pci was used for the PCC pavement designs. The values were empirically derived based upon our experience with the cohesive subgrade soils and our understanding of the quality of the subgrade as prescribed by the **Site Preparation** conditions as outlined in **Earthwork**. A modulus of rupture of 580 psi was used for pavement concrete.

Once proposed grading is provided to Terracon for our review or it is determined that the partial undercut option will be implemented at pavement subgrade elevation in areas where high-plasticity clays are encountered, consideration can be given to increasing our CBR value used for pavement design, where appropriate.

Pavement Section Thicknesses

The following table provides options for AC and PCC Sections:

Minimum Recommended Pavement Section Thickness (inches)						
Traffic Area	**Pavement Type**	**Asphalt Concrete Couse**		**Portland Cement Concrete [1]**	**Aggregate Base [2]**	**Total Thickness[3]**
		Surface	**Base**			
Light Duty Areas	AC	1.5	1.5	--	6.0	9.0
	PCC	--	--	5.0	4.0	9.0
Heavy Duty Areas	AC	1.5	2.0	--	6.0	10.0

Minimum Recommended Pavement Section Thickness (inches)						
	PCC	--	--	6.0	4.0	10.0

1. 4,000 psi compressive strength at 28 days, Concrete materials and placement requirements should follow ACI 330.1. PCC pavements are recommended for trash container pads and in any other areas subject to heavy wheel loads and/or turning traffic such as entrance aprons.
2. KYTC crushed limestone dense graded aggregate (DGA). The aggregate base will serve to provide improved drainage beneath the concrete, reduce pumping of fines and reduce frost heave during winter months. Aggregate base course should be compacted to 98 percent of its maximum dry density as determined by ASTM D-698, Standard Proctor Test.
3. Based on an assumed CBR value of 3.0.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Based on the possibility of shallow and/or perched groundwater, we recommend installing a pavement subdrain system to control groundwater, improve stability, and improve long-term pavement performance.

Due to frost-susceptible soils and the possibility of perched groundwater, consideration should be given to installing a pavement subdrain system to control subgrade moisture, improve stability, and improve long-term pavement performance.

We recommend at least 6 inches of free-draining granular material be placed beneath the pavements. The use of a free draining granular base will also reduce the potential for frost action. We recommend pavement subgrades be crowned at least 2% to promote the flow of water towards the subdrains, and to reduce the potential for ponding of water on the subgrade. The design recommendations for the subdrains are provided in the following table:

Subdrain Design Recommendations	
Item	**Value**
Free Draining Granular Base Thickness below Pavement	6 inches of material meeting No. 57 aggregate specifications
Minimum Drain Pipe Diameter	4 inches
Drain Trench Width	16 inches or greater to provide minimum 6-inch annulus of drainage aggregate around drain pipe.

Subdrain Design Recommendations	
Item	**Value**
Invert Depth below Subgrade Elevation	3½ feet
Maximum Drain Pipe Spacing	50 feet
Subdrain Trench Backfill Material	No. 57 aggregate or ¾-inch aggregate

The subdrains should be hydraulically connected to the free-draining granular base layer. Subdrains should be sloped to provide positive gravity drainage to reliable discharge points such as the storm water detention basin. Periodic maintenance of subdrains is required for long-term proper performance.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install below pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

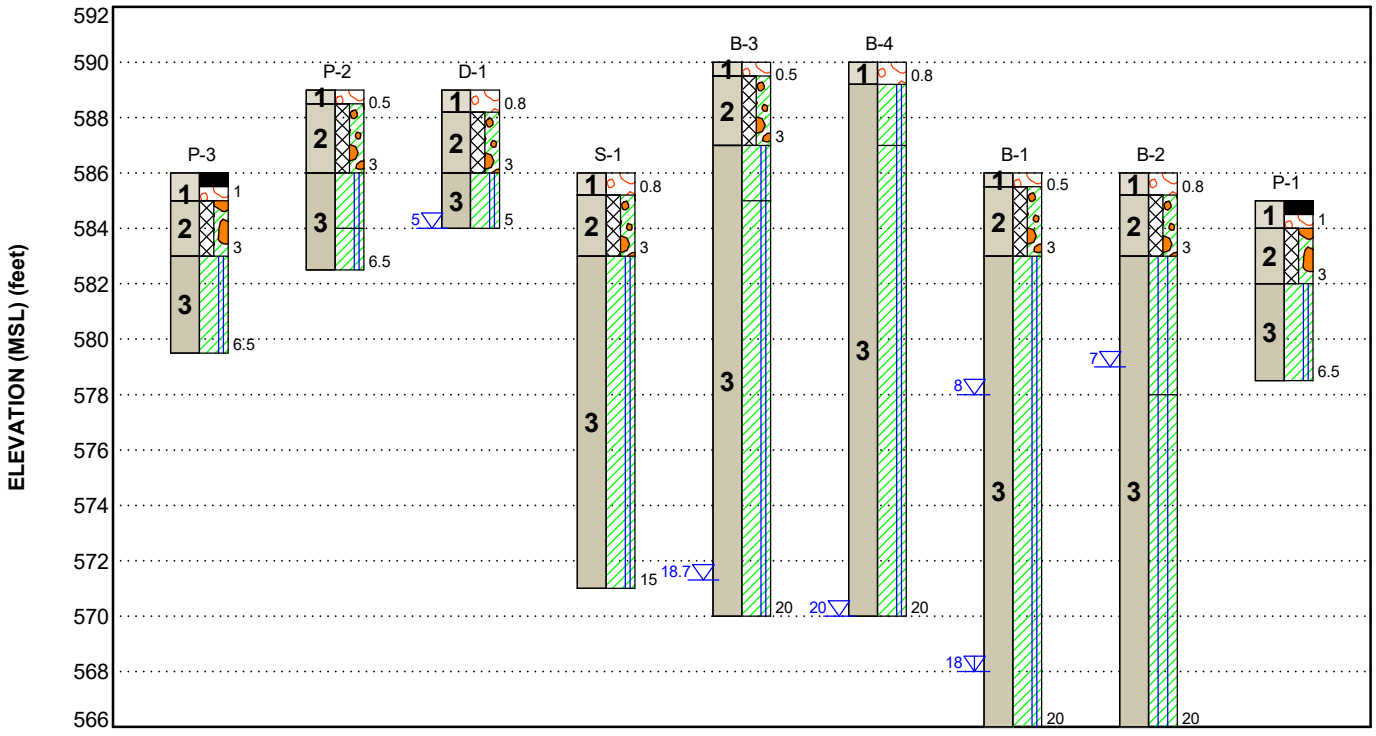
Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

FIGURES

Contents:

GEOMODEL

Proposed Burger King Grayson, KY ■ Grayson, KY
Terracon Project No. N3215024



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surface	Asphalt and aggregate base
2	Fill	Gravelly lean clay, brown
3	Cohesive soils	Lean clay with silt (CL) and silty clay (CL-ML), very soft to very stiff, light brown and gray

LEGEND

- Aggregate Base Course
- Lean Clay with Gravel
- Lean Clay with Silt
- Silty Clay
- Asphalt
- Gravelly Lean Clay

▽ First Water Observation
▽ Second Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Planned Location
4	20	Planned building area (Proposed Burger King)
3	6.5	Planned parking/driveway area
1	15	Sign
1	5	Dumpster pad

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and approximate current elevations were obtained by interpolation from Google Earth® software; we have not been provided with site grading plans at the issuance of this report and are not aware of how much earthwork is anticipated at this location to bring the site to proposed design grade. If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted rotary drill rig using hollow stem continuous flight augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

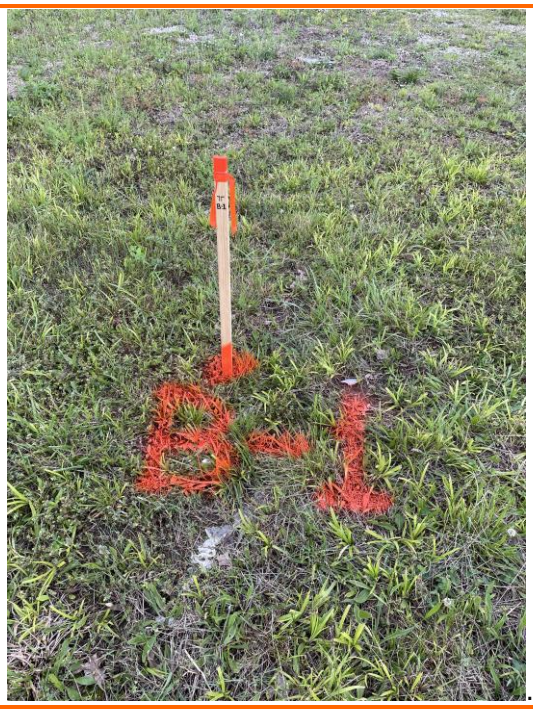
Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil and rock strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

PHOTOGRAPHY LOG



B-1

B-2

B-3

B-4

P-1

P-2

P-3

D-1

	
S-1	

SITE LOCATION AND EXPLORATION PLANS

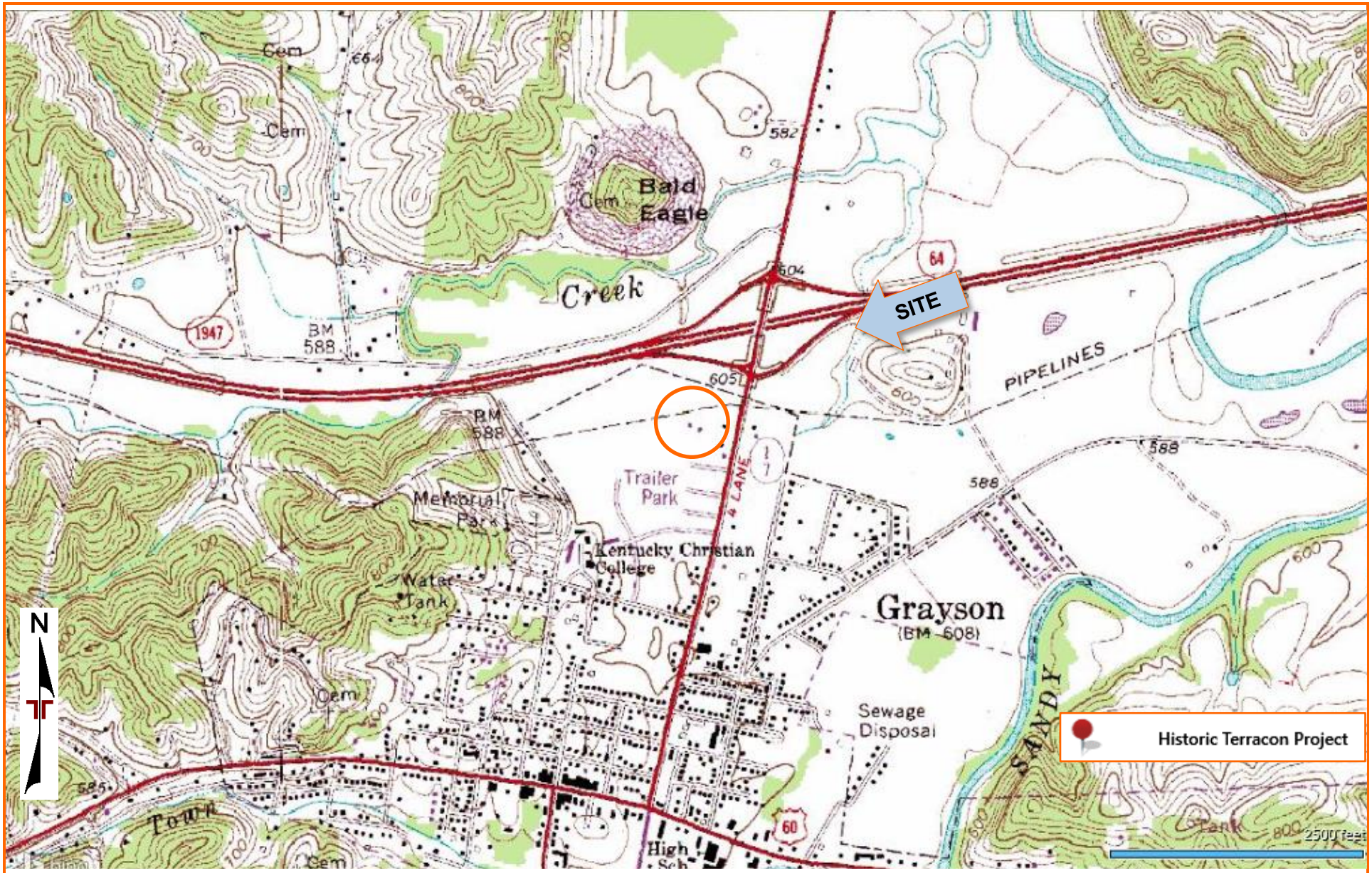
Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

Burger King Restaurant ■ Grayson, Carter County, KY
July 6, 2021 ■ Terracon Project No. N3215024



EXPLORATION PLAN

Burger King Restaurant ■ Grayson, Carter County, KY
July 6, 2021 ■ Terracon Project No. N3215024

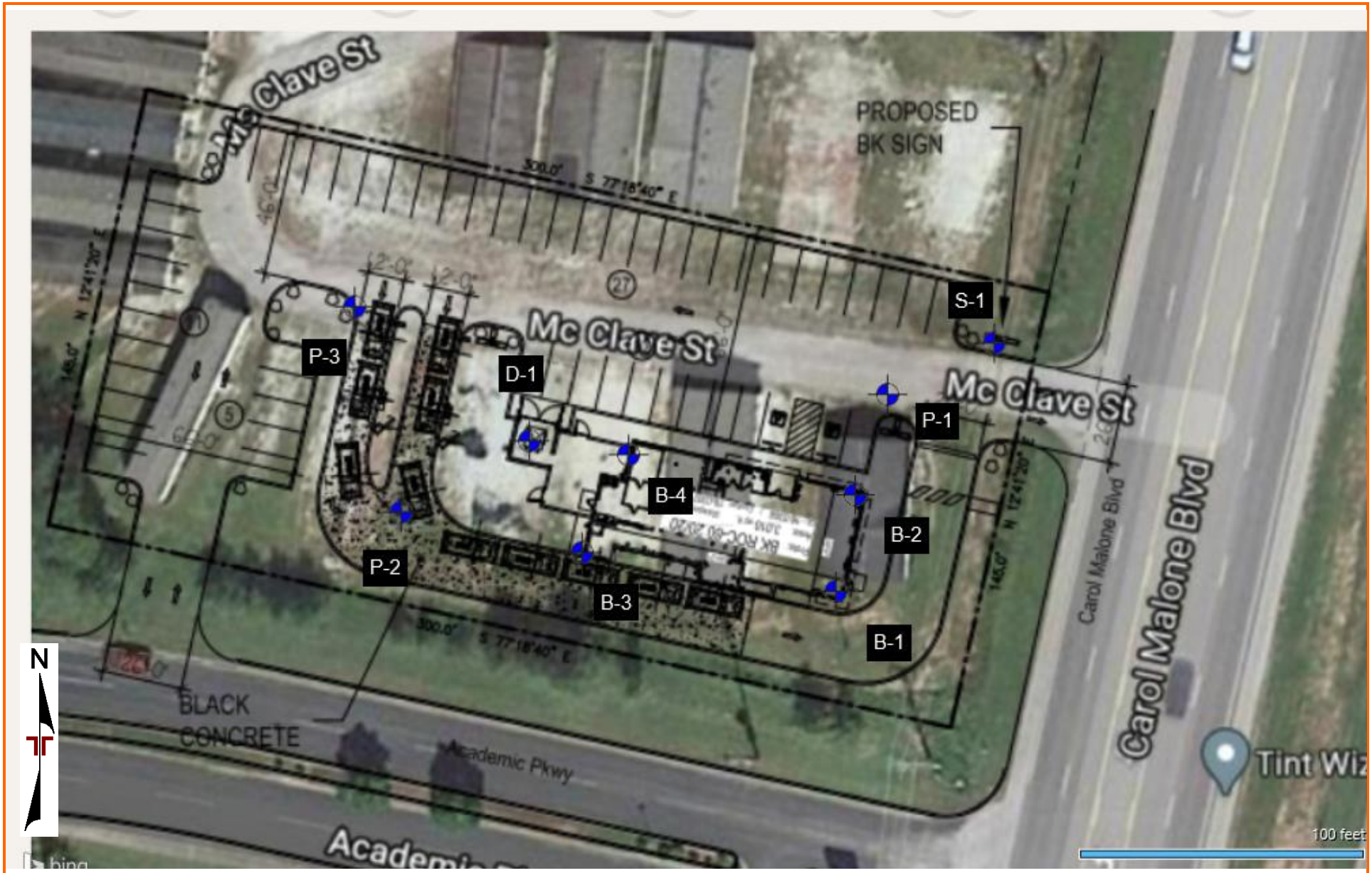


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-4), D-1, (P-1 through P-3), and S-1
Atterberg Limits

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3396° Longitude: -82.9437°

Surface Elev.: 586 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.5	585.5								
2		**FILL -** , brown				X	7	2-2-3 N=5	3.00 (HP)	32.0	
		3.0	583								
3		**LEAN CLAY WITH SILT (CL)**, light brown and gray, medium stiff to stiff		5		X	11	2-2-3 N=5	1.50 (HP)	39.6	
						X	18	4-4-5 N=9	2.50 (HP)	31.3	
					▽						
				10		X	16	3-4-5 N=9	1.75 (HP)	27.0	
				15		X	10	2-3-5 N=8	2.00 (HP)	33.4	
					▽						
						X	11	3-3-4 N=7	1.25 (HP)	31.7	
		20.0	566	20							
		Boring Terminated at 20 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

▽ *8 feet: While drilling*

▽ *18 feet: At completion of drilling*

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-22-2021 | Boring Completed: 06-22-2021

Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

BORING LOG NO. B-2

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3397° Longitude: -82.9436°

Surface Elev.: 586 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.8	585	**AGGREGATE BASE COURSE**								
2		3.0	583	**FILL -** , brown				12	3-2-3 N=5	2.00 (HP)	18.8	
3		6.5	579.5	**SILTY CLAY (CL-ML)**, light brown and gray, moist, very soft to soft	5			18	0-0-0 N=0	0.25 (HP)	45.3	46-28-18
3		20.0	566	**SILTY CLAY (CL-ML)**, light brown and gray, medium stiff to stiff		▽		18	3-5-6 N=11	1.25 (HP)	49.0	
					10			15	2-3-3 N=6	2.00 (HP)	42.3	
					15			10	3-3-4 N=7	1.50 (HP)	37.9	
					20			11	4-4-6 N=10	2.00 (HP)	22.7	
				Boring Terminated at 20 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

▽ *7 feet: While drilling*

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-22-2021 | Boring Completed: 06-22-2021

Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

BORING LOG NO. B-3

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3396° Longitude: -82.9440°

Surface Elev.: 590 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.5	589.5								
		AGGREGATE BASE COURSE									
2		**FILL -** , brown				X	13	3-2-2 N=4	2.50 (HP)	15.7	
		3.0	587								
		LEAN CLAY WITH SILT (CL), light brown and gray, soft to medium stiff				X	14	1-2-2 N=4	1.00 (HP)	34.7	
				5		X	15	2-3-4 N=7	.75 (HP)	42.5	45-26-19
						X	15	4-4-6 N=10	.75 (HP)	32.8	
3				10							
						X	12	2-1-2 N=3	.50 (HP)	36.0	
				15							
					▽	X	10	2-3-4 N=7	.75 (HP)	40.6	
		20.0	570	20							
		Boring Terminated at 20 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

▽ *18.7 feet: At completion of drilling*

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-22-2021 | Boring Completed: 06-22-2021

Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

BORING LOG NO. B-4

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3397° Longitude: -82.9439°

Surface Elev.: 590 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.8	589	**AGGREGATE BASE COURSE**								
3		3.0	587	**LEAN CLAY WITH SILT**, light brown, very soft				10	0-0-0 N=0	.50 (HP)	52.5	
		8.0	582	**LEAN CLAY WITH SILT (CL)**, light brown and gray, soft to medium stiff	5			11	3-2-2 N=4	2.00 (HP)	16.0	
								10	1-2-1 N=3	1.75 (HP)	35.6	
				LEAN CLAY WITH SILT (CL), light brown and gray, stiff	10			11	3-4-6 N=10	2.50 (HP)	24.7	39-21-18
					15			8	3-4-4 N=8	2.00 (HP)	31.0	
		20.0	570		20	▽		10	4-5-8 N=13	2.00 (HP)	34.0	
				Boring Terminated at 20 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

▽ *20 feet: At completion of drilling*

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-21-2021 | Boring Completed: 06-21-2021

Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

BORING LOG NO. D-1

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3397° Longitude: -82.9440°

Surface Elev.: 589 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.8	588								
2			**AGGREGATE BASE COURSE** **FILL -** , brown				11	3-3-3 N=6	3.00 (HP)	13.2	
		3.0	586								
3			**LEAN CLAY WITH SILT (CL)**, light brown and gray, moist, very soft				11	2-1-1 N=2	.50 (HP)	42.7	44-26-18
		5.0	584	5	▽						
			Boring Terminated at 5 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

▽ *5 feet: At completion of drilling*

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-22-2021 | Boring Completed: 06-22-2021

Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

BORING LOG NO. P-1

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3398° Longitude: -82.9436°

Surface Elev.: 585 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.5 **ASPHALT**	584.5								
		1.0 **AGGREGATE BASE COURSE**	584								
2		**FILL -** , with chert, brown, stiff to very stiff				X	6	4-3-3 N=6	4.50 (HP)	16.3	
		3.0	582								
3		**LEAN CLAY WITH SILT (CL)**, light brown and gray, medium stiff to stiff		5		X	18	2-2-4 N=6	1.75 (HP)	33.3	
						X	18	4-4-6 N=10	1.75 (HP)	32.0	
		6.5	578.5								
		Boring Terminated at 6.5 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-22-2021 | Boring Completed: 06-22-2021

Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

BORING LOG NO. P-2

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3397° Longitude: -82.9442°

Surface Elev.: 589 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.5	588.5	**AGGREGATE BASE COURSE**								
2		3.0	586	**FILL -** , brown				7	3-2-3 N=5	3.50 (HP)	13.6	
3		5.0	584	**LEAN CLAY WITH SILT (CL)**, light brown and gray, soft to medium stiff	5			18	1-2-2 N=4	1.00 (HP)	26.0	
		6.5	582.5	**LEAN CLAY WITH SILT (CL)**, light brown and gray, medium stiff				10	2-4-4 N=8	1.50 (HP)	41.4	47-26-21
				Boring Terminated at 6.5 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-22-2021 | Boring Completed: 06-22-2021

Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

BORING LOG NO. P-3

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3399° Longitude: -82.9443°

Surface Elev.: 586 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		0.5	585.5								
1		**ASPHALT**									
		1.0	585								
2		**AGGREGATE BASE COURSE** **FILL - GRAVELLY LEAN CLAY (CL)**, with chert, brown, stiff				X	10	3-2-3 N=5	4.50 (HP)	14.9	
		3.0	583								
3		**LEAN CLAY WITH SILT (CL)**, light brown and gray, medium stiff to stiff		5		X	8	1-2-3 N=5	1.00 (HP)	30.0	
						X	5	2-3-5 N=8	2.00 (HP)	27.9	
		6.5	579.5								
		Boring Terminated at 6.5 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-22-2021 | Boring Completed: 06-22-2021

Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

BORING LOG NO. S-1

PROJECT: Proposed Burger King Grayson, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

SITE: 765 Carol Malone Blvd
Grayson, KY

LOCATION See Exploration Plan

Latitude: 38.3397° Longitude: -82.9440°

Surface Elev.: 586 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	LABORATORY HP (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.8	585								
2		**FILL -** , brown				X	10	2-3-4 N=7	2.75 (HP)	19.5	
		3.0	583								
3		**LEAN CLAY WITH SILT (CL)**, light brown and gray, moist, medium stiff to stiff		5		X	12	2-2-3 N=5	3.00 (HP)	30.7	
						X	10	4-4-5 N=9	3.00 (HP)	29.1	
				10		X	10	2-2-4 N=6	1.25 (HP)	35.3	
		13.0	573								
		LEAN CLAY WITH SILT (CL), light brown and gray, stiff				X	12	3-4-6 N=10	3.25 (HP)	28.1	
		15.0	571	15							
		Boring Terminated at 15 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.00" SFA

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from google earth.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2460 Palumbo Dr
Lexington, KY

Boring Started: 06-21-2021 | Boring Completed: 06-21-2021

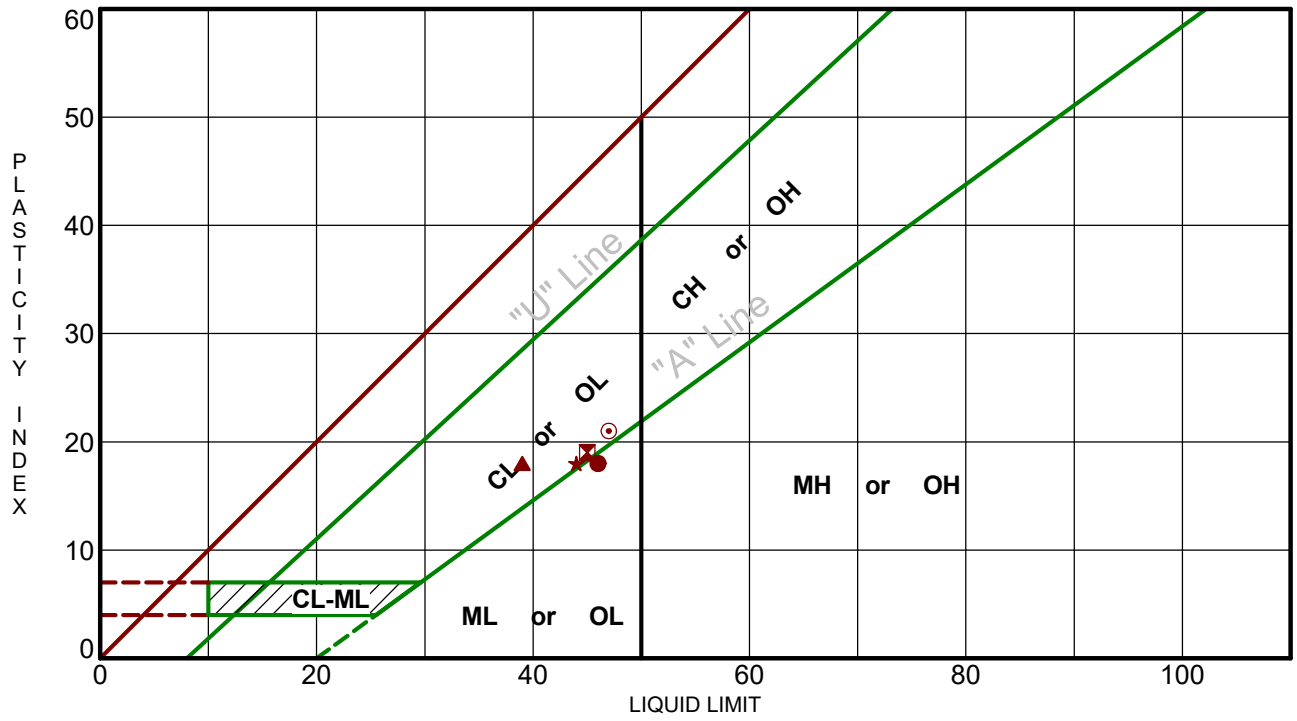
Drill Rig: D-50 track | Driller: D. Anderson

Project No.: N3215024

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 7/1/21

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth	LL	PL	PI	Fines	USCS	Description
●	B-2	3.5 - 5	46	28	18			
⊠	B-3	6 - 7.5	45	26	19			
▲	B-4	8.5 - 10	39	21	18			
★	D-1	3.5 - 5	44	26	18			
⊙	P-2	5 - 6.5	47	26	21			

PROJECT: Proposed Burger King Grayson, KY

PROJECT NUMBER: N3215024

SITE: 765 Carol Malone Blvd
Grayson, KY

Terracon
2460 Palumbo Dr
Lexington, KY

CLIENT: Ampler Development, LLC
Oklahoma City, OK

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS N3215024 PROPOSED BURGER K.GPJ TERRACON_DATATEMPLATE.GDT 6/28/21

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
Proposed Burger King Grayson, KY ■ Grayson, KY
Terracon Project No. N3215024

SAMPLING	WATER LEVEL	FIELD TESTS
Standard Penetration Test	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Proposed Burger King Grayson, KY ■ Grayson, KY

Terracon Project No. N3215024

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay [K, L, M, N] / Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay [K, L, M, P] / Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.