Geotechnical Engineering Report

Proposed Panda Express #S8-19-D6559
Nashville, Tennessee
August 16, 2018
Terracon Project No. 18185131

Prepared for:
CFT NV Developments, LLC
Rosemead, California

Prepared by:
Terracon Consultants, Inc.
Nashville, Tennessee

August 16, 2018

Terracon

CFT NV Developments, LLC
1683 Walnut Grove Avenue
Rosemead, CA 91770

Attn: Mr. Dan Waguespack

Re: Geotechnical Engineering Report
Proposed Panda Express #S8-19-D6559
Nashville, TN
Terracon Project Number: 18185131

Dear Mr. Waguespack:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with the October 2011 Master Services Agreement and our Task Order dated July 10, 2018.

This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements 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.

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Enclosures

cc: 1 – Electronic copy

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EXECUTIVE SUMMARY

This geotechnical investigation has been performed for the proposed Panda Express restaurant to be constructed on an existing closed bank property at 2740 Elm Hill Pike in Nashville, Tennessee. Eight (8) borings were advanced to auger refusal and/or termination depths of approximately 1 to 13 feet below the existing ground surface within the proposed development area. Two (2) infiltration tests were also performed at the site. The following geotechnical considerations were identified:

- All borings except W-1 and P-3 encountered about 3 to 7½ feet of existing fill extending to natural subgrade and/or auger refusal. The fill typically consisted of lean clay with several samples containing some limestone fragments. SPT N-values in the fill were highly erratic ranging from 6 to over 50 bpf. The higher N-values are likely exaggerated by the presence of limestone fragments within the fill and may not represent true strength. Natural clay was encountered below the existing fill in borings B-2 and W-2 and below the surface topsoil cover in boring W-1 and extended to auger refusal depths of about 9½ to 13 feet below existing grade. Natural clay is stiff to hard but occasionally soft. Boring P-3 refused immediately below existing pavement at a depth of about 1 foot most likely on limestone bedrock. Groundwater was not encountered in our borings.

- The lack of fill placement documentation and erratic field penetration test data are a geotechnical concern for this project. These conditions pose a potential risk for excessive foundation, slab and pavement settlement. This risk cannot be eliminated without removing the fill in its entirety, but can be reduced by performing partial undercutting and replacement and additional testing/evaluation at the time of construction by our forces.

- Assuming that Terracon is retained to provide continuity of service for the geotechnical recommendations. We recommend the existing fill, where present beneath foundations, be undercut to suitable approved natural subgrade (stiff clay or bedrock). The undercut area should be backfilled with flowable fill (Min. 200 psi strength) and/or approved engineered granular fill as described in Sections 4.1 and 4.3.2. The existing fill within the floor slab and pavement areas may be left in place provided the fill subgrade is recompacted, passes a proofroll test and is thoroughly evaluated by a Terracon engineer by observing test pits and DCP testing. Any unsuitable or weak material discovered should be undercut and replaced or recompacted or bridged as directed by the engineer.

  The existing fill where present beneath the proposed retaining wall should also be undercut as needed to construct a minimum 2-foot thick new engineered fill buffer. Any remaining fill below the engineered fill buffer should be recompacted to a non-yielding state and approved by a Terracon representative.

- After necessary fill evaluation and subgrade repair, the proposed building may be supported on shallow spread footings bearing on suitable natural subgrade or new engineered fill or flowable fill. Shallow footings designed and constructed as recommended in this report should

be dimensioned using a maximum net allowable bearing capacity of 2,500 psf for columns and wall footings. Ground supported floor slabs and pavements may be used after proper subgrade evaluation and preparation as discussed herein.

- The above recommendations are predicated upon the assumption that the boring data is representative, and that existing fill will be addressed as outlined herein and bearing subgrades will be approved by a Terracon representative. This will not completely eliminate the risk posed by the unknown aspects of the existing fill beneath the building and pavements but is intended to help reduce this risk.

- The 2012 IBC Chapter 20 ASCE 7 seismic site classification for this site is “C”.

- The near-surface soils are moisture sensitive and will require moisture control techniques in the field to achieve compaction. If the grading is performed during wet weather, we expect near surface soils will become unstable and may require remediation across the construction footprint. We recommend the grading activities be performed during dry weather.

- Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. We therefore recommend that Terracon be retained to monitor this portion of the work.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

GEOTECHNICAL ENGINEERING REPORT
PROPOSED PANDA EXPRESS #S8-19-D6559
NASHVILLE, TENNESSEE
Terracon Project No. 18185131
August 16, 2018

1.0 INTRODUCTION

This geotechnical engineering report has been completed for the proposed Panda Express restaurant to be located on an existing closed bank property at 2740 Elm Hill Pike in Nashville, Tennessee. Eight (8) borings were drilled to depths of approximately 1 to 13 feet below the existing ground surface within the area proposed for construction. Two of the eight borings (W-1 and W-2) were drilled along the proposed retaining wall alignment near the west property line. Two (2) infiltration tests were also performed within the proposed stormwater basin along the west side of the property. Logs of the borings along with a boring location plan are included in Appendix A.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- earthwork
- foundation design and construction
- seismic considerations
- slab design and construction
- lateral earth pressures
- pavement section thickness

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Site layout	See Appendix A, Exhibit A-1, Boring Location Plan
Proposed Improvements	A one-story ± 2,200 square foot (sf) restaurant building, associated at-grade paved parking and drive areas and retaining wall along the west property line.
Building Construction	Light gauge metal framing with masonry walls, wood trusses, grade supported floor slabs, and brick or stone cladding
Finished floor elevation	Unknown but expected to be at/near the existing building finished floor elevation and is anticipated to be within 0 to 2 feet of existing grades within the proposed building pad.
Maximum loads	Columns: 60 kips (assumed) Walls: 2 klf (assumed) Slab: 125 psf (assumed)
Grading	Unknown, but we anticipate less than 2 feet of fill within the proposed construction footprint.
Cut and fill slopes	Unknown, but no significant slopes are expected
Free-standing retaining walls	A free standing retaining wall is currently proposed near the west property line. Wall height and configuration are unknown but we expect the wall will likely be less than 8 feet high and may provide storm water containment in the detention basin.
Below grade areas	None anticipated

2.2 Site Location and Description

Item	Description
Location	The proposed site is currently developed with a closed bank facility located at 2740 Elm Hill Pike, Nashville, Davidson County, TN. Latitude / Longitude: N 36.14958° / W 86.66789°
Existing improvements	Site is currently occupied by a closed bank facility containing a single story building, an attached drive through canopy, sidewalks, concrete curbs, asphalt parking and drive areas, landscaping and several buried utilities. The footprint of the existing building appears to overlap the southern portion of the proposed building.
Current ground cover	Existing building, asphalt, concrete, grass and mulch, scattered trees

Item	Description
Existing topography	A topographic survey was not available as of this writing. Review of the Nashville Planning Department Parcel Viewer indicates the site is relatively flat to slightly sloping from the northeast corner (about El. 532 feet, MSL) to the southwest corner (about El. 526 feet, MSL). The majority of the site appears to be at approximately El. 530 feet, MSL.

3.0 SUBSURFACE CONDITIONS

3.1 Geology

Formation	Description
Bigby-Cannon Limestone and Hermitage Formation [1]	Bigby-Cannon: Brownish-gray phosphatic calcarenite and light-gray to brownish-gray, even-bedded limestone Hermitage Formation - Thin-bedded to laminated, sandy and argillaceous limestone with shale; nodular shaly limestone; coquina; and phosphatic calcarenite.

1. *Geologic Map of the Tennessee, West Central Sheet, Tennessee* published by the State of Tennessee Department of Conservation, Division of Geology (1966).

The site is underlain by carbonate limestone that is highly susceptible to dissolution along joints and bedding planes in the rock mass. This results in voids and solution channels within the rock strata and a highly irregular bedrock surface. The weathering of the bedrock and subsequent collapse or erosion of the overburden into these openings results in what is referred to as karst topography. Any construction in karst topography is accompanied by some degree of risk for future internal soil erosion and ground subsidence that could affect the stability of the rock supported structure. Our borings drilled at the site did not disclose any soil softening at depth and/or impending overburden collapse associated with karst activity. Furthermore, our review of USGS topographic mapping did not reveal any closed depressions at the site.

3.2 Typical Profile

Borings B-1 and B-2 were drilled within the proposed building footprint. Borings P-1 to P-4 were drilled within the proposed parking lot footprint. Borings W-1 and W-2 were drilled within the proposed retaining wall alignment.

Beneath the surface cover (pavement, mulch and topsoil), all borings except W-1 and P-3 encountered about 3 to 7½ feet of existing fill extending to natural subgrade and/or auger refusal. The fill typically consisted of lean clay with some samples containing occasional limestone fragments. SPT N-values in the fill were highly erratic ranging from 6 to over 50 bpf. The higher N-values are likely exaggerated by the presence of limestone fragments within the fill and may not represent true strength. Natural clay was encountered below the existing fill in borings B-2

and W-2 and below the surface topsoil cover in boring W-1 and extended to auger refusal depths of about 9½ to 13 feet below existing grade. Natural clay is stiff to hard but occasionally soft (N-values ranging from 3 to 34 bpf). Softer consistency was noted where trace of phosphate was noted in the clay. Boring P-3 refused immediately below the existing pavement at a depth of about 1 foot most likely on limestone bedrock.

The depth to auger refusal at our boring locations varied from about 1 to 13 feet below the existing ground surface at most boring locations. Pavement borings P-2 and P-4 were terminated at shallow depths of about 5 feet below existing grade. The following table summarizes fill thickness and auger refusal depths at each boring location.

Boring No.	Approximate Fill Depth (feet)	Approximate Auger Refusal Depth (feet)	Boring No.	Approximate Fill Depth (feet)	Approximate Auger Refusal Depth (feet)
B-1	3	3	P-3	0	1
B-2	3 ½	13	P-4	5	> 5 [1]
P-1	5	5	W-1	0	10 ½
P-2	5	> 5 [1]	W-2	7 ½	9 ½

1. Boring terminated prior to auger refusal

A sample of the onsite clay tested was classified as lean clay of low plasticity based on the following measured Atterberg limits:

Sample Location, Depth	Liquid Limit, (%)	Plastic Limit, (%)	Plasticity Index, (%)
Boring W-1, 1 – 2.5 ft.	44	22	22

Conditions encountered at each boring location are indicated on the individual logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in situ, the transition between materials may be gradual. Details for each of the borings can be found on the logs in Appendix A. A discussion of field sampling procedures is included in Appendix A and laboratory testing procedures are presented in Appendix B.

3.3 Groundwater

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Groundwater was not observed in the borings while drilling, or for the short duration that the borings were allowed to remain open. However, this does not necessarily mean the borings terminated above groundwater. Due to the low permeability of the soils encountered in the borings, a relatively long period of time may be necessary for a groundwater level to develop and stabilize in a borehole in these materials. Long term observations in piezometers or observation wells sealed

from the influence of surface water are often required to define groundwater levels in materials of this type.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Perched water can also develop within porous fill and/or on top of bedrock. The possibility of groundwater level fluctuations and perched water should be considered when developing the design and construction plans for the project.

3.4 Infiltration Testing

Two infiltration tests were performed at the proposed stormwater basin/bio-retention area using procedures outlined in the *City of Nashville Best Management Practice Bioretention Management Manual.* Borings were drilled to depths of about 4 feet below existing grade at the proposed infiltration test locations. Rigid test casings (PVC pipes) 4 inches in diameter were installed in each test hole to depths of about 4 feet below the current ground surface.

The test casings were filled with clean distilled water to a height of 2 feet, and the underlying soil was allowed to presoak for 24 hours. After 24 hours, the test casings were refilled with another 2 feet of clean distilled water and the drop in water level within the individual test casings was recorded after one hour. This procedure was repeated three additional times, for a total of four observations at both test locations (I-1 and I-2).

The infiltration rate of the underlying soils is reported as the average of all four observations rounded to the nearest inch and is shown in the table below:

Boring No.	Test No. 1 (in./hr.)	Test No. 2 (in./hr.)	Test No. 3 (in./hr.)	Test No. 4 (in./hr.)	Average Rate (in./hr.)	USCS Classification
I-1	0	0.25	0	0	0.06	Fat clay
I-2	0	0.25	0	0	0.06	Fat clay

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The results of our field exploration revealed about 3 feet of existing fill in both building borings, about 7½ feet in one retaining wall boring and about 5 feet of fill in two pavement borings. The fill consisted of lean clay with several samples containing occasional limestone fragments. We have no records or density test results of the former fill operations or any documentation that the previous site grading was observed by technical personnel. The erratic field penetration test data and unknown aspects of undocumented fill is a geotechnical concern for this project, which poses a potential risk for excessive foundation, slab and pavement settlement. This risk cannot be eliminated

without removing the fill in its entirety, but can be reduced by performing partial undercutting and replacement and additional testing/evaluation at the time of construction by our forces.

Considering the limited thickness and unpredictable nature of the existing fill, we recommend undercutting the existing fill from beneath all building foundations to suitable approved natural subgrade (stiff natural clay or bedrock) and backfilling with flowable fill or engineered granular fill. The undercut and replacement should be performed per our recommendations outlined in Section 4.3.2. The existing fill within the proposed floor slab and pavement areas may be left in place provided the material passes a proofroll, is recompacted to a non-yielding state and approved by a Terracon engineer via test pits and DCP testing. We recommend that final remediation depths be field determined by a Terracon engineer based on the fill conditions observed.

After the site clearing, above-recommended subgrade evaluation and repair, proofrolling, and necessary subgrade preparation and planned grading, the proposed building may be supported on shallow footings bearing on new engineered fill or flowable fill (min. 200 psi strength) extending to suitable natural soils. Foundations designed and constructed as recommended herein may be dimensioned using a net allowable bearing pressure of 2,500 psf for wall footings and column footings. Ground supported floor slabs and pavements may be used after proper subgrade preparation and grading as discussed herein.

The existing fill where present within the proposed retaining wall area should also be undercut, as needed, to construct a minimum 2-foot thick “buffer” layer of new engineered fill beneath wall foundation bearing subgrade elevation. The remaining fill beneath the buffer should be recompacted and thoroughly evaluated by a Terracon engineer by observing test pits and DCP testing. Any unsuitable and/or weak fill materials encountered should be further undercut and/or stabilized (bridged) as directed by a Terracon engineer. The proposed retaining wall may be supported on a shallow spread foundation over stiff natural soils and/or new engineered fill. Foundations designed and constructed as recommended herein may be dimensioned using a net allowable bearing pressure of 2,000 psf.

Support of slabs and pavements and retaining wall above existing fill soils is discussed herein. However, even with the recommended construction testing services, there is an 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 performing the recommended testing and evaluation as discussed herein.

4.2 Earthwork

4.2.1 Site Preparation

Prior to placing any fill, all above and below grade structures including footings, slabs, pavements, sidewalks, curbs, utilities and any disturbed or uncontrolled fill, vegetation, topsoil and any unsuitable material should be removed from the proposed construction area. Wet or disturbed or

loose material should either be removed or moisture conditioned and recompacted. Deeper excavation required to remove buried structures should be backfilled with approved engineered fill per our recommendations outlined herein. Where instability is perceived to be shallow (i.e., less than about 12 inches), acceptable remediation might consist of scarification, aeration and recompaction.

After site clearing, stripping and grubbing, the subgrade should be proof-rolled to aid in locating soft areas. Proofrolling is a very useful tool in identifying shallow areas of subgrade instability, but should be performed only after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade. The proofroll should be performed with a loaded tandem-axle dump truck under the observation of the Terracon geotechnical engineer or his representative. Soft, and low-density soil delineated by the proofroll should be removed or compacted in place prior to placing fill. Any areas that pump or deflect excessively and cannot be stabilized should be undercut as recommended by the geotechnical engineer. The extent of near surface subgrade remediation will be greatly impacted by the prevailing weather conditions at the time of grading. Therefore, grading be performed during dry weather.

As discussed in Section 4.1, existing fill where present beneath the proposed building foundations should be undercut to suitable natural subgrade and the undercut area backfilled with flowable fill or engineered granular (crushed rock) fill as described in Section 4.3.2. The existing fill where present beneath the proposed retaining wall should also be undercut, as needed, to construct a minimum 2-foot "buffer" layer of new engineered fill beneath foundation bearing elevation. Ground supported floor slabs and pavements may be used after proper subgrade preparation and grading as discussed herein. Additional exploration in the form of test pits should be performed to further evaluate the existing fill and to finalize the extent of remediation required. The contractor should be prepared to further undercut weak or suspect soils as directed by Terracon engineer.

Adequate site drainage during and after construction is recommended to control and divert the surface runoff away from the proposed development area. We recommend that construction activities be performed during dryer weather. Subgrade instability should be anticipated if construction is planned during wet weather. Alternatives for subgrade improvement could include scarification and recompaction, undercutting and replacement, use of well graded clean shot rock fill and/or the use of geogrid such as Tensar BX-1100 or equal with crushed stone, and chemical stabilization using lime or cement or use of well graded clean shotrock.

4.2.2 Material Requirements

Compacted structural fill should meet the following material property requirements:

Engineered Fill Description and Recommended Uses		
Fill Type [1]	**USCS Classification**	**Acceptable Location for Placement**
Lean clay	CL (LL< 45)	All locations and elevations, not recommended in footing undercut areas
Lean to fat clay	CL/CH (45<LL<50)	1 ft. below finished subgrade unless tested and meets low volume change material criteria. Not recommended in footing undercut areas
Fat clay [2]	CH (LL $\geq$ 50)	> 2 ft. below finished subgrade not recommended in footing undercut areas
Well graded granular	GW [3]	All locations and elevations
Clean shot rock, < 5% soil; max. particle size is 1 ft. [4]	-	All locations and elevations, not recommended in confined footing undercut areas
Existing fill	CL	The existing fill free of debris or unsuitable material and excessive rock content can be reused as engineered fill provided it meets the above fill criteria

1. Controlled, compacted fill should consist of approved materials that are 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.
2. Delineation of fat clays should be performed in the field by a qualified geotechnical engineer or his representative.
3. Similar to TDOT Section 903.05 Type A, Grading D crushed limestone aggregate, limestone screenings, or granular material such as well graded gravel or crushed stone.
4. Approval of any shot rock material should be made prior to placement to verify gradation and maximum particle size.

4.2.3 Compaction Requirements

Item	Description
Fill Lift Thickness	9 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
	Shot rock can be placed in 12-inch thick horizontal layers
Compaction Requirements	At least 98% of the materials standard Proctor maximum dry density (ASTM D 698)
Moisture Content Cohesive Soil	Within the range of 1% below to 2% above the optimum moisture content value as determined by the standard Proctor test at the time of placement and compaction
Moisture Content Granular Material	Moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proofrolled.

We recommend that engineered fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.

Shot rock fill should be compacted in lifts not exceeding 12 inches using a D-8 class Dozer (10-ton class vibratory roller) or equivalent. Each lift of fill should be compacted using a minimum of ten passes, five in one direction and five that are at a right angle to the initial passes. A complete pass consists of complete coverage of the surface with the tracks or roller.

4.2.4 Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches that could migrate below the building.

4.2.5 Grading and Drainage

Final surrounding grades should be sloped away from the structure on all sides to prevent ponding of water. Gutters and downspouts that drain water a minimum of 10 feet beyond the footprint of the proposed structures are recommended. This can be accomplished through the use of splash-blocks, downspout extensions, and flexible pipes that are designed to attach to the end of the downspout. Flexible pipe should only be used if it is daylighted in such a manner that it gravity-drains collected water. Splash-blocks should also be considered below hose bibs and water spigots.

4.2.6 Earthwork Construction Considerations

Although the exposed subgrade is anticipated to be relatively stable upon initial exposure, unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. Should unstable subgrade conditions develop, stabilization measures will need to be employed.

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to floor slab and pavement construction.

Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required, to maintain stability of both the excavation sides and bottom. All excavations should be sloped or braced to comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proof-rolling; placement and compaction of controlled compacted fills; backfilling of excavations into the completed subgrade; and, just prior to construction of building floor slabs.

4.3 Foundations

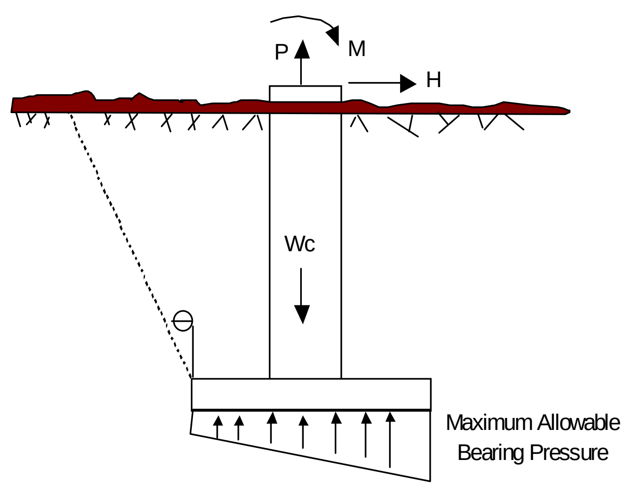
After site clearing and addressing the existing fill soils and necessary subgrade preparation and grading as discussed in Sections 4.1 and 4.2 the proposed building can be supported by shallow spread footings bearing on approved new engineered fill or flowable fill and/or suitable natural soils. Design recommendations for shallow foundations for the proposed building are presented in the following section.

4.3.1 Foundation Design Recommendations

Description	Column	Wall
Net allowable bearing pressure [1]	2,500 psf	2,500 psf
Minimum dimensions	30 inches	18 inches
Minimum embedment below finished grade for frost protection [2]	18 inches	18 inches
Approximate total settlement [3]	<1 inch	<1 inch

Estimated differential settlement	<¾ inch between columns	<¾ inch over 40 feet
Allowable passive pressure [4]	500 psf (below 2 feet)	
Ultimate coefficient of sliding friction [4]	0.35	

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Assumes existing fill and/or any soft soils will be undercut and replaced with approved engineered fill or flowable fill (min 200 psi strength). An allowable bearing pressure of 2,000 psf may be used for retaining wall foundation design provided the subgrade is prepared as outlined herein.
2. For perimeter footing and footings beneath unheated areas. Also to reduce the effects of seasonal moisture variations in the subgrade soils.
3. The foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations. These values do not take into account any foundation movement instigated by karst related ground subsidence.
4. The sides of the excavation for spread footings must be nearly vertical and the concrete should be placed neat against these vertical faces for the passive earth pressure value to be valid. If the loaded side is sloped or benched, and then backfilled, the allowable passive pressure will be significantly reduced. Passive resistance in the upper 2 feet of the soil profile should be neglected. Lateral resistance due to friction at the base of the footing should be ignored where uplift also occurs.



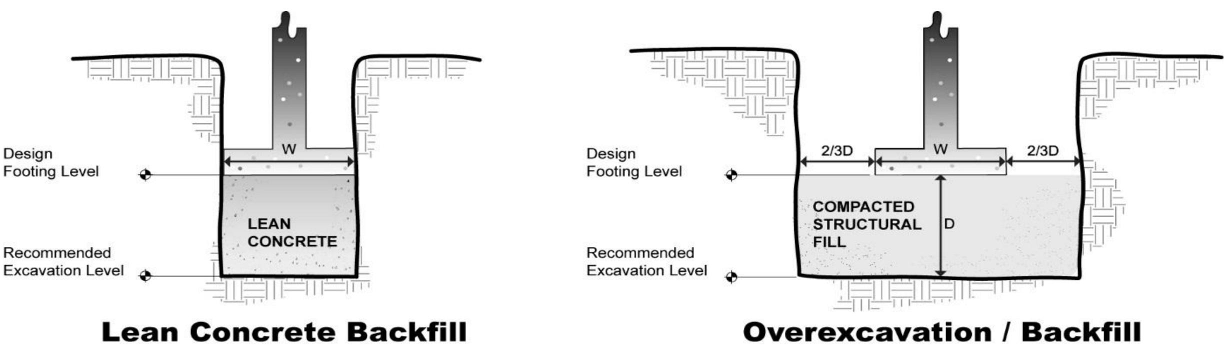
Uplift resistance can be developed from the weight of the footing, the effective weight of any overlying soil (» 115 pcf), and from the weight of the structure itself. Soil uplift resistance may be calculated as the weight of the soil prism defined by a diagonal line extending from the perimeter of the foundation to the ground surface at an angle q equal to 20 degrees from the vertical. Additional resistance due to the shear strength of the compacted backfill may be calculated as 1/3 (tan d = 20°) of the passive resistance over the perimeter of the failure zone taken as a vertical line above the base of the footing. This shear strength is an ultimate value and an appropriate factor of safety should be applied dependent on the level of field quality control. The ground surface should be sloped away from the footings to avoid ponding of water and saturation of the backfill materials.

4.3.2 Foundation Construction Considerations

The base of all foundation excavations should be free of water and loose soil and rock prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil

disturbance. Should the soils at bearing level become excessively dry, disturbed or saturated, or frozen, the affected soil should be removed prior to placing concrete. A lean concrete mud-mat should be placed over the bearing soils if the excavations must remain open for an extended period of time. We recommend that the geotechnical engineer be retained to observe and test the soil foundation bearing materials.

The existing fill and/or soft or unsuitable bearing soils where present in footing excavations should be undercut to suitable natural subgrade (stiff natural clay or bedrock) and the footings could bear directly on the suitable natural subgrade at the lower level or on flowable fill or lean concrete backfill placed in the excavations. As an alternative, the footings could also bear on properly compacted structural granular backfill extending down to the suitable natural subgrade. Overexcavation for compacted structural fill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with well graded granular material placed in lifts of 9 inches or less in loose thickness (6 inches or less if using hand-guided compaction equipment) and compacted to at least 98 percent of the material's standard proctor maximum dry density (ASTM D 698). The overexcavation and backfill procedure is described in the following figure.



NOTE: Excavations in sketches shown vertical for convenience. Excavations should be sloped as necessary for safety.

4.4 Floor Slabs

4.4.1 Floor Slab Design Recommendations

Item	Description
Floor slab support	Low plasticity natural clay or approved engineered fill [1]
Modulus of subgrade reaction	100 pounds per square inch per in (psi/in) for point loading conditions
Aggregate base course/capillary break [2]	4 inches of free draining granular material
Vapor barrier	Project Specific [3]

1. The floor slab subgrade should be prepared as outlined herein.
2. The floor slab design should include a capillary break, comprised of free-draining, compacted, granular material, at least 4 inches thick. Free-draining granular material should have less than 5 percent fines (material passing the #200 sieve). Other design considerations such as cold temperatures and condensation development could warrant more extensive design provisions.
3. The use of a vapor retarder should be considered beneath concrete slabs on grade that will be 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.

Floor slabs should be structurally independent of any building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation. Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates that any differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks that occur beyond the length of the structural dowels. The structural engineer should account for this potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

4.4.2 Floor Slab Construction Considerations

Prior to construction of grade supported slabs, varying levels of remediation may be required to reestablish stable subgrades within slab areas due to construction traffic, rainfall, disturbance, desiccation, etc. As a minimum, the following measures are recommended.

- Confirm that interior trench backfill placed beneath slabs is compacted in accordance with recommendations outlined in the Section 4.2 of this report.
- All floor slab subgrades should be moisture conditioned and properly compacted to recommendations in this report immediately prior to placement of the stone base and concrete.

4.5 Seismic Considerations

Code Used	Site Classification
2012 International Building Code (IBC) [1]	C [2,3]

1. In general accordance with the *2012 International Building Code,* Section 1613.3.2, which gives specific reference to Chapter 20 of ASCE 7 for site class definition.
2. Chapter 20 of ASCE 7 requires a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope requested does not include the required 100-foot soil profile determination. Borings for the building extended to a maximum auger refusal depth of approximately 13 feet and this seismic site class definition considers that limestone bedrock continues below the maximum depth of the subsurface exploration. Additional exploration to deeper

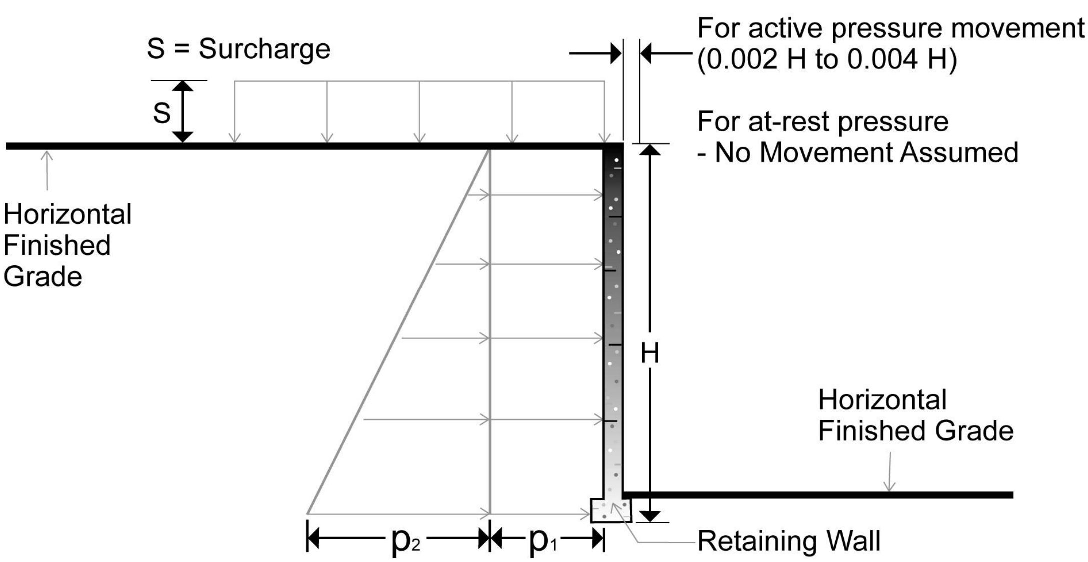
depths could be performed to confirm the conditions below the current depth of exploration. Alternatively, a geophysical exploration could be utilized in order to attempt to attain reduced acceleration values.

3. This assumes that footings will be supported on greater than 10 feet of overburden above limestone bedrock. If grades are lowered and overburden thickness is less than 10 feet a site class "B" may be used.

4.6 Lateral Earth Pressures

The lateral earth pressure recommendations given in the following paragraphs are applicable to the design of rigid retaining walls subject to slight rotation, such as cantilever, or gravity type concrete walls. These recommendations are not applicable to the design of modular block - geogrid reinforced backfill walls.

Reinforced concrete walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls.



Earth Pressure Coefficients				
Earth Pressure Conditions	**Coefficient for Backfill Type**	**Equivalent Fluid Density (pcf)**	**Surcharge Pressure, p_1 (psf)**	**Earth Pressure, p_2 (psf)**
Active (Ka)	Granular - 0.33	40	(0.33)S	(40)H
	Lean Clay - 0.42	50	(0.42)S	(50)H
At-Rest (Ko)	Granular - 0.46	55	(0.46)S	(55)H
	Lean Clay - 0.58	70	(0.58)S	(70)H
Passive (Kp)	Granular - 3.0	360	---	---
	Lean Clay - 2.4	290	---	---

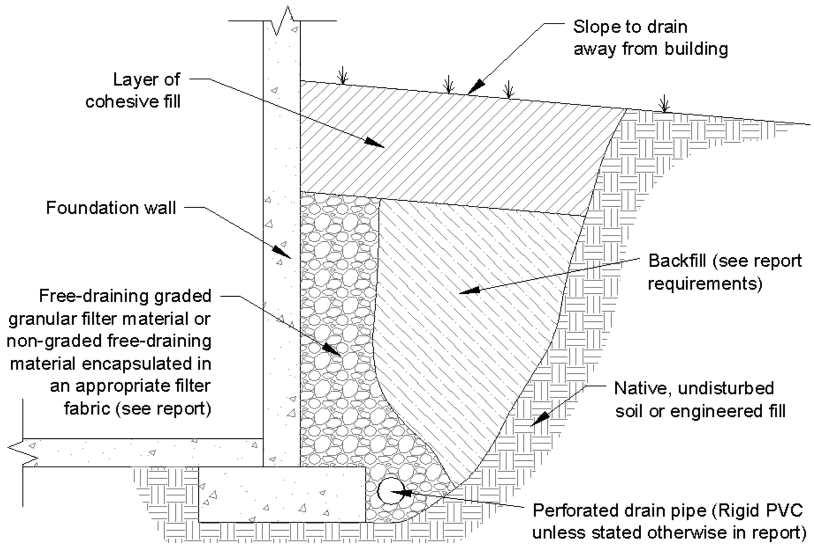
<u>Applicable conditions to the above include:</u>

- For active earth pressure, wall must rotate about base, with top lateral movements of about 0.002 **H** to 0.004 **H**, where **H** is wall height
- For passive earth pressure to develop, wall must move horizontally to mobilize resistance
- Uniform surcharge, where S is surcharge pressure
- In-situ soil backfill weight a maximum of 120 pcf
- Horizontal backfill, compacted between 95 and 98 percent of standard Proctor maximum dry density
- Loading from heavy compaction equipment not included
- No hydrostatic pressures acting on wall
- No dynamic loading
- No safety factor included in soil parameters
- Ignore passive pressure in frost zone

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively. To calculate the resistance to sliding, a value of 0.35 should be used as the ultimate coefficient of friction between the footing and the underlying soil.

To control the water level behind the wall, we recommend a perimeter drain be installed at the foundation level as shown on the following figure and described in the following notes.

- Granular backfill in this case consists of Tennessee Department of Transportation (TDOT) No. 57 stone or equivalent.
- Perforated pipe should be rigid PVC, sized to transport the expected water.
- Exterior ground surface should consist of a 24 inch clay cap sloped to drain from building.
- The clay cap can be replaced by a pavement section



- Weep holes can be considered in lieu of perimeter drains for retaining walls if the water seepage will not impact adjacent structures.

4.7 Pavements

We assume that the traffic loads will be produced primarily by automobile traffic and a limited number of delivery and trash removal trucks. Light-duty pavement traffic is assumed to include 500 automobiles per day. The heavy-duty pavement traffic will include automobiles plus two delivery trucks per day and two trash removal trucks per week. If heavier traffic loading is expected, this office should be provided with the information and allowed to review these pavement sections. A design life of 20 years was assumed to develop the total traffic used in thickness design. A California Bearing Ratio (CBR) value of 3 has been estimated for the onsite clayey soils and the proposed engineered soil fill. To help obtain this CBR value in the field, the upper 12 inches of pavement subgrade should be compacted to at least 98 percent of the standard Proctor maximum dry density at moisture contents within -1 to +3 percent of its optimum moisture.

Recommended paving material characteristics, taken from the Tennessee Department of Transportation's (TDOT) 2015 edition of *Standard Specifications for Road and Bridge Construction* are included for the asphalt concrete sections.

4.7.1 Pavement Design Recommendations

Minimum Recommended Pavement Section Thickness (inches)[1]						
Traffic Area	**Alternative**	**Asphalt Concrete Surface Course**	**Asphalt Concrete Leveling Course**	**Portland Cement Concrete [2]**	**Aggregate Base Course [3]**	**Total Thickness**
Light Duty	ACC	1 ½	1 ½	--	6	9

Minimum Recommended Pavement Section Thickness (inches)[1]						
Traffic Area	**Alternative**	**Asphalt Concrete Surface Course**	**Asphalt Concrete Leveling Course**	**Portland Cement Concrete [2]**	**Aggregate Base Course [3]**	**Total Thickness**
	PCC	--	--	5	4	9
Heavy Duty	ACC	1 ½	2 ½	--	8	12
	PCC	--	--	6 ½	4	10 ½

1. Asphalt concrete aggregates and base course materials should conform to the following TDOT specifications;
   - Section 903.11 for Surface Course, Grading E
   - Section 903.06 for Hot Mix Asphalt Leveling Course, Grading B-M
   - Section 903.05 for Aggregate Base Course material, Class A, Grading D
2. Portland concrete should be 4,000 psi compressive strength at 28 days, 4-inch maximum slump and 5 to 7 percent air entrained, 6-sack min. mix. PCC pavements are recommended for trash container pads and in any other areas subjected to heavy wheel loads and/or turning traffic such as entrance aprons.
3. Crushed mineral aggregate base

The above section represents the minimum design thickness and, as such, periodic maintenance should be anticipated. Prior to placement of the crushed stone the areas should be thoroughly proofrolled. For dumpster pad, the concrete pavement area should be large enough to support the container and tipping axle of the refuse truck.

An adequate number of longitudinal and transverse control joints should be placed in the rigid pavement in accordance with ACI and/or AASHTO requirements. Control joints should be ¼ of the depth of the concrete, and should be cut as soon as the slab can support the weight of a man and saw (usually 24 hours). Expansion (isolation) joints must be full depth and should only be used to isolate fixed objects abutting or within the paved area.

Sealing of construction joints is essential to long term performance of concrete pavement. Joints should be sealed with a sealant designed especially for pavements subject to truck and car traffic to protect subgrade. The joints should be sealed as soon as possible (in accordance with sealant manufacturer’s instructions) to minimize infiltration of water into the soil.

Long term performance of pavements constructed on the site will be dependent upon maintaining stable moisture content of the subgrade soils, and providing for a planned program of preventative maintenance. The performance of all pavements can be enhanced by minimizing excess moisture that can reach the subgrade soils. The following recommendations should be considered at a minimum:

- Final grade adjacent to parking lots and drives should slope down from pavement edges at a minimum 2%;
- The subgrade and the pavement surface should have a minimum ¼ inch per foot slope to promote proper surface drainage;
- Install pavement drainage surrounding areas anticipated for frequent wetting;
- 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; and,
- Place curb, gutter and/or sidewalk directly on a lean clay subgrade soils rather than on unbound granular base course materials to minimize water infiltration.

4.7.2 Pavement Construction Considerations

Pavement subgrades prepared early in the project should be carefully evaluated as the time for pavement construction approaches. We recommend the pavement areas be rough graded and then thoroughly proofrolled with a loaded tandem-axle dump truck. Particular attention should be paid to high traffic areas that were rutted and disturbed and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by replacing the materials with properly compacted fill. After proofrolling and repairing deep subgrade deficiencies, the entire subgrade should be scarified to a depth of 12 inches and uniformly compacted to at least 98 percent of standard Proctor maximum dry density.

5.0 GENERAL COMMENTS

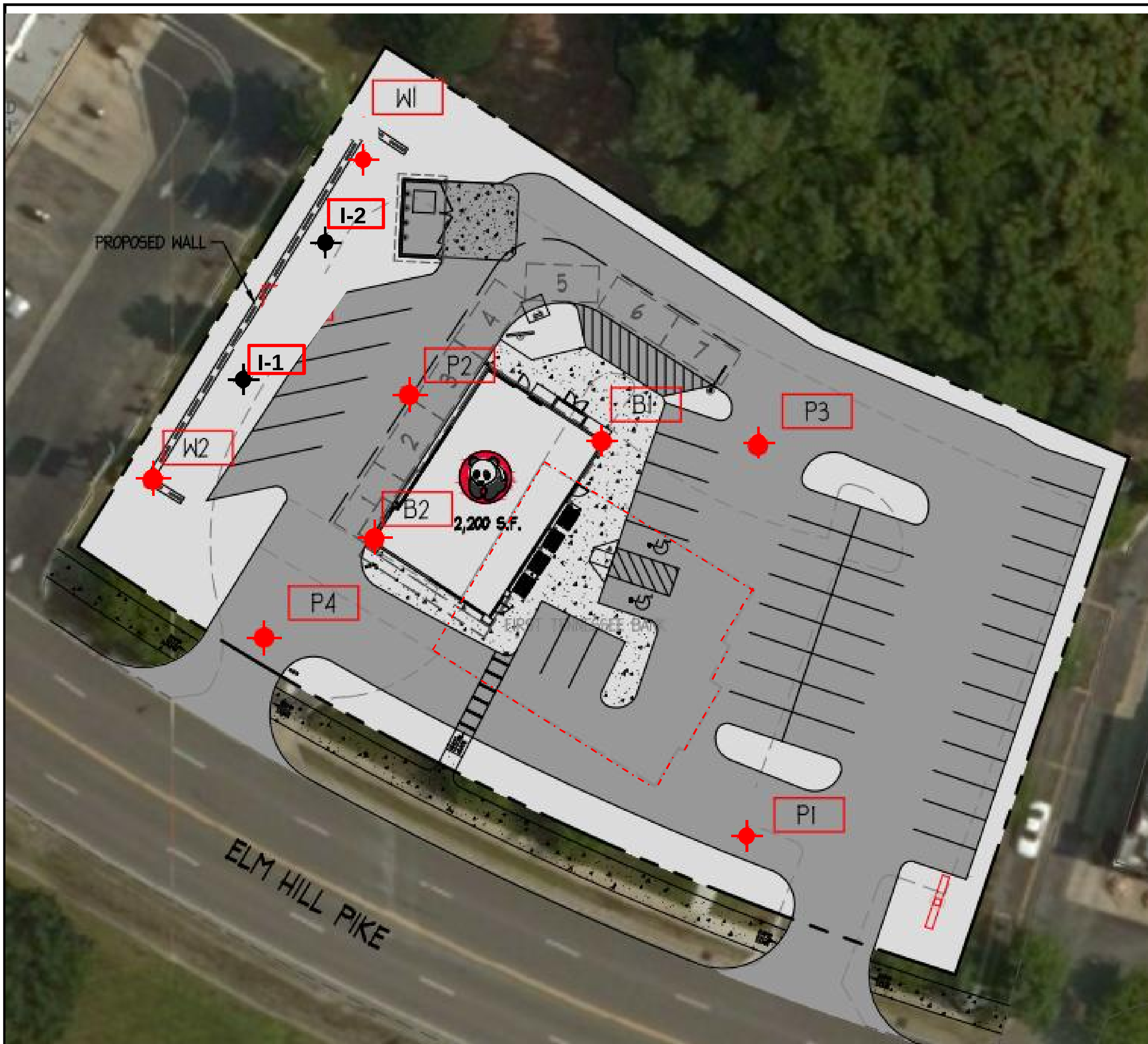
Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, 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. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project 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.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



Approximate Boring Location

Approximate Infiltration Test Location

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

Project Mgr. AM	Project No. 18185131	Terracon Consulting Engineers & Scientists	BORING LOCATION PLAN
Drawn by: AM	Scale: N.T.S.	5217 Linbar Drive, Suite 309 Nashville, Tennessee 37211	Proposed Panda Express #S8-19-D6559 2740 Elm Hill Pike Nashville, TN
Reviewed by: DB	File Name: Exhibit A-1	PH. (615) 333-6444 FAX. (615) 333-6443	Exhibit
Approved by: DB	Date: 8/12/2018		A-1

Field Exploration Description

The boring locations were laid out by Terracon personnel. Distances from these locations to the reference features indicated on the attached diagram are approximate and were measured by pacing and/or a measuring wheel. Right angles for the boring location measurements were estimated. The locations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

The borings were drilled with truck mounted rotary drill rigs using hollow-stem augers to advance the boreholes. Samples of the soil encountered in the borings were obtained using the split barrel sampling procedure. In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a rope and cathead manual safety hammer with a free fall of 30 inches, is the Standard Penetration Resistance Test (SPT) N-value. This value is used to estimate the in-situ relative density of cohesionless soils and consistency of cohesive soils.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT N-value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

A field log of each boring was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.

Samples obtained in the field were sealed and returned to the laboratory for classification and testing. The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled with auger cuttings prior to the drill crew leaving the site.

BORING LOG NO. B-1

PROJECT: Panda - Nashville, TN #S8-19-D6559

CLIENT: Panda Restaurant Group Inc Rosemead, CA

SITE: 2740 Elm Hill Pike Nashville, TN

LOCATION See Exhibit A-1

Latitude: 36.1495° Longitude: -86.6679°

GRAPHIC LOG	DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	0.3	**4" ASPHALT CONCRETE**						
	1.0	**8" STONEBASE**						
	3.0	**FILL - LEAN CLAY/FAT CLAY**, occasional limestone fragments, brown			X	9-3-50/4"	18	
		Auger Refusal at 3 Feet						
		NOTE: Offset boring refused at 1.5'						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with asphalt plugs upon completion.

See Exhibit A-2 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
5217 Linbar Dr, Ste 309
Nashville, TN

Boring Started: 07-20-2018	Boring Completed: 07-20-2018
Drill Rig: CME 45	Driller: B. Jones
Project No.: 18185131	Exhibit: A-3

BORING LOG NO. B-2

PROJECT: Panda - Nashville, TN #S8-19-D6559

CLIENT: Panda Restaurant Group Inc
Rosemead, CA

SITE: 2740 Elm Hill Pike
Nashville, TN

LOCATION See Exhibit A-1

Latitude: 36.1495° Longitude: -86.6682°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.4	**5" ASPHALT CONCRETE**						
	FILL - CRUSHED STONE, trace clay			X	2-3-7 N=10	3	
3.5							
	LEAN CLAY (CL), brown, stiff to very stiff			X	5-6-6 N=12	22	
		5		X	5-12-22 N=34	21	
		10		X	3-11-10 N=21	18	
11.5							
	WEATHERED ROCK						
13.0							
	Auger Refusal at 13 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with asphalt plugs upon completion.

See Exhibit A-2 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
5217 Linbar Dr, Ste 309
Nashville, TN

Boring Started: 07-20-2018	Boring Completed: 07-20-2018
Drill Rig: CME 45	Driller: B. Jones
Project No.: 18185131	Exhibit: A-4

BORING LOG NO. W-1

PROJECT: Panda - Nashville, TN #S8-19-D6559

CLIENT: Panda Restaurant Group Inc Rosemead, CA

SITE: 2740 Elm Hill Pike Nashville, TN

LOCATION See Exhibit A-1

Latitude: 36.1498° Longitude: -86.6683°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	**3" TOPSOIL**						
3.0	**LEAN CLAY (CL)**, brown, very stiff			X	10-8-8 N=16	21	44-22-22
10.0	**LEAN TO FAT CLAY (CL/CH)**, with sand, brown, stiff to soft, with trace phosphate			X	11-6-7 N=13	22	
		5		X	4-1-2 N=3	33	
		10		X	2-3-10 N=13	31	

Auger Refusal at 10.5 Feet

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with asphalt plugs upon completion.

See Exhibit A-2 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
5217 Linbar Dr, Ste 309
Nashville, TN

Boring Started: 07-20-2018	Boring Completed: 07-20-2018
Drill Rig: CME 45	Driller: B. Jones
Project No.: 18185131	Exhibit: A-5

BORING LOG NO. W-2

PROJECT: Panda - Nashville, TN #S8-19-D6559

CLIENT: Panda Restaurant Group Inc Rosemead, CA

SITE: 2740 Elm Hill Pike Nashville, TN

LOCATION See Exhibit A-1

Latitude: 36.1495° Longitude: -86.6684°

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	**3" TOPSOIL**						
	FILL - LEAN CLAY (CL), some limestone fragments, brown			X	12-14-11 N=25	10	
		5		X	6-3-3 N=6	16	
7.5				X	6-7-7 N=14	20	
9.5	**LEAN CLAY (CL)**, some roots, brown to dark brown, stiff			X	7-50/5"	17	
	Auger Refusal at 9.5 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with asphalt plugs upon completion.

See Exhibit A-2 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
5217 Linbar Dr, Ste 309
Nashville, TN

Boring Started: 07-20-2018	Boring Completed: 07-20-2018
Drill Rig: CME 45	Driller: B. Jones
Project No.: 18185131	Exhibit: A-6

BORING LOG NO. P-1

PROJECT: Panda - Nashville, TN #S8-19-D6559

CLIENT: Panda Restaurant Group Inc Rosemead, CA

SITE: 2740 Elm Hill Pike Nashville, TN

LOCATION See Exhibit A-1

Latitude: 36.1492° Longitude: -86.6679°

GRAPHIC LOG	DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	0.5	**6" MULCH**						
		FILL - LEAN CLAY, some limestone fragments, brown			X	5-2-4 N=6	16	
	5.0		5		X	3-25-50/1"	15	
		Auger Refusal at 5 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with asphalt plugs upon completion.

See Exhibit A-2 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
5217 Linbar Dr, Ste 309
Nashville, TN

Boring Started: 07-20-2018	Boring Completed: 07-20-2018
Drill Rig: CME 45	Driller: B. Jones
Project No.: 18185131	Exhibit: A-7

BORING LOG NO. P-2

PROJECT: Panda - Nashville, TN #S8-19-D6559

CLIENT: Panda Restaurant Group Inc Rosemead, CA

SITE: 2740 Elm Hill Pike Nashville, TN

LOCATION See Exhibit A-1

Latitude: 36.1496° Longitude: -86.6682°

GRAPHIC LOG	DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	0.3	**4" ASPHALT CONCRETE**						
	0.8	**6-1/2" STONEBASE**						
		FILL - LEAN CLAY/FAT CLAY, occasional limestone fragments, brown to grayish brown			X	3-3-5 N=8	20	
	5.0		5		X	2-1-19 N=20	20	
		Boring Terminated at 5 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with asphalt plugs upon completion.

See Exhibit A-2 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
5217 Linbar Dr, Ste 309
Nashville, TN

Boring Started: 07-20-2018	Boring Completed: 07-20-2018
Drill Rig: CME 45	Driller: B. Jones
Project No.: 18185131	Exhibit: A-8

BORING LOG NO. P-3

PROJECT: Panda - Nashville, TN #S8-19-D6559

CLIENT: Panda Restaurant Group Inc Rosemead, CA

SITE: 2740 Elm Hill Pike Nashville, TN

GRAPHIC LOG	LOCATION See Exhibit A-1 Latitude: 36.1496° Longitude: -86.6679° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	0.4 **3-1/2" ASPHALT CONCRETE**						
	1.0 **FILL - 8" CRUSHED STONE**						
	Auger Refusal at 1 Foot						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with asphalt plugs upon completion.

See Exhibit A-2 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
5217 Linbar Dr, Ste 309
Nashville, TN

Boring Started: 07-20-2018	Boring Completed: 07-20-2018
Drill Rig: CME 45	Driller: B. Jones
Project No.: 18185131	Exhibit: A-9

BORING LOG NO. P-4

PROJECT: Panda - Nashville, TN #S8-19-D6559

**CLIENT: Panda Restaurant Group Inc
Rosemead, CA**

**SITE: 2740 Elm Hill Pike
Nashville, TN**

GRAPHIC LOG	LOCATION See Exhibit A-1 Latitude: 36.1494° Longitude: -86.6683° DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	FILL - LEAN CLAY/FAT CLAY, with rock fragments, brown						
				X	2-4-11 N=15	17	
				X	7-6-4 N=10	15	
	5.0	5					
	Boring Terminated at 5 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

Abandonment Method:
Boring backfilled with asphalt plugs upon completion.

See Exhibit A-2 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
5217 Linbar Dr, Ste 309
Nashville, TN

Boring Started: 07-20-2018	Boring Completed: 07-20-2018
Drill Rig: CME 45	Driller: B. Jones
Project No.: 18185131	Exhibit: A-10

APPENDIX B
LABORATORY TESTING

Laboratory Testing Description

The laboratory testing program consisted of performing water content tests and an Atterberg Limits test on representative natural clay sample. Information from these tests was used in conjunction with field penetration test data to evaluate soil strength in-situ, volume change potential, and soil classification. In addition, a hand penetrometer was used to estimate the approximate unconfined compressive strength of some samples. The hand penetrometer has been correlated with unconfined compression tests and provides a better estimate of soil consistency than visual examination alone. The test results are provided on the boring logs included in Appendix A.

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

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 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 **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. 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

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

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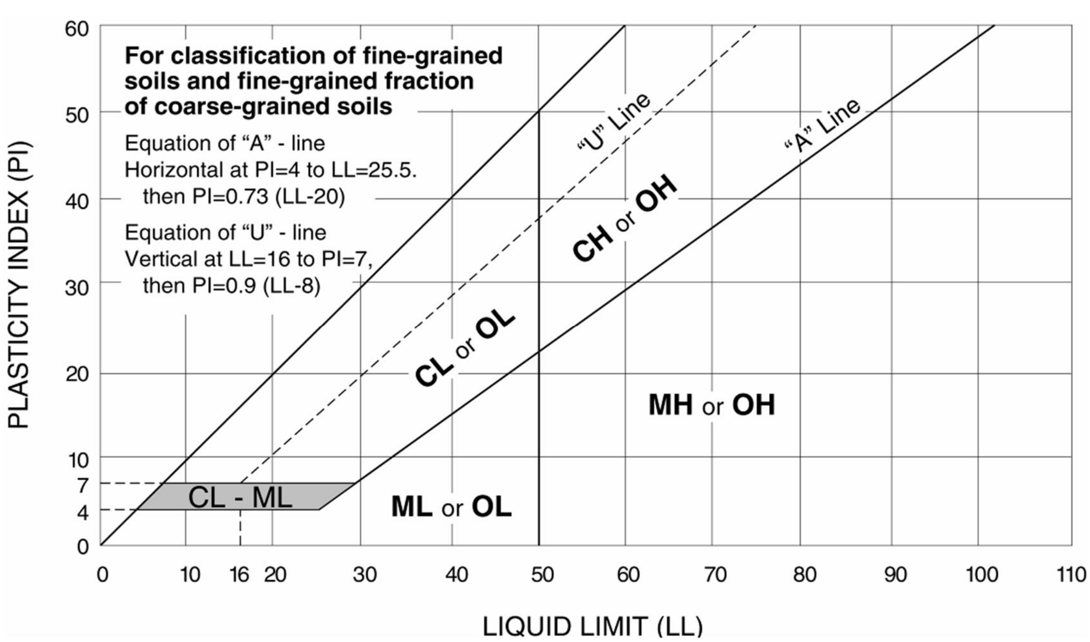
UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification: Group Symbol	Soil Classification: 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 ³ 4 and 1 £ Cc £ 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 ³ 6 and 1 £ Cc £ 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" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			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	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			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] $Cu = D_{60}/D_{10} \qquad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ³ 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 ³ 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 ³ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ³ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ³ 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.



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