September 21, 2020

Mr. Bryan Kizer, P.E.
Stantec Consulting Services, Inc.
4969 Centre Point Drive Suite 200
North Charleston, SC 28418

Reference: Shallow Subsurface Exploration and Engineering Analysis
CARTA Infiltration and Subgrade Exploration
3664 Leeds Ave
North Charleston, SC 29405

ECS Project Number 34:3953

Dear Mr. Kizer,

As authorized by your acceptance of our proposal number 34:4319-GP dated August 27, 2020, ECS Southeast, LLP (ECS) has completed a shallow subsurface exploration and geotechnical engineering analysis for the proposed parking area and pervious pavers at the above referenced project.

PROJECT INFORMATION

The project site is located at 3664 Leeds Avenue in North Charleston, South Carolina as shown on Figure 1 attached to this report. The site is bound by commercial properties to the north, Leeds Avenue to the east, and property owned by the South Carolina Electric and Gas Company to the south and west. The site currently consists of administrative buildings, maintenance bays, fuel storage and POL facilities, and asphalt and concrete parking and drive areas. The area identified on the site plan for additional parking currently consists of an open green space and a paved asphalt parking lot. It is not known when the existing pavement sections in the motor pool were constructed and no maintenance history for the pavements has been provided.

According to correspondence with Stantec Consulting Services, Inc, we understand that plans are to pave the south east corner of the lot with concrete pavement for an additional bus parking area and install pervious pavers in the two areas adjacent to the existing administrative building. Traffic loading information was not available at the time of this report.

EXPLORATION PROCEDURES

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field data to assist in the determination of geotechnical recommendations.

Test locations were identified in the field by ECS personnel using GPS techniques and are shown on Figure 2 Test Location Diagram attached to this report. Prior to performing the field exploration, we contacted Palmetto Utility Protection Service (PUPS) to check the test locations for potential underground utilities.

KESSLER DYNAMIC CONE PENETROMETER TESTING (KDCP)

Two (2) Kessler DCPs, designated K-1 and K-2, were performed at widely spaced locations within the proposed pavement areas during our field exploration. The Kessler DCP tests were conducted in general conformance with ASTM D6951. In this procedure the Kessler DCP is driven into the soil by dropping either a Single-Mass 10.1 lb (4.6 kg) Hammer or a Dual-Mass 17.6 lb (8 kg) Hammer from a height of 22.6 in (575mm). Based on the encountered soil conditions at this site, the 10.1 lb (4.6 kg) and the 17.6 lb (8 kg) hammers were selected. The depth of cone penetration is measured at selected penetration or hammer drop intervals and the soil shear strength is reported in terms of DCP index. The DCP index is based on the average penetration depth resulting from one blow of the hammer. The index values are correlated to strength parameters, such as CBR, which can be used in pavement recommendations. The Kessler DCP logs are attached to this report.

HAND AUGER BORINGS

Two (2) hand auger borings, designated K-1 and K-2, were performed adjacent to the Kessler DCPs during our field exploration. The hand auger borings were conducted in general conformance with ASTM D1452. In this procedure, the auger boring is made by manually rotating and advancing an auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The auger cuttings were visually classified in the field. Stratification lines shown on the hand auger boring logs represent approximate boundaries between physical soil types. The hand auger boring logs are attached to this report. Stratification lines shown on the hand auger boring logs represent approximate boundaries between physical soil types.

SEASONAL HIGH WATER TABLE (SHWT) AND INFILTRATION TESTING

Two (2) hand auger borings, designated I-1 and I-2, were performed to depths of approximately 6 feet below the current site grades during our field exploration adjacent to the administrative building within the location of the proposed pervious pavers. The hand auger borings were conducted in general conformance with ASTM D1452. The auger cuttings were visually classified in the field to determine the Seasonal High Water Table (SHWT) and an appropriate depth for infiltration testing.

A Constant Compact Head Permeameter (CCHP) was utilized within the hand auger borings to collect infiltration data. The CCHP allows measurement of the in-situ saturated hydraulic conductivity (Ksat) of the vadose (unsaturated) zone by constant head method. Infiltration testing forms are attached to this report.

SHWT determinations and infiltration rates are presented in this report.

SHALLOW SUBSURFACE CHARACTERIZATION AND GROUNDWATER OBSERVATIONS

This section provides a generalized characterization of the soil strata encountered during our shallow subsurface exploration. For shallow subsurface information at a specific location, refer to the boring logs and infiltration testing form attached to this report.

The site is located in the Coastal Plain Physiographic Province of South Carolina. The Coastal Plain is composed of seven terraces, each representing a former level of the Atlantic Ocean. Soils in this area generally consist of sedimentary materials transported from other areas by the ocean or rivers. These deposits vary in thickness from a thin veneer along the western edge of the region to more than 10,000 feet near the coast. The sedimentary deposits of the Coastal Plain rest upon consolidated rocks similar to those underlying the adjacent Piedmont Physiographic Province. In general, shallow unconfined groundwater movement within the overlying soils is largely controlled by topographic gradients. Recharge occurs primarily by infiltration along higher elevations and typically discharges into streams or other surface water bodies. The elevation of the shallow water table is transient and can vary greatly with seasonal fluctuations in precipitation.

It is important to note that the shallow near surface natural geology within the site has been modified in the past by grading that included the placement of fill materials. The quality of man-made fills can vary significantly, and it is often difficult to assess the engineering properties of existing fills.

Uncontrolled fill identified as SAND with Silt and Gravel (SP-SM) and Silty SAND (SM) was observed in the hand auger borings to a depth of about 2 feet below the current site grades. Below the fill material, native soils consisting of Sandy CLAY (CL) and Clayey SAND (SC) were encountered to the maximum depth explored of about 4 feet below the current site grades. At test location K-1, mulch and trace amounts of organic material were observed in the hand auger cuttings at a depth of approximately 2 feet.

Groundwater was encountered at a depth of approximately 1.9 feet and 1.8 feet at test locations K-1 and K-2, respectively, at the time of our field exploration. The highest groundwater observations are normally encountered in the late winter and early spring. Variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not immediately apparent at the time of this exploration. Following seasonal heavy rains the groundwater table could rise 1 foot or more and perch on near-surface clayey soil.

SEASONAL HIGH WATER TABLE AND INFILTRATION TESTING

The Seasonal High Water Table (SHWT) and groundwater depth was estimated below the existing site grades at test locations I-1 and I-2. A summary of the SHWT and current ground water depth and infiltration test results are depicted on the tables below.

SEASONAL HIGH WATER TABLE (SHWT)		
Location	SHWT Below Existing Grade (inches)	Approximate Groundwater Depth Below Existing grade (inches)
I-1	16	48
I-2	16	56

INFILTRATION TEST RESULTS			
Location	Description	Test Depth (inches)	Rate (inches/hr)
I-1	Brown, red, clayey sand with red redox	10	0.45
I-2	Red, brown, gray clayey sand with red redox	10	0.15

Infiltration rates and SHWT will vary within the proposed site due to changes in elevation and subsurface conditions. The values provided are field values. An appropriate factor of safety should be applied for design.

PAVEMENT DESIGN RECOMMENDATIONS

We have performed analyses for new rigid concrete pavement sections using the 2008 SCDOT Pavement Design Guidelines and associated literature. Figure A-1 from the 2008 SCDOT Pavement Design Manual shows the relationship between the California Bearing Ratio (CBR) and the Soil Support Value (SSV). As a part of the exploration, a CBR value was interpreted using the results from the Kessler DCP Tests. The tests indicated CBR values ranging from about 2 to greater than 50 with most above a CBR value of 7. Based on our experience in the area and the variation in the subgrade conditions throughout the project area, a CBR value of 7 was utilized in our analysis which corresponds to a modulus of subgrade reaction of a about 160 psi/in. From the results of our analysis, we recommend the following rigid concrete pavement section:

RECOMMENDED MINIMUM RIGID PAVEMENT SECTIONS		
Material	**Rigid Pavement (25,000 ESALS)**	**Rigid Pavement (65,000 ESALS)**
Portland Cement Concrete (f'c = 4,000 psi)	4 inches	5 inches
Graded Aggregate Base Course	4 inches	4 inches
Well-Draining Imported Compacted Structural Fill or Existing Approved Fill	12 inches	12 inches

The recommended minimum rigid concrete pavement sections were based off of an assumed Average Annual Daily Truck Traffic (AADTT) of about 20 trucks and 50 Trucks per day, respectively, Class 5 Trucks, and a 20 year design life. Materials and workmanship should follow the latest edition of the South Carolina Department of Transportation Standard Specifications for Highway Construction.

When designing rigid concrete pavements, the Civil Engineer of record should ensure that the design complies with code requirements for joint spacing and reinforcement in order to reduce the potential for cracking and to allow for proper load transfer.

A stable subgrade is very important to pavement performance. Immediately prior to paving, the subgrade should be thoroughly proofrolled with previously approved construction equipment having a minimum axle load of 10 tons (e.g. fully loaded tandem-axle dump truck) and any unstable areas that are not firm and unyielding be repaired. The base course should be compacted to at least 100% of the maximum dry density, as determined by the Modified Proctor Compaction Test (ASTM D1557).

Structural fill materials should be well draining, free of organic matter and debris, and should contain no particle sizes greater than 3 inches in the largest dimension. Open graded materials, such as gravels (GP), which contain void space in their mass should not be used in structural fills unless properly encapsulated with filter fabric. Suitable structural fill material should consist of inorganic soils with the following engineering properties and compaction requirements. Structural fill should be compacted to at least 95% of the maximum dry density and within -3 to +3 percent of the soil's optimum moisture content, as determined by the Modified Proctor Compaction Test (ASTM D1557).

Materials that should not be used as engineered fill include topsoil, organic materials (OH, OL), and high plasticity CLAYS and SILTS (CH, MH). Such materials removed during grading operations should be placed in approved off-site disposal areas.

To document that the base course and structural fill has been uniformly compacted, in-place field density tests should be performed by ECS and the area should be methodically proofrolled under our observation.

Where undercutting of unsuitable materials extends below the existing undocumented fill and into native clayey soils, a woven geotextile fabric (e.g. Mirafi HP-270 or equivalent) should be placed prior to the placement and compaction of structural fill materials.

The performance of pavements will be dependent upon a number of factors, including subgrade conditions at the time of paving, rainwater runoff, and traffic. Rainwater runoff should not be allowed to seep below pavements from adjacent areas. Therefore, drainage swales or underdrains may be required.

The above recommendations are very important for long-term performance of the pavements. Because pavement design typically has relatively low factors of safety, it will be very important that the specifications are followed closely during pavement construction. Our analysis was based on a 15-year design life; however, some isolated areas could require repair or premature maintenance in a shorter period of time.

SITE CONSTRUCTION RECOMMENDATIONS

SUBGRADE PREPARATION

Because the site has been modified in the past and existing undocumented fill was noted during our field exploration at varying locations and depths, we emphasize the importance of comprehensive subgrade evaluations prior to engineered fill placement and/or other construction activities. These evaluations may include proofrolling the subgrade soils, performing hand auger borings, and excavation of test pits. The mentioned evaluations would help in identifying areas of soft, loose, otherwise unsuitable materials, which would require remedial activities.

STRIPPING AND GRUBBING

The subgrade preparation should consist of stripping vegetation, rootmat, topsoil, and any other soft or unsuitable materials from the 5-foot expanded pavement limits and to 5 feet beyond the toe of structural fills.

Existing undocumented fill identified as SAND with Silt and Gravel (SP-SM) and Silty SAND (SM) was observed in the hand auger borings to a depth of approximately 24 inches, where explored. Surficial material visually observed at unexplored areas of the site consisted of existing pavement and topsoil.

Deeper organics, fill, or otherwise unsuitable material may be present at unexplored areas of the site. ECS should observe and document that unsuitable surficial materials have been removed or are firm and unyielding prior to the placement of structural fill.

PROOFROLLING

After removing unsuitable surface materials, cutting to the proposed grade, and prior to the placement of any structural fill or other construction materials, the exposed subgrade should be examined by ECS. The exposed subgrade should be thoroughly proofrolled with previously approved construction equipment having a minimum axle load of 10 tons (e.g. fully loaded tandem-axle dump truck).

The areas subject to proofrolling should be traversed by the equipment in two perpendicular (orthogonal) directions with overlapping passes of the vehicle under the observation of ECS. This procedure is intended to assist in identifying any localized yielding materials. In the event that unstable or “pumping” subgrade is identified by the proofrolling, those areas should be repaired prior to the placement of any subsequent structural fill or other construction materials.

Loose/soft subgrade soils that cannot be improved in-place should be undercut and replaced with new engineered fill. Methods of repair of unstable subgrade, such as stabilization with geogrid, undercutting or moisture conditioning or chemical stabilization, should be discussed with ECS to determine the appropriate procedure with regard to the existing conditions causing the instability.

A test pit(s) may be excavated to explore the shallow subsurface materials in the area of the instability to help in determining the cause of the observed unstable materials and to assist in the evaluation of the appropriate remedial action to stabilize the subgrade.

SITE TEMPORARY DEWATERING

It is possible that perched water or groundwater may be encountered by excavations which extend more than 1 to 2 feet below existing grades. Based upon our subsurface exploration at this site, as well as significant experience on sites in nearby areas of similar geologic setting, it is our opinion that construction dewatering at this site will likely be limited to mainly removing perched water, groundwater, or accumulated rain water. Dewatering can be completed using pumps in sumps for small areas. Removal of perched water which seeps into excavations could be accomplished by pumping from sumps excavated in the trench bottom and which are backfilled with AASHTO size No. 57 Stone or open graded bedding material. Should water conditions beyond the capability of sump pumping be encountered, the Contractor should submit a dewatering plan in accordance with project specifications.

EARTHWORK OPERATIONS

Structural Fill Materials

Prior to placement of structural fill, representative bulk samples (about 50 pounds) of on-site and off-site borrow should be submitted to ECS for laboratory testing, which will include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications.

Satisfactory Structural Fill Materials: Materials satisfactory for use as structural fill should consist of inorganic soils classified as SM, SC, SW, SP, GW, GP, GM, and GC, or a combination of these group symbols, per ASTM D2487. The structural fill materials should be free of organic matter, debris, and should contain no particle sizes greater than 1 ½ inches in the largest dimension. Open graded materials, such as gravels (GP), which contain void space in their mass should not be used in structural fills unless properly encapsulated with filter fabric. Suitable structural fill material should consist of inorganic soils with the following engineering properties and compaction requirements.

STRUCTURAL FILL INDEX PROPERTIES	
Subject	**Property**
Building and Pavement Areas	LL < 35, PI<10
Max. Particle Size	1 ½ inches
Fines Content (% passing the #200 sieve)	Max. 35 %
Max. organic content	5% by dry weight

STRUCTURAL FILL COMPACTION REQUIREMENTS	
Subject	**Requirement**
Compaction Standard	Modified Proctor, ASTM D1557
Required Compaction	95% of Max. Dry Density
Moisture Content	-3 to +3 % points of the soil's optimum value
Loose Thickness	8 inches prior to compaction

Unsatisfactory Materials: Materials that should not be used as engineered fill include topsoil, organic materials (OH, OL), and high plasticity CLAYS and SILTS (CH, MH). Such materials removed during grading operations should be placed in approved off-site disposal areas.

Fill Placement Considerations: Fill materials should not be placed on excessively wet soils. Borrow fill materials should not be excessively wet at the time of placement. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned. At the end of each work day, fill areas should be graded to facilitate drainage of any precipitation and the surface should be sealed by use of a smooth-drum roller to limit infiltration of surface water.

Proper drainage should be maintained during the earthwork phases of construction to avoid the ponding of water which has a tendency to degrade subgrade soils. Alternatively, if these soils cannot be stabilized by conventional methods as previously discussed, additional modifications to the subgrade soils such as cement stabilization may be utilized to adjust the moisture content. If cement is utilized to control moisture contents and/or for stabilization, regular Type I/II cement can be used. The contractor should be required to minimize dusting or implement dust control measures, as required.

We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. We do not anticipate significant problems in controlling moisture within the fill during dry weather, but moisture control may be difficult during winter months or extended periods of rain. The control of moisture content of higher plasticity soils is difficult when these soils become wet. Further, such soils are easily degraded by construction traffic when the moisture content is elevated.

On-Site Borrow Suitability

Hand auger borings K-1 and K-2 were advanced to depths of approximately 4 feet below the current site grades in the planned parking area. Existing undocumented fill identified as SAND with Silt and Gravel (SP-SM) and Silty SAND (SM) was observed in the hand auger borings to a depth of approximately 24 inches, where explored. Below the undocumented fill material, native soils consisting of Sandy CLAY (CL) and Clayey SAND (SC) were encountered to the maximum depth explored of about 4 feet below the current site grades.

Laboratory testing of the existing undocumented fill was not completed; however, in our experience the on-site upper SP-SM and SM material is suitable for use as structural fill.

If the existing undocumented fill is used in lieu of imported borrow, the grading contractor should anticipate additional efforts including disking and drying as the material is placed to lower moisture contents to facilitate compaction and reduce the risk of pumping conditions during placement. Use of the clayey sand (SC) material may require extensive reworking, disking and chemical stabilization.

We do not recommend using the on-site upper CL materials as structural fill.

CLOSING

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the information and recommendations presented in this report, please contact us at (843) 654-4448 for further assistance.

Sincerely,

ECS SOUTHEAST, LLP represented by;

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
09/21/2020
No. 33709
MATTHEW MARK LATTIN

SOUTH CAROLINA
ECS SOUTHEAST, LLP
No. COA3239
CERTIFICATE OF AUTHORIZATION

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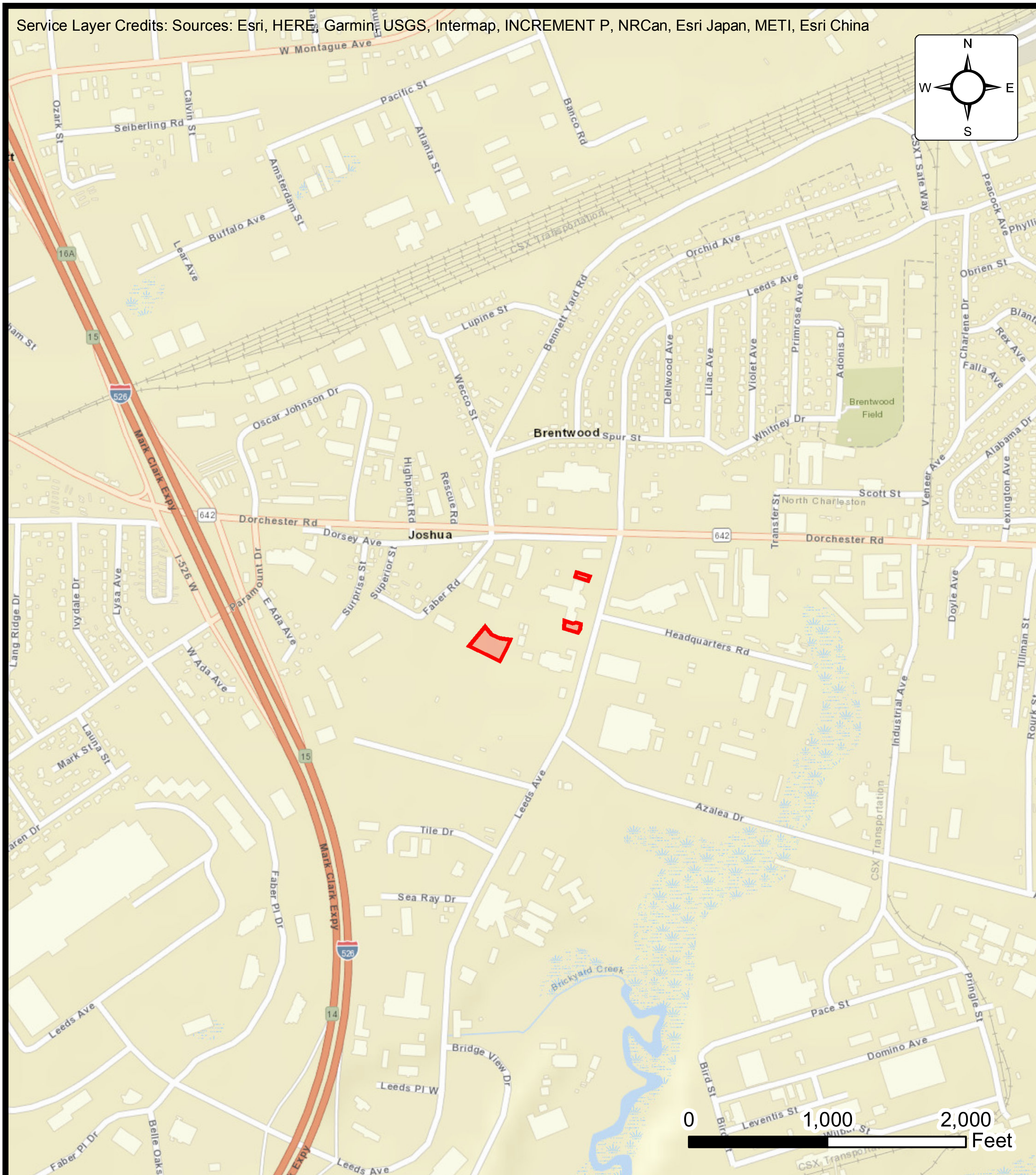
Attachments:
- Figure 1: Site Location Diagram
- Figure 2: Test Location Diagram
- Reference Notes for Boring Logs
- Hand Auger Logs
- DCP Test Data
- Infiltration Testing Forms



SITE LOCATION DIAGRAM

CARTA INFILTRATION AND SUBGRADE EXPLORATION

3664 LEEDS AVENUE

NORTH CHARLESTON, SOUTH CAROLINA

STANTEC CONSULTING SERVICES, INC

ENGINEER	PDK
SCALE	AS NOTED
PROJECT NO.	34:3953
FIGURE	1
DATE	9/16/2020

TEST LOCATION DIAGRAM
CARTA INFILTRATION AND SUBGRADE EXPLORATION

3664 LEEDS AVENUE
NORTH CHARLESTON, SOUTH CAROLINA
STANTEC CONSULTING SERVICES, INC

ENGINEER	PDK
SCALE	NTS
PROJECT NO.	34:3953
FIGURE	2
DATE	9/16/2020

REFERENCE NOTES FOR BORING LOGS

MATERIAL1,2	
	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
FILL[3]	MAN-PLACED SOILS
GW	WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
GP	POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
GM	SILTY GRAVEL gravel-sand-silt mixtures
GC	CLAYEY GRAVEL gravel-sand-clay mixtures
SW	WELL-GRADED SAND gravelly sand, little or no fines
SP	POORLY-GRADED SAND gravelly sand, little or no fines
SM	SM SILTY SAND sand-silt mixtures
SC	CLAYEY SAND sand-clay mixtures
ML	SILT non-plastic to medium plasticity
MH	ELASTIC SILT high plasticity
CL	LEAN CLAY low to medium plasticity
CH	FAT CLAY high plasticity
OL	ORGANIC SILT or CLAY non-plastic to low plasticity
OH	ORGANIC SILT or CLAY high plasticity
PT	PEAT highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION		PARTICLE SIZES
Boulders		12 inches (300 mm) or larger
Cobbles		3 inches to 12 inches (75 mm to 300 mm)
Gravel:	Coarse	¾ inch to 3 inches (19 mm to 75 mm)
	Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")		<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, QP[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<3	Very Soft
0.25 - <0.50	3 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT[7]	COARSE GRAINED (%)[8]	FINE GRAINED (%)[8]
Trace	≤5	≤5
Dual Symbol (ex: SW-SM)	10	10
With	15 - 25	15 - 25
Adjective (ex: "Silty")	30	≥30

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT[5]	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS[6]

- WL (First Encountered)
- WL (Completion)
- WL (Seasonal High Water)
- WL (Stabilized)

[1]Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

[2]To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

[3]Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

[4]Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[5]Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

[6]The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

[7]Minor deviation from ASTM D 2488-17 Note 16.

[8]Percentages are estimated to the nearest 5% per ASTM D 2488-17.

CLIENT: Stantec Consulting Services, Inc	PROJECT NO.: 34:3953	SHEET: 1 of 1
PROJECT NAME: CARTA Infiltration and Subgrade Exploration	HAND AUGER NO.: K-1	SURFACE ELEVATION:
SITE LOCATION: 3664 Leeds Avenue, North Charleston, South Carolina 29405		STATION:
NORTHING:	EASTING:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	MOISTURE CONTENT (%)
			(SP-SM) FILL, SAND WITH SILT AND GRAVEL, contains slight rootlets, black and light brown, moist	D		S-1	
	▽		(SM) FILL, SILTY SAND, contains slight rootlets , black, moist	M		S-2	
			(CL) PROBABLE FILL, SANDY LEAN CLAY, contains rootlets, trace mulch and organic laden soil, black, wet	E		S-3	
			(SC) CLAYEY SAND, light brown, wet			S-4	
			END OF HAND AUGER AT 4 FT				
5							
10							
15							

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

	ECS REP.:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
▽ WL (First Encountered) **1.9**				
▼ WL (Completion)	AG	Sep 09 2020	Feet	

HAND AUGER LOG

CLIENT:	PROJECT NO.:	SHEET:
Stantec Consulting Services, Inc	**34:3953**	**1 of 1**
PROJECT NAME: **CARTA Infiltration and Subgrade Exploration**	HAND AUGER NO.: **K-2**	SURFACE ELEVATION:
SITE LOCATION: **3664 Leeds Avenue, North Charleston, South Carolina 29405**		STATION:
NORTHING:	EASTING:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	MOISTURE CONTENT (%)
			(SP-SM) FILL, FINE SAND WITH SILT AND GRAVEL, contains roots, black and light brown, moist	D		S-1	
	∇		(SM) PROBABLE FILL, SILTY SAND, trace clay, contains slight roots, orange and light brown, moist to wet	M		S-2	
			(CL) SANDY LEAN CLAY, gray mottled orange, wet	E		S-3	
			(SC) CLAYEY FINE SAND, orange and gray, wet	M		S-4	
			END OF HAND AUGER AT 4.0 FT				
5							
10							
15							

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

	ECS REP.:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
∇ WL (First Encountered) **1.8**				
▼ WL (Completion)	**AG**	**Sep 09 2020**	**Feet**	

HAND AUGER LOG

DCP TEST DATA

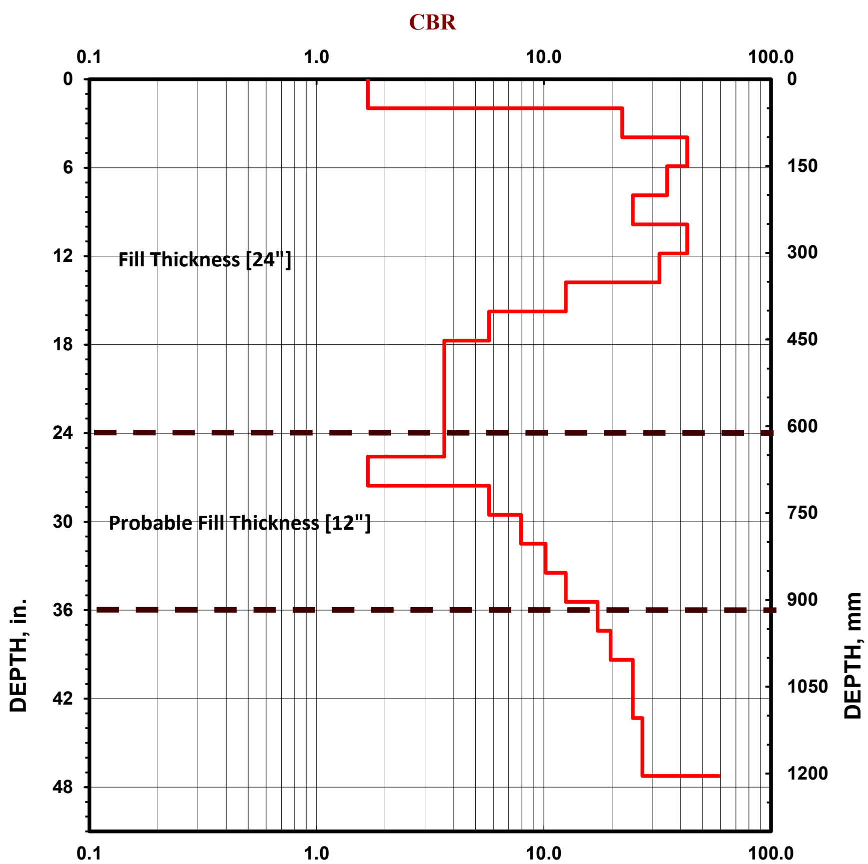
Project: CARTA Infiltration and Subgrade Evaluation
Location: K-1

Hammer
- ◯ 10.1 lbs.
- ◯ 17.6 lbs.
- ◉ Both hammers used

Soil Type
- ◯ CH
- ◯ CL
- ◉ All other soils

Project Number: 34:3953
Date: 9/10/2020
Soil Type(s): SP-SM, SM, CL, SC

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	2
1	50	2
10	100	2
18	150	2
15	200	2
11	250	1
9	300	1
7	350	1
3	400	2
3	450	2
2	500	2
2	550	2
2	600	2
2	650	2
1	700	2
3	750	2
4	800	2
5	850	2
6	900	2
8	950	2
9	1000	2
11	1050	2
11	1100	2
12	1150	2
12	1200	2



DCP TEST DATA

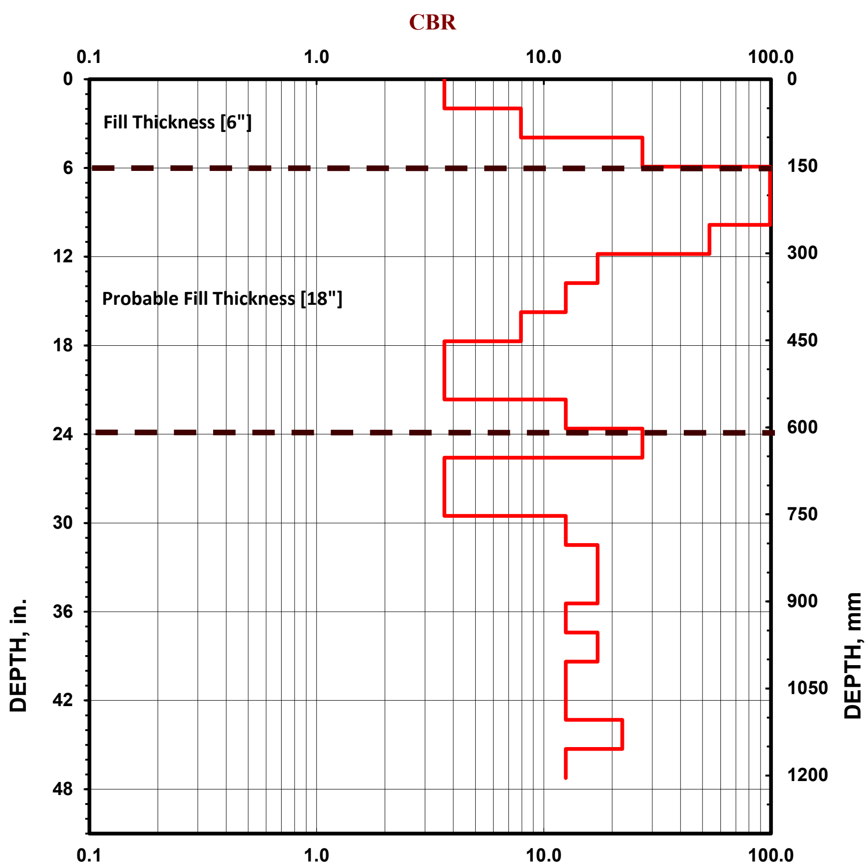
Project: CARTA Infiltration and Subgrade Evaluation
Location: K-2

Project Number: 34:3953
Date: 9/10/2020
Soil Type(s): SP-SM, SM, CL, SC

Hammer
- ○ 10.1 lbs.
- ◉ 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ◉ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
1	50	1
2	100	1
6	150	1
20	200	1
21	250	1
11	300	1
4	350	1
3	400	1
2	450	1
1	500	1
1	550	1
3	600	1
6	650	1
1	700	1
1	750	1
3	800	1
4	850	1
4	900	1
3	950	1
4	1000	1
3	1050	1
3	1100	1
5	1150	1
3	1200	1



Infiltration Testing Form
CARTA Infiltration & Subgrade Exploration
North Charleston, South Carolina
ECS Project No. 34: 3953

Location	Depth	Soil Description
I-1	0-1"	Dark, black sandy topsoil
	1-8"	Dark, black loamy sand with unmasked grains
	8-16"	Brown, red, clayey sand with red redox
	16-36"	Brown, red, sandy clay with red redox
	36-60"	Brown, red, gray clayey sand with red redox

Seasonal High Water Table was encountered at 16 inches below existing grade.

Groundwater was encountered within 48 inches below existing grade.

Test was conducted at 10 inches below existing grade.

Infiltration Rate: 0.45 inches per hour

Infiltration Testing Form
CARTA Infiltration & Subgrade Exploration
North Charleston, South Carolina
ECS Project No. 34: 3953

Location	Depth	Soil Description
I-2	0-1”	Dark, black sandy topsoil
	1-4”	Dark, brown gray loamy sand
	4-16”	Red, brown, gray clayey sand with red redox
	16-28”	Red, brown, gray sandy clay with red redox
	28-36”	Gray, brown, tan clay with red redox
	36-60”	Gray, sandy clay with red redox

Seasonal High Water Table was encountered at 16 inches below existing grade.

Groundwater was encountered within 56 inches below existing grade.

Test was conducted at 10 inches below existing grade.

Infiltration Rate: 0.15 inches per hour