STEWART

STRONGER BY DESIGN

GEOTECHNICAL ENGINEERING REPORT

Wilson Street Park

106 Wilson Street NE
Concord, North Carolina

June 3, 2021

GEOTECHNICAL ENGINEERING REPORT

<u>Wilson Street Park</u>
106 Wilson Street NE
Concord, North Carolina

June 3, 2021

<u>Prepared For:</u>

ViZ, PLLC
PO Box 704
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<u>Prepared By:</u>

STEWART
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Charlotte, NC 28273

Stewart Project No.: F21018.00

6/3/2021

NORTH CAROLINA PROFESSIONAL SEAL 028422 ENGINEER DONALD W. BROWN JR.

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1 EXECUTIVE SUMMARY

Stewart has completed a geotechnical exploration for Wilson Street Park at 106 Wilson Street NE in Concord, North Carolina. This Executive Summary is provided as a brief overview of our geotechnical engineering evaluation for the project and is not intended to replace more detailed information contained elsewhere in this report. A summary of our findings, opinions, and recommendations is provided below.

- The park upgrades will include the new construction of a restroom/shelter building and the replacement of the existing gravel parking lot with a larger asphalt parking lot.

- A total of four hand auger borings were performed for this geotechnical exploration, extending to depths ranging from approximately 4 feet to 8 feet below the existing grade.

    - The onsite soils encountered during this exploration consist of fill and residual soil. The soil types encountered consist of Silty SAND (SM) and Sandy fat CLAY (CH).

    - Groundwater was encountered in borings B-1 and B-4 at a depth of approximately 4 feet below the current grade (el. 587± feet and el. 589± feet), respectively.

- The fat clay encountered onsite is poorly suited for direct support of pavements, slabs, and footings. Undercutting and replacement is recommended.

- The proposed restroom building can be supported by spread footings, provided that the undercut and stone replacement recommendations provided herein are implemented.

The owner/designer/contractor should not rely solely upon the summary above. This report should be read in its entirety prior to implementing the recommendations in the preparation of design and construction documents. Stewart should be retained to perform sufficient services to determine plan/specification compliance with the recommendations in this report.

2 PROJECT INFORMATION

2.1 Project Understanding

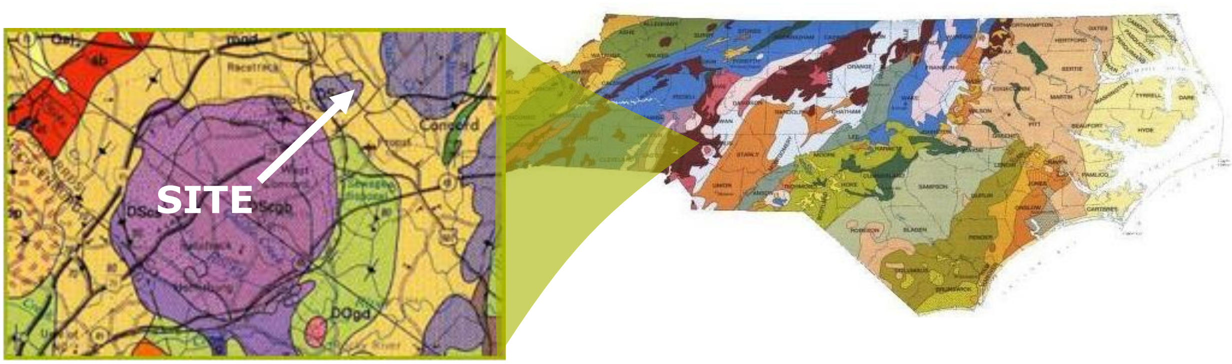
The park upgrades will include the new construction of a restroom/shelter building and the replacement of the existing gravel parking lot with a larger asphalt parking lot. Other site enhancements, which are not included in our scope for evaluation, include paving the existing gravel walking path, a stamped concrete patio around the new restroom building, picnic areas, and new concrete sidewalk along the north side of Wilson Street. At the time of this report, the restroom/shelter building is planned to have a finished floor elevation (FFE) of 592± feet.

2.2 Site Location and Description

The subject site currently serves as the Wilson Street entrance to the McEachern Greenway in Concord, North Carolina. Please refer to Figure A1 in Appendix A of this report for a site vicinity map. The current park is lightly wooded and contains a gravel parking lot with gravel walkways leading northeast to the greenway. A creek runs along the west side of the property, as well as a parallel sanitary sewer easement. A sewer tie-in also extends north-south from a manhole structure at the north end of the evaluated area. Site photographs are included in Appendix C of this report.

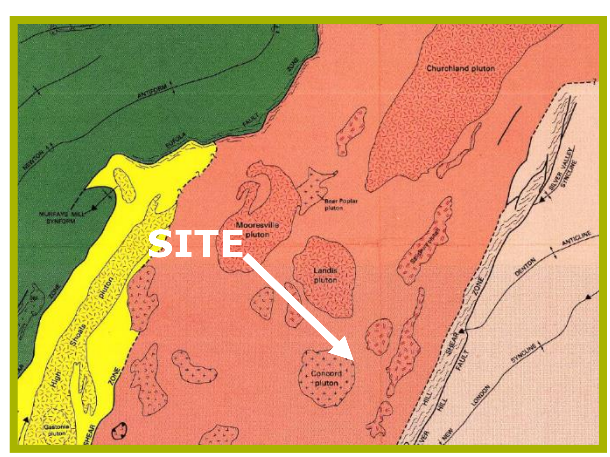
2.3 Geologic Area Overview

The project site is located in north central Cabarrus County, North Carolina, and lies within the Piedmont Geologic Province of North Carolina within the Charlotte Belt, in the Salisbury Plutonic Suite. Review of the *Geologic Map of the Charlotte 1°×2° Quadrangle, North Carolina and South Carolina (R. Goldsmith, D. Milton and J. Wright Horton, Jr., 1988)* indicates that the underlying bedrock at the subject site is characterized by granite of Salisbury Plutonic Suite (DSsg).



The site is located in a region of North Carolina that contains several mapped faults and shear zones. These geologic features have relatively low seismicity and are not associated with seismic events that have caused significant structural damage.

Based on our local experience, differential weathering of bedrock often results in highly variable subsurface conditions over relatively short horizontal and vertical distances. Furthermore, suspended boulders, discontinuous rock layers/lenses, rock pinnacles and/or zones of weathered and/or fractured rock are commonly encountered within the residual soils in this region.



3 SUBSURFACE EXPLORATION

3.1 Field Testing

A total of four hand auger borings (B-1 thru B-4) were conducted for this exploration. One boring was performed in the proposed restroom/shelter building area and the remaining three borings were performed in the proposed parking lot area. The hand auger borings were advanced to their target depths of 4 feet in the proposed parking lot area and 8 feet in the proposed restroom/shelter building area. Dynamic Cone Penetrometer (DCP) testing was performed in each borehole at 1± foot intervals, in general accordance with ASTM STP-399, to provide a measure of the soil strength.

The soil samples obtained during the augering were placed in labeled containers and transported to our Charlotte laboratory where they were visually-manually classified in general accordance with ASTM D2488 and logged by a professional engineer. The Hand Auger Boring Logs are included in Appendix B of this report.

3.2 Subsurface Conditions

3.2.1 Ground Cover

The site is generally covered with both grass and natural/landscaped areas. At test locations B-1, B-2, and B-4 approximately 3 to 4 inches of topsoil was encountered at the ground surface. The topsoil thickness is expected to vary widely based on past uses of the area. Please note the term topsoil is used to describe the organic-laden surficial material as mentioned above. No organic or nutrient testing was performed for this exploration; therefore, the topsoil should not be assumed capable of establishing or maintaining vegetation of any kind.

Boring B-3 encountered approximately 3 inches of gravel at the ground surface.

3.2.2 Fill

Fill soil was encountered in all four borings extending to depths ranging from approximately 1 to 3 feet below the current grade. This fill consisted of Silty SAND (SM). The fill contained varying amounts of gravel/rock fragments and organic or deleterious material in the samples collected. The DCP readings within the fill material ranged from 6 to 14 blows per increment (bpi) indicating it is poorly to moderately-well compacted material.

3.2.3 Residuum

Residual soils are the fully weathered remains of the parent rock. Residual soil was encountered in all four boings immediately below the aforementioned fill. Residuum encountered at the site consists of an upper stratum of Sandy fat CLAY (CH). The clay was underlain by Silty SAND (SM) in the deeper boring (B-1). The DCP readings for the clay ranged from 2 to 9 bpi. The DCP readings for the underlying sand ranged from 2 to 10 bpi. All borings were terminated in residuum.

3.2.4 Groundwater

Groundwater was encountered at the time of augering in B-1 (4± feet) and B-4 (4± feet). All auger holes were backfilled immediately after completed for public safety. The groundwater conditions represent the conditions at the time of the exploration. Fluctuations in groundwater levels are common and should be expected. Common factors that influence groundwater levels include, but are not limited to, soil stratification, climate/weather, nearby bodies of water (lakes, ponds, etc.), underground springs, streams, rivers and surface water discharge.

4 DESIGN AND CONSTRUCTION CONSIDERATIONS

4.1 Site Development

4.1.1 Old Fill

As described earlier in this report, the site contains old fill from previous grading activities for the gravel parking lot and other sitework/landscaping. The presence of old fill increases the risk for encountering unforeseen conditions during construction. While such risk is difficult to quantify, we expect the risk for this site to be low.

4.1.2 Subgrade Preparation

All vegetation, topsoil, root mat, existing gravel, and any other unsatisfactory or deleterious materials should be removed from the limits of new construction. Such material should be considered unsuitable for reuse as structural fill.

As noted in Section 3.2 of this report, fat clay (CH) was encountered at the site. Please refer to Section 4.1.3 of this report for further discussion on CH soil limitations.

After striping the site, the exposed ground surface in areas to receive fill or at finished subgrade elevation should be moisture conditioned and thoroughly densified with a large roller. In areas of cut, the finished subgrade should be rolled/compacted to densify any disturbed material. Scarifying of the exposed ground surface may be required for wet soils prior to densification.

Areas of the site to receive fill or directly support new construction should be proofrolled with a tandem-axle dump truck weighing between 15 and 20 tons. Proofrolling should occur prior to fill placement or after reaching final grade in cut areas but must be in the presence of Stewart so that recommendations can be provided for areas that rut, pump, or deflect excessively. Once prepared, it is the contractor's responsibility to protect the prepared subgrade from degradation caused by wet weather and/or construction traffic. Proofrolling should not be performed on frozen or excessively wet subgrades.

Given the fine/clayey nature of the onsite soil, the exposed surface soils are likely to become unstable rapidly in the presence of excess moisture (water) and construction traffic loading. Therefore, proper site drainage should be maintained during earthwork operations. If not, the accumulation of water could result in construction delays. Common approaches to reduce wet weather delays include grading the area so that surface water flows away from the excavation, sealing exposed soil surface with a smooth-drum roller prior to precipitation events, and forming temporary ditches, swales, berms or other surface water diversion features. We also recommend limiting construction traffic during and after wet weather.

4.1.3 Fat Clay

Fat clay (CH soil) is considered poorly suited for direct support of pavements, foundations, and slabs. If present at/near finished grade, fat clays should be undercut and replaced to provide a minimum 12-inch buffer (separation) between them and the overlying construction (e.g., stone base, bearing surface). Judging by the borings, we anticipate this condition for the restroom building foundations at boring B-1, and potentially portions of the parking lot depending on final grades. We recommend undercut soils be replaced with a structural soil meeting the criteria provided in Section 4.1.4 of this report. Undercutting should extend a minimum of 2 feet laterally beyond edges of the pavement. As an alternative to undercutting, the site grades can be raised slightly so that the buffer is created with new fill soils. Chemically stabilization using lime, cement, or kiln dust is also a viable alternative to improve the performance and support capabilities of the nears surface clays.

4.1.4 Structural Fill

4.1.4.1 Selection

Whether imported or borrowed from an onsite source, structural fill should satisfy the following:

- No excessive deleterious material
- No rocks or other inclusions greater than 3 inches in diameter
- A maximum of 30% of the total material weight retained on the ¾-inch sieve
- Maximum Dry Density (MDD) of 95 pounds per cubic foot (pcf) or greater, as determined by the Standard Proctor Compaction Test (ASTM D698)
- Liquid Limit (LL) of 50 or less and a Plasticity Index (PI) of 25 or less, as determined by Atterberg Limit testing (ASTM D4318), unless otherwise noted/allowed
- Organic content no greater than 3% (by weight)

The SM soils encountered onsite meet the LL/PI requirements above and are suitable for reuse as structural fill; however, it is expected to be available only in limited quantities. The CH soils encountered onsite will not meet the LL/PI requirements above; therefore, if encountered, their use should be restricted to areas outside of the building pads or in nonstructural areas. If used in pavement areas, CH soils should be capped with at least 18 inches of structural fill meeting the requirements noted above.

4.1.4.2 Moisture Conditioning

The water content of fill placed in structural areas should be maintained within ±3% of the material's optimum water content as determined by the Standard Proctor Compaction Test (ASTM D698). Please note that soils can be deemed unusable due to water content but shall not be classified as unsuitable based solely on water content. When soil water content falls outside of the requirements set herein, the contractor shall be responsible for taking appropriate measures (drying or wetting) to render the soil usable.

4.1.4.3 Compaction

When using large, ride-on compactors, fill should be placed in loose lifts measuring 8 to 10-inch thick. Lift thicknesses should be thinned to 4 to 6 inches when using smaller, Rammax-type compactors and no more than 4 inches thick for sled and jumping-jack tampers. Structural fill should be compacted to the requirements below, which are based on the soil's maximum dry density as determined by ASTM D698:

- Within 12 inches of finished subgrade elevation........................... 98%
- Below 12 inches of finished subgrade elevation 95%

It is recommended that the placement and compaction of structural fill be monitored by an engineering technician from Stewart. Field compaction testing should be performed in accordance with ASTM D1556 (Sand Cone Method), ASTM D2167 (Rubber Balloon Method), ASTM D2937 (Drive Cylinder Method), or ASTM D6938/D8167 (Nuclear Methods).

4.1.5 Groundwater Management

Based on the hand auger borings and anticipated shallow cuts required during grading, groundwater is not expected to significantly impact site grading. Utility trenching could be impacted by the shallow groundwater if deeper than 4 feet below the existing ground surface. If groundwater is encountered, we expect that conventional sump and pump techniques from the point of seepage will be sufficient to manage the groundwater.

4.2 Foundations

4.2.1 Design

Based on the subgrade conditions encountered in the hand auger borings, and the stone replacement recommendations in Section 4.2.2, we recommend the use of spread footings for restroom/shelter building. In designing the foundations for the structures, we recommend the design parameters provided in Table 1.

Table 1: Spread Footing Design Parameters

Parameter	Value
Allowable Bearing Capacity, psf [1]	1,500
Minimum Bearing Depth, in.	18
Moist Soil Unit Weight, pcf	120
Passive Earth Pressure Coefficient (K_p)[2]	2.56
Friction Factor (tan δ)	0.30

1. *The allowable bearing pressure should include dead load plus sustained live load.*
2. *Ultimate value. We recommend that a safety factor of at least 1.5 be used to determine the allowable passive resistance and the soil's allowable friction.*

4.2.2 Construction

Due to the low bearing strength of the near-surface fat clay, we recommend that the footings be overexcavated to 36 inches below the design bearing depth and backfilled with #57 stone. We anticipate the footing to be a thickened slab section around the perimeter of the restroom building.

It is preferable for spread footing excavations to be performed using a bucket with a flat cutting edge (no teeth) to reduce disturbance of the exposed bearing soil. Regardless, footing bottoms should be tamped with a jumping-jack or sled compactor prior to the foundation inspection and placement of reinforcing steel. Footings should be clean of loose material and debris and protected from disturbance. This includes protection from surface water run-off and freezing. If water is allowed to accumulate within a footing excavation and soften bearing soils, or if the bearing soils are allowed to freeze, the deficient soils should be removed from the excavation and rechecked by Stewart prior to concrete placement. When concrete cannot be placed immediately, we recommend placing a mud-mat to protect the bearing soil.

Foundations should be evaluated at the time of construction to verify satisfactory bearing conditions (i.e., materials and strength). This typically involves using a ½-inch diameter, T-handled probe rod for an overall qualitative assessment throughout the foundation excavations, followed by strategically placed hand auger borings and Dynamic Cone Penetrometer (ASTM STP-399) testing for quantitative evaluation. DCP testing should be performed in accordance with the ASTM and completed prior to stone, steel, or concrete placement. Unsuitable soil detected during this evaluation should be addressed as recommended by Stewart.

4.3 Slab-On-Grade Recommendations

4.3.1 Design

In designing the slab-on-grade, we recommend a minimum 4-inch base layer of washed No. 57 stone to provide uniform support and to provide a capillary break. We recommend the installation of a vapor barrier as a measure of protection against water vapor intrusion into the building. Even when groundwater is not shallow, omitting the vapor barrier could lead to water vapor transmission through the slab and cause damage to flooring and/or cause elevated moisture levels within the structure. We recommend considering the use of a vapor barrier meeting ASTM E1745, which should be installed per the ACI guidelines (ACI 302.2R) and ASTM E1643. For open air structures, a vapor barrier is not needed.

The design of the concrete slab-on-grade should be based on Westergaard's modulus of subgrade reaction (k). Based on the soil conditions encountered at the site, and the stone layer recommended above, we recommend using an effective value (k_{ef}) of 100 pci for slab design.

It is important to point out that cracking of concrete is normal and should be expected. Proper jointing of slabs is paramount in the control of cracking. The American Concrete Institute (ACI) recommends a maximum panel size (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions. Controlling the water-cement ratio of the concrete, particularly after batching, and including fiber reinforcement in the mix can also help reduce shrinkage cracking.

4.3.2 Construction

After the pad area is prepared as described in Section 4.1.2 of this report, it should be evaluated by Stewart to check for weak or excessively unstable areas that need repair. This is typically accomplished by proofrolling with heavy, rubber-tired equipment such as a tandem-axle dump truck. In confined areas that cannot be proofrolled with a dump truck, use of smaller rubber tire equipment, probing, and/or DCP testing should be considered.

In the event that fat clay is encountered within 12 inches of the finished subgrade, it should be undercut, bridged, or chemically stabilized as described in section 4.1.3 of this report.

4.4 Flexible Pavement

Per an email from ViZ, PLLC, we understand that the parking lot will receive approximately 40 passenger vehicles per day and frequent school buses. For the purpose of our evaluation, we have assumed two school buses per day.

4.4.1 Design

Based on the information provided and the site soil conditions encountered in the hand auger borings, we recommend the minimum pavement section in Table 2.

Table 2: Asphalt Pavement Section

Course	Thickness, in.
Surface (S9.5B)	3*
Aggregate Base (ABC)	8
**Two lifts required*	

The flexible pavement design above is based on the standard 20-year design life and the NCDOT/AASHTO design methodology. All materials and workmanship used during construction should conform to the North Carolina Department of Transportation Standard Specifications for Roads and Structures, current edition.

4.4.2 Construction

The pavement recommendations above are predicated by the assumption that the subgrade soils are suitable for pavement support and have been properly moisture conditioned and compacted to a uniform and stable condition. Experience has shown that most pavement failures are caused by localized soft spots in the subgrade or inadequate drainage. Proofrolling observed by an experienced engineer or technician from Stewart will reduce the likelihood of weak spots in the subgrade.

We recommend proofrolling finished subgrades, as well as subsequent placed stone base, with a tandem-axle dump truck weighing between 25 and 35 tons. Proofrolling should occur in the presence of Stewart so that recommendations can be provided for areas that rut, pump, or deflect excessively. Proofrolling should not be performed on frozen or excessively wet subgrades. If subgrades are exposed to precipitation or freezing temperatures prior to paving, the area should be re-proofrolled to verify its condition.

Like slabs, if fat clay is encountered at the finished subgrade elevation, we recommend undercutting, bridging, or chemically stabilizing as described in Section 4.1.3.

Aggregate base course stone should be compacted to at least 98 percent of the stone's maximum dry density as determined by AASHTO T-180 (modified Proctor). Asphalt shall be placed with appropriate lift thicknesses and achieve the proper compaction for the mix(es) used, as specified in the latest edition of the NCDOT HMA/QMS manual. For reference, these requirements are provided in Table 3.

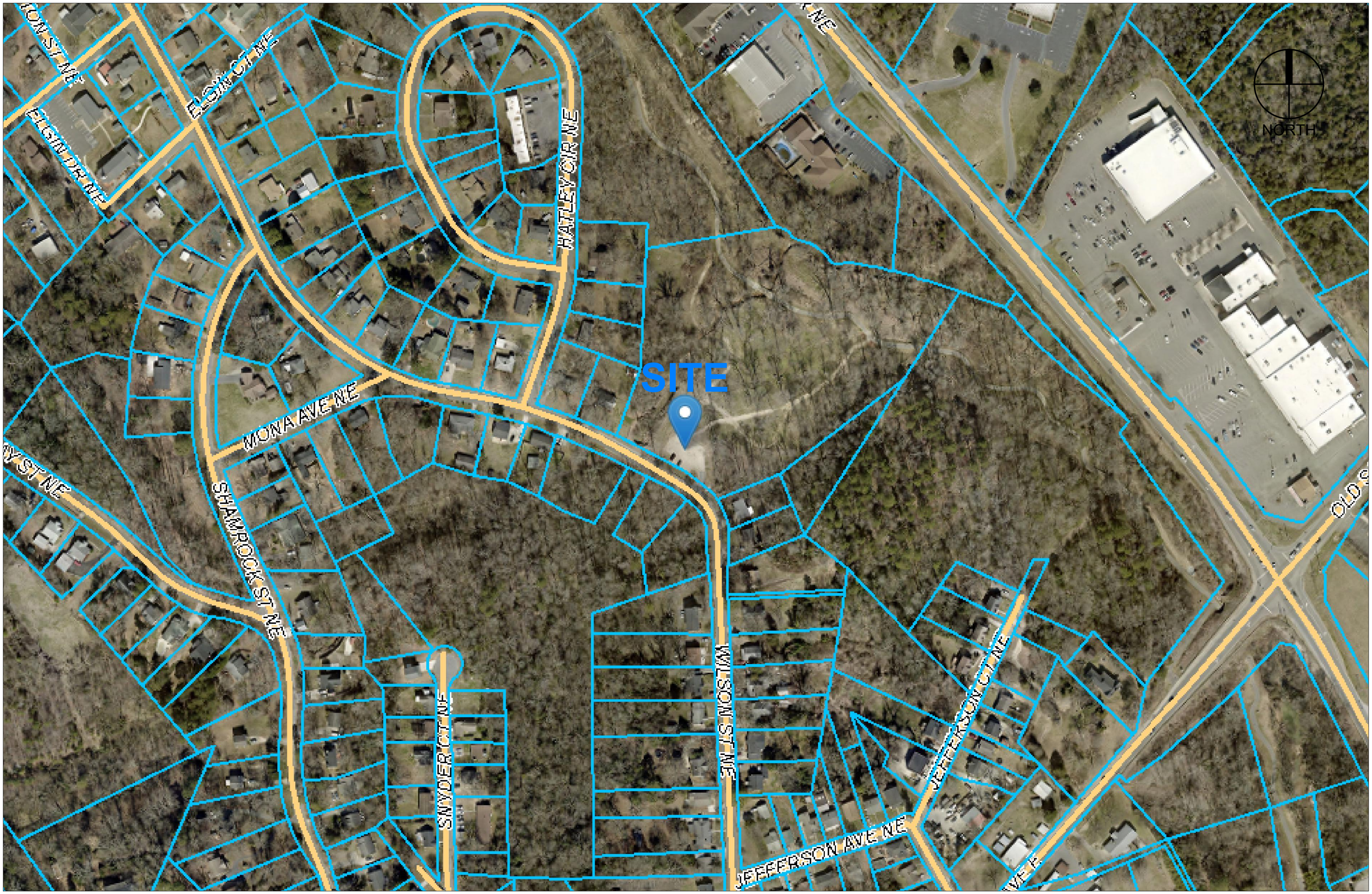
Table 3: NCDOT Single Lift Asphalt Placement Requirements

<table>
<tr><th>Asphalt Course</th><th>Mix Type</th><th>Thickness, in.</th><th>Compaction, %*</th></tr>
<tr><td rowspan="2">Surface</td><td>B</td><td>1.0 – 1.5</td><td>90.0</td></tr>
<tr><td>C, D</td><td>1.5 – 2.0</td><td rowspan="3">92.0</td></tr>
<tr><td>Intermediate</td><td rowspan="2">C</td><td>2.5 – 4.0</td></tr>
<tr><td>Base</td><td>4.0 – 5.5</td></tr>
<tr><td colspan="4">* Percent of maximum specific gravity (G_{mm})</td></tr>
</table>

The pavement sections provided herein do not account for construction traffic (dump trucks, concrete trucks, Lulls, etc.), which is typically very heavy. If construction traffic is allowed to operate on paved surfaces, damage should be expected. In light of this, we recommend that paving operations be scheduled for the end of construction when heavy construction traffic will be less.

APPENDIX A

SITE VICINITY MAP
BORING LOCATION DIAGRAM



Note: All test locations are approximate (unless otherwise reported) and intended for illustration purposes only.

STEWART

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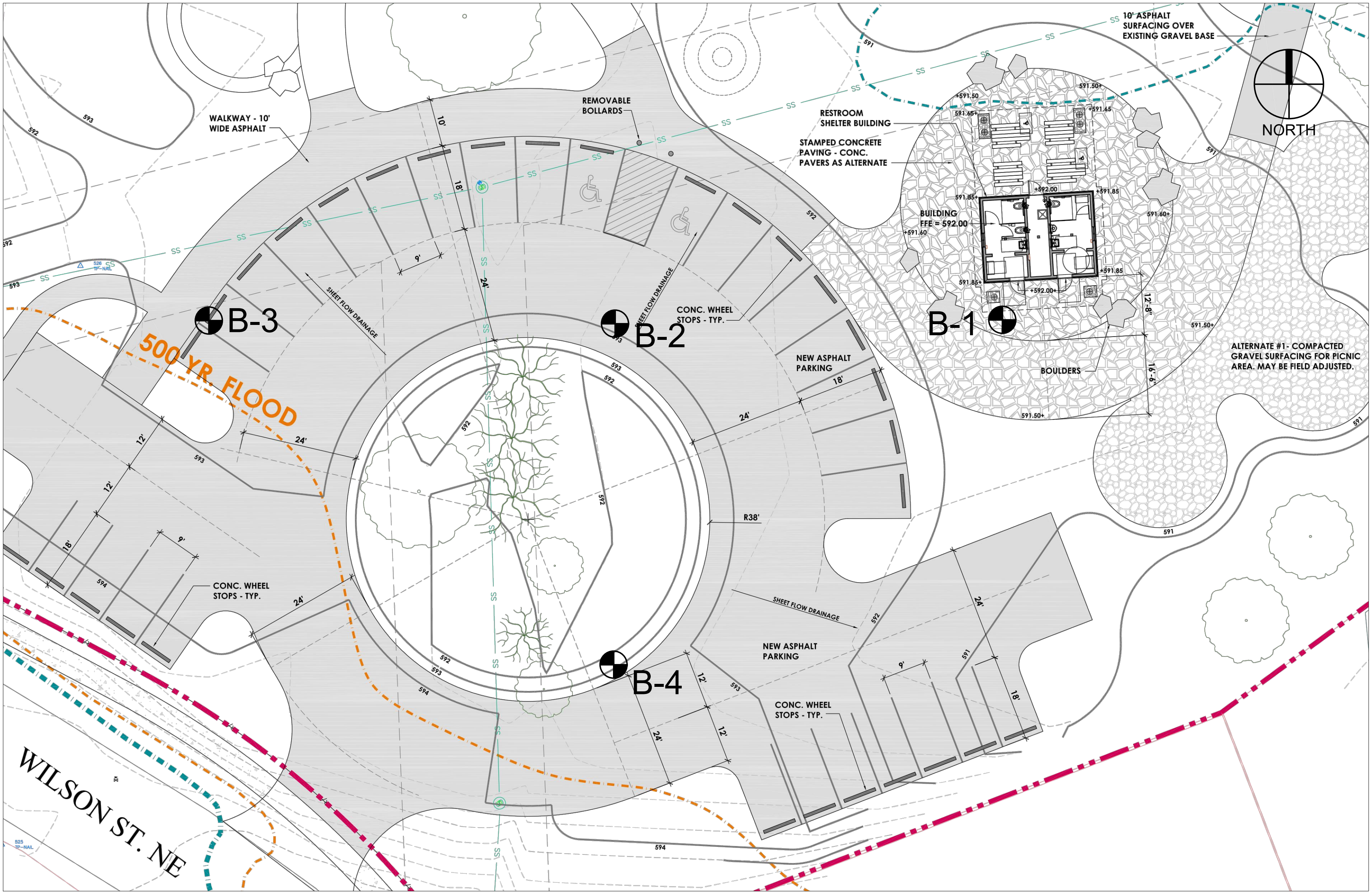
SITE VICINITY MAP

Wilson Street Park

106 Wilson St., NE

Concord, NC

Project No.:	F21018.00
Scale:	NTS
Prepared by:	DB
Date:	6-3-21
Figure No.:	A1



Note: All test locations are approximate (unless otherwise reported) and intended for illustration purposes only.

STEWART

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FIRM LICENSE #: C-1051
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BORING LOCATION DIAGRAM

Wilson Street Park

106 Wilson St., NE

Concord, NC

Project No.:	F21018.00
Scale:	1 in = 30 ft
Prepared by:	DB
Date:	6-3-21

Figure No.:

A2

APPENDIX B

HAND AUGER LOGS
LEGEND TO SOIL DESCRIPTIONS

HAND AUGER BORING LOG

STEWART

PROJECT WILSON STREET PARK **CLIENT** VIZ, PLLC

PROJECT NUMBER F21018.00 **LOCATION** CONCORD, NC

HAND AUGER BORING B- 1

DATE 05/17/21 **LOGGED BY** J. NANCE

GROUND SURFACE EL. 591 ft **BORING DEPTH** 8 ft

WL AT TIME OF AUGERING 4.0 ft

WL AFTER AUGERING FIAD

NOTES:
GSE INTERPOLATED FROM CABARRUS COUNTY GIS TOPOGRAPHIC DATA AND SHOULD BE CONSIDERED APPROXIMATE.

DEPTH (ft)	USCS SYMBOL	MATERIAL DESCRIPTION	ELEVATION (ft)	GWL (ft)	MOISTURE CONTENT(%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT(%)
0.3		TOPSOIL	590.7					
1.0	SM	**FILL -** BROWN, MOIST, SILTY SAND WITH TRACE MICA	590.0					
4.0	CH	**RESIDUAL -** BROWN AND GRAY, MOIST TO WET, SANDY CLAY WITH TRACE MICA	587.0	▽				
8.0	SM	BROWN AND GRAY, SATURATED, SILTY SAND WITH TRACE MCIA	583.0					
		BORING TERMINATED						

DYNAMIC CONE PENETROMETER BLOW COUNTS	⊙ AVG DCP (BPI*) ⊙
5 6 6	6
4 3 3	3
3 2 2	2
3 2 2	2
3 3 2	2
2 2 2	2
8 9 11	10
4 7 9	8
7 9 9	9

HAND AUGER BORING B- 2

DATE 05/17/21 **LOGGED BY** J. NANCE

GROUND SURFACE EL. 594 ft **BORING DEPTH** 4 ft

WL AT TIME OF AUGERING DRY

WL AFTER AUGERING FIAD

NOTES:
GSE INTERPOLATED FROM CABARRUS COUNTY GIS TOPOGRAPHIC DATA AND SHOULD BE CONSIDERED APPROXIMATE.

DEPTH (ft)	USCS SYMBOL	MATERIAL DESCRIPTION	ELEVATION (ft)	GWL (ft)	MOISTURE CONTENT(%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT(%)
0.3		TOPSOIL	593.7					
1.0	SM	**FILL -** BROWN, MOIST, SILTY SAND WITH TRACE MICA	593.0					
4.0	CH	**RESIDUAL -** BROWN AND GRAY, MOIST TO WET, SANDY CLAY WITH TRACE MICA	590.0					
		BORING TERMINATED						

DYNAMIC CONE PENETROMETER BLOW COUNTS	⊙ AVG DCP (BPI*) ⊙
6 7 9	8
6 6 2	4
4 3 3	3
5 4 4	4
3 2 4	3

**BPI = Blows Per (1.75-in) Increment, unless otherwise reported.*

HAND AUGER BORING LOG

STEWART

PROJECT WILSON STREET PARK
CLIENT VIZ, PLLC
PROJECT NUMBER F21018.00
LOCATION CONCORD, NC

HAND AUGER BORING B- 3

DATE 05/17/21
LOGGED BY J. NANCE
GROUND SURFACE EL. 597 ft
BORING DEPTH 4 ft
WL AT TIME OF AUGERING DRY
WL AFTER AUGERING FIAD

NOTES:
GSE INTERPOLATED FROM CABARRUS COUNTY GIS TOPOGRAPHIC DATA AND SHOULD BE CONSIDERED APPROXIMATE.

DEPTH (ft)	USCS SYMBOL	MATERIAL DESCRIPTION	ELEVATION (ft)	GWL (ft)	MOISTURE CONTENT(%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT(%)	DYNAMIC CONE PENETROMETER BLOW COUNTS	⊙ AVG DCP (BPI*) ⊙
0.3		GRAVEL	596.7						16 18 18	18
	SM	**FILL -** BROWN, SILTY SAND WITH TRACE ORGANICS AND MICA							12 12 14	13
			594.0						8 10 14	12
3.0	CH	**RESIDUAL -** BROWN AND GRAY, MOIST, SANDY CLAY WITH TRACE MICA							14 16 12	14
4.0			593.0						5 4 4	4
		BORING TERMINATED								

HAND AUGER BORING B- 4

DATE 05/17/21
LOGGED BY J. NANCE
GROUND SURFACE EL. 593 ft
BORING DEPTH 4 ft
WL AT TIME OF AUGERING 4.0 ft
WL AFTER AUGERING FIAD

NOTES:
GSE INTERPOLATED FROM CABARRUS COUNTY GIS TOPOGRAPHIC DATA AND SHOULD BE CONSIDERED APPROXIMATE.

DEPTH (ft)	USCS SYMBOL	MATERIAL DESCRIPTION	ELEVATION (ft)	GWL (ft)	MOISTURE CONTENT(%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT(%)	DYNAMIC CONE PENETROMETER BLOW COUNTS	⊙ AVG DCP (BPI*) ⊙
0.3		TOPSOIL	592.7						7 5 5	5
1.0	SM	**FILL -** BROWN, MOIST, SILTY SAND WITH TRACE MICA	592.0						5 7 5	6
	CH	**RESIDUAL -** BROWN AND GRAY, MOIST TO SATURATED, SANDY CLAY WITH TRACE MICA							5 4 4	4
									6 8 10	9
4.0			589.0	▽					5 5 7	6
		BORING TERMINATED								

UNIFIED SOIL CLASSIFICATION (ASTM D-2487)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LOW PLASTICITY (LEAN) CLAY
			PI>4 AND PLOTS<"A" LINE	ML	LOW PLASTICITY SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	HIGH PLASTICITY (FAT) CLAY
			PI PLOTS <"A" LINE	MH	HIGH ELASTICITY SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT

MATERIAL TYPES ENCOUNTERED ONSITE

- Fat Clay (CH)
- Fill - Silty Sand (SM)
- Gravel
- Silty Sand (SM)
- Topsoil / Organic Layer

SAMPLE TYPES

- Split Spoon

ADDITIONAL ABBREVIATIONS, TERMS, & SYMBOLS

HSA	-	HOLLOW-STEM AUGER
HA	-	HAND AUGER
SPT	-	STANDARD PENETRATION TEST
BPF	-	BLOWS PER FOOT
PL	-	PLASTIC LIMIT
LL	-	LIQUID LIMIT
MC	-	MOISTURE CONTENT
SS	-	SPLIT SPOON
AP	-	AUGER PROBE
WL	-	WATER LEVEL
USCS	-	UNIFIED SOIL CLASSIFICATION SYSTEM
WOH	-	WEIGHT OF HAMMER
WOR	-	WEIGHT OF RODS
EOD	-	END OF DAY

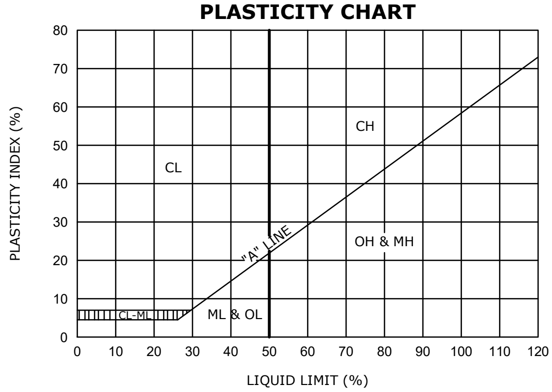
FIAD	-	FILLED IMMEDIATELY AFTER DRILLING/DIGGING
DRY	-	REQUIRES WETTING TO REACH OPTIMUM
MOIST	-	AT OR NEAR OPTIMUM
WET	-	REQUIRES DRYING TO REACH OPTIMUM
SAT	-	SATURATED, NEARLY LIQUID
TRACE	-	< 5%
FEW	-	5 - 10%
FEW	-	15 - 25%
LITTLE	-	15 - 25%
SOME	-	30 - 45%

▽ WATER LEVEL AT TIME OF DRILLING

▼ WATER LEVEL AFTER DRILLING

CAVE-IN LEVEL

PLASTICITY CHART



PENETRATION RESISTANCE
(RECORDED AS BLOWS PER 6 IN.)

SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	UNDRAINED SHEAR STRENGTH (KSF)
VERY LOOSE	0 - 3	VERY SOFT	0 - 1	0 - 0.25
LOOSE	4 - 9	SOFT	2 - 4	0.26 - 0.50
MEDIUM DENSE	10 - 30	MEDIUM STIFF (FIRM)	5 - 8	0.51 - 1.0
DENSE	31 - 50	STIFF	9 - 15	1.1 - 2.0
VERY DENSE	51+	VERY STIFF	16 - 30	2.1 - 4.0
		HARD	31+	4.0+

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

STEWART

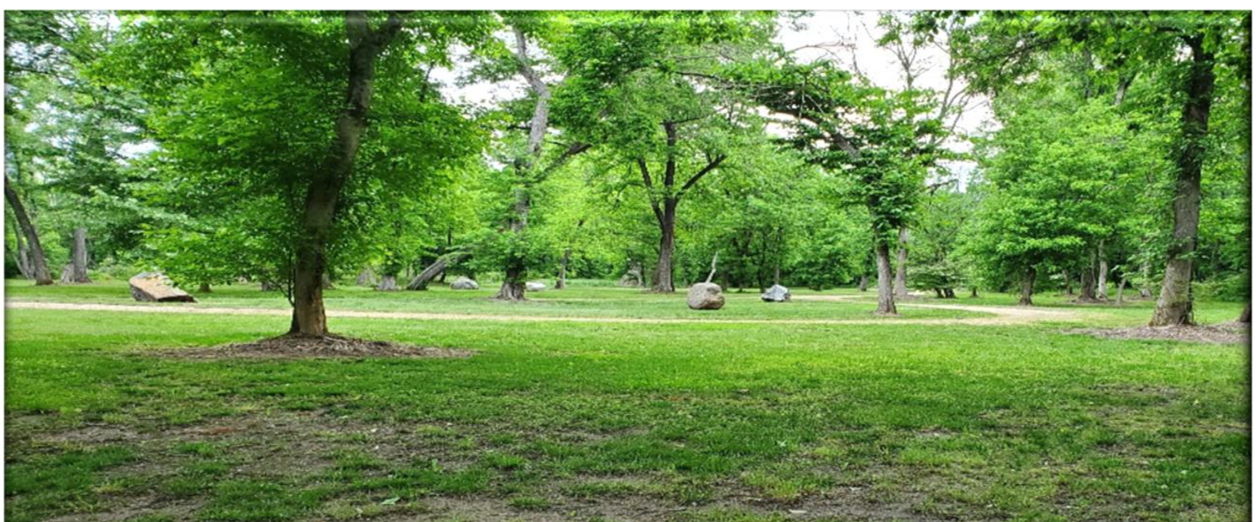
LEGEND TO SOIL DESCRIPTIONS

PROJECT NUMBER: F21018.00

APPENDIX C

SITE PHOTOGRAPHS

Photograph 1: Current park entrance from Wilson St. leading to gravel parking lot.



Photograph 2: General site photo facing north.

Photograph 3: Riprap and drainage swale plan east of the existing park entrance.

Photograph 4: General site photo from the greenway facing south.