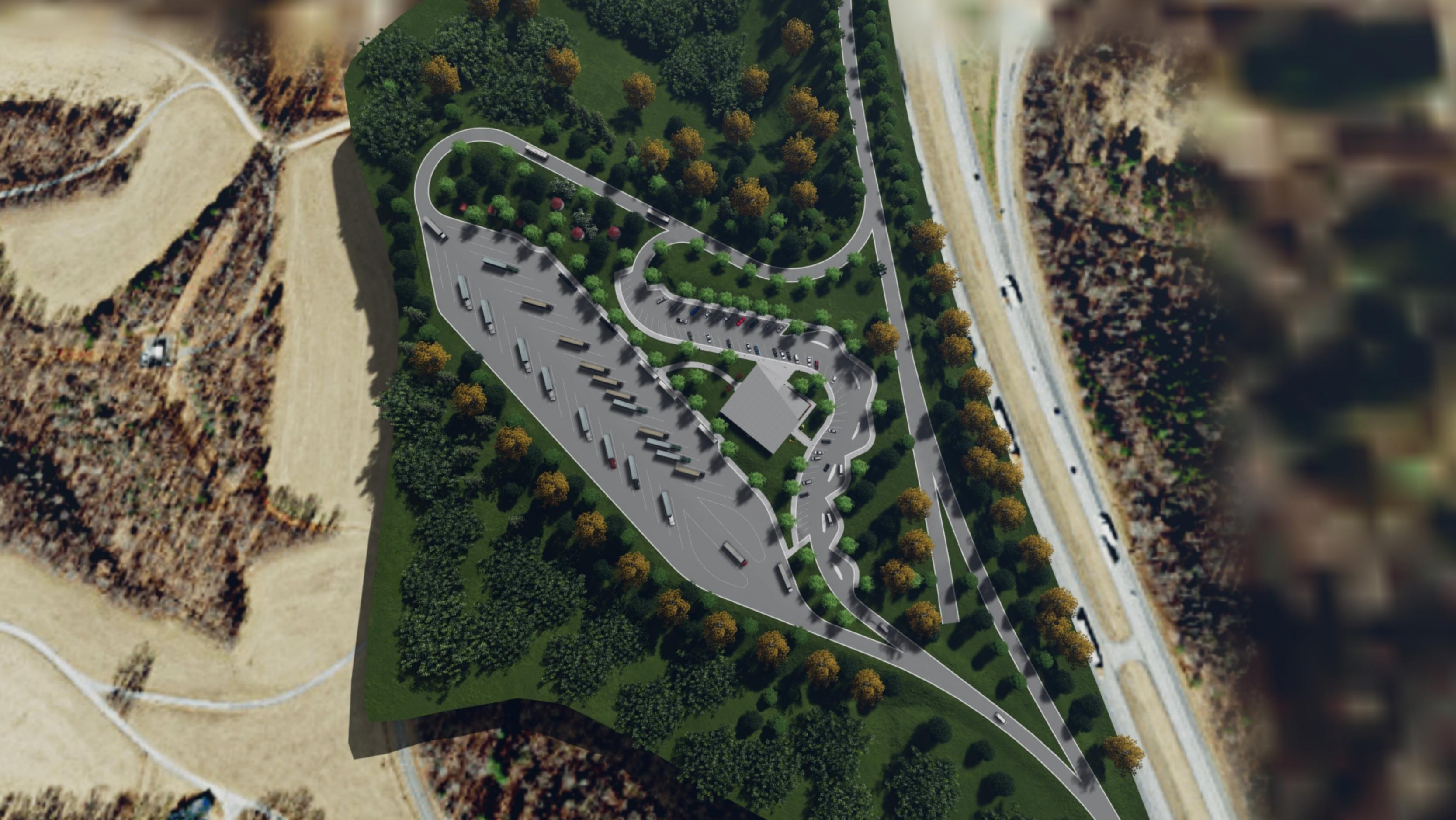


I-77 North Welcome Center Feasibility Study (2023)

















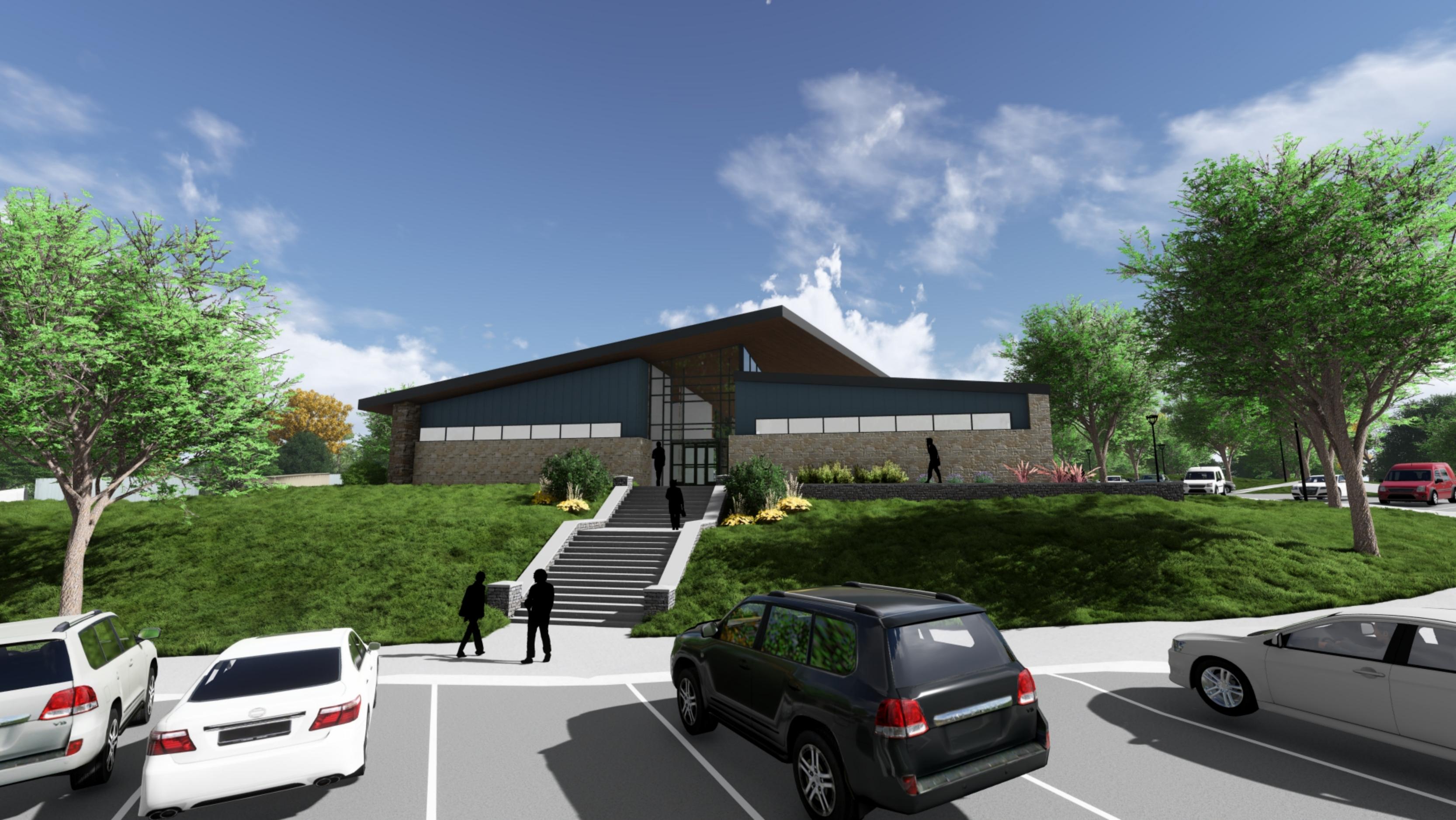


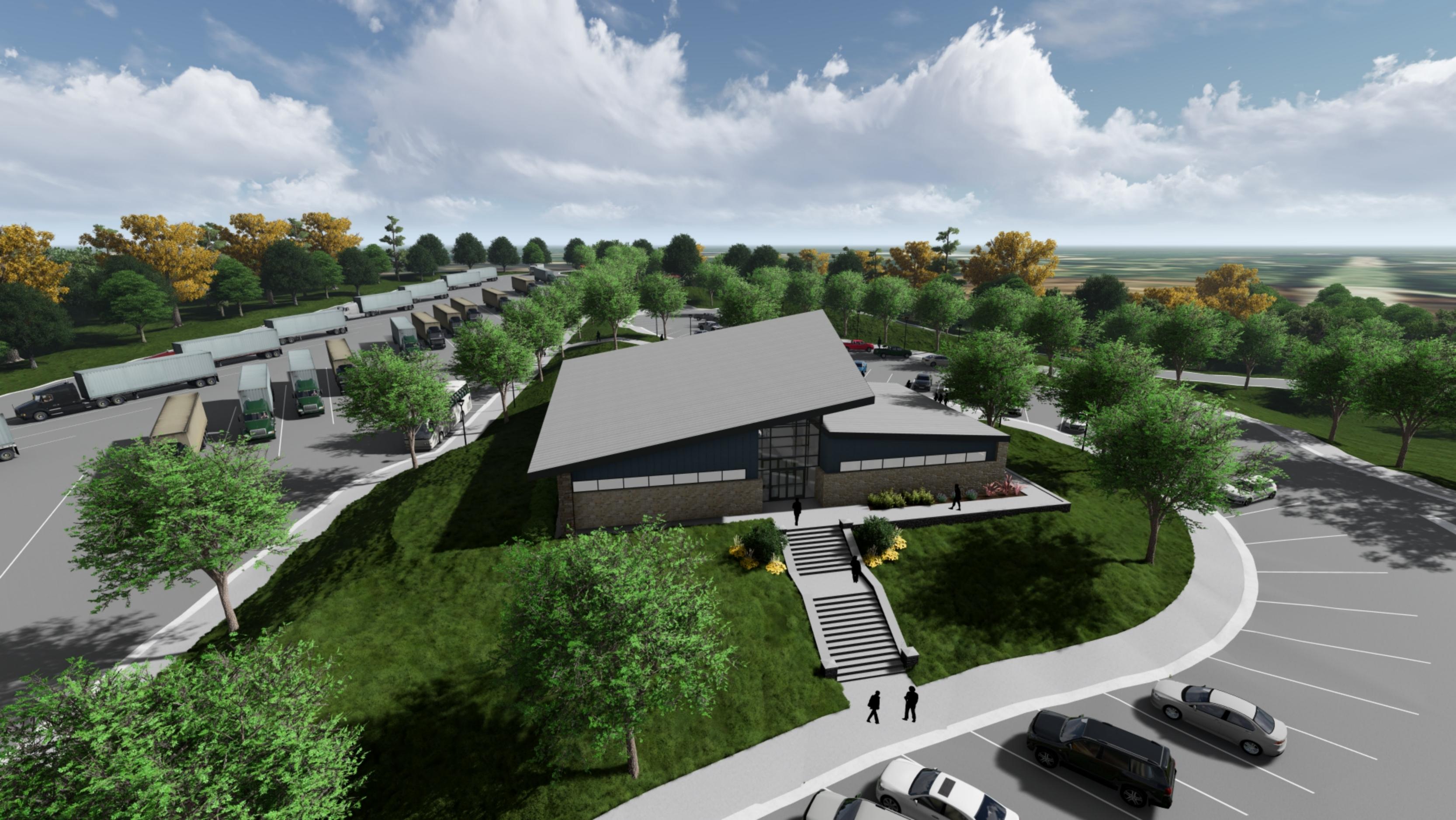






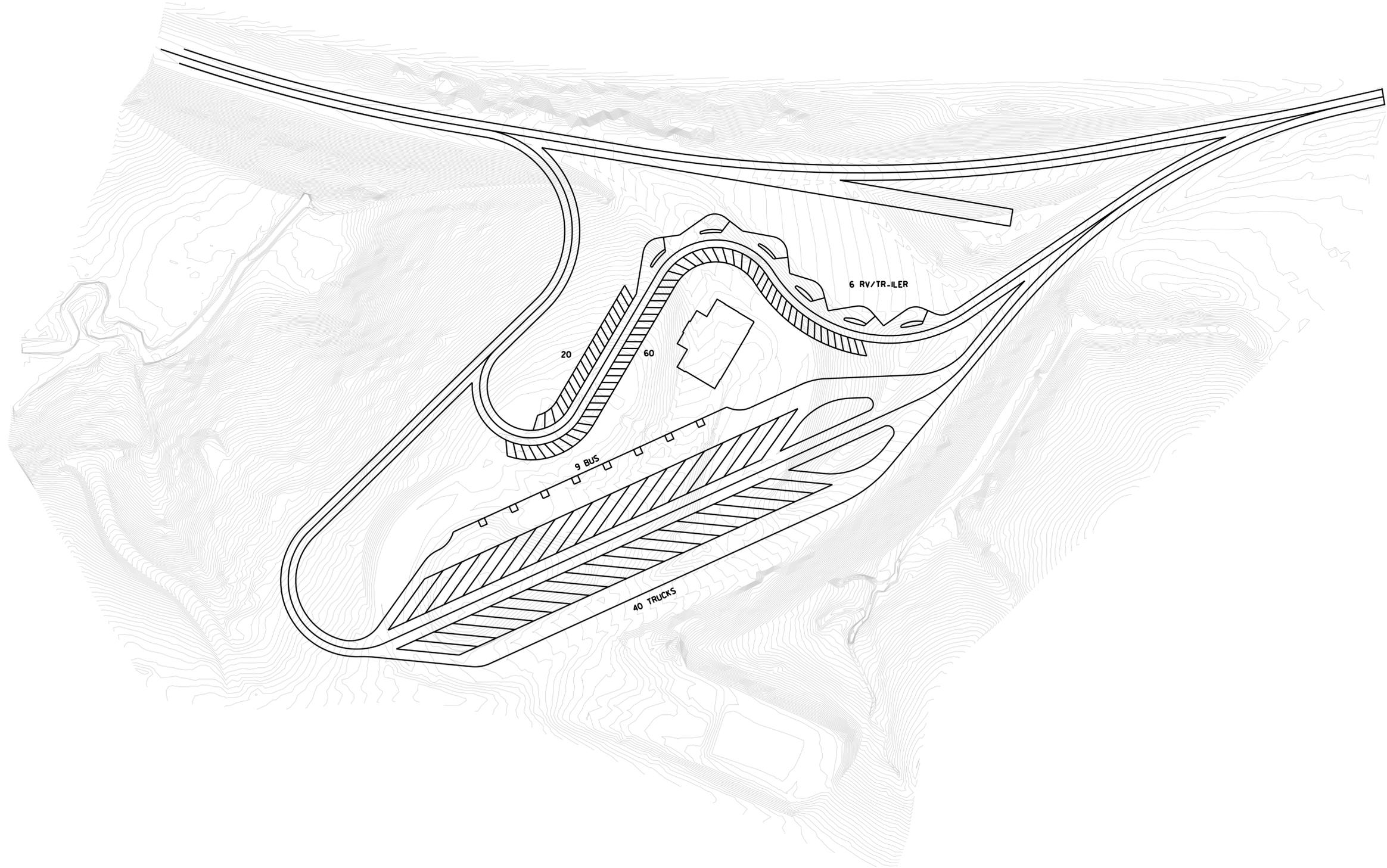






ALTERNATIVE 8

TRUCKS: 40
BUS/RV/TRAILERS: 15
CARS: ~80



PROJECT REFERENCE NO.	SHEET NO.
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

North Carolina Department of Transportation
Preliminary Estimate

TIP No. **Surry Co. I-77 Rest Area**
Route I-77

Preliminary Design

CONSTR. COST
\$39,468,992

Prepared By: NCDOT - Roadside
Prepare Date: 2023

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			<u>Roadway/Parking</u>				
			Clearing and Grubbing	2.1	Acre	\$ 10,500.00	\$ 22,050.00
			Supplemental Clearing and Grubbing	1	Acre	\$ 11,500.00	\$ 11,500.00
			Excavation	227,470	CY	\$ 28.00	\$ 6,369,160.00
			Borrow	8,550	CY	\$ 40.00	\$ 342,000.00
			Pavement Removal	19,060	SY	\$ 20.00	\$ 381,200.00
			Drainage New Location	1.00	LS	\$ 375,000.00	\$ 375,000.00
			Curb & Gutter	11,380	LF	\$ 35.00	\$ 398,300.00
			Fine Grading	22,430	SY	\$ 7.00	\$ 157,010.00
			12.0" Asphalt Base Course TY.B25.0C	15,120	Tons	\$ 85.00	\$ 1,285,200.00
			6.0" Asphalt Intermediate Course TY.I19.0C	7,420	Tons	\$ 75.00	\$ 556,500.00
			3.0" Asphalt Surface Course TY.S9.5C	3,580	Tons	\$ 65.00	\$ 232,700.00
			Asphalt Binder	1,250	Tons	\$ 500.00	\$ 625,000.00
			Sidewalk	1,580	SY	\$ 75.00	\$ 118,500.00
			Guardrail	4,910	LF	\$ 30.00	\$ 147,300.00
			Guardrail Anchors, Greu TL-3	5	Each	\$ 3,200.00	\$ 16,000.00
			Guardrail Anchors, Type CAT-1	5	Each	\$ 1,050.00	\$ 5,250.00
			Erosion Control	2.1	Acre	\$ 160,000.00	\$ 336,000.00
			Thermo and Markers	1.02	Miles	\$ 11,000.00	\$ 11,220.00
			<u>Structures</u>				
			Retaining Wall	1,200	SF	\$ 225.00	\$ 270,000.00
			<u>Utility Construction</u>				
			Relocate Existing Water Line (10" Waterline)	300.0	LF	\$ 950.00	\$ 285,000.00
			Domestic Water Line	150.0	LF	\$ 80.00	\$ 12,000.00
			Sanitary Sewer	800	LF	\$ 175.00	\$ 140,000.00
			Fire Line	150	LF	\$ 125.00	\$ 18,750.00
			Fire Hydrants	1	Each	\$ 10,500.00	\$ 10,500.00
			Site Lighting/Electrical	1	LS	\$ 500,000.00	\$ 500,000.00
			<u>Site Development</u>				
			Misc. Demolition	1	LS	\$ 325,000.00	\$ 325,000.00
			Stormwater Basin/Hazardous Spill	1	LS	\$ 975,000.00	\$ 975,000.00
			Supplemental Earthwork	1	LS	\$ 255,000.00	\$ 255,000.00
			Septic System Conversion	1	LS	\$ 250,000.00	\$ 250,000.00
			Plaza Paving (Pavers)	2,500	SF	\$ 45.00	\$ 112,500.00
			Site Furnishings (Allowance)	1	LS	\$ 12,000.00	\$ 12,000.00
			Flagpole (30' Aluminum)	1	Each	\$ 10,000.00	\$ 10,000.00
			Site Signage - Pedestrian (Allowance)	1	LS	\$ 1,500.00	\$ 1,500.00
			Picnic Shelters w/Pad & Tables	3	Each	\$ 25,000.00	\$ 75,000.00
			Picnic Pad w/Tables	3	Each	\$ 5,000.00	\$ 15,000.00
			Landscaping (Allowance)	1	LS	\$ 125,000.00	\$ 125,000.00
			Seatwalls (Stone Veneer)	200	LF	\$ 150.00	\$ 30,000.00
			<u>Building Construction Cost</u>				\$ 7,500,000.00
			<u>Municipal Sanitary Sewer Connection</u>				\$ 5,000,000.00
			Misc. & Mob (10% Strs&Util)				\$ 1,592,225.00
			Misc. & Mob (35% Functional)				\$ 3,986,461.50

Lgth ___ Miles

Contract Cost	\$ 32,890,826.50
E. & CA. 20%	\$ 6,578,165.30
Construction Cost	\$ 39,468,991.80

NCDOT

Surry County, North Carolina

SCHEMATIC DESIGN

WELCOME CENTER AND REST AREA DESIGN

July 19, 2023

ARCHITECTURAL NARRATIVE

DESIGN GUIDING PRINCIPLE

SITE ACCESSIBILITY

(3) Existing buildings to be demolished in their entirety. Entirety of parking and road is anticipated to be demolished and re-built in new configuration. (3) Existing maintenance buildings to be demolished and replaced with (1) new maintenance building at 300 SF.

BUILDING PROGRAM

Restrooms, Welcome Center, Vending and associated spaces.

BUILDING SHELL

Building exterior will be stone veneer, cement board plank and aluminum curtain wall. Two different stone veneer colors are anticipated. One vertically oriented plank cement board is anticipated. Standing seam metal roof.

INTERIOR UPFIT

- Terrazzo flooring and base. Custom terrazzo floor pattern in lobby and welcome center
- 12x24 tiles only at toilet partitions
- Wall tiles on all toilet walls running to 7' AFF
- Thru Color Phenolic toilet partitions
- Restroom accessories to include soap, hand dryers and mirrors
- GWB ceilings in all toilets
- Wood ceilings in lobby and welcome center
- Manual roller shades in welcome center
- Interior and exterior dimensional metal signage
- Built in display cases in lobby
- Lobby/Main Corridor walls to be terrazzo panels, stone or other decorative material
- Electric Fireplace in Welcome Center, BOD: SimpliFire Scion 55" Clean Face Linear

STRUCTURAL SYSTEM AND FOUNDATION

Design Criteria

Design for the structure will be in accordance with the requirements of the 2018 North Carolina State Building Code. For purposes of wind, snow and seismic loading the structure is designated Occupancy Category II (Standard Occupancy) per Table 1604.5.

The following loading and design criteria will be utilized in the design of the structure:

Uniform Live Loading

Ground Floor	100 PSF
Mechanical Equipment	75 PSF plus equipment pads

Wind Loading

Basic Wind Speed	110 MPH
Exposure	B

Snow Loading

Ground snow Load	20 PSF (<i>CS Snow Area</i>)
Drifting Snow	In accordance with ASCE 7
Snow Exposure Factor	B
Importance Factor	1.00

Seismic Loading

Seismic Site Class	D (<i>per Geotechnical Investigation</i>)
Importance Factor	1.0
Seismic Design Category	B

Soil Criteria

Net Allowable Bearing Pressure 2000 PSF (*per Geotechnical Investigation*)

Deflection Criteria

Live and snow load deflections will be limited to the following:

Roof Members	Span / 360, supporting rigid ceilings Span / 240, supporting flexible ceilings
Exterior Walls	Span / 240, with brittle finishes Span / 180, with flexible finishes

Materials

The structural system will be constructed using the following materials:

Concrete and Reinforcing

Footings	3500 PSI, at 28 days
Foundations	5000 PSI, at 28 days

Slabs on Grade	4000 PSI, at 28 days
Reinforcing Bars	ASTM A615, Grade 60
Anchor Bolts	ASTM F1554, Grade 36

Structural Steel

Wide Flange Columns & Beams	ASTM A992, Grade 50
HSS Columns & Beams	ASTM A500, Grade B
Miscellaneous Shapes & Plates	ASTM A36
Bolts	ASTM A325 and A490
Welding	In accordance with AWS

Masonry

Concrete Block	ASTM C90, Grade N
Grout	3000 PSI, at 28 days
Mortar	ASTM C270, Type S (Walls) / N (Brick)

Wood Framing

Wall Studs	Spruce/Pine/Fir No.1/No.2
------------	---------------------------

Substructure Systems

Foundation

The foundations will be comprised of concrete walls on continuous strip footings, and concrete piers on spread footings at the new column locations. The subgrade below the building shall be improved stripping vegetation, topsoil, and removal of any poor-quality soils as defined by the geotechnical report. Upon proof-rolling and replacing weak or soft areas, competent structural fill shall be placed to the appropriate elevation.

Slabs On Grade

The structural floor construction will typically be a 5" thick normal weight concrete slab on grade, reinforced with welded wire fabric. The slab will be underlain by a vapor barrier and a minimum of 8" of compacted crushed stone. The slab will have saw-cut control joints spaced approximately 15 feet in each direction, and on each column line. Full depth isolation joints will be constructed around columns.

Superstructure

Primary Framing

The superstructure of the proposed building will be designed to support the code-required gravity vertical loads and the horizontal lateral loads imparted by wind and seismic events. The proposed building will resist lateral loads by use of braced frames or moment resisting frames. The design will consider both the strength of members as well as stiffness to control deflection throughout the building.

Exposed steel columns will be designated AESS (architecturally exposed structural steel) and will be HSS (hollow structural sections) of either round pipe or square tube. Concealed columns will be wide-flange shapes.

Roof Construction

Typical flat and sloped roof construction for the proposed building will consist of 1½" deep galvanized steel roof deck spanning 6 feet (maximum) across open web steel joists and/or steel beams. Snow drift loads will be assessed on the lower roofs.

Rooftop mechanical units (with manufacturer's standard curbs) will be supported directly on the roof structure. There will be no mechanical equipment screens.

Exterior Walls

Exterior bearing walls will consist of nominal 2x6 wood studs at 16" on center. The exterior studs will be designed with a stiffness ratio to resist wind forces perpendicular to the exterior finish system anchored to them. Long horizontal bands of windows will require steel substructures for stability of heads and sills. Secondary steel substructures to be implemented at glazed wall systems (curtainwall/storefront) as necessitated by architectural design.

Special Inspections

Special Inspections testing will be required for this proposed building and should be included in construction costs.

MECHANICAL SYSTEMS

GENERAL

The mechanical systems shall include all equipment, materials and labor necessary to provide the desired conditions for a functioning welcome center with a lobby, restrooms, break room, offices and other associated spaces.

DESIGN CRITERIA

All engineering design and construction work will comply with the following codes and standards:

- A. 2018 North Carolina Building Code
- B. 2018 North Carolina Mechanical Code
- C. 2018 North Carolina Energy Conservation Code
- E. All applicable chapters of NFPA, including, but not limited to:
 - a. NFPA 101 – Life Safety Code
 - b. NFPA 90A – Ductwork Systems

HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

The Surry Welcome Center will be conditioned by three split direct expansion heat pump systems with auxiliary electric coils for heat. There will also be two air to air heat exchangers that recover energy from the restroom exhaust. A heat exchanger, along with an inline exhaust fan for both the outside air and toilet exhaust will be located over the mechanical room for the men's restrooms and over the Break/Office area for the women's restrooms.

The men's restrooms will be served by a seven and a half ton split heat pump system. A 23 kW electric coil will back up the heat pump. This unit also serves the mechanical room, electrical room, vending storage room, and corridor in front of the men's restrooms. An energy recovery ventilator will be installed to exhaust 1,400 cfm and recover both sensible and latent energy from this airstream to pretreat 1,200 cfm of outside air for ventilation. Both outside and exhaust air fans will be contained within the energy recovery ventilator.

Like the men's restrooms, the women's restrooms will be served by a seven and a half ton split heat pump system. A 23 kW electric coil will back up the heat pump. This unit also serves a family restroom, break room/office area and the corridor in front of the women's restrooms. An energy recovery ventilator will be installed to exhaust 1,470 cfm and recover both sensible and latent energy from this

airstream to pretreat 1,200 cfm of outside air for ventilation. Both outside and exhaust air fans will be contained within the energy recovery ventilator.

A new five ton split heat pump system will be installed to serve the main welcome center area, storage spaces, office, staff restroom and kitchenette. A 17 kW electric coil will back up the heat pump for these spaces. The staff toilet will be provided with a dedicated exhaust fan that will run continuously when the building is occupied.

A new five ton split air conditioning system will be installed to serve the main welcome center lobby, and vestibules. A 17 kW electric coil will back up the heat pump for these spaces.

A one ton mini split heat pump will provide heating and cooling for the vending area. The air handling unit will be a ceiling cassette.

Cooling and heating loads will be performed to more accurately predict the capacity of the HVAC systems required and the new systems will be sized accordingly.

TEMPERATURE CONTROLS

All HVAC systems will be controlled by 24 hour/ 7 day a week programmable thermostats.

AIR DISTRIBUTION

Galvanized steel ductwork will be specified to distribute air. All duct construction shall conform to SMACNA recommendations for duct pressures up to 3"wg.

All supply air duct shall be insulated with mineral fiber insulation in accordance with the 2018 North Carolina Energy Conservation Code.

Air distribution devices will be selected to be appropriate for their location. Supply grilles will be surface mounted in restrooms as will the exhaust grilles. The lobby will be served by duct mounted grilles located in exposed spiral wound ductwork. Four-cone diffusers will be selected to serve any area with lay-in ceilings.

PLUMBING SYSTEMS

DESIGN CRITERIA

All engineering design and construction work will comply with the following codes and standards:

- A. 2018 North Carolina Building Code
- B. 2018 North Carolina Plumbing Code
- C. 2018 North Carolina Energy Conservation Code
- D. All applicable chapters of NFPA, including, but not limited to:
 - a. NFPA 101 - Life Safety Code
- E. Americans with Disabilities Act (ADA)
- F. Underwriters Laboratories, Inc. (UL)

FIXTURES AND TRIM

Water Closets will be wall hung with back outlet by American Standard "AFWALL" or approved equal. Sloan or approved equal 1.28 gallon per flush sensor activated valves and new carriers.

New urinals will be American Standard wall hung with Sloan or approved equal sensor activated 0.5 gallon per flush valves and new carriers,

Large restrooms wall hung lavatories are to be Sloan Stone two station units with 0.5 GPM sensor activated faucets, soap dispensers, and new carriers.

Individual restrooms will have individual wall lavatories with 0.5 GPM sensor faucets, soap dispensers, and carriers. Water Closets will be floor mounted with bottom outlet with 1.28 sensor activated flush valves.

Electric Water Coolers with sensor activated spouts will be provided. One Electric Water Cooler located at the main toilet area will include bottle filler.

Mop basins and service sinks with manual faucets will be provided.

Break Rooms will be provided with stainless sinks and manual faucets.

Dishwasher connections will be provided in the Break Room Area.

HOT WATER

Both the men's and the women's gang toilets will each have a propane fired 199 MBH gas water heater with recirculation line and pump. The women's restroom water heater will also serve the family restroom next to it. The office restroom and kitchenette will be served by instantaneous electric water heaters under the lavatory and sink respectively.

BASIC PLUMBING MATERIALS

Potable water piping will be type L copper with lead free solder, and type "k" soft copper with no joints below grade for trap primers.

All sewer, waste and vent piping will be cast iron with standard no hub fittings according to CISPI 301.

All domestic water piping shall be insulated with pre-formed mineral fiber insulation with thickness conforming to the requirements of the 2018 North Carolina Energy Conservation Code. All below grade copper for trap primers shall be insulated with ½" thick Armaflex.

ELECTRICAL SYSTEMS

GENERAL

The electrical requirements shall include power and lighting distribution equipment, raceways and wiring, lighting fixtures, wiring devices, addressable fire alarm system, and rough-in for security, IT, and audiovisual systems.

DESIGN CRITERIA

Applicable Electrical Codes

The latest edition of the codes, orders, standards, and guides referred to in this section will be followed for the electrical system design:

- 2018 North Carolina Building Code (based on 2015 IBC).
- 2018 North Carolina Fire Prevention Code
- 2018 North Carolina Energy Conservation Code
- 2020 National Fire Protection Association – NFPA 70: National Electrical Code with North Carolina amendments.
- 2021 National Fire Protection Association – NFPA 70E: Standard for Electrical Safety in the Workplace.
- 2022 National Fire Protection Association – NFPA 72: National Fire Alarm and Signaling Code
- 2021 National Fire Protection Association – NFPA 101: Life Safety Code
- 2022 National Fire Protection Association - NFPA 110: Standard for Emergency and Standby Power Systems
- IESNA - The Illuminating Engineering Society of North America
- NEMA - National Electrical Manufacturers Association
- UL - Underwriters Laboratory
- ADA – Americans with Disabilities Act Accessibility Guidelines
- Local codes and utility company installation requirements

1. Connected Load Calculation Criteria

<u>Functional Area</u>	<u>Load Density (VA/ sq. ft.)</u>
Welcom Center	3.0
Kitchenette	10.0
Offices and Meeting Rooms	3.5
Circulation	0.5
Toilet Rooms	1.0
Storage	0.5
Mechancial/Electrical	1.0
Vending	3.0
Mechanical Equipment	As required

2. Equipment Connection Assumptions

Secondary Design Voltage:

Motors ½ HP and larger	208V, 3P, 3W
Electric Resistance Heat	208V, 3P, 3W
Air Conditioning Units	208V, 3P, 3W
Motors smaller than ½ HP	120V, 1P, 3W
Lighting	120V, 1P, 3W
Receptacle Loads	120V, 1P, 3W

3. Preliminary Load Calculations Results

Existing Building Area: 7,339 sq. ft.

Estimated Receptacle/Equipment Load	15.0 kVA
Estimated Kitchenette Load:	2.0 kVA
Estimated HVAC Load:	55.0 kVA
Estimated Indoor Lighting Load:	7.0 kVA
Estimated Outdoor Lighting Load:	<u>5.0 kVA</u>
Total Estimated Connected Load:	84.0 kVA
Estimated Demand Load	65.0 kVA

BUILDING ELECTRIC SERVICE

The building will be fed from a separate utility metered service from a pad mounted, utility owned transformer. The transformer will supply 208/120V, 3P, 4W power to a 400 Amp main distribution panel (MDP) located in the building electrical room. This service will accommodate the proposed building load as well as required site lighting. The service will be equipped with a Surge Protection Device (SPD) to protect sensitive electrical equipment in the building and a power monitor. The SPD will be UL 1449 3rd Edition Type 2, and protection modes shall be L-N, L-L, and N-G. The SPD shall be shunt-

type with replaceable MOV technology bolt-in modules and shall be directly mounted to the panelboard bus with integral disconnecting means.

ELECTRIC POWER DISTRIBUTION

The MDP will provide power to HVAC equipment, interior and exterior lighting, and receptacles circuits on the Men's Toilet Room/Vending side of the building. A sub panel, located in the Storage Room on the Welcome Center/Women's Toilet Room side of the building is proposed to feed HVAC, lighting, and receptacle circuits on that side of the building.

All new distribution equipment shall be by Square D, General Electric, Siemens, or Eaton. Panelboards shall have copper bussing with bolt-on circuit breakers. Disconnect switches shall be heavy-duty fused or non-fusible as required. All distribution and branch circuit panelboards shall be provided with a minimum of 20 percent prepared spaces for future circuit breaker use.

BRANCH CIRCUIT WIRING

The voltage drop in new feeders and branch circuits will be limited to 2% and 3% respectively. All feeders and branch circuits will be 600V copper conductors with THHN/THWN insulation installed in conduit. Conductors #14 and smaller will be solid. Conductors larger than #14 will be stranded. Individual grounded circuit conductors will be required for all new branch circuits. All wiring will be continuous from outlet-to-outlet. Sharing of neutrals will not be permitted.

With the Seismic Design Category C, seismic restraints, in addition to normal electrical system supports will be required for emergency/life safety systems. A specification will be provided for delegated design of these restraints by a manufacturer qualified in seismic restraint design, manufacture, and application. This specification will list the systems and items requiring restraints.

Ground fault and tamperproof receptacles will be specified in all areas where required by the latest National Electrical Code. All wiring devices such as receptacles and light switches will be commercial specification grade by Legrand, Arrow-Hart, Leviton, or Hubbell, gray color for normal power and red for standby power with stainless steel cover plates and matching screws. Weatherproof covers for wiring devices will be cast aluminum, while-in-use type. Non-metallic covers will not be acceptable. Receptacles used in damp or wet locations will be listed weather-resistant type. Tamper-resistant receptacles will be used in all public areas of the building including the Welcome Center, lobbies, corridors, vending, and restrooms to comply with NEC 406.12.

Ground fault circuit-interrupter (GFCI) protection for personnel shall be provided for all single-phase receptacles rated 50A or less and all three-phase receptacles rated 100A or less in the following

locations per NEC 210.8:

- Restrooms
- Break rooms
- Rooftops
- Outdoors
- Sinks - within 6 feet from the top inside edge of the bowl of the sink
- Indoor damp and wet locations

All wiring will be installed in conduit. Use rigid galvanized steel (RGS) where exposed outdoors or subject to physical damage. Use Schedule 40 PVC below slab or grade; transition to RGS at elbow prior to stub-up. Use flexible metal conduit for final connection to vibrating equipment; liquid tight in wet locations. The use of MC cable will not be allowed. Use EMT with compression fittings in all other locations. Set screw fittings are not allowed.

STANDBY POWER GENERATOR

A standby power diesel generator with sub-base fuel tank is proposed (preliminary estimate) to provide standby power to the entire site. A 208V, 3P, 400A service entrance rated automatic transfer switch (ATS), equipped with a 3P-400A utility main circuit breaker, will feed the MDP.

To provide generator power for the entire building, an approximately 100 kW generator set is anticipated; the exact size will be determined in Design Development based on the owner's requirements for standby power and actual load information. The main fuel tank shall have a minimum capacity of at least 133 percent of the runtime Class per NFPA 110. If the fuel tank height causes any generator output breaker height to exceed 6'-7" above finished grade, access stairs and platforms shall be provided for the generator.

LIGHTNING PROTECTION

The electrical service will be solidly grounded according to the National Electrical Code with bonding connections to an exterior ground ring around the building, building steel, water service piping, and concrete slab reinforcing.

A UL Master Label lightning protection system will be provided with air terminals on the roof, connected at appropriate intervals and bonded to the building steel per NFPA-780. Exterior conductive equipment will also be bonded to the exterior ground ring.

INTERIOR LIGHTING SYSTEMS

Interior lighting fixtures will use LED sources throughout. All LED drivers shall have integral surge protection. Dimming drivers shall dim to 1% minimum. Fixture housing and frame shall be arranged to match ceiling construction. Fixtures shall be supported from the building structure. Linear direct fixtures will be used in restrooms, Volumetric troffers will be used in offices, break rooms, and similar spaces with lay-in ceilings. Strips with wire-guard will be used in electrical rooms, storage rooms, and

other support spaces. Recessed downlights (“cans”) and decorative fixtures will be utilized in the lobby, Welcome Center, and elsewhere depending on space requirements.

Dimming controls will be specified where desired. Automatic occupancy sensing control will be provided in all areas as required by the Energy Code. Daylight harvesting controls will be provided where for appropriate to maximize energy savings.

The Illumination Engineering Society of North America, IESNA, recommended average maintained illumination levels are used to determine appropriate levels in each space. Unit power density (watts per square foot) requirements will be maintained as outlined in the North Carolina State Energy Code

Design Illumination Levels (Average Maintained Footcandles):

- Visitors Center/Offices: 40-50 FC
- Corridors: 15-20 FC
- Storage: 10-20 FC
- Restrooms: 20-30 FC
- Support Spaces: 30-40 FC

EXTERIOR LIGHTING SYSTEMS

Exterior lighting fixtures will use LED sources. Exterior lighting will consist of building-mounted decorative fixtures, decorative lighting at entrances, and wall packs in service areas. All exterior lighting fixtures will be UL listed for use in wet and/or damp locations as required by the fixture location. Exterior lighting will have full cutoff characteristics to control light pollution from the site while providing adequate illumination for safety and security. Exterior building-mounted lighting will be controlled by a lighting control system including programmable digital time clock with LCD display and holiday scheduling, 30A contactors, photocell, HOA switch, and accessories for complete and operable system.

EMERGENCY LIGHTING SYSTEMS

We propose an exit and emergency lighting be supplied from a separate 24V LED system with a central battery. This system will be located in the Electrical Room. LED exit signs will be constantly illuminated. Designated emergency lights will operate upon loss of utility power.

SPECIAL SYSTEMS

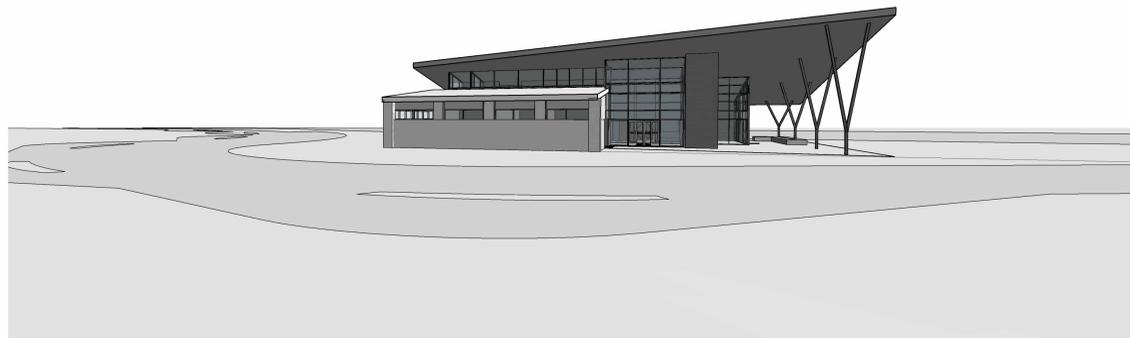
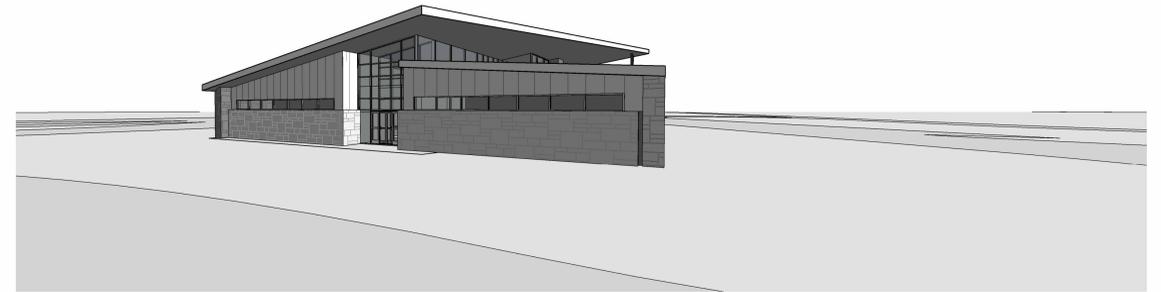
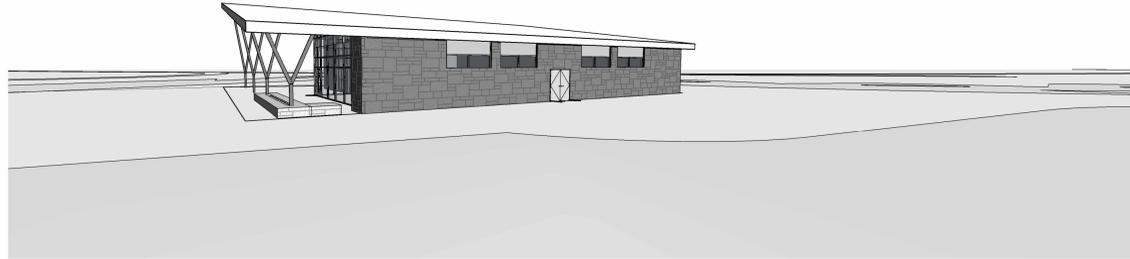
1. **Fire Alarm System:** A complete fire alarm system will be provided for the building. The fire alarm installation shall comply with NFPA 72 and all applicable fire codes. The system will include a digital addressable intelligent fire alarm control panel with notification devices, smoke and heat detectors, manual pull stations, and sprinkler flow and tamper switches. The fire alarm system will interface with the HVAC systems to ensure deactivation of these systems as required in an emergency condition. Wiring will be Class B and shall be installed in conduit in all exposed locations. Plenum-rated cabling supported by J-hooks may be used in concealed accessible ceiling spaces only in lieu of conduit if allowed by local Authority Having Jurisdiction.

2. **Tele/Data Cabling:**

A new MDF (Main Distribution Frame) will be established in the Electrical Room. Underground conduits with innerducts are proposed between the MDF and the Welcome Center side of the building to accommodate data outlets and equipment on that side of the building. Pathways (cable trays and conduit drops) will be provided for new IT cabling between each new tele/data drop and the MDF location. Category 6 cable will be installed between the tele/data outlet and a patch panel located in a data rack in the MDF. It is not anticipated that horizontal cabling runs will exceed 300 linear feet. All horizontal cable will be labelled, tested, and certified end-to-end. Network switches and equipment is assumed to be provided by the Owner.

Tele/data outlets will consist of 1" EMT conduit from a double gang box with a single gang mud ring stubbed above the ceiling or run to the cable tray location.

3. **Security/Access Control/CCTV:** Security, access control, and Closed Circuit Television system equipment is assumed to be provided by the Owner's security system vendors in order to integrate in to existing systems. Cable pathways and box rough-ins will be provided to accommodate system cabling. Electrical power will be provided to these system as required.



NCDOT - SURRY COUNTY REST AREA
NCDOT

3D VIEWS

SCALE:



NCDOT - SURRY COUNTY REST AREA
NCDOT

FLOOR PLAN

SCALE: 1/4" = 1'-0"



ECS Southeast, LLP

Geotechnical Engineering Report

I-77 Rest Area Reconstruction

158 I-77 Southbound
Lowgap, Surry County, North Carolina

ECS Project Number 09:29946

May 17, 2023





May 17, 2023

Mr. Jon Wood
Senior Project Manager
Alfred Benesch & Company
2359 Perimeter Pointe Parkway, Suite 350
Charlotte, NC, 28208

ECS Project No. 09:29946

Reference: Report of Subsurface Exploration
I-77 SBL Rest Area Reconstruction
Lowgap, Surry County, North Carolina

Dear Mr. Wood:

ECS Southeast, LLP (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed scope of work. This report presents our understanding of the geotechnical aspects of the project, the results of the field exploration conducted, and our geotechnical design and construction recommendations for the project.

It has been our pleasure to be of service to you during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify subsurface conditions assumed for this report. Should you have questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us at (336) 856-7150.

Respectfully submitted,

ECS Southeast, LLP

Oliver K. Badal, P.E.
Geotechnical Project Manager
Obadal@ecslimited.com
N.C. Registration No. 045050



5/17/2023

Amanda R. Suttle, P.G.
Project Geologist
ARoth@ecslimited.com

Michael J. Walko, P.E.
Principal Engineer
Mwalko@ecslimited.com

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	2
2.0 PROJECT INFORMATION	3
2.1 Site Information	3
2.2 Proposed Construction.....	3
3.0 FIELD EXPLORATION AND LABORATORY TESTING	4
3.1 Subsurface Characterization	4
3.2 Groundwater Observations.....	5
3.3 Laboratory Testing	5
4.0 DESIGN RECOMMENDATIONS	5
4.1 Structure Foundations.....	5
4.2 Floor Slabs	6
4.3 Seismic Design	7
4.4 Site Design Considerations.....	7
4.4.1 Cut and Fill Slopes.....	7
4.4.2 Asphalt Pavement Sections	8
5.0 SITE CONSTRUCTION RECOMMENDATIONS.....	10
5.1 Subgrade Preparation	10
5.1.1 Previous Site Development.....	10
5.1.2 Stripping and Grubbing.....	10
5.1.3 Proofrolling	10
5.2 Earthwork Operations	11
5.2.1 Potentially Expansive Soil	11
5.2.2 Excavation Considerations.....	11
5.2.3 Engineered Fill Materials	12
5.2.4 Compaction.....	12
5.3 Foundations and Floor Slabs	13
5.4 Pavements.....	14
5.4.1 Subgrade Evaluation	14
5.4.2 Aggregate Base Course	14
5.4.3 Asphalt Quality Control	14
6.0 CLOSING.....	14

APPENDICES

Appendix A – Diagrams & Reports

- Site Location Diagram
- Boring Location Diagram

Appendix B – Field Operations

- Reference Notes for Boring Logs
- Subsurface Exploration Procedure: Standard Penetration Testing (SPT)
- Boring Logs B-1 through B-21

Appendix C – Laboratory Testing

- Laboratory Test Results Summary
- Liquid and Plastic Limits Test Result
- CBR Test Results

Appendix D – Other Documents

- GBA Important Information About This Geotechnical Engineering Report

EXECUTIVE SUMMARY

This executive summary is intended as a very brief overview of the primary geotechnical conditions that are expected to affect design and construction. Information gleaned from the executive summary should not be utilized in lieu of reading the entire geotechnical report.

- Depending on final grades, very soft or very loose soils may be encountered at foundation bearing levels, slab-on-grade, or pavement subgrades in the vicinity of Boring B-2, B-5, B-7, B-10, and B-11.
- The proposed building can be supported by conventional shallow foundations consisting of column and/or strip footings bearing on compacted structural fill or natural soils or approved existing fill, sized using a net allowable soil bearing pressure of 2,000 psf.
- Concrete slabs-on-grade supported by approved residual soils or properly prepared structural fill can be designed using a modulus of subgrade reaction of 90 pounds per cubic inch (pci).
- Based on the N-values measured in the borings, a Seismic Site Class “D” designation is appropriate for seismic design of the proposed building.
- Groundwater was not encountered in the borings at the time of exploration or following a stabilization period of approximately 24 hours.

The above information summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal foundation recommendations are summarized. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the proposed new Rest Area/Welcome Center with associated paved parking and drive areas. The subject property consists of approximately 14 acres, located along Interstate 77 Southbound (I-77 SB), in Lowgap, Surry County, North Carolina. The recommendations developed for this report are based on project information supplied by Mr. Jon Wood of Alfred Benesch & Company and NCDOT.

Our services were provided in general accordance with ECS Proposal No. 08:29025P, dated October 7, 2022, and the subconsultant agreement dated February 2023 between Alfred Benesch & Company and ECS.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project and includes the following items.

- Information on site conditions including surface drainage, geologic information, and special site features.
- Description of the field exploration and laboratory tests performed.
- Final logs of the soil borings and records of the field exploration and laboratory tests in accordance with the standard practice of geotechnical engineers. This includes site and boring location diagrams. Grade elevations at the top of each boring are based on available topographic information and should be considered approximate.
- Recommendations regarding foundation options for the structure and settlement potential.
- Recommendations regarding slab-on-grade construction and design.
- Seismic site classification per North Carolina Building Code based on the average N-value method.
- Light and heavy-duty asphalt pavement section recommendations.
- Evaluation of the on-site soil characteristics encountered in the soil borings. Specifically, we will discuss the suitability of the on-site materials for reuse as engineered fill to support ground slabs and pavements. A discussion of groundwater, in-place fill, rock, and alluvial soils (if discovered) and their potential impact on structures and project construction will be provided.
- Recommendations for minimum soil cover during frost heaving, compaction requirements for fill and backfill areas, and slab-on-grade construction.
- Recommendations regarding site preparation and construction observations and testing.

2.0 PROJECT INFORMATION

2.1 SITE INFORMATION

The site is located at 158 Interstate 77 Southbound (I-77 SB), in Lowgap, Surry County, North Carolina. The property is approximately 14 acres in size and is owned by NCDOT. The site is shown at the approximate location in the following figure.



Figure 2.1.1 - Approximate Site Location Shown Outlined in Red

At the time of our site activities, the site was developed as an existing Rest Area / Welcome Center with existing buildings, paved parking lots, and drive areas.

2.2 PROPOSED CONSTRUCTION

Based on our discussions, we understand the project will consist of the demolition and reconstruction of the existing facility and will include a new Welcome Center that will be constructed west of the existing buildings. A new parking lot north of the building will consist of car parking (45 stalls) and extended vehicle parking (10 stalls). A Truck (40 stalls) and Bus/RV (7 stalls) lot will be constructed south of the new building. New access (loop) roads will also be constructed. We also understand an existing wastewater treatment facility located in the western portion of the site will be decommissioned and a new sewer line (from the Town of Mt. Airy) will be constructed beneath I-77 and tie into the new rest area.

We assume that the proposed building will be a one-story, wood-framed structure with masonry load bearing walls and a concrete slab-on-grade ground floor. Design foundation loads have not been provided to us; however, for the purpose of this report, we assume the maximum unfactored foundation loads will be:

- Maximum Column Load = 150 kips
- Maximum Wall Loads= 3 kips per linear foot

3.0 FIELD EXPLORATION AND LABORATORY TESTING

Our exploration procedures are explained in greater detail in Appendix B including the insert titled Subsurface Exploration Procedure. Our original scope of work included drilling a total of twenty-three (23) widely spaced soil test borings. However, two (2) borings for the proposed sewer crossing along I-77 were eliminated. The borings were field located using GPS technology and existing site features as reference and their approximate locations are shown on the Boring Location Diagram in Appendix A. Ground surface elevations noted on the boring logs and in this report were interpolated from provided site topographic information and should be considered approximate. If increased accuracy is desired by the Client, we recommend that the boring locations and elevations be surveyed.

3.1 SUBSURFACE CHARACTERIZATION

The site is located in the Piedmont Physiographic Province of North Carolina. The native soils in the Piedmont Province consist mainly of residuum with underlying saprolites weathered from the parent bedrock, which can be found in both weathered and unweathered states. In a mature weathering profile of the Piedmont Province, the soils are generally found to be finer grained at the surface where more extensive weathering has occurred. The particle size of the soils generally becomes more granular with increasing depth and gradually changes first to weathered and finally to unweathered parent bedrock.

With the exception of the artificial fill material encountered within portions of the site, the subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil and rock strata. Please refer to the boring logs in Appendix B. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual. The actual strata depths, including topsoil, may vary significantly between and at specific boring locations.

Approximate Depth Range (ft)	Stratum	Description	Ranges of SPT ⁽¹⁾ N-values (bpf) ⁽¹⁾
0.3 – 1.0 ⁽²⁾	N/A	Surficial Material: Topsoil (0.3' – 0.7'), Asphalt (0.3') and Stone Base Course (0.7' – 1.0')	N/A
0.3 – 13.0	I	Artificial Fill: Sandy/Clayey SILT (A-4, A-5), Very Soft to Very Stiff, Moist	0 - 20
0.0 – 20.0	II	Roadway Embankment: Sandy SILT (A-4), Soft to Very Stiff, Moist	6 - 20
0.0 – 25.0	III	Residuum: Sandy CLAY (A-6), Medium Stiff to Stiff, Moist / Sandy/Clayey SILT (A-4, A-5), Medium Stiff to Very Stiff, Moist / Silty SAND (A-2-4), Loose to Very Dense, Moist	4 - 87
18.5 – 23.8	IV	Weathered Rock: Gray-Brown GNEISS	100+

Notes:

- (1) Standard Penetration Test in blows per foot (bpf).
- (2) Surficial materials are driller reported and should not be used for surface material take offs.
- (3) Artificial fill was encountered at Borings B-1, B-2, B-5, B10, B-11, and B-12 and extended to depths ranging from approximately 2 to 13 feet below existing grades.
- (4) WR is defined as residual material exhibiting SPT N-values greater than 100 bpf.

The soil stratification shown on the boring logs represents the soil conditions at the actual boring locations. Variations in the stratification can occur between sample intervals and widely spaced boring locations. The subsurface conditions at other locations on the site may differ from those found at the boring locations. If different site conditions are encountered during construction, ECS should be contacted to review our recommendations relative to the new information.

Ground surface elevations noted on the boring logs and in this report were interpolated from provided site topographic information and should be considered approximate. If increased accuracy is desired by the Client, we recommend that the boring locations and elevations be surveyed.

3.2 GROUNDWATER OBSERVATIONS

Groundwater measurements were attempted at the termination of drilling and prior to demobilization from the site. At the time of our subsurface exploration (March 2023), groundwater was not encountered during drilling activities to the explored depths. After an approximate 24-hour stabilization period, the borings were dry. Variations in the long-term water table may occur, and should be expected, because of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

3.3 LABORATORY TESTING

Each sample was visually classified on the basis of texture and plasticity in accordance with the AASHTO soil classification system. After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The AASHTO group symbols for each soil type are indicated in parentheses along with the soil descriptions. Laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples. In addition, two bulk soil samples were collected and were used for standard Proctor and California Bearing Ratio (CBR) testing. Laboratory tests were performed in general accordance with AASHTO Standards.

4.0 DESIGN RECOMMENDATIONS

4.1 STRUCTURE FOUNDATIONS

Provided subgrades and structural fills are prepared as discussed herein, and based on the assumed design foundation loads, the proposed structure can be supported by conventional shallow spread footing foundations. These include individual column footings and continuous wall footings. The design of the shallow foundations should utilize the following parameters:

Net Allowable Bearing Pressure ⁽¹⁾	2,000 psf	2,000 psf
Acceptable Bearing Soil Material	Low Plasticity Residual Soils or Engineered Fill	
Minimum Width	24 inches	18 inches
Minimum Footing Embedment Depth (below slab or finished grade) ⁽²⁾	24 inches	24 inches
Estimated Total Settlement ⁽³⁾	Less than 1 inch	Less than 1 inch
Estimated Differential Settlement ⁽⁴⁾	Less than ¾-inch between columns	Less than ¾-inch over 50 feet

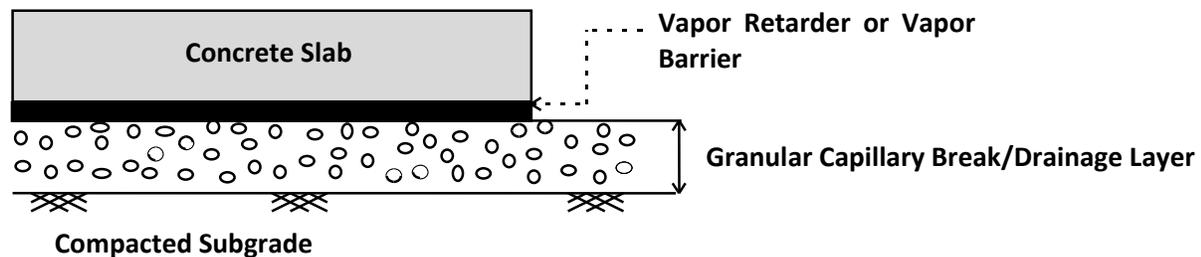
Notes:

- (1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
- (2) For bearing considerations and frost penetration requirements. Also, to mitigate effects of expansive soils.
- (3) Based on assumed structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
- (4) Based on anticipated range of column/wall loads and variability in borings. Differential settlement can be re-evaluated once the foundation plans are more complete.

4.2 FLOOR SLABS

The on-site low plasticity residual soils and new engineered fill are considered adequate for support of the ground floor slabs, although moisture control during earthwork operations, including the use of diking or appropriate drying equipment, may be necessary. Additionally, artificial fill was encountered in the vicinity of Borings B-1 and B-2 and extend to depths ranging from approximately 3 to 4 feet below existing grades. Depending on final design grades, some of these materials may be removed during mass grading. N-values in the artificial fill ranged from 10 to 20 bpf, indicating they were placed with some degree of compactive effort. Pending a successful proofroll, these soils may be left in place. If it is determined that they are unstable during proofrolling, they should be undercut to firm, unyielding residual soils and backfilled with approved structural fill material.

The following graphic depicts our soil-supported slab recommendations:



1. Drainage Layer Thickness: 4 inches, minimum
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)
3. Subgrade below slabs compacted to 98% maximum dry density per ASTM D698
4. Vapor Barrier or Vapor Retarder – Refer to ACI 302.1R-04 Guide for Concrete Floor and Slab Construction and ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs for recommendations on this issue. Additionally, environmental vapor intrusions considerations should be taken into account by the vapor barrier/vapor retarder material selection and design.

Subgrade Modulus: Provided the Structural Fill and Granular Drainage Layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction, k_1 of 90 pci (lbs per cubic inch). The modulus of subgrade reaction value is based on a 1 foot by 1 foot plate load test basis.

Vapor Barrier: Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. When a vapor barrier is used, special attention should be given to surface curing of the slab to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the Structural Engineer and/or the Architect may choose to eliminate the vapor barrier.

Slab Isolation: Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab such as in a turn down footing/monolithic slab configuration, the slab should be designed with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

4.3 SEISMIC DESIGN

Seismic Site Classification: The North Carolina Building Code (NCBC) requires site classification for seismic design based on the upper 100 feet of a soil profile. Two methods are primarily utilized in classifying sites, namely the shear wave velocity (v_s) method and the Standard Penetration Resistance (N-value) method. The N-value method was used in classifying this site. The seismic site class definitions for the weighted average of SPT N-values in the upper 100 feet of the soil profile are shown in the following table.

SEISMIC SITE CLASSIFICATION			
Site Class	Soil Profile Name	Shear Wave Velocity, V_s , (ft/s)	\bar{N} value (bpf)
A	Hard Rock	$V_s > 5,000$ fps	N/A
B	Rock	$2,500 < V_s \leq 5,000$ fps	N/A
C	Very dense soil and soft rock	$1,200 < V_s \leq 2,500$ fps	>50
D	Stiff Soil Profile	$600 \leq V_s \leq 1,200$ fps	15 to 50
E	Soft Soil Profile	$V_s < 600$ fps	<15

Based on the subsurface findings, a Seismic Site Class of "D" appears appropriate for this site.

Our experience indicates that evaluation of seismic site class in North Carolina using N-values can be overly conservative. If it is determined that a significant advantage could be gained with an improved Site Class, additional site testing could be performed to measure actual shear wave velocities at the site. ECS can provide a proposal for these services upon request.

4.4 SITE DESIGN CONSIDERATIONS

4.4.1 Cut and Fill Slopes

We recommend that permanent cut slopes with less than 15 feet crest height through undisturbed residual soils be constructed at 2H:1V (horizontal: vertical) or flatter. Permanent fill slopes less than 15 feet tall may be constructed using Structural Fill at a slope of 2.5H:1V or flatter. Where fill materials will

be placed to extend an existing slope, the soil subgrade should be scarified, and the new fill benched or keyed into the existing material. A slope of 3H:1V, or flatter, may be desirable to permit establishment of vegetation, safe mowing, and maintenance. Appropriately sized ditches should run above and parallel to the crest of permanent slopes to divert surface runoff away from the slope face. Slope drainpipes should be installed, if necessary, to reduce drainage from flowing down the slope face.

Taller slopes may require flatter inclinations and/or benching incorporated at regular intervals. The surface of cut and fill slopes should be properly compacted. To aid in obtaining proper compaction on the slope face, the fill slopes should be overbuilt with properly compacted Structural Fill and then excavated back to the proposed grades. Permanent slopes should be protected using vegetation or other means to prevent erosion.

A slope stability analysis should be performed on cut and fill slopes exceeding 15 feet in height to determine a slope inclination resulting in a factor of safety greater than 1.3. Upon finalization of site civil drawings, ECS should be contacted to perform slope stability analyses and determine if further exploration is necessary.

The outside face of building foundations and the edges of pavements placed near slopes should be located an appropriate distance from the slope. Buildings or pavements placed at the top of fill slopes should be placed a distance equal to at least 1/3 of the height of the slope behind the crest of the slope. Buildings or pavements near the bottom of a slope should be located at least 1/2 of the height of the slope from the toe of the slope. Slopes with structures located closer than these limits or slopes taller than the height limits indicated should be specifically evaluated by ECS and may require approval from the building code official.

Temporary slopes in confined or open excavations should perform satisfactorily at inclinations of 2H:1V. Excavations should conform to applicable OSHA regulations. Appropriately sized ditches or other appropriate storm water controls should run above and parallel to the crest of permanent slopes to divert surface runoff away from the slope face.

4.4.2 Asphalt Pavement Sections

Design Traffic Loading: Design traffic loadings information was not available at the time of this report. Based on our experience with similar projects, we have based our report on an assumed traffic volume of 7,000 passenger cars per day and 750 tractor trailer trucks per day. Using a growth rate of 2% and a design life of 20 years, this correlates to 6,450,000 ESAL's for heavy-duty pavement. Per the NCDOT Pavement Design Procedure, AASHTO 1993 method, loading from automobiles are considered negligible. The civil engineer, developer, owner, and/or user should verify these assumptions and notify ECS if the actual pavement design traffic loading conditions exceed or are significantly different than what we have assumed.

Subgrade Characteristics: Pavement subgrades soils should consist of firm, adequate, compacted low plasticity soil. Based on the laboratory test results and our experience with similar soils, a design CBR value of 8 is recommended for this project. The pavement design assumes subgrades consist of adequate materials evaluated by ECS and placed and compacted in general accordance with NCDOT guidelines.

Minimum Material Thicknesses: The following minimum pavement sections may be used by the civil engineer to develop the pavement design drawings for the project, provided the civil engineer is in

agreement with ECS' design traffic loading assumptions and estimates. The contractor should bid and construct the project in accordance with the civil design drawings, not the recommendations given in this report. These recommendations are not contract drawings nor specifications. For the purpose of this report, we assume automobile and passenger vehicle parking areas will be considered light-duty pavement. All other areas such as access / loop roads, service drives, truck and RV parking would be considered heavy-duty pavement.

MATERIAL	FLEXIBLE PAVEMENT SECTION	
	Light Duty	Heavy Duty
Asphaltic Concrete Surface Course (S9.5C)*	3 inches	3 inches
Asphaltic Concrete Intermediate Course (I19.0C)	-	4 inches
Asphaltic Concrete Base Course (B25.0C)	-	5 inches
Aggregate Base Course Stone (ABC)	8 inches	-

*Note: Multiple lifts required to achieve recommended thickness.

Based on the recommended minimum asphalt pavement design presented herein, we have calculated a Structural Number (SN) of 2.44 for the light-duty pavement section and a SN of 4.58 for the heavy-duty pavement section. If it is determined that these Structural Numbers are not adequate, ECS should be given the opportunity to revise our pavement design recommendations.

We emphasize that good base course drainage is essential for successful pavement performance. Water buildup in the base course may result in premature pavement failures. The subgrade and pavement should be graded to provide effective runoff to either the outer limits of the paved area or to catch basins so that standing water will not accumulate on the subgrade or pavement.

It is important to note that the design sections do not account for construction traffic loading. An incomplete pavement section (without the final 1½-inches of surface course asphalt) can be used for temporary construction traffic. Please note that damage to asphalt already placed is likely to occur in localized areas, and it should be repaired by removal and replacement with new asphalt at or near the end of construction, prior to placement of the final surface course.

Alternatively, heavy construction vehicles and traffic could be limited to a temporary pavement section consisting of 12 inches of compacted ABC overlying a high-strength woven geotextile (Tencate Mirafi HP270 or equivalent).

It should also be noted that these design recommendations may not satisfy the local municipality or North Carolina Department of Transportation guidelines. Roadways constructed for public use and to be dedicated to the local municipality or State for repair and maintenance must be designed in accordance with the local municipality or State requirements.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

5.1.1 Previous Site Development

Our experience with previously graded sites indicates that unexpected conditions can exist that were not encountered by the soil test borings. Unexpected conditions could include areas of soft or loose fill, debris-laden fill, and other obstructions or conditions. These conditions should be addressed by on-site engineering evaluation by ECS during construction.

5.1.2 Stripping and Grubbing

The subgrade preparation should consist of stripping vegetation, rootmat, topsoil, asphalt, concrete, artificial fill, and other soft or poor-quality materials from the proposed construction areas. ECS should be called on to verify that topsoil and poor-quality surficial materials have been completely removed prior to the placement of engineered fill or construction of structures and pavements.

5.1.3 Proofrolling

After removing poor-quality surface materials, cutting to the proposed grade, and prior to the placement of engineered fill or other construction materials, the exposed subgrade should be examined by the geotechnical engineer or authorized representative. The exposed subgrade should be thoroughly proofrolled with 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 the geotechnical engineer or authorized representative. This procedure is intended to assist in identifying localized yielding materials.

In the event that soft or “pumping” subgrade is identified by the proofrolling, those areas should be marked for repair prior to the placement of subsequent engineered fill or other construction materials. Methods of repair of yielding subgrades, such as undercutting or moisture conditioning or chemical stabilization, should be discussed with the geotechnical engineer to determine the appropriate procedure with regard to the existing conditions causing the instability. Test pits and/or hand auger borings may be excavated to explore the shallow subsurface materials in the area of the instability to help in determining the cause of the observed poor-quality materials and to assist in the evaluation of the appropriate remedial action to stabilize the subgrade.

Based on the soil test borings, some localized undercutting of very soft to soft or very loose near-surface soils may be required. Depending on final design grades, some undercutting of the very soft or very loose soils may be encountered in the vicinity of Borings B-2, B-5, B-7, B-10, and B-11. If site earthwork is performed during the typically cooler, wetter months of the year, additional undercutting in other areas of the site is anticipated due to potentially excessively wet soils. Undercut excavations should be backfilled with properly placed and engineered fill. Use of geotextiles and select granular fill may be recommended by ECS during construction to reduce the required undercut depths and/or aid in stabilization of subgrades. We recommend that poor-quality, soft/loose soils undercut allowance quantities be determined by the design team for inclusion in a classified earthwork contract, and bidders should provide unit prices for the following:

- Excavation of, disposal of (either off-site or on-site, depending on available space and owner's preference), and replacement of poor-quality soils with engineered fill (per cubic yard).
- Excavation of, disposal of (either off-site or on-site, depending on available space and owner's preference), and replacement of poor-quality soils with NCDOT Class II, Type 1 Select Material (per cubic yard).
- Installation of woven geotextile, Mirafi HP270 or equivalent (per square yard).

5.2 EARTHWORK OPERATIONS

5.2.1 Potentially Expansive Soil

High plasticity and moisture sensitive soils are those materials classified as an elastic silt or a high plasticity clay. Moisture sensitive soils will degrade quickly when disturbed by construction traffic and/or with elevated moisture contents.

High plasticity, expansive, moisture sensitive soils (elastic silts with a Plasticity Index (PI) greater than 30 and highly plastic clay soils) should not be used for direct support of slabs, foundations, and pavements. If encountered within proposed structural areas, they should be undercut and replaced with low plasticity engineered fill to a minimum depth of 2 feet below subgrade elevations in slab, foundation, and pavement areas. Upon completion of the undercut, the resulting subgrade soils should be evaluated for stability prior to the placement of engineered fill. Alternatively, chemical (lime) stabilization may be considered to improve/modify high plasticity, moisture sensitive soils in lieu of undercut and replacement. Lime used for stabilization should consist of quicklime or hydrated lime materials.

5.2.2 Excavation Considerations

Excavation Safety: Excavations and slopes should be made and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing and constructing adequate, temporary excavations and slopes and should shore, slope, or bench the sides of the excavations and slopes as required to maintain stability of both the excavation sides and bottom. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

Construction Dewatering: Based on the borings, our experience with groundwater fluctuations on similar sites, and anticipated design grades, most of the temporary excavations are unlikely to encounter groundwater. The contractor should be prepared to remove precipitation or groundwater that may seep into temporary construction excavations using open pumping. Open pumping utilizes submersible sump pumps in pits or trenches dug below the bottom of the excavation and backfilled with No. 57 stone.

Excavability: Based on the assumed excavation depths for mass grading, footings and utilities, in addition to the depth at which weathered rock was encountered in the borings, we anticipate that the majority of the materials to be excavated will be existing artificial fill and natural residual soils, which can be removed with conventional earth excavation equipment such as track-mounted backhoes, loaders, or bulldozers. However, the weathering process in the Piedmont can be erratic and significant variations of the depths of the denser materials can occur in relatively short distances. In some cases, isolated boulders

or thin rock seams may be present in the soil matrix. These isolated boulders or rock seams may require ripping, hammering, or blasting to remove.

5.2.3 Engineered Fill Materials

Product Submittals: At least one week prior to placement of engineered fill, representative bulk samples (about 50 pounds) of on-site and/or 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. Imported materials should be tested prior to being hauled to the site to determine if they meet project specifications.

Engineered Fill Materials: Materials adequate for use as engineered fill should consist of inorganic soils that meet the criteria outlined in Table 1018-1 (Piedmont and Western Area Criteria for Acceptance of Borrow Material) of the NCDOT Standard Specifications. The materials should be free of organic matter and debris and should exhibit a maximum dry density of at least 90 pounds per cubic foot, as determined by a Standard Proctor compaction test ASHTO T99.

On-site soils meeting the criteria in Table 1018-1 of the NCDOT Standard may be used as engineered fill. We anticipate that a majority of the soil encountered within the anticipated excavation depths will be adequate for re-use as engineered fill.

On-site soils used as engineered fill will require careful moisture control in order to achieve compaction and stability. Soils excavated from below the water table will require significant drying to achieve the recommended moisture content and minimum compaction. Soils above the water table may also be relatively dry at the time of construction and require wetting to achieve the recommended moisture content and minimum compaction.

5.2.4 Compaction

Fill Compaction: Engineered fill should be placed in maximum 8-inch loose lifts. In confined areas such as utility trenches, portable compaction equipment and thin lifts of 4 inches to 6 inches may be required to achieve specified degrees of compaction. Engineered fill should be moisture conditioned as necessary to within -3 and +3 % of the soil's optimum moisture content. Moisture conditioning options include spraying and mixing in water to excessively dry soils, scarifying and drying of excessively wet soils, and adding lime to excessively wet soils.

Engineered fill should be compacted with adequate equipment to a dry density of at least 95% of the Standard Proctor maximum dry density (ASTM D698) more than 12 inches below the finish subgrade elevation and to a least 98% in the upper 12 inches.

ECS should be retained to observe and test the placement and compaction of engineered fill.

Fill Placement Considerations: Proper drainage should be maintained during the earthwork phases of construction to reduce the likelihood of water ponding which will degrade the subgrade soils. Exposed soil subgrades should be protected at the end of each working day by sloping to drain and sealing with a smooth-drum roller to limit infiltration of precipitation and surface water. Where fill materials will be placed to widen existing embankment fills, or placed up against sloping ground, the soil subgrade should be scarified, and the new fill benched or keyed into the existing material. Fill material should be placed in thin horizontal lifts.

Moisture Conditioning: The on-site soils can be difficult to work when they are wet. Problems include softening of exposed subgrade soils, excessive rutting or deflection under construction traffic, and the inability to adequately dry and compact wet soil.

Drying and compaction of wet soils is typically difficult during typically cooler, wetter months of the year (typically November through March). During the cooler and wetter periods of the year, delays and additional costs should be anticipated. At these times, reduction of soil moisture may need to be accomplished by a combination of mechanical manipulation and the use of chemical additives, such as lime or cement, in order to lower moisture contents to levels appropriate for compaction. Alternatively, removal and replacement with drier, off-site materials may be necessary.

Subgrade Protection: Measures should also be taken to limit site disturbance, especially from rubber-tired heavy construction equipment, and to control and remove surface water from development areas, including structural and pavement areas. It would be advisable to designate and cover haul roads and construction staging areas to limit the areas of disturbance and to reduce the effects of construction traffic from excessively degrading subgrade soils. Haul roads and construction staging areas should be covered with ABC to protect those subgrades.

5.3 FOUNDATIONS AND FLOOR SLABS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made or shortly thereafter. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 2 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: It will be important to have the geotechnical engineer of record observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are as anticipated.

If very loose sand, very soft to soft silt/clay, or otherwise poor-quality soils are observed at the footing bearing elevations, they should be undercut and removed. Undercut excavations should be backfilled with engineered fill, No. 57 stone wrapped in woven geotextile, flowable fill, or lean concrete ($f'_c \geq 1,000$ psi at 28 days) up to the original design bottom of footing elevation. The footing should be constructed on top of the engineered fill, No. 57 stone wrapped in woven geotextile, hardened flowable fill, or hardened lean concrete.

Slab Subgrade Verification: A representative of ECS should be called on to observe exposed subgrades within the expanded building limits prior to engineered fill placement to verify that adequate subgrade preparation has been achieved. Proofrolling using a drum roller or loaded dump truck should be performed in their presence at that time. Once subgrades have been determined to be firm and unyielding, engineered fill can be placed.

If there will be a significant time lag between the site grading work and final grading of concrete slab areas prior to the placement of the design floor slab section materials, a representative of ECS should be called on to verify the condition of the prepared soil subgrade. Prior to final floor slab section construction, the soil subgrade may require scarification, moisture conditioning, and re-compaction to restore adequate conditions.

5.4 PAVEMENTS

5.4.1 Subgrade Evaluation

The soil subgrade should be smooth-rolled and proofrolled prior to ABC or asphalt placement. Areas that pump, rut, or are otherwise should be re-compacted or undercut and replaced. Based on the borings, we anticipate undercutting of very soft to soft or very loose pavement subgrade soils could be necessary in localized areas of the site. The amount of undercutting will be dependent on design grades and weather conditions at the time of construction.

5.4.2 Aggregate Base Course

To confirm that the specified degree of compaction is being obtained, field compaction testing should be performed in each ABC lift by the geotechnical engineer's representative. We recommend that compaction tests be performed at a minimum frequency of one test per 5,000 square feet per lift in pavement areas.

The early placement of the ABC will minimize the deterioration of the prepared soil subgrades. However, some loss of graded aggregate due to rutting and surface contamination may occur prior to final asphalt or concrete paving. Some infilling and re-grading of the aggregate base course may be required. The ABC should be smooth-rolled and proofrolled prior to asphalt or concrete pavement placement. Areas that pump, rut, or are yielding should be wetted or dried as needed and re-compacted. Alternatively, any weak areas could be undercut and replaced with additional asphalt.

5.4.3 Asphalt Quality Control

We recommend that the asphalt contractor perform quality control procedures and testing per the project specifications to establish the required roller pattern(s). Quality assurance testing should be provided by the geotechnical engineer's representative and should consist of coring the placed asphalt pavement to verify thickness and compaction.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS. If any of this information is inaccurate, either due to our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted immediately in order that we can review the report in light of

the changes and provide additional or alternate recommendations as may be required to reflect the proposed construction.

We recommend that ECS be allowed to review the project's plans and specifications pertaining to our work so that we may ascertain consistency of those plans/specifications with the intent of the geotechnical report.

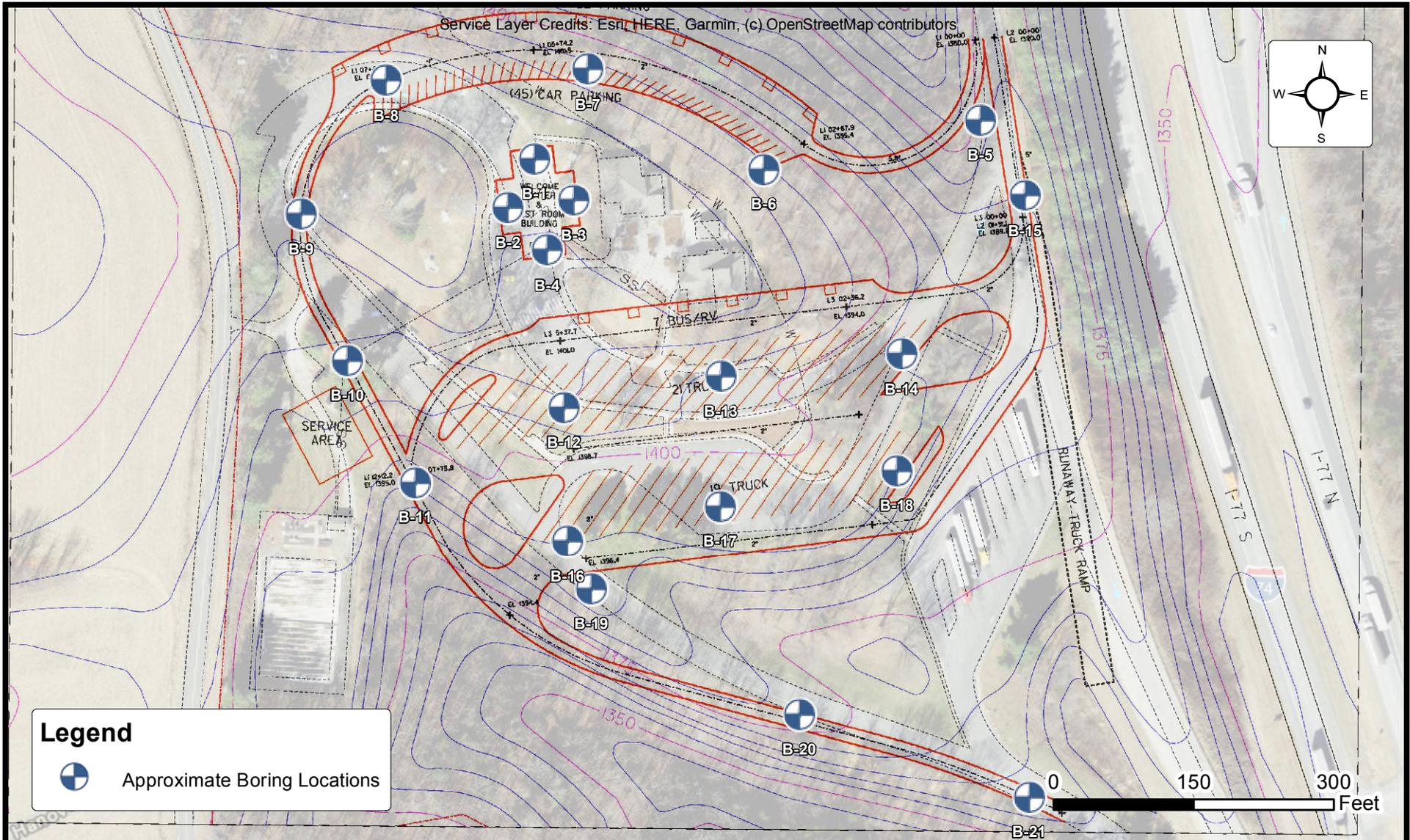
Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of and integral to the geotechnical design recommendation. We recommend that the owner retain these quality assurance services and that ECS be allowed to continue our involvement throughout these critical phases of construction to provide general consultation as issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Diagrams

Site Location Diagram

Boring Location Diagram



BORING LOCATION DIAGRAM I-77 REST AREA RECONSTRUCTION

I-77 SOUTHBOUND, SURRY COUNTY, NORTH CAROLINA
CPL

ENGINEER MJW
SCALE AS NOTED
PROJECT NO. 09:29946
FIGURE 1
DATE 5/16/2023

APPENDIX B – Field Operations

Reference Notes for Boring Logs

Subsurface Exploration Procedure: Standard Penetration Testing (SPT)

Boring Logs B-1 through B-21



REFERENCE NOTES FOR BORING LOGS

MATERIAL ^{1,2}	
	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
	FILL³ 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 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 - 20	15 - 25
Adjective (ex: "Silty")	≥25	≥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	Water Level (WS)(WD) (WS) While Sampling (WD) While Drilling
	SHW	Seasonal High WT
	ACR	After Casing Removal
	SWT	Stabilized Water Table
	DCI	Dry Cave-In
	WCI	Wet Cave-In

¹Classifications and symbols per ASTM D 2488-09 (Visual-Manual Procedure) unless noted otherwise.

²To 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.

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

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

⁵Standard 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.

⁶The 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.

⁷Minor deviation from ASTM D 2488-09 Note 16.

⁸Percentages are estimated to the nearest 5% per ASTM D 2488-09.



SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586 Split-Barrel Sampling

Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

SPT Procedure:

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth
- Recording the number of hammer blows required to drive split-spoon a distance of 18-24 inches (in 3 or 4 Increments of 6 inches each)
- Auger is advanced* and an additional SPT is performed
- One SPT typically performed for every two to five feet. An approximate 1.5 inch diameter soil sample is recovered.



**Drilling Methods May Vary*— The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle									
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)								
BORING NO. B-1		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry								
COLLAR ELEV. 1,418.0 ft		TOTAL DEPTH 19.0 ft		NORTHING 1,027,271		EASTING 1,486,888	24 HR. Dry								
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. King		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1420															
	1,417.0	1.0	5	8	12									1,418.0	0.0
1415	1,414.5	3.5	5	5	5									1,414.0	4.0
	1,412.0	6.0	3	4	7										
1410	1,409.5	8.5	2	3	4										
	1,404.5	13.5	14	17	22									1,405.0	13.0
1400	1,399.5	18.5												1,399.5	18.5
			100/0.5											1,399.0	19.0

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle									
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)								
BORING NO. B-2		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry								
COLLAR ELEV. 1,419.0 ft		TOTAL DEPTH 25.0 ft		NORTHING 1,027,218		EASTING 1,486,860	24 HR. Dry								
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. King		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1420															
	1,418.0	1.0	2	4	6									GROUND SURFACE	0.0
1415	1,415.5	3.5	2	2	2									ARTIFICIAL FILL Stiff, Brown-Red, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel	3.0
	1,413.0	6.0	2	3	4									RESIDUAL Soft to Medium Stiff, Gray-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica	
1410	1,410.5	8.5	2	3	3										
1405	1,405.5	13.5	16	40	47										
1400	1,400.5	18.5	6	2	3									Loose to Very Dense, Gray-Brown-White, Silty Fine to Coarse SAND (A-2-4), with trace mica and rock fragments	13.0
1395	1,395.5	23.5	15	12	14										
														Boring Terminated at Elevation 1,394.0 ft In Residual Silty SAND (A-2-4)	25.0
														Surfical Organic Soil from 0.0-0.6'	

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle										
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)									
BORING NO. B-3		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry									
COLLAR ELEV. 1,418.0 ft		TOTAL DEPTH 23.8 ft		NORTHING 1,027,227		EASTING 1,486,930	24 HR. Dry									
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER W. King		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1420																
	1,417.0	1.0	3	4	5										1,418.0	GROUND SURFACE 0.0
1415	1,414.5	3.5	6	4	4											RESIDUAL Medium Stiff to Very Stiff, Red-Brown-Gray, Fine to Coarse Sandy SILT (A-4(1)), with trace mica and rock fragments
	1,412.0	6.0	2	3	3											
1410	1,409.5	8.5	10	12	8											
	1,404.5	13.5	3	3	3										1,405.0	13.0
1405	1,399.5	18.5	9	16	20											Loose to Dense, Gray-Brown-White, Silty Fine to Coarse SAND (A-2-4(0)), with trace mica
1400	1,394.5	23.5														
1395	1,394.5	23.5													1,394.5	23.5
															1,394.2	23.8
																WEATHERED ROCK Gray-Brown (GNEISS) Boring Terminated at Elevation 1,394.2 ft In Weathered Rock (GNEISS) Surficial Organic Soil from 0.0-0.4'

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle											
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)										
BORING NO. B-4		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry										
COLLAR ELEV. 1,415.0 ft		TOTAL DEPTH 22.0 ft		NORTHING 1,027,173		EASTING 1,486,902	24 HR. Dry										
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER W. King		START DATE 03/23/23		COMP. DATE 03/23/23		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)	DEPTH (ft)
1415															1,415.0	0.0	GROUND SURFACE
	1,414.0	1.0	6	7	8												RESIDUAL Medium Stiff to Hard, Brown-Red-Gray, Fine to Coarse Sandy SILT (A-4), with trace mica
	1,411.5	3.5	3	3	3												
1410	1,409.0	6.0	5	6	6												
	1,406.5	8.5	2	4	6												
1405																	
	1,401.5	13.5	8	12	13												
1400																	
	1,396.5	18.5	22	20	13												
1395																	
	1,393.0	22.0	60/0.0												1,393.0	22.0	

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle											
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)										
BORING NO. B-5		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry										
COLLAR ELEV. 1,375.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 1,027,317		EASTING 1,487,364	24 HR. Dry										
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER W. King		START DATE 03/21/23		COMP. DATE 03/21/23		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
1375															1,375.0	GROUND SURFACE	0.0
	1,374.0	1.0	1	1	1									ARTIFICIAL FILL Soft, Red-Brown, Fine Sandy SILT (A-4(2)), with trace organics and gravel			
	1,371.5	3.5	4	1	1						M						
1370	1,369.0	6.0	2	1	2						M						
	1,366.5	8.5	9	6	16						M						
1365														1,366.0	9.0	RESIDUAL Medium Dense, Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with trace rock fragments Boring Terminated at Elevation 1,365.0 ft in Residual Silty SAND (A-2-4) Surficial Organic Soil from 0.0-0.6'	
													1,365.0	10.0			

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle											
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)										
BORING NO. B-7		STATION N/A		OFFSET N/A		ALIGNMENT N/A											
COLLAR ELEV. 1,407.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 1,027,367		EASTING 1,486,944											
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER W. King		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)	
1410																	
															1,407.0	GROUND SURFACE	0.0
1405	1,406.0	1.0															
	1,403.5	3.5	1	2	2								M	RESIDUAL Soft to Very Stiff, Brown-Red, Fine to Coarse Sandy SILT (A-4(0)), with trace mica and rock fragments			
	1,401.0	6.0	4	7	12								M				
1400	1,401.0	6.0	5	3	1								M				
	1,398.5	8.5	3	4	9								M			1,397.0	10.0
																Boring Terminated at Elevation 1,397.0 ft In Residual Sandy SILT (A-4)	
																Surfical Organic Soil from 0.0-0.3'	
																Bulk Sample Obtained from 1.0' - 5.0'	

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle									
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)								
BORING NO. B-8		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry								
COLLAR ELEV. 1,418.0 ft		TOTAL DEPTH 19.6 ft		NORTHING 1,027,353		EASTING 1,486,728	24 HR. Dry								
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. King		START DATE 03/23/23		COMP. DATE 03/23/23		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1420															
	1,417.0	1.0	7	7	9									GROUND SURFACE	0.0
1415	1,414.5	3.5	4	5	6									ROADWAY EMBANKMENT Asphalt (0.3'), Stone Base (0.7')	1.0
	1,412.0	6.0	2	2	5									RESIDUAL Very Stiff, Brown-Red, Clayey SILT (A-5), with trace rock fragments	3.0
1410	1,409.5	8.5	6	8	12									Medium Stiff to Stiff, Red, Fine to Coarse Sandy CLAY (A-6(8))	8.0
	1,404.5	13.5	4	5	6									Stiff to Very Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4), with trace rock fragments	19.0
1400	1,399.5	18.5	20	26	74/0.1									WEATHERED ROCK Gray-Brown (GNEISS)	19.6
														Boring Terminated at Elevation 1,398.4 ft in Weathered Rock (GNEISS)	

NCDOT BORE SINGLE - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle															
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)														
BORING NO. B-9		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry														
COLLAR ELEV. 1,419.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 1,027,209		EASTING 1,486,639	24 HR. Dry														
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic															
DRILLER W. King		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A															
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)						
			0.5ft	0.5ft	0.5ft	0	25	50	75	100											
1420																					
	1,418.0	1.0	5	5	6									1,419.0	GROUND SURFACE	0.0					
1415	1,415.5	3.5	4	4	5						M								RESIDUAL Stiff, Red-Brown-Gray, Fine to Coarse Sandy SILT (A-4), with trace mica		
	1,413.0	6.0	2	8	9						M								1,413.5	Medium Dense, Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with trace mica	5.5
1410	1,410.5	8.5	5	5	7						M								1,409.0	Boring Terminated at Elevation 1,409.0 ft In Residual Silty SAND (A-2-4) Surfical Organic Soil from 0.0-0.5'	10.0

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle										
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)									
BORING NO. B-10		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry									
COLLAR ELEV. 1,408.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 1,027,053		EASTING 1,486,690	24 HR. Dry									
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER W. King		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1410																
	1,407.0	1.0													1,408.0	GROUND SURFACE 0.0
1405	1,404.5	3.5	3	3	3	•	•	•	•	•	•	•	•	M	1,406.0	ARTIFICIAL FILL Medium Stiff, Brown-Red, Clayey SILT (A-5) 2.0
	1,402.0	6.0	2	2	2	•	•	•	•	•	•	•	•	M		RESIDUAL Soft to Medium Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica
1400	1,399.5	8.5	2	2	2	•	•	•	•	•	•	•	•	M		
			3	3	4	•	•	•	•	•	•	•	•	M	1,398.0	Boring Terminated at Elevation 1,398.0 ft In Residual Sandy SILT (A-4)
																Surfical Organic Soil from 0.0-0.4'

NCDOT BORE SINGLE 09-28946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle												
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)											
BORING NO. B-11		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry											
COLLAR ELEV. 1,392.0 ft		TOTAL DEPTH 30.0 ft		NORTHING 1,026,923		EASTING 1,486,764	24 HR. Dry											
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER W. King		START DATE 03/22/23		COMP. DATE 03/22/23		SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)			
1395															1,392.0	GROUND SURFACE	0.0	
1390	1,391.0	1.0	3	3	5								M	X	ARTIFICIAL FILL			
	1,388.5	3.5	WOH	WOH	WOH								M			1,389.0	Medium Stiff, Black-Brown, Fine to Coarse Sandy SILT (A-4), with trace gravel	3.0
1385	1,386.0	6.0	2	1	2								M	X	Very Soft, Red-Brown, Clayey SILT (A-5), with trace gravel		5.5	
	1,383.5	8.5	1	1	2								M			1,386.5	Soft, Black-Red, Fine to Coarse Sandy SILT (A-4), with little organics and trace mica	
1380	1,378.5	13.5	7	8	7								M	X	RESIDUAL		13.0	
	1,373.5	18.5	3	4	6								M			1,379.0	Loose to Medium Dense, Red, Silty Fine to Coarse SAND (A-2-4)	
1370	1,368.5	23.5	3	4	4								M	X	Medium Stiff, Brown-Red, Fine to Coarse Sandy SILT (A-4), with trace mica		23.0	
	1,363.5	28.5	6	8	8								M			1,369.0	Medium Dense, Brown-Black-White, Silty Fine to Coarse SAND (A-2-4)	28.0
															1,362.0	Boring Terminated at Elevation 1,362.0 ft In Residual Silty SAND (A-2-4)		30.0
																Surfical Organic Soil from 0.0-0.7'		

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle									
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)								
BORING NO. B-12		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry								
COLLAR ELEV. 1,408.0 ft		TOTAL DEPTH 15.0 ft		NORTHING 1,027,005		EASTING 1,486,922	24 HR. Dry								
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER W. King		START DATE 03/21/23		COMP. DATE 03/21/23		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)
1410														1,408.0	0.0
	1,407.0	1.0	4	4	6	10						M	ARTIFICIAL FILL		
1405	1,404.5	3.5	4	5	7	12						M	Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel	3.0	
	1,402.0	6.0	3	4	3	7						M	RESIDUAL Medium Stiff to Stiff, Red, Fine to Coarse Sandy CLAY (A-6(4))		
1400	1,399.5	8.5	3	4	3	7						M	Loose, Red-Orange, Silty Fine to Coarse SAND (A-2-4)	8.0	
	1,394.5	13.5	4	7	8	15						M	Stiff, Red-Brown-Gray, Fine to Coarse Sandy SILT (A-4), with trace mica	13.0	
													Boring Terminated at Elevation 1,393.0 ft In Residual Sandy SILT (A-4)	15.0	
													Surfical Organic Soil from 0.0-0.3'		

NCDOT BORE SINGLE 09-29946 - I-77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle										
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)									
BORING NO. B-13		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry									
COLLAR ELEV. 1,404.0 ft		TOTAL DEPTH 13.0 ft		NORTHING 1,027,040		EASTING 1,487,090	24 HR. Dry									
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER W. King		START DATE 03/23/23		COMP. DATE 03/23/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)
1405																
	1,403.0	1.0	10	12	8										1,404.0	0.0
	1,400.5	3.5	10	6	2										1,403.0	1.0
1400															1,401.0	3.0
	1,398.0	6.0	2	3	4											
1395																
	1,395.5	8.5	4	4	4											
	1,391.0	13.0	60/0.0												1,391.0	13.0

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle										
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)									
BORING NO. B-15		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry									
COLLAR ELEV. 1,384.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 1,027,237		EASTING 1,487,413	24 HR. Dry									
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER W. King		START DATE 03/21/23		COMP. DATE 03/21/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)	
1385														1,384.0	GROUND SURFACE	0.0
	1,383.0	1.0	5	5	5	•	•	•	•	•		M	ROADWAY EMBANKMENT Stiff, Red-Brown-Gray, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel			
1380	1,380.5	3.5	3	4	8	•	•	•	•	•		M				
	1,378.0	6.0	4	4	6	•	•	•	•	•		M				
1375	1,375.5	8.5	8	8	16	•	•	•	•	•		M				
														1,376.0	RESIDUAL	8.0
														1,374.0	Medium Dense, Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica Boring Terminated at Elevation 1,374.0 ft in Residual Silty SAND (A-2-4)	10.0
															Surfical Organic Soil from 0.0-0.4'	

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle													
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)												
BORING NO. B-16		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry												
COLLAR ELEV. 1,395.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 1,026,862		EASTING 1,486,927	24 HR. Dry												
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic													
DRILLER W. King		START DATE 03/21/23		COMP. DATE 03/21/23		SURFACE WATER DEPTH N/A													
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)			
1395															1,395.0	GROUND SURFACE	0.0		
	1,394.0	1.0	4	5	6									ROADWAY EMBANKMENT Stiff to Very Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica					
	1,391.5	3.5	6	8	12														
1390	1,389.0	6.0	3	4	6														
	1,386.5	8.5	5	7	8														
1385														1,387.0	RESIDUAL	8.0			
														1,385.0	Stiff, Red, Fine to Coarse Sandy CLAY (A-6)	10.0			
															Boring Terminated at Elevation 1,385.0 ft In Residual Sandy CLAY (A-6)				
															Surfical Organic Soil from 0.0-0.5'				

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle											
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)										
BORING NO. B-18		STATION N/A		OFFSET N/A		ALIGNMENT N/A	0 HR. Dry										
COLLAR ELEV. 1,395.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 1,026,941		EASTING 1,487,279	24 HR. Dry										
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER W. King		START DATE 03/21/23		COMP. DATE 03/21/23		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)	
1395															1,395.0	GROUND SURFACE	0.0
	1,394.0	1.0	2	3	4						M		RESIDUAL Medium Stiff to Stiff, Gray-Red-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica				
	1,391.5	3.5	4	5	9						M						
1390	1,389.0	6.0	3	3	3						M						
	1,386.5	8.5	5	6	7						M						
1385														1,385.0	10.0	Boring Terminated at Elevation 1,385.0 ft In Residual Sandy SILT (A-4) Surficial Organic Soil from 0.0-0.4'	

GEOTECHNICAL BORING REPORT

BORE LOG

WBS N/A		TIP N/A		COUNTY SURRY		GEOLOGIST A. Suttle											
SITE DESCRIPTION Surry County Rest Area/Welcome Center on I-77							GROUND WTR (ft)										
BORING NO. B-19		STATION N/A		OFFSET N/A		ALIGNMENT N/A											
COLLAR ELEV. 1,393.0 ft		TOTAL DEPTH 20.0 ft		NORTHING 1,026,811		EASTING 1,486,953											
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER W. King		START DATE 03/23/23		COMP. DATE 03/23/23		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)	
1395																	
	1,392.0	1.0	3	4	5	•	•	•	•	•	•	•	•		1,393.0	GROUND SURFACE	0.0
1390	1,389.5	3.5	2	4	4	•	•	•	•	•	•	•	•	M	ROADWAY EMBANKMENT Medium Stiff to Stiff, Red-Brown-Gray, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel		
	1,387.0	6.0	5	6	7	•	•	•	•	•	•	•	•	M			
1385	1,384.5	8.5	3	6	7	•	•	•	•	•	•	•	•	M			
						•	•	•	•	•	•	•	•	M			
1380	1,379.5	13.5	3	4	5	•	•	•	•	•	•	•	•	M			
						•	•	•	•	•	•	•	•	M			
1375	1,374.5	18.5	4	5	5	•	•	•	•	•	•	•	•	M	1,373.0	Boring Terminated at Elevation 1,373.0 ft In Roadway Embankment Sandy SILT (A-4)	20.0
																Surfical Organic Soil from 0.0-0.6'	

NCDOT BORE SINGLE 09-29946 - I77 REST AREA RECONSTRUCTION.GPJ NC_DOT.GDT 5/16/23

APPENDIX C – Laboratory Testing

Laboratory Testing Summary

Sample Location	Sample Number	Depth (')	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-01	S-2	3.5-5.0	12.2	A-4	31	NP		43.6					
B-01	S-5	13.5-15.0	5.7	A-2-4	28	NP		19.2					
B-03	S-1	1.0-2.5	13.7	A-4	32	24	8	41.9					
B-03	S-5	13.5-15.0	22.6	A-2-4	29	NP		30.1					
B-05	S-1	1.0-2.5	19.5	A-4	31	22	9	46.8					
B-07	BULK-1	1.0-5.0	13.5	A-4	31	28	3	37.7	107.1	17.7	7	9.2	
B-08	S-3	6.0-7.5	21.6	A-6	40	24	16	61.8					
B-12	S-3	6.0-7.5	16.6	A-6	34	22	12	51.9					
B-13	BULK-2	1.0-5.0	10.2	A-2-4	28	26	2	34.4	113.8	13.3	10.2	13	
B-17	S-1	1.0-2.5	14.5	A-4	29	23	6	38.8					

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: I-77 Rest Area Reconstruction
Client: CPL

Project No.: 09:29946
Date Reported: May 16, 2023

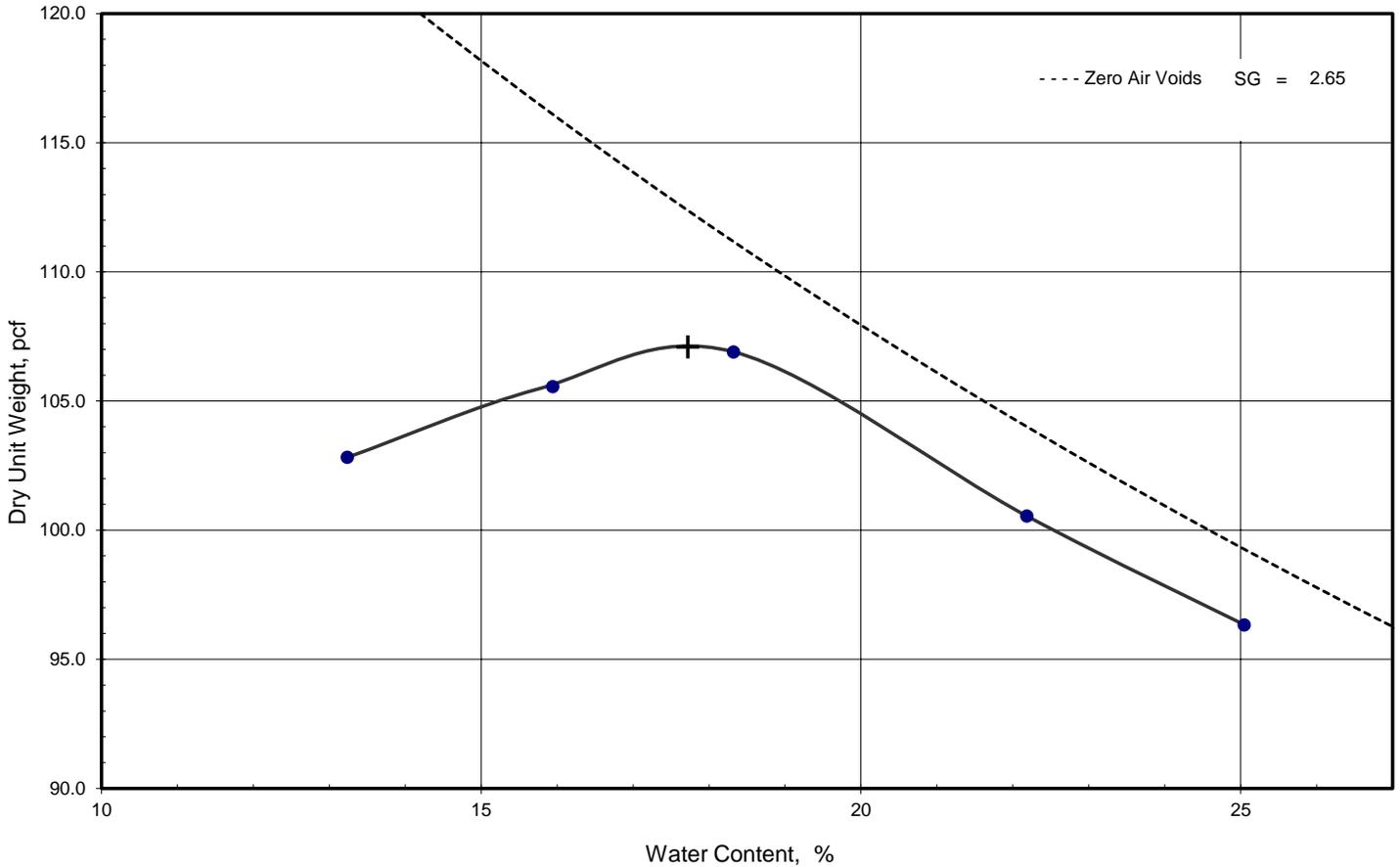


Office / Lab
ECS Southeast LLP - Charlotte

Address
1812 Center Park Drive
Suite D
Charlotte, NC 28217

Office Number / Fax
(704)525-5152
(704)357-0023

Laboratory Compaction Characteristics of Soil Using Standard Effort



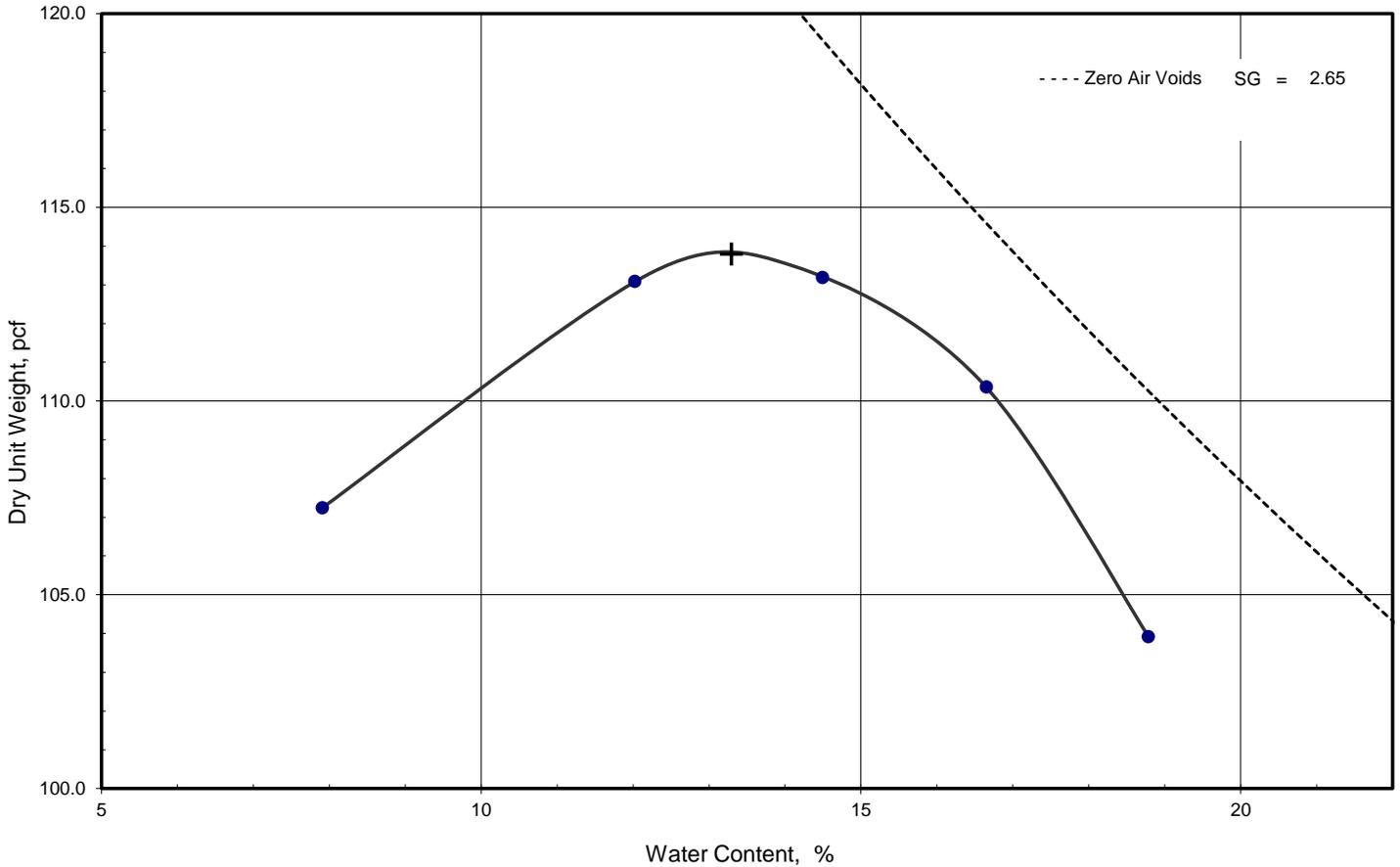
Optimum Moisture Content	17.7	%	Preparation	ASTM moist preparation
Maximum Dry Unit Weight	107.1	pcf	Type of rammer	Manual - 5.5lbf (24.5N)
Cumulative material retained on:			Test Specification / Method	ASTM D698-12e2-method A
3/4 in. sieve		%	Specific gravity - D854 water pycnometer	2.65 Historical
3/8 in. sieve		%	Coarse Aggregate Specific Gravity -	
#4 sieve		%		

Soil Description	Nat. Moist. %	Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Red-Brown Sandy SILT (A-4)	13.5	31	3	37.7		A-4

Project: Surry County Rest Area/Welcome Center on I-77 Client: CPL Architects Sample / Source B-07 Test Reference/No.:	Project No.: 09:29946 Depth (ft.): 1.0 - 5.0 Sample No.: BULK-1 Date Reported: 5/2/2023
---	--

	Office / Lab	Address	Office Number / Fax
	ECS Southeast LLP - Charlotte	1812 Center Park Drive Suite D Charlotte, NC 28217	(704)525-5152 (704)357-0023

Laboratory Compaction Characteristics of Soil Using Standard Effort



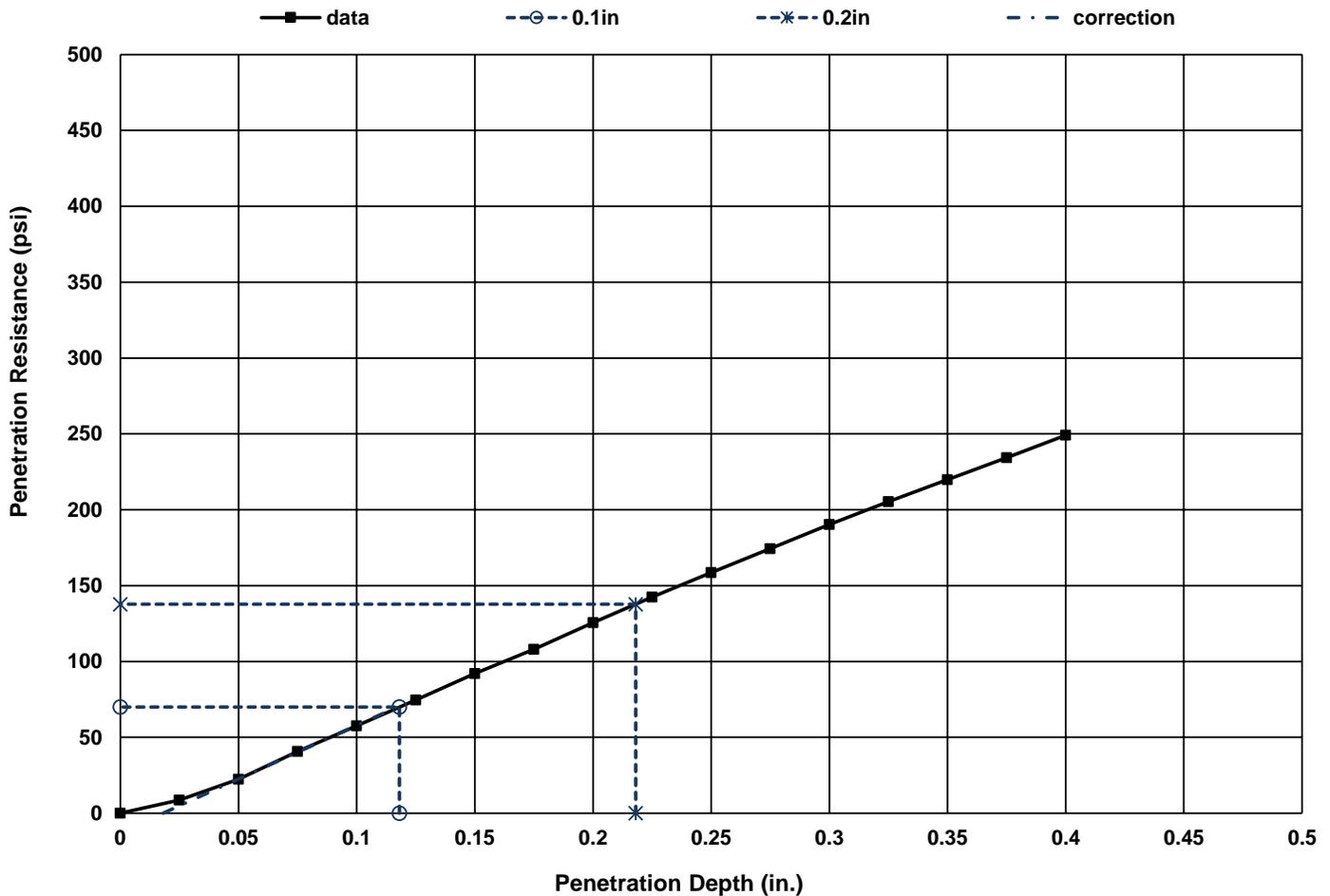
Optimum Moisture Content	13.3	%	Preparation	ASTM moist preparation
Maximum Dry Unit Weight	113.8	pcf	Type of rammer	Manual - 5.5lbf (24.5N)
Cumulative material retained on:			Test Specification / Method	ASTM D698-12e2-method A
	3/4 in. sieve	%	Specific gravity - D854 water pycnometer	2.65 Historical
	3/8 in. sieve	%	Coarse Aggregate Specific Gravity -	
	#4 sieve	%		

Soil Description	Nat. Moist. %	Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Orange-Brown Silty SAND (A-2-4)	10.2	28	2	34.4		A-2-4

Project: Surry County Rest Area/Welcome Center on I-77 Client: CPL Architects Sample / Source B-13 Test Reference/No.:	Project No.: 09:29946 Depth (ft.): 1.0 - 5.0 Sample No.: BULK-2 Date Reported: 5/2/2023
---	--

	Office / Lab	Address	Office Number / Fax
	ECS Southeast LLP - Charlotte	1812 Center Park Drive Suite D Charlotte, NC 28217	(704)525-5152 (704)357-0023

California Bearing Ratios (CBR) of Laboratory-Compacted Soils



TEST RESULTS (ASTM D1883-16)

Molded			Soaked			CBR (%)		Linearty Correction (in.)	Surcharge (lbs.)	Swell (%)			
Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.1 in.	0.2 in.						
104.1	97.2	18.2	101.4	94.7	21.0	7.0	9.2	0.02	10	0.28			
Material Description Red-Brown Sandy SILT (A-4)						AASHTO	USCS	MAX. Dens. (pcf)	Optimum Moisture (%)	LL	PI	% Fines	% Gravel
						A-4		107.1	17.7	31	3	37.7	6.3

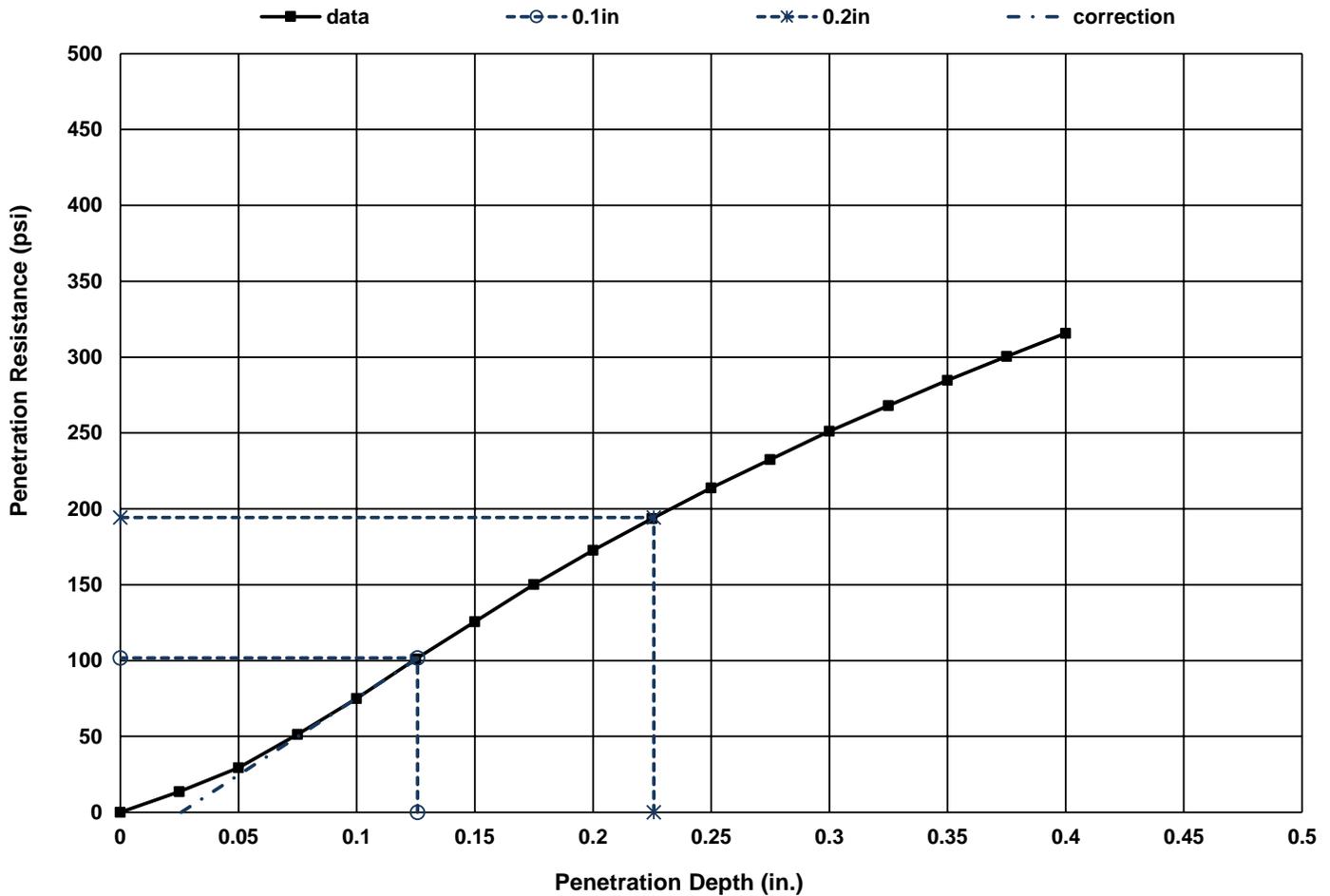
Project: Surry County Rest Area/Welcome Center on I-77
 Client: CPL Architects
 Sample / Source B-07
 Test Reference/No.: 1

Project No.: 09:29946
 Depth (ft.): 1.0 - 5.0
 Sample No.: BULK-1
 Date Reported: 5/2/2023



Office / Lab	Address	Office Number / Fax
ECS Southeast LLP - Charlotte	1812 Center Park Drive Suite D Charlotte, NC 28217	(704)525-5152 (704)357-0023

California Bearing Ratios (CBR) of Laboratory-Compacted Soils



TEST RESULTS (ASTM D1883-16)

Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Swell (%)			
Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.1 in.	0.2 in.						
112.4	99.2	13.8	110.1	97.2	15.8	10.2	13.0	0.03	10	0.38			
Material Description Orange-Brown Silty SAND (A-2-4)						AASHTO	USCS	MAX. Dens. (pcf)	Optimum Moisture (%)	LL	PI	% Fines	% Gravel
						A-2-4		113.3	13.8	28	2	34.4	8.5

Project: Surry County Rest Area/Welcome Center on I-77
 Client: CPL Architects
 Sample / Source B-13
 Test Reference/No.: 1

Project No.: 09:29946
 Depth (ft.): 1.0 - 5.0
 Sample No.: BULK-2
 Date Reported: 5/2/2023



Office / Lab
 ECS Southeast LLP - Charlotte

Address
 1812 Center Park Drive
 Suite D
 Charlotte, NC 28217

Office Number / Fax
 (704)525-5152
 (704)357-0023

APPENDIX D – Supplemental Documents

GBA Important Information About This Geotechnical Engineering Report

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

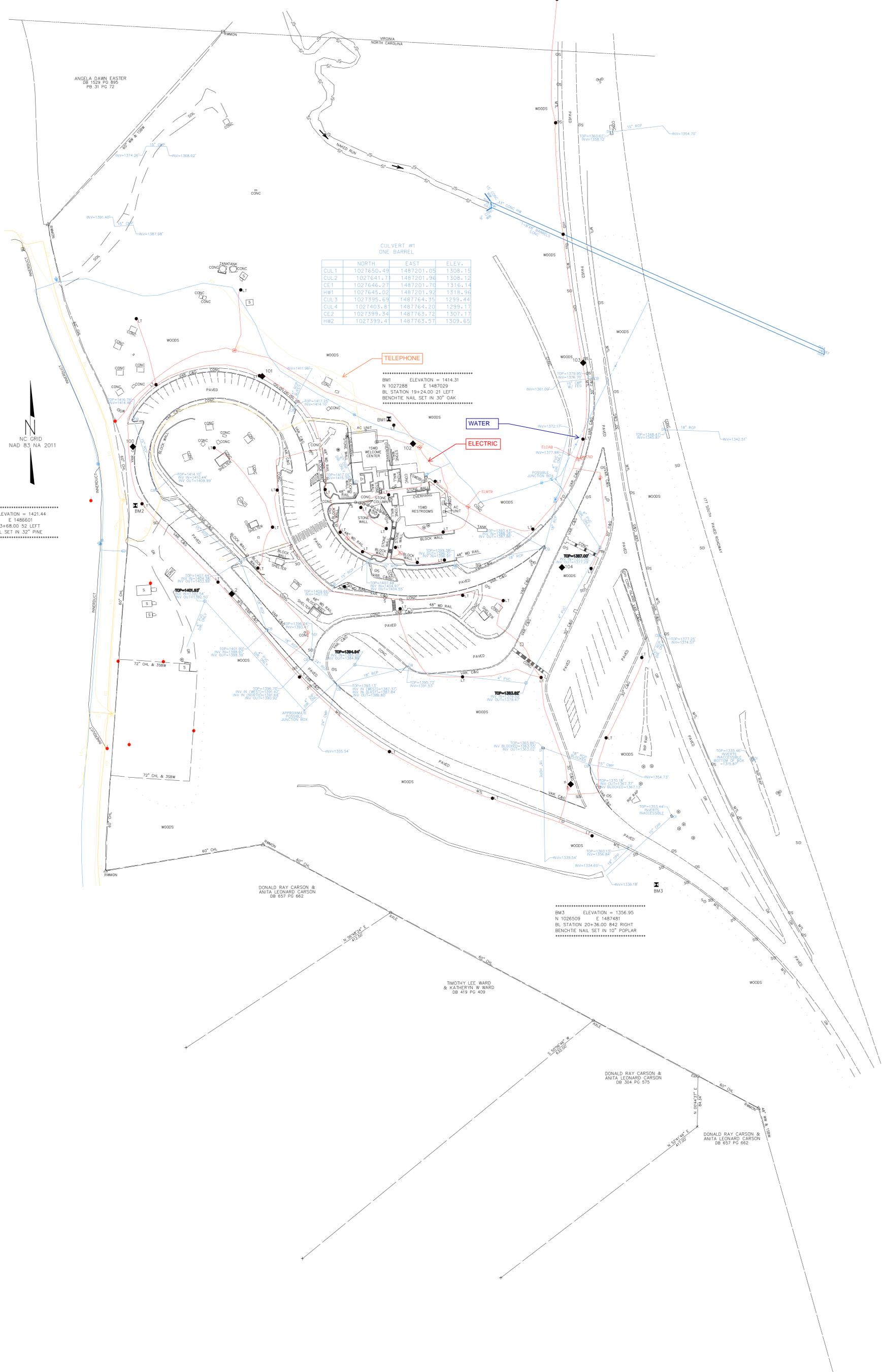
Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



Telephone: 301/565-2733

e-mail: info@geoprofessional.org www.geoprofessional.org



ANGELA DANN EASTER
DB 1529 PG 895
PB 31 PG 72

CULVERT #1
ONE BARREL

	NORTH	EAST	ELEV.
CUL 1	1027650.49	1487201.05	1308.15
CUL 2	1027641.71	1487201.96	1308.12
CE 1	1027646.27	1487201.70	1316.14
HW 1	1027645.02	1487201.92	1318.96
CUL 3	1027395.69	1487764.35	1299.44
CUL 4	1027403.81	1487764.20	1299.17
CE 2	1027399.34	1487763.72	1307.17
HW 2	1027399.41	1487763.57	1309.65



.....
BM2 ELEVATION = 1421.44
N 1027143 E 1486601
BL STATION 13+68.00 52 LEFT
BENCHMARK SET IN 32" PINE
.....

TELEPHONE
.....
BM1 ELEVATION = 1414.31
N 1027288 E 1487029
BL STATION 19+24.00 21 LEFT
BENCHMARK SET IN 30" OAK
.....

WATER
ELECTRIC

DONALD RAY CARSON &
ANITA LEONARD CARSON
DB 657 PG 662

.....
BM3 ELEVATION = 1356.95
N 1026909 E 1487481
BL STATION 20+36.00 842 RIGHT
BENCHMARK SET IN 10" POPLAR
.....

TIMOTHY LEE WARD
& KATHERYN W WARD
DB 418 PG 409

DONALD RAY CARSON &
ANITA LEONARD CARSON
DB 304 PG 575

DONALD RAY CARSON &
ANITA LEONARD CARSON
DB 657 PG 662

LINE A	
A-2 PI = 9 + 96.02 Δ = 16° 31' 45" LT D = 2' 00" T = 416.12' L = 326.46' R = 2,864.73' MAX. SE = 0.04"	A-3 PI = 19 + 45.56 Δ = 110° 24' RT D = 18' 00" T = 457.99' L = 613.31' R = 318.31' MAX. SE = 0.04"
A-4 PI = 22 + 20.60 Δ = 71° 36' RT D = 35.8099' T = 119.70' L = 205.53' R = 160.00' MAX. SE = 0.04"	A-5 PI = 25 + 68.99 Δ = 112° 00' LT D = 40.9256' T = 207.56' L = 273.67' R = 140.00' MAX. SE = 0.04"
A-6 PI = 27 + 86.50 Δ = 108° 00' LT D = 52.0871' T = 151.40' L = 207.35' R = 110.00' MAX. SE = 0.04"	A-7 PI = 30 + 01.00 Δ = 30° 01' 30" LT D = 8' 00" T = 192.07' L = 375.37' R = 76.20' MAX. SE = 0.04"
A-8 PI = 33 + 64.19 Δ = 30° 01' 30" LT D = 8' 00" T = 192.07' L = 375.37' R = 76.20' MAX. SE = 0.04"	A-9 PI = 41 + 11.28 Δ = 47° 22' RT D = 6' 00" T = 418.85' L = 789.44' R = 954.93' MAX. SE = 0.08"
A-10 PI = 45 + 41.92 Δ = 5° 37' 30" RT Ls = 150.00' Δ = 1° 07' 29.4" L = 4° 30' 00.6" T = 90.05' Ts = 60.05'	A-11 PI = 46 + 46.87 Δ = 0° 27' RT D = 1' 30" T = 15.00' L = 30.00' R = 3,819.72'

LINE B		LINE C	
B-1 PI = 67.45 Δ = 34° 00' RT D = 30.557' T = 58.09' L = 712.75' R = 190.00' MAX. SE = 0.04"	B-2 PI = 7 + 21.36 Δ = 89° 32' 53.8" LT D = 57.2958' T = 99.23' L = 156.23' R = 100.00' MAX. SE = 0.04"	C-1 PI = 3 + 34.64 Δ = 60° 00' RT D = 95.4930' T = 34.64' L = 62.83' R = 60.00' MAX. SE = 0.04"	C-2 PI = 7 + 10.46 Δ = 133° 22' 39.7" LT D = 95.4930' T = 139.24' L = 139.67' R = 60.00' MAX. SE = 0.04"

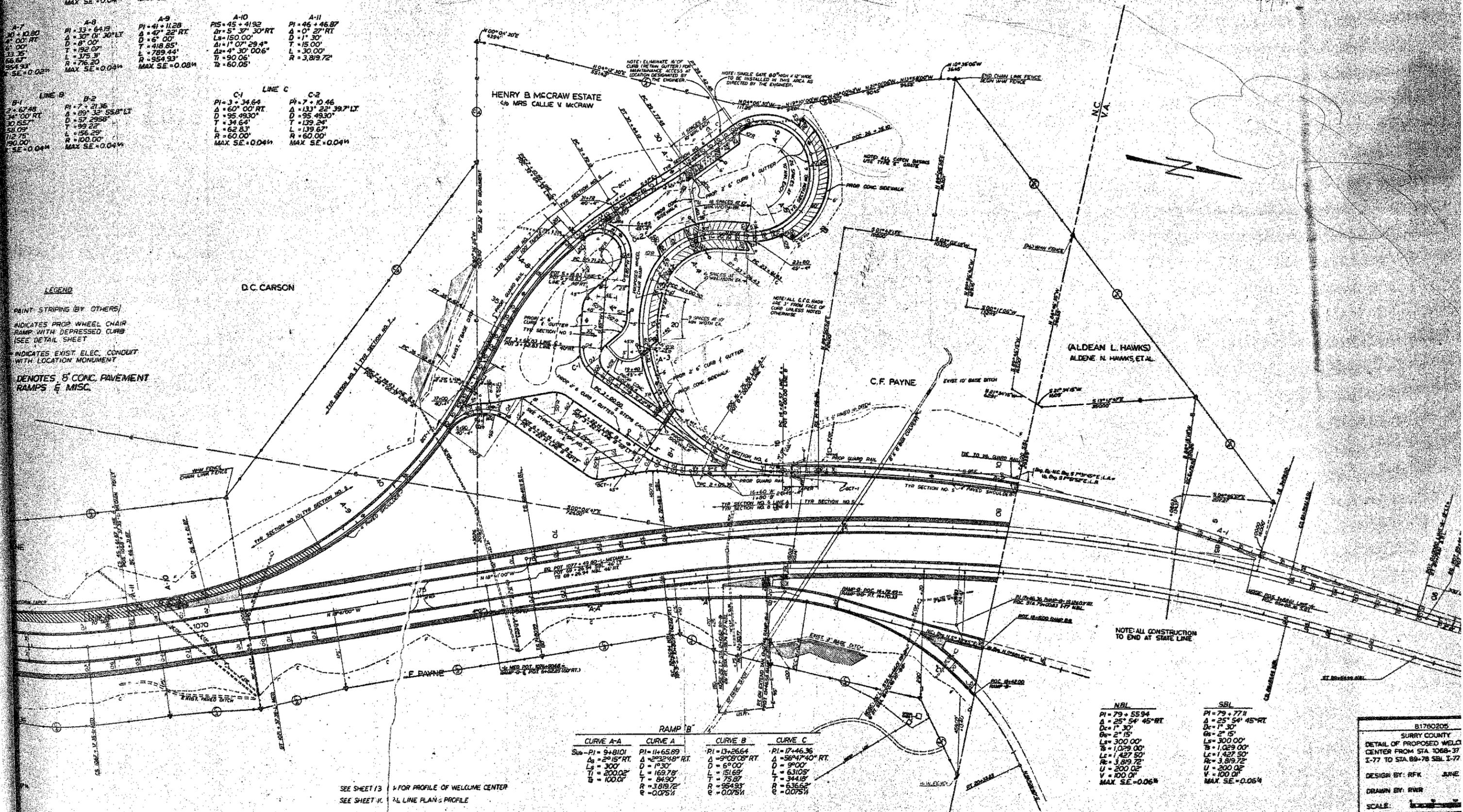
LEGEND

PAINT STRIPING BY OTHERS

INDICATES PROP. WHEEL CHAIR RAMP WITH DEPRESSED CURB (SEE DETAIL SHEET)

INDICATES EXIST. ELEC. CONDUIT WITH LOCATION MONUMENT

DENOTES 5' CONC. PAVEMENT RAMP & MISC.



SEE SHEET 13 FOR PROFILE OF WELCOME CENTER
 SEE SHEET 14 FOR LINE PLAN & PROFILE

RAMP B			
CURVE A-A	CURVE A	CURVE B	CURVE C
Sub-PI = 9+81.01 Δ = 2° 15' RT Ls = 300' T = 200.02' Ts = 100.00'	PI = 14+65.89 Δ = 2° 32' 48" RT D = 1° 30" L = 169.75' T = 84.90' R = 3,819.72' e = 0.075H	PI = 13+26.64 Δ = 9° 08' 05" RT D = 6° 00" L = 151.63' T = 75.87' R = 584.93' e = 0.075H	PI = 17+46.36 Δ = 56° 47' 40" RT D = 9° 00" L = 631.05' T = 344.18' R = 636.62' e = 0.075H

NBL	SBL
PI = 79 + 55.94 Δ = 25° 54' 45" RT D = 1° 30" Gs = 2' 15" Ls = 300.00' Ts = 1,029.00' L = 1,427.50' R = 3,819.72' U = 200.02' V = 100.01' MAX. SE = 0.06"	PI = 79 + 77.11 Δ = 25° 54' 45" RT D = 1° 30" Gs = 2' 15" Ls = 300.00' Ts = 1,029.00' L = 1,427.50' R = 3,819.72' U = 200.02' V = 100.01' MAX. SE = 0.06"

B1760205
 SURRY COUNTY
 DETAIL OF PROPOSED WELCOME CENTER FROM STA. 1068+37 TO STA. 89+78 SBL I-77
 DESIGN BY: RPK JUNE
 DRAWN BY: RWR
 SCALE: 1" = 40'