

ADVERTISEMENT FOR BIDS

Sealed proposals will be received in the Office of the Procurement Manager, Greenville Utilities Commission, 401 S. Greene Street, Greenville, North Carolina 27834 until 3:00 PM (EDST) on August 22, 2024 and immediately thereafter publicly opened and read for the furnishing of Precast Concrete Relay Control House for the Hudson Substation.

Instructions for submitting bids and complete specifications will be available in the Office of the Procurement Manager, Greenville Utilities Commission, 401 S. Greene Street, Greenville, North Carolina during regular office hours, which are 8:30AM – 5:00PM Monday through Friday.

Greenville Utilities Commission reserves the right to reject any or all bids. **Late bids will not be considered.**

SECTION I
GENERAL INSTRUCTIONS FOR FORMAL BIDS
RELATED TO THE PURCHASE OF APPARATUS, SUPPLIES,
MATERIALS, AND EQUIPMENT

1.0 NOTICE TO BIDDERS

Sealed bids, subject to the conditions made a part hereof, will be received in the Office of the Procurement Manager, Greenville Utilities Commission, 401 S. Greene Street, Greenville, North Carolina 27834 until 3:00 PM (EDST) on August 22, 2024, the day of opening. **Bids submitted in a fax or e-mail in response to this Invitation for Bids will not be acceptable. Late Bids will not be considered.**

2.0 STANDARD FORMS REQUIRED

Each bidder must submit a proposal on the enclosed bid forms. **The bid must be signed by an authorized official of the firm. Return only the attached Proposal Form. Do not return the Advertisement for Bids, Instructions to Bidders or Specifications.**

3.0 PREPARATION OF BID

Bids must be in sealed envelopes clearly marked on the outside with the name of the bid and the bid opening date and time. Bid shall be addressed to the Procurement Manager, GREENVILLE UTILITIES COMMISSION, P. O. BOX 1847, 401 S. GREENE STREET, GREENVILLE, NORTH CAROLINA 27835-1847.

4.0 TIME FOR OPENING BIDS

Bids will be opened promptly and read at the hour and on the date set forth in the advertisement in the Office of the Procurement Manager, Greenville Utilities Main Office, 401 S. Greene Street, Greenville, North Carolina. Bidders or their authorized agents are invited to be present.

5.0 DEPOSIT

A deposit is required for this bid.

6.0 NC SALES TAX

Do **not** include NC sales taxes in bid figure; however, Greenville Utilities Commission (GUC) does pay sales tax. Sales tax should be added to the invoice as a separate item.

7.0 FEDERAL EXCISE TAX

GUC is exempt from Federal Excise Tax and will issue a Federal Exemption Certificate upon request to the successful bidder.

8.0 EXCEPTIONS TO BE CLEARLY STATED

If bid is not in strict accordance with Section II, "Specifications," bidder must list or note all exceptions **on the Request for Proposal Form**, otherwise, it is fully understood that the successful bidder will furnish equipment and/or materials exactly as specified. GUC reserves the right to accept or reject bids with noted minor deviations from specifications and to determine the lowest responsible, responsive bid from the standpoint of quality, performance, and price.

9.0 EVALUATION AND AWARD OF BIDS

GUC reserves the right to reject any and all bids, to waive any and all informalities, and to disregard all nonconforming or conditional bids or counter proposals. In evaluating bids, GUC shall consider whether the bids comply with the prescribed requirements, plus all alternates or options requested. GUC reserves the right to include or exclude any option or alternative in GUC's opinion is in GUC's best interests. If a bid is to be awarded, it will be awarded to the lowest responsible, responsive bidder whose evaluation by GUC indicates that the award will be in GUC's best interests. Only firm prices will be considered for award of this bid.

10.0 PROMPT PAYMENT DISCOUNTS

Bidders are urged to compute all discounts into the price offered. If a prompt payment discount is offered, it may be considered in the award of the contract.

11.0 NUMERICAL ERRORS

In the case of a discrepancy between a unit price and the extension (the unit price multiplied by the number of units), the unit price governs. In the case where numerical bids are stated both in numbers and in words, the words govern.

12.0 BID WITHDRAWAL

A bidder must notify GUC in writing of its request to withdraw a bid within seventy-two (72) hours after the bid opening, not including Saturdays, Sundays, or holidays. In order to justify withdrawal, the bidder must demonstrate that a substantial error exists and that the bid was submitted in good faith.

13.0 MINORITY BUSINESS PARTICIPATION PROGRAM

GUC has adopted an Affirmative Action and Minority and Women Business Enterprise Plan (M/WBE) Program. Firms submitting a proposal are attesting that they also have taken affirmative action to ensure equality of opportunity in all aspects of employment, and to utilize M/WBE suppliers of materials and/or labor.

14.0 QUANTITIES

Quantities specified are only estimates of GUC's requirements. GUC reserves the right to purchase more or less than the stated quantities at prices indicated in the submitted Proposal Form based on our actual needs.

15.0 DELIVERY

Shipments will be made to GUC only upon releases from a purchase order issued by GUC in accordance with its current needs.

Time is of the essence with respect to all deliveries under this Agreement.

Delivery of all equipment, materials, or supplies shall be made Free on Board (FOB), customer's foundation pad, Hudsons Substation, Corner of Fox Pen Rd and Blackjack Simpson Rd. unless otherwise specified. The agreed price for such equipment, materials, or supplies shall include all costs of delivery and ownership, and risks of loss shall not be transferred from Provider to GUC until express written acceptance of delivery and inspection by GUC. Delivery hours are between 8:00 AM and 4:30 PM Monday-Friday only. **GUC's purchase order number is to be shown on the packing slip or any related documents.** GUC reserves the right to refuse or return any delivery with no purchase order number or which is damaged. GUC will not be charged a restocking fee for any delivery which is refused or returned.

16.0 DELIVERY TIME

Delivery time is to be stated and will be considered in the evaluation of bids. Failure by the successful bidder to meet quoted delivery shall be interpreted as non-compliance with these specifications and may be deemed sufficient cause for removal of the manufacturer and/or distributor from our lists as acceptable manufacturers or bidders..

17.0 CONTRACT PERIOD

NA.

18.0 MANUFACTURER

Bidder is to specify the manufacturer of items being quoted.

19.0 CONTACT INFORMATION

Questions regarding this bid request should be directed to Cleve Haddock, Procurement Manager, Finance Department at (252) 551-1533, haddocgc@guc.com. **All questions must be received via e-mail by or before 5:00pm (EDST) August 5, 2024.**

20.0 TERMS AND CONDITIONS

The attached Terms and Conditions apply to all purchases made by Greenville Utilities Commission (GUC) and must be considered as part of the bid proposal.

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**GREENVILLE UTILITIES
GREENVILLE, NORTH CAROLINA**

**SPECIFICATIONS AND BID DOCUMENTS
FOR A
PRECAST CONCRETE RELAY CONTROL HOUSE
FOR THE
HUDSON SUBSTATION**

TECHNICAL SPECIFICATIONS

1. Scope

The scope of this project is the construction and installation of a 25' x 14' x 10' height precast concrete control house for the Hudson Substation.

The work shall include furnishing all labor, materials, equipment, and supplies, except materials and equipment to be furnished by others, necessary for the complete installation of a Precast Concrete Relay Control House, primary and secondary structural framing members, connecting bolts, windows, doors, flashing, closures, sealer, insulation, supporting structural steel, concrete floor pad, concrete foundations, and other miscellaneous items as shown or called for in the Drawings or Specifications. The building is to be used as a substation relay control house upon their completion.

2. General

2.1. Site visits are encouraged. Contact John Powell at 252-551-3388 to schedule a site visit.

2.2. All construction shall be performed in a workmanlike manner and shall conform to the Drawings and Specifications.

2.3. All material shall be new.

2.4. The Drawings and Specifications are complementary, one to the other. That which is shown on the Drawings or called for in the Specifications shall be as binding as if both were called for and shown. The intention of the Drawings and Specifications is to include all labor, materials, transportation, equipment, and any other items necessary to do a complete job.

2.5. Electric service is available at the site.

2.6. Greenville Utilities will provide and maintain a temporary toilet for use of workmen and locate toilet where directed.

2.7. Contractor shall be responsible for laying out work. The Contractor shall, immediately upon entering project site for purpose of beginning work, locate all general reference points and take such action as is necessary to prevent their destruction, lay out his own work, and be responsible for any error resulting from his failure to exercise such precaution.

2.8. The installation shall conform to the latest editions of the National Electric Code and North Carolina Building Code.

2.9. Modification to General Conditions.

2.9.1. Permits, Fees, Etc.

The Contractor shall be responsible for obtaining and paying for all permits, licenses, certificates, inspections, etc., required, both permanent and temporary.

2.9.2. Cleaning Up

The Contractor shall be individually responsible for cleaning smears, labels, spots, and discoloration from each piece of equipment. All building materials shall be left clean and in new condition.

2.10. The Contractor shall provide such temporary structures as are required for the proper storage of materials and equipment. The Contractor shall, if necessary, provide temporary heat during construction at his own expense.

2.11. The Contractor shall leave all holes, chases, or openings straight, true, and of proper size as may be necessary for the proper installation of the work. Contractors shall consult the Engineer and other Contractors regarding size and location of different chases, etc., required.

2.12. The building manufacturer shall furnish complete Erection Drawings showing foundation details, anchor bolt settings, sidewall, under wall and roof framing, transverse cross-sections, covering and flashing details, and accessory installation details to clearly indicate proper assembly of all building parts. **Two (2) complete sets of Drawings shall be sent to Greenville Utilities prior to actual construction for review of the proposed building design.**

2.13. Submit the information specified in this subsection to GUC and have approved before start of concrete shelter fabrication. Include clear explanations where drawings and data deviate from drawings or this specification.

2.13.1. Preliminary Drawings. Submit shop drawings that include the following details:

- 2.13.1.1. interior layout, including reflected ceiling plan
- 2.13.1.2. load path or whole concrete shelter section that describes frame and sheathing materials, and structural fasteners
- 2.13.1.3. one-line electrical diagram that describes service and feeder power wiring in the concrete shelters
- 2.13.1.4. circuit breaker panel schedule that identifies rating & location of circuits furnished with concrete shelter

2.13.2. Foundation Drawing. Submit foundation plan drawing showing slab plan dimensions and concrete shelter tie-down details. Soil-bearing data is attached with this order, also furnish foundation structural details, such as concrete strength and reinforcing steel.

3. **Drawings**

The building design construction shall conform to Greenville Utilities' Drawings all of which form a part of these Specifications. Use additional attached drawings for reference only.

<u>Sheet</u>	<u>Title</u>
CLHS-AR1	Control House Control Panels
CLHS-AR2	Control House Cable Tray Plan
CLHS-AR3	Control House Elevations
SUGG-STSV-IN	Control House Electrical Interconnection

4. **Shop Drawings**

4.1. Approval of Shop Drawings and Bill of Materials will be required. The Contractor shall supply two (2) copies of all Shop Drawings and Bill of Materials to the Greenville Utilities so they may ascertain that all materials and equipment being furnished by the Contractor meet the Specifications.

4.1.1. Final Drawings, Reaction Calculations, and final Bill of Materials shall be furnished by the Contractor for installation of the Control House.

4.1.2. General Arrangement Drawings, Erection Diagrams, Steel (or Aluminum) Details, and Other Details shall be provided.

4.1.3. One (1) CD-ROM or electronic file transfer containing Drawing files of all Drawings. Drawing files shall be compatible for use with AutoCAD 2019.

4.2. All Drawings and documentation are to be forwarded to Greenville Utilities,

3355 NC Highway 43, Greenville, North Carolina, 27834, Attention: Mr. John Powell

5. APPLICABLE DOCUMENTS

The following documents, of issue in effect at time of invitation-for-bid or request-for-proposal, form a part of this specification to the extent specified herein. At time of publication, editions indicated were valid.

In event of conflict between drawing and this specification, the drawing shall take precedence. In event of conflict between this specification and other documents specified herein, this specification shall take precedence.

All standards are subject to revision. Manufacturer is encouraged to investigate applying the most recent editions of standards indicated below:

5.1. Documents

ACI 304: Guide for Measuring, Mixing, Transporting, and Placing Concrete

ACI 305: Hot Weather Concreting

ACI 306: Cold Weather Concreting

ACI 308: Standard Practice for Curing Concrete

ACI 309: Guide for Consolidation of Concrete

ACI 318: Building Code Requirements for Structural Concrete

ARI 210/240: Standard for Unitary Air Conditioning and Air Source Heat Pump Equipment

ASCE 7: Minimum Design Loads for Buildings and Other Structures

ASHRAE 90.1: Energy Efficient Design of New Buildings

ASTM A36: Standard Specification for Structural Steel

ASTM A185: Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

ASTM A615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C33: Standard Specification for Concrete Aggregate

ASTM C39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C150: Standard Specification for Portland Cement

ASTM C172: Standard Method of Sampling Freshly Mixed Concrete
ASTM C260: Standard Specification for Air-Entraining Admixtures in Concrete
ASTM C330: Standard Specification for Lightweight Aggregate for Structural Concrete
ASTM C494: Standard Specification for Chemical Admixtures in Concrete
ASTM E84: Test Method for Surface Burning Characteristics of Building Materials [fire retardant]
ASTM E119: Test Methods for Fire Tests on Building Construction and Materials [fire resistance]
ASTM E136: Test Method for Behavior of Materials in a Vertical Tube Furnace [non-combustibility]
ASTM E152: Methods of Fire Tests of Door Assemblies
AWS D1.1: Structural Welding Code-Steel
AWS D1.4: Structural Welding Code-Reinforcing Steel
EIA 222: Structural Standards for Steel Antenna Towers and Antenna Supporting Structures
IBC: International Building Code, International Code Council (ICC)
NBC: National Building Code, Building Officials Code Association (BOCA)
NFPA-70: National Electric Code, National Fire Protection Association
SBC: Standard Building Code, Southern Building Code Conference International (SBCCI)
UBC: Uniform Building Code, International Conference of Building Officials (ICBO)
UL 752: Bullet Resisting Equipment
UL 1449: 2nd Ed., Transient Voltage Surge Suppressor

6. REQUIREMENTS

Engineer, design, and fabricate concrete shelter to conform to performance requirements specified, herein. Requirements are categorized by discipline as structural, electrical, mechanical, and architectural. Ancillary equipment and systems not classified as above are specified as a miscellaneous requirement.

6.1. Structural Requirements

- 6.1.1. Design Loads. Design concrete shelter to resist loads from wind, gravity, structural movement including thermally induced, and to withstand in-service use (e.g. weather) without failure.

Provide floor panel with integral and flush lifting provisions that permit crane lift without use separate bolt-on devices, but make use of readily available crane hardware, e.g., hooks, shackles, or D-rings. Design lifting provision for concrete shelter tie-down. Tie-down hardware in wall not permitted.

Unless otherwise indicated on drawing, design loads are:

- 200 psf uniform floor live load per ASCE 7 while on foundation
- 125 psf uniform floor live load per ASCE 7 during lifting and transport

Concentrated floor load of 2,000 pounds over any 2.5 square foot area
 100 psf uniform roof live load per ASCE 7
 155 mph wind load per ASCE 7, exposure C
 Seismic: importance factor 1.0, use group I, spectral response coefficients
 – SDS = 0.47 & SD1 = 0.19, site class D
 2-hour fire resistance per ASTM E119 on exterior walls
 Level 4 high rifle bullet resistance when tested in accordance with UL 752

In addition, concrete shelter shall be capable of certification under the following model code influences and construction classifications when classed as **S2** occupancy:

UBC [ICBO]V_N
 SBC [SBCCI]IV_U
 NBC [BOCA]5B
 IBC [ICC]..... 5B

6.1.1 Materials. Furnish required materials and components in the process necessary for structural system.

6.1.2 Concrete. Use concrete formulation with no less than 4000-psi compressive strength at 28 days and a density less than 100 pcf.

Cement: Type I or II Portland cement per ASTM C150
 Aggregate: lightweight sand per ASTM C33 and lightweight coarse per ASTM C330; use coarse aggregate no larger than ¾ inches nominal.
 Admixtures: air entraining admixtures per ASTM C260 and water reducing admixtures per ASTM C494.
 Water: clean and free of oils, acids, solids, salts, organic materials, or other substances harmful to concrete or reinforcing steel. Use no non-potable water.

6.1.3 Steel. Use embedded reinforcing and other structural steel components that conform to the following:

Rebar: use grade 60 deformed reinforcing bar per ASTM A615
 Welded wire fabric: use f_y=60 ksi wire fabric reinforcement per ASTM A185
 Other steel: use ASTM A36 steel, or better, for other steel components, e.g. weld plates, lifting and tie-down hardware

6.1.4 Installation.

6.1.4.1 Panel Fabrication. Construct floor, walls, and roof into pre-cast reinforced concrete panels in conformance with ACI 318 with a minimum thickness of 6" on floors and 4" on roof and wall panels. Cast reinforced steel plates in floor, walls, and roof panels to provide for welded panel-to-panel connections. Also:

Measure, mix, and transport concrete per ACI 304
 Collect concrete samples for strength testing per ASTM C172, mold into cylinders per ASTM C31, and test for compressive strength per ASTM C39.

Cure concrete in forms and protect from moisture loss, excessive heat, and freezing until removal from form; conform to ACI 305 and ACI 306 as required for hot and cold concreting
Consolidate concrete per ACI 309
Mold or screed minimum ¼” per foot slope on roof in two directions for proper water drainage
Mold steel door frames into cast panel walls where required; herein; include step-joint threshold to prevent water from entering concrete shelter
Mold keyed or step-joint edges into fabricated panels to enhance moisture protection and water runoff; mold roof/wall so that joint is not exposed
Treat wall panels with retarders as required to permit exposure of coarse aggregate for exterior finish; “seeding” of exterior surface with coarse aggregate is not permitted

6.1.4.2 Concrete Shelter Assembly. Install weatherproofing features as concrete panels are assembled. Weld finished panels together to form rigid concrete shell. Also:

Dust and waterproofing herein
Welding: use certified welders and conform to applicable provisions of AWS D1.1 and D1.4

6.2 Electrical Requirements

6.2.1 Electrical Performance.

Electric Power & Lighting. Engineer, design, and furnish electrical system compatible with applicable electrical details on drawing [Attached] and NFPA 70, the National Electrical Code.

General interior lighting: 40 W florescent fixtures with rapid start ballasts, lamps, and acrylic lens cover. minimum of 50 fc at the work plane, 30” above finished floor (LED Lighting may be submitted as an exception)
Emergency interior lighting: 50 W DC output for 90 minutes, 12-volt DC, operation on loss of 120 VAC single phase 60 Hz power
input: dual glass sealed beam lamps with maintenance-free lead calcium battery pack self-contained unit
Exterior Lighting: 35 W, high pressure sodium (LED Lighting may be submitted as an exception)
Service AIC rating: 10,000 amps minimum
Provide 15-amp duplex convenience receptacles around room perimeter

6.2.2 Hydrogen Monitoring. Detector can operate exhaust fans and building alarms / SCADA systems:

Warning Settings: Should the concentration of hydrogen gas in the air surrounding the sensor reach 1% by volume, the “1% Warning” yellow LED will light up on the main control of the unit. In addition, the 1% internal relay will energize and can be used to activate an external exhaust

fan or a building management/alarm system (via SCADA).

Alarm Settings: Should the hydrogen gas concentration reach 2% by volume, the “2% Alarm” red LED will light up, the strobe will flash, and an audible alarm will sound. In addition, the 2% internal relay will energize and can be used to activate a building management/alarm system (via SCADA).

6.2.3 Fire/Smoke Alarm System. Smoke detectors will have audible alarms, visual alarms (LEDs) and output alarm contacts. Detectors will provide sensors to sense the following conditions and provide stated alarm, and provide wired control contacts for field connection to monitor:

Alarm: if any detector in any zone senses positive, sound horn or siren and close “alarm” contacts

Trouble alarm: if power should fail, or supervised circuit be opened or shorted, close “trouble alarm” contact

Wire detector and audible alarms as supervised circuits to detect inadvertent circuit damage or disruption.

6.2.4 Materials. Furnish materials, components, and devices that are new and of highest quality. Ensure that, where applicable, electric materials are listed or recognized by Underwriters Laboratories. See reference drawing for specific components and systems, as well as circuit ratings and sizes. Conform to the following:

Heating and Air Conditioning: Commercial grade through the wall heat pump unit which shall be removeable from its mounted wall sleeve from inside of control house to provide self-contained heating and cooling systems for temperature and humidity control. Shall provide supply and return ventilation grilles with a replaceable high efficiency filter on the return side.

AC Service Enclosure - Main Terminal Box: 120/240 VAC, Single Phase, 3 wire plus ground. Lugs shall be rated for 200 amperes and accept conductor range of #6 AWG to 600 kcmil copper. Cutler Hammer, 3MTB400R Series or equivalent

Indoor Manual AC Service Transfer Switch: Dual source to single load, heavy-duty Double Throw, non-fusible, 240 VAC, 200 amperes, 2-pole, single phase, 15 HP AC rating, load break rated, UL listed per File No. E5239, Cutler Hammer, DT Series or equivalent

AC Service Meter Socket Base: Single meter base, single phase 3-wire, rated 600 VAC, 200 amperes, 10,000 amperes RMS symmetrical, outdoor surface mount enclosure, socket lugs shall accept No. 8 AWG to 250 MCM conductor range.

AC Service Panel No. 1 & 2: 120/240 VAC, single phase 3-wire with neutral; minimum interrupting 22 kA symmetrical, 225 amperes main bus rating, 32 branch circuit poles, NEMA Type 1 indoor surface mounted box and trim; Cutler Hammer PRL1a Panelboard series using Type ED main breaker and Type QBHW branch breakers or equivalent.

AC Service Panel No. 3: Used to isolate circuits serving outdoor mast-mounted lighting, 120/240 VAC, single phase, 3-wire with neutral, MLO main lug only, 22 kA symmetrical interrupting, UL listed E8741, sized to accommodate 8 branch circuit poles with top or bottom service entrance to main breaker, NEMA Type 1 indoor surface mounted box and trim. Cutler Hammer BR Load center Type BRH branch breakers or equivalent.

Isolation Transformer - Outdoor Lighting: Indoor dry-type isolation transformer, minimum rating of 7.5 kVA, 60 Hz, single phase, 120x240 VAC primary, to 120x240 VAC secondary. GE, 9T21B1002GO4 or equivalent

DC Service Panel Cutler Hammer PRL2a Panelboard series Type FD breakers or equivalent. 125/250 VDC, single phase 2-wire without neutral; minimum interrupting 14 kA symmetrical, 100 ampere main bus rating, fifteen (12) 2-pole branch circuit poles, NEMA Type 1 indoor surface mounted box and trim.

Cable Tray: B-Line series 14 6063-T6 alloy composite, ladder type, 4-inch nominal side rail height, 30-inch and 18-inch nominal tray widths with 9-inch rung spacing with the field cabling exiting through the wall at cable tray elevation.

SBS-H2 Hydrogen Detector: Power inputs 48 Vdc
Sensor status indicator LEDs on the main control
Modular design for optimal placement of sensor(s)
NRTL/C Certified: UL Std. No 61010-1
Wall or 2-gang junction box mountable
Warning 1 % relay, 10 A @ 28 Vdc
Alarm 2% relay, 0.5 A resistive @ 28 Vdc
Indicator LEDs can be tested by pushing "TEST" button

OSD308 Smoke Detector: Power inputs 48 Vdc
Sensor status indicator LEDs on the main control

Modular design for optimal placement of sensor(s)
Smoke detectors and fire alarm systems that support NFPA 72 must produce an audible alarm signal that is different from all other audible signals
Wall or 2-gang junction box mountable
Alarm relay, 10 A @ 48Vdc
Trouble Alarm 2% relay, 10 A @ 48 Vdc
Indicator LEDs can be tested by pushing “TEST” button

Power wiring: 600V THHN or THWN wire sized in accordance with NFPA-70; use size 12 awg minimum
Control wiring: 250V TFFN solid wire sized in accordance with manufacturer or listing instructions for class 2 thermostat, generator, or fire detection systems; use #18 awg minimum
Alarm wiring: 250V solid shielded, twisted cable assemblies; use #22 awg minimum
Flexible raceway; use liquidtight conduit on exterior and flexible metal conduit on interior of concrete shelter
Branch circuit breakers: thermal magnetic circuit breakers; rate breakers that supply lighting circuits as “SWD” and motor loads as “HACR”
Light fixtures: 2-tube, 4-foot surface-mounted fluorescent fixtures with CBM-rated ballast, prismatic wrap-around diffuser, and in-line RFI filters for noise suppression
Wiring devices: use UL listed quiet-type lighting toggle switches and grounded receptacles
Service Disconnects: Fused disconnects or enclosed circuit breakers labeled as “suitable for use as service equipment”

6.2.5 Installation. Perform all wiring in accordance with best commercial practice in accordance with NFPA-70.

Install wiring in surface mount EMT conduit; where flexible conduit is required by code between equipment and final junction box in circuit, use flexible metal conduit on interior and liquidtight conduit on concrete shelter’s exterior
Where required, use properly sized and insulated wire nuts for conductor splices; locate no splices except in outlet or junction boxes.
Install exterior door light with vandal-resistant lens and, when required by drawing, a photocell and switched override
Coordinate location of interior light fixtures to maximize illumination between rows of equipment
Center duplex receptacles 18 inches above finished floor and locate so that no point along room perimeter is greater than six feet from a receptacle
Insofar as practical, enclose class 2 signal circuits in raceway

6.3 Mechanical Requirements

6.3.1 Performance. Furnish and install mechanical systems as specified in this section.

6.3.1.1 HVAC System. Design and equip concrete shelter for heating, ventilation, and air conditioner system that will maintain interior temperature under specified operating conditions. Calculate heating and cooling based on heat load of concrete shelter manufacturer's installed equipment and concrete shelter conduction losses and solar loading.

Ambient temperature: -30°F (-35°C) thru 110°F (40°C)

Interior temperature: 60°F (18°C) minimum at minimum ambient, and 80°F (30°C) maximum at maximum ambient temperature,

Ambient humidity: 5-95%

6.3.2 Materials. Except where alternate approval is permitted, furnish only UL-listed equipment; also:

air conditioners: Thru wall (hotel style, PTAC, industry standard size)

units with SEER rating no less than 10.0 and capacity rated using ARI 210/240; equip each unit with low ambient control, anti-cycle relay, integral circuit breaker disconnect, and washable filter

heater: built-in to air conditioner, smallest standard rating available for the air conditioner required

fire detection system: see separate specification

fire extinguisher: class ABC Halon 1211 or class BC CO₂; each

extinguisher fully charged to capacity with 9lb minimum

vent louvers: aluminum gravity shutters for fan intake and exhaust; add motor operator where fire suppression system is specified

vent fan: ac powered, single speed with built-in or separate overload

thermostats: vent and air conditioner control over range of 50°-90°F;

provide air conditioner control for integral heat and control to

continuously run evaporator fan

6.3.3 Installation.

6.3.3.1 Heating and Air Conditioner. Install commercial grade through the wall heat pump unit which shall be removeable from its mounted wall sleeve from inside of control house for transport as well as operation. Use stainless steel fastening hardware for mounting air conditioners. Seal exterior with UV-resistant caulk and install drip edge over top of each unit to prevent water entry. Locate units for maximum circulation and behind no equipment obstructions.

6.4 Architectural Requirements

Construct concrete shelter with standard interior and exterior finish and weather resistance consistent with environment of the continental United States.

6.4.1 Performance. Provide necessary weatherproofing to prevent moisture and dust

infiltration. Provide panel insulation to reduce heat loss from conduction. Add insulation to floor, wall, and roof construction to ensure that total concrete shelter U_0 factor is less than 0.09 btu/hr/ft²/°F when calculated per ASHRAE 90.1.

6.4.2 Materials. Furnish components and materials that conform to architectural requirements of this specification. Also:

Concrete floor to be sealed prior to installation of vinyl tile
Dust seal: precompressed, self-expanding polyurethane joint sealant to be installed around the perimeter of the floor
Bearing pad to be installed around the perimeter of the floor in the step-joint
Water seal: two layers of butyl tape to be installed at all wall-to-wall and wall-to-roof joints
Roof finish: white mastic coating made with elastomeric acrylic
Exterior wall coating: clear, non-yellowing and UV resistant acrylic sealer
Exterior trim (concrete surfaces): high build, textured, water based, acrylic paint for masonry and concrete.
Exterior door: heavy duty steel, fully welded with continuous aluminum tamperproof hinge
Insulation walls/roof: use polyisocyanurate or other insulation with equivalent K-factor
Insulation floor: use polystyrene or other insulation with equivalent K-factor

6.4.3 Installation.

6.4.3.1 Interior Finish. Finish interior walls and ceiling with white laminated sheathing board and vinyl trim. Finish floor with light colored commercial-grade vinyl.

6.4.3.2 Exterior Finish. Finish exterior with medium colored exposed aggregate finish sealed standard light gray, ANSI No. 70 and standard light gray, ANSI No. 70 trim. Finish roof with seamless UV-resistant elastomeric coating.

6.4.3.3 Weatherproofing. Add dust and waterproofing to fabricated concrete panels before assembly:

Waterproofing: double-seal all wall-to-wall and roof-to-wall joints with butyl sealant; to permit water runoff, use no waterproofing on wall-to-floor joints
Dust proofing: seal exterior exposure of wall-to-wall and floor-to-wall joints with a dust seal

7 QUALITY ASSURANCE

Concrete shelter manufacturer must maintain an aggressive quality assurance program that

ensures delivered units meet highest standards of workmanship and materials, and that these specifications are satisfied.

7.1 Organization

Provide for separate quality assurance organization where authority and responsibility are clearly defined in writing. This organization shall have:

- Clear authority to withhold items that do not meet quality standards.

- Direct access to top management at each facility so that quality problems can be efficiently resolved

- Quality assurance manual with current approval by nationally recognized third-party agency

- Records on each deliverable unit relative to item acceptance and rejection, plus disposition of rejected items

7.2 Material Control

Provide for program to ensure materials and components meet requirements specified herein and manufacturer's own specifications, and that nonconforming materials will not be used. This program shall include:

- Receiving inspection program where receiving inspectors have ready access to appropriate drawings, engineering orders, specifications, vendor catalogs, purchase orders, etc.

- Area with controlled access for adequate storage and security of materials furnished by customers

- Material aging program to control use of materials with limited shelf life

- Documented system for handling nonconforming materials, including means of removing nonconforming materials from process

7.3 Test Equipment

Provide for controlled program that maintains calibration of measuring devices, gauges, and test equipment. This includes:

- Procedures that call for periodic inspection of tools used for inspection in production process and means of removing nonconforming tools and test equipment

- Written working standards of accuracy for test equipment and periodic calibration program to primary standards traceable to National Bureau of Standards

- Program to stamp test equipment with most recent calibration date and due date of next calibration

7.4 In-Process Inspection

Provide for program to ensure work-in-process and finished goods meet applicable codes & standards, manufacturer's standards, and requirements specified herein. This program shall provide for means to:

Prevent unauthorized use of nonconforming or uninspected materials

Inspect finished items to ensure that contract requirements are met using drawing and other documents that reflect latest changes

Compile and maintain inspection log of in-process and final inspections of deliverable units

Identify inspection status of in-process work

Track disposition of rejected items, including reworked items

8 DOCUMENTATION

8.1 Engineering Drawings

Submit one (1) complete set of engineering drawings with each delivered concrete shelter unit. Do not include preliminary drawings already submitted. Include the following in each set:

Final dimensioned foundation, interior layout, including wall orientation and ceiling plan showing all installed components and surface raceway

Exterior elevations on all four (4) main views

Electric feeder diagram, including electric service information panel schedules

Control wiring diagrams and schedule of manufacturer-installed concrete shelter alarms

Schedule of key allowable stresses, including wind, live floor, and live roof loads, and seismic shear coefficient; also list construction and occupancy classification

Schedule of fire resistance ratings

Shipping and foundation information, including approximate shipping weight

Total concrete shelter section that identifies all structural components and connections, sheathings and finishes; identify total load path from top of roof to foundation connection

Provide drawings on paper format no smaller than OCE D+ size, 24" x 36"; also make final engineering drawings available on AutoCAD .DWG format.

8.2 Calculations

Where required for certification submit one (1) set of complete engineering calculations as required:

Structural: justify concrete shelter construction with structural design loads

Electrical: justify service size using loads of all known equipment

Lighting: justify furnished lighting with illumination level required using zonal cavity method

Energy: justify concrete shelter construction and insulation with overall concrete shelter energy efficiency required in using system performance method of ASHRAE 90.1; when required for state certification, also justify per code having jurisdiction

Air conditioner; justify air conditioner size using actual air conditioner performance with concrete shelter conduction loss, solar loading, lighting loss, vent loss, and equipment load

Fire-suppression: justify agent tank fill with concrete shelter internal area using appropriate specific volume

8.3 Service Manual

Provide one (1) operations and maintenance manual with each delivered concrete shelter unit. Assemble manual in bound format with table of contents to identify major divisions. Compile manual to include:

- Model and serial numbers for concrete shelter and major components (e.g. air conditioner, engine-generator, etc.)

- Building statement of warranty

- Warranty information on components with transferable warranty

- Manufacturer data on electrical and mechanical systems, and electrical components where available

- Concrete shelter start-up information

- Preventive maintenance procedures and schedule

- Concrete shelter repair procedures

8.4 Warranty

Furnish, with each delivered unit, statement of warranty that includes all systems furnished and installed by manufacturer for period of not less than one (1) year and to commence no sooner than manufacturer's final invoice date. Items to include in statement of warranty:

- assignments of warranties of any systems, materials or components that exceed the one (1) year concrete shelter warranty period

- clear instruction on activating warranty

- clear instructions on submitting claims for service under warranty, including 24-hour phone contact

9 SITEWORKS

9.1 Transportation to Site

Deliver prefabricated concrete shelter to disclosed site without damage or deformity. Encase delicate exterior components and cover openings for protection against transportation damage. Use tractor-trailer combination designed for proper over width, over height, and overweight load per DOT regulations. Use trailer with air-ride suspension.

9.2 Off Loading

When specified on purchase order, furnish crane to off load concrete shelter on owner's furnished foundation. Provide detailed offloading drawings that describe recommended rigging requirements. Furnish and install tie-down hardware.

9.3 On-Site Services

Install all items removed for transportation; this includes, but is not limited to drip caps, hoods, air conditioner and exterior lights.

9.4 Certifications

Furnish GUC up to four (4) sets of plans prepared and signed by a professional engineer legally authorized to practice in jurisdiction where concrete shelter will be delivered, verifying that structure meets indicated loading requirements and codes of authorities having jurisdiction. GUC will disclose site location at time of order. Also provide state certification (decal, insignia, letter, etc.) as required to legally deliver and place manufactured concrete shelter on disclosed site.

SUBMIT BIDS ON ATTACHED PROPOSAL FORM

ALL DIMENSIONS ARE IN INCHES
UNLESS SPECIFIED OTHERWISE

FRACTIONS	$\pm 1/2''$
DECIMALS	$\pm 0.5''$
ANGLES	$\pm 3^\circ$

▲ FRACTIONS	$\pm 1/4"$
DECIMALS	$\pm 0.25"$
ANGLES	$\pm 1^\circ$

FRACTIONS $\pm 1''$
 DECIMALS $\pm 1.0'$
 ANGLES $\pm 5'$



- a. RUN THE MAXIMUM NUMBER OF 2" CONDUITS, STOP ALL CONDUITS 3" FROM THE BOTTOM OF CABLE TRAY.
- b. 1 EACH BLACK AND 1 EACH RED, 1AWG, 15' COILED FOR BATTERY CONNECTION (BY OTHERS).
- c. COIL 12AWG THHN, BLK, WHT, GRN 6FT. FOR BATTERY CHARGER (CONNECTION BY OTHERS).
- d. LOCATION OF STATE LABEL AND DATA PLATE.
- e. EMPTY CONDUIT FOR FUTURE BATTERY CHARGER ALARMS (BY OTHERS).
- f. EMPTY CONDUIT FOR FUTURE BATTERY CHARGER.

INTERIOR FOLDOUT

NO.	1.A
-----	-----

REVISIONS

MARK UP



GREENVILLE UTILITIES
Greenville, North Carolina

TYPICAL SUBSTATION
115 TO 15 kV
CONTROL
ARRANGEMENY No.1

DWN.	DATE	DWG. NO.
CKD.	APPD.	
SCALE: NONE		

CTHS_AR1_R?

TOLERANCES

ALL DIMENSIONS ARE IN INCHES
UNLESS SPECIFIED OTHERWISE

STANDARD:
FRACTIONS ± 1/2"
DECIMALS ± 0.5"
ANGLES ± 3°

IF NOTED WITH SYMBOL:
▲ FRACTIONS ± 1/4"
DECIMALS ± 0.25"
ANGLES ± 1°

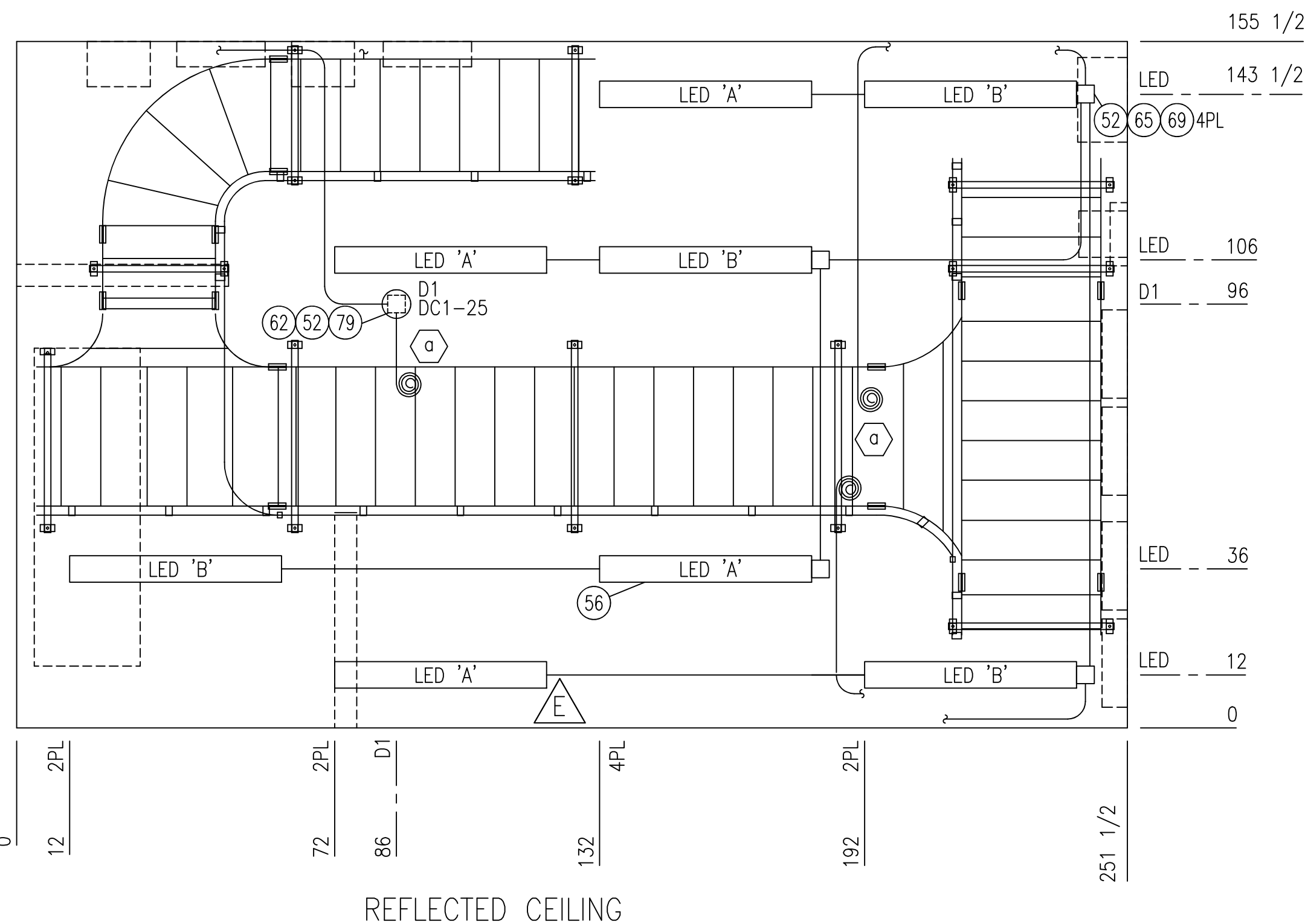
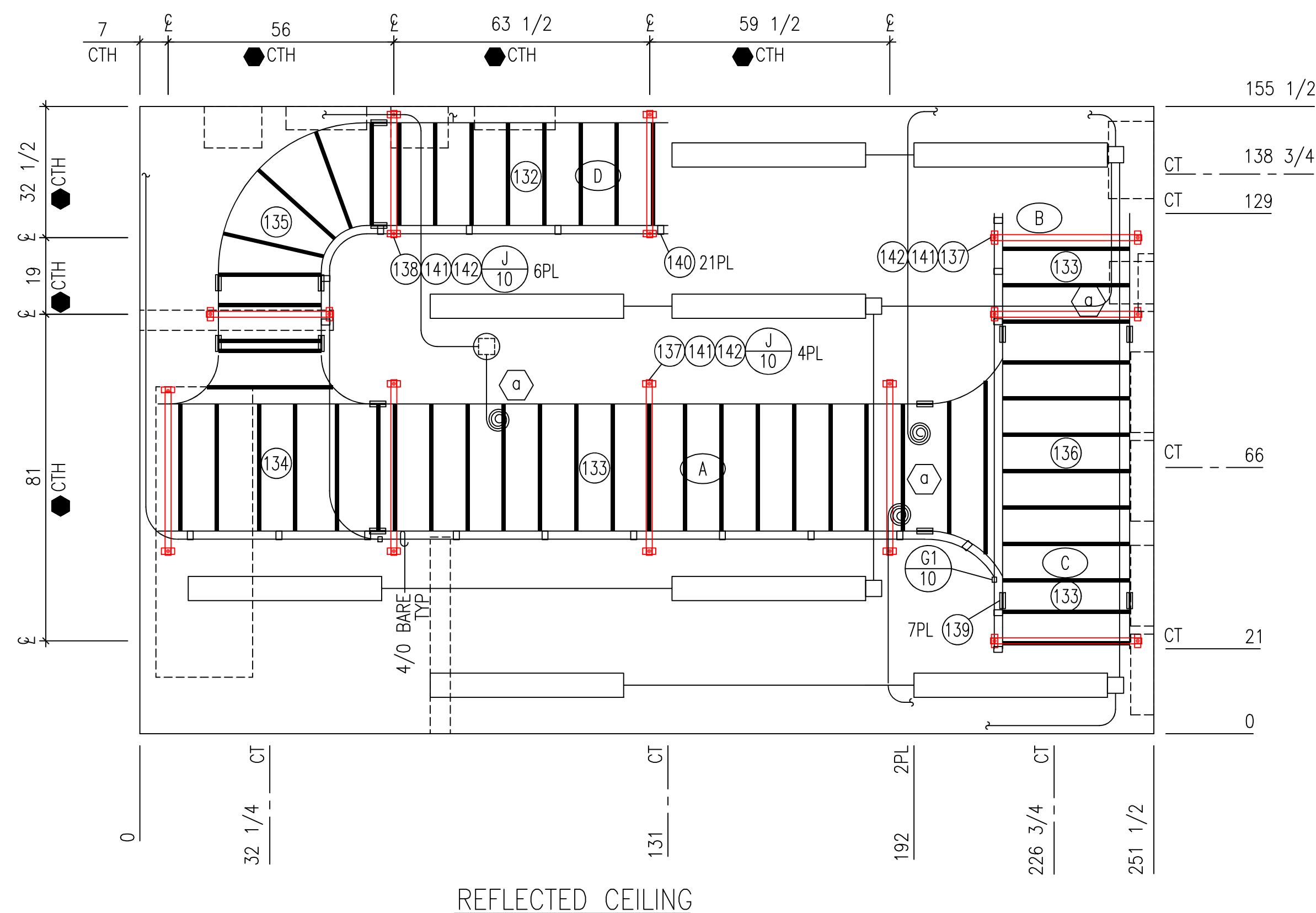
IF NOTED WITH SYMBOL:
● FRACTIONS ± 1"
DECIMALS ± 1.0"
ANGLES ± 5°

LEGEND

AC1,2 - AC LOAD CENTER (200A)
AR - AS REQUIRED
CFE - CUSTOMER FURNISHED EQUIPMENT
CIE - CUSTOMER INSTALLED EQUIPMENT
CT - CABLE TRAY
CTH - CABLE TRAY HANGER
D1 - SMOKE DETECTOR
DC1,2 - DC LOAD CENTER (100A)
EXT - EXTERIOR
HGD - HYDROGEN DETECTOR
HP - HEAT PUMP
INT - INTERIOR
LE - EXTERIOR LIGHT (LED)
LED A,B - LIGHT FIXTURE LED (4' LED)
LM1,2 - EMERGENCY/EXIT LIGHT 1,2
MTS - MANUAL TRANSFER SWITCH
NIP - NIPPLE
PC - PHOTOCELL
PL - PLACES
RCPT - RECEPTACLE
REF - REFERENCE
S1,2,4,5 - SWITCH, 1,2,4,5, INTERIOR LIGHTS, 3 WAY
S3,6 - SWITCH 3,6, LIGHT, EXTERIOR
T1 - THERMOSTAT, SET @ 72°(HP)
TYP - TYPICAL
WR - WEATHER RESISTANT RECEPTACLE
□ - JUNCTION BOX, 4 X 4
⑩ - REF PART LIST ITEM NUMBER
⑤ - REF DWG NOTE
② - RCPT., DUPLEX
③ - RCPT., DUPLEX, GFCI
XFMR - 7.5KVA TRANSFORMER
△ - REVISION

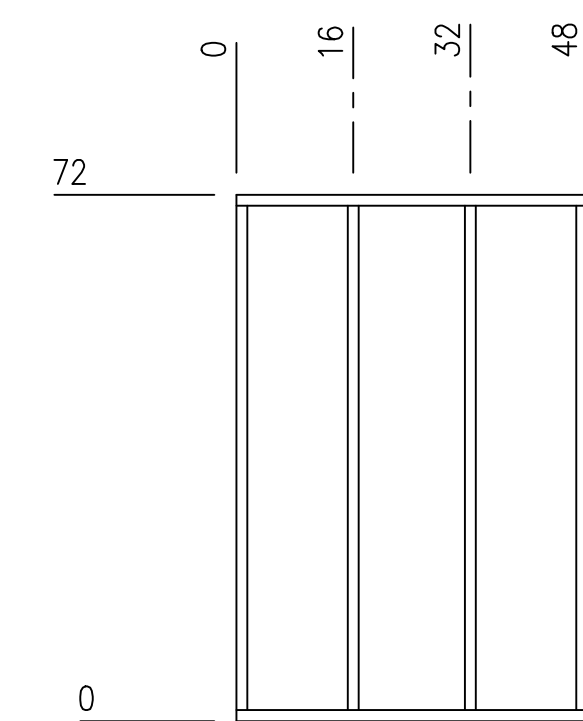
NOTES

⑤ COIL & TAG 10' of 18 AWG ALARM WIRE

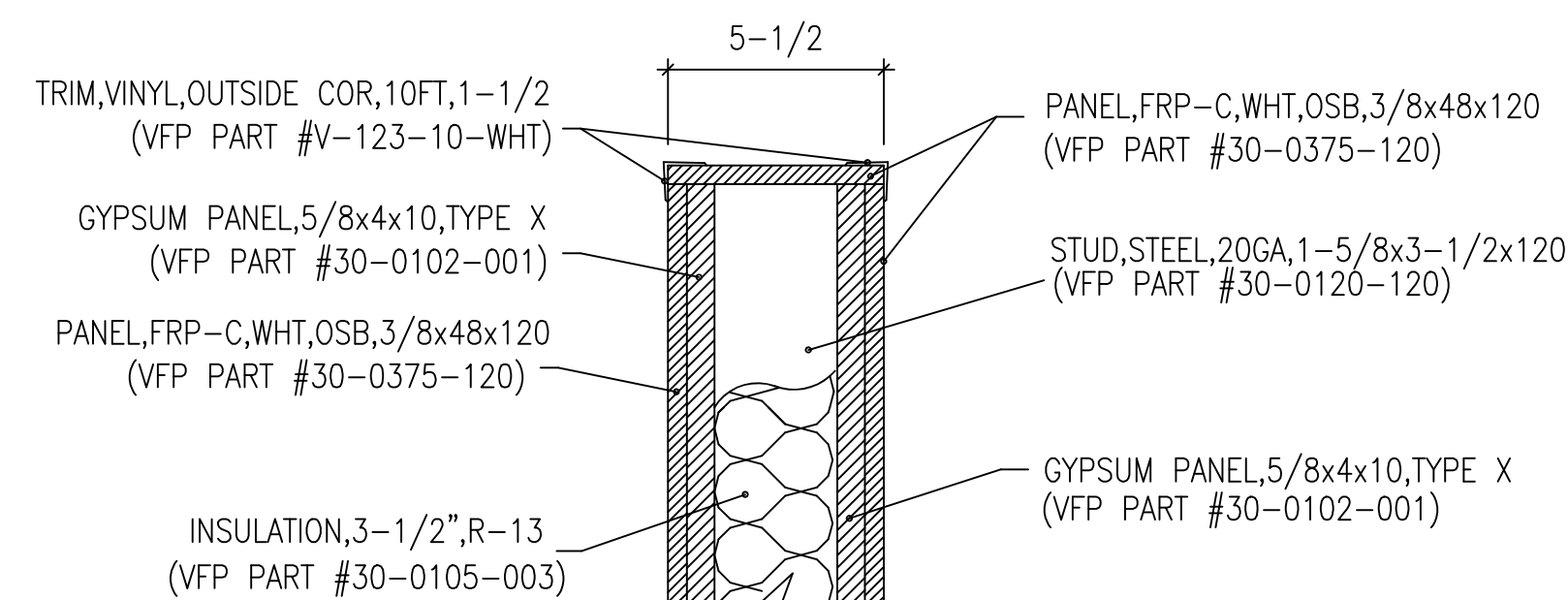


CABLE TRAY CUT LEGEND

24A09-30-144 CUT 1@ 135-3/4" (A)
24A09-30-144 CUT 1@ 30" (B)
24A09-30-144 CUT 1@ 12" (C)
24A09-24-144 CUT 1@ 71-3/4" (D)



(A) PARTITION WALL CONSTRUCTION
(BATTERY ROOM VIEW)




(B) INTERIOR PARTITION WALL

NO.
1. A

REVISIONS
FROM: SUGG BUILD
EVS 3-7-2024

MARK UP

		GREENVILLE UTILITIES Greenville, North Carolina	
TYPICAL SUBSTATION 115 TO 15 kV CONTROL ARRANGEMENY No.2			
DWN.	DATE	DWG. NO.	
CKD.	APPD.		
SCALE: NONE			

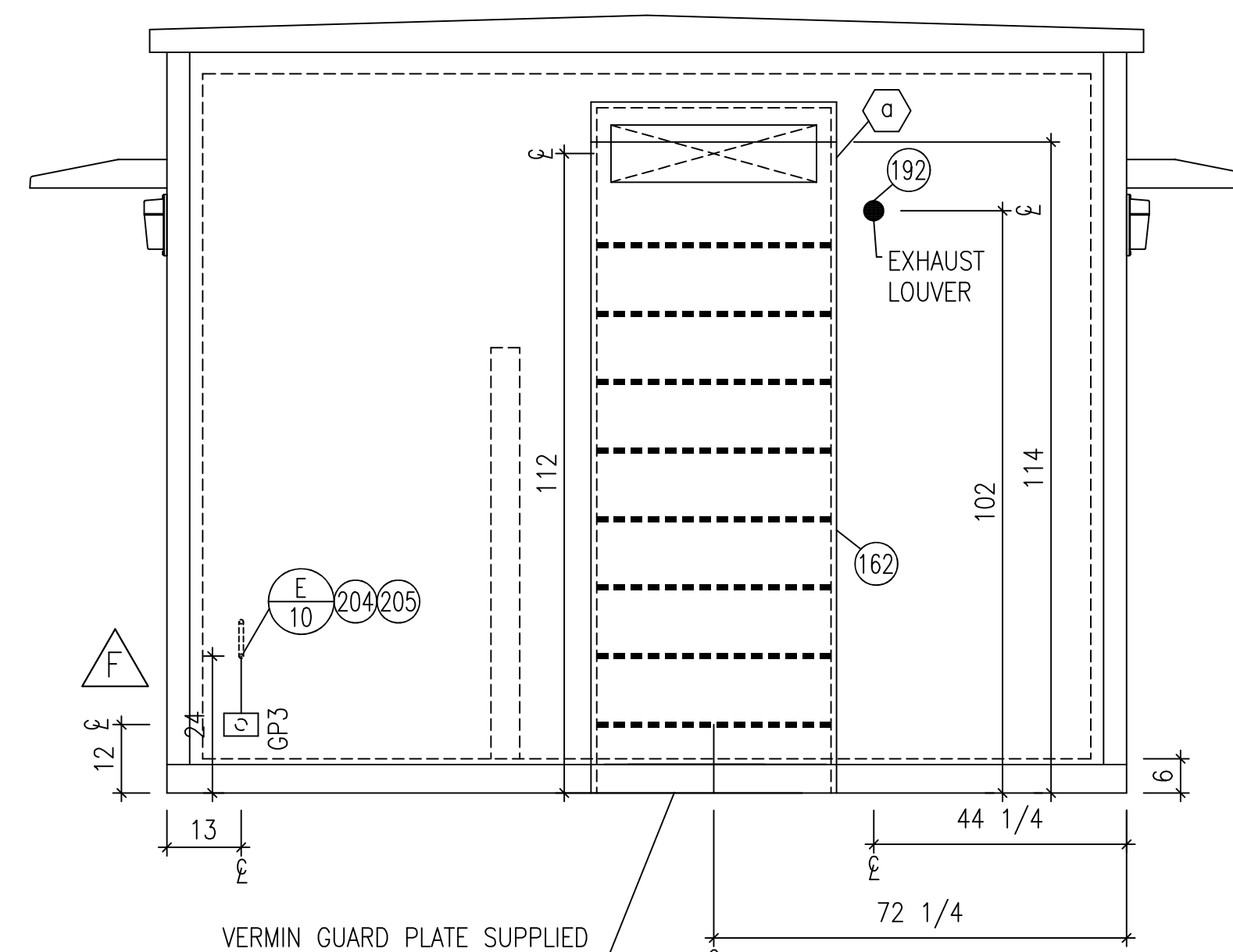
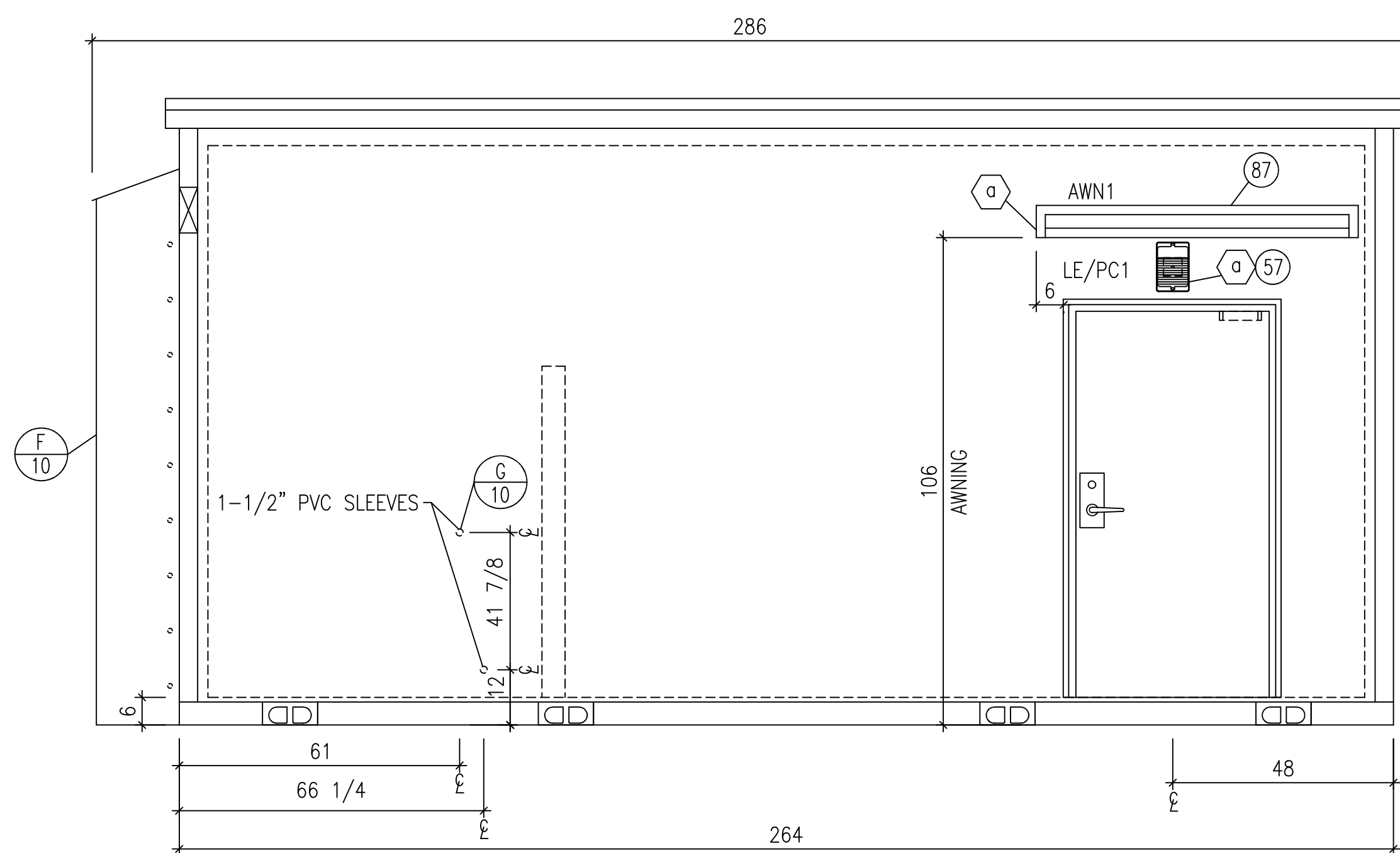
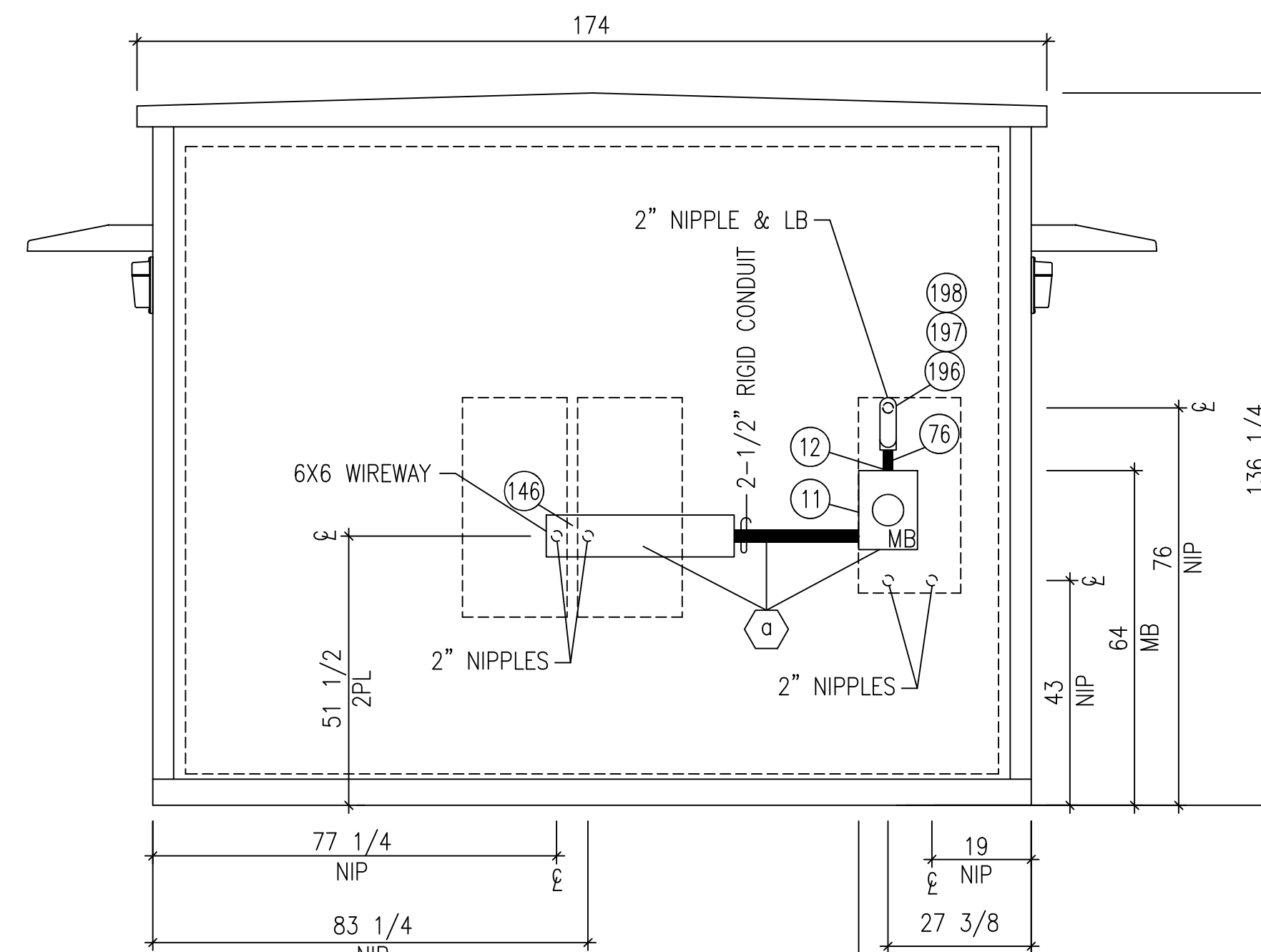
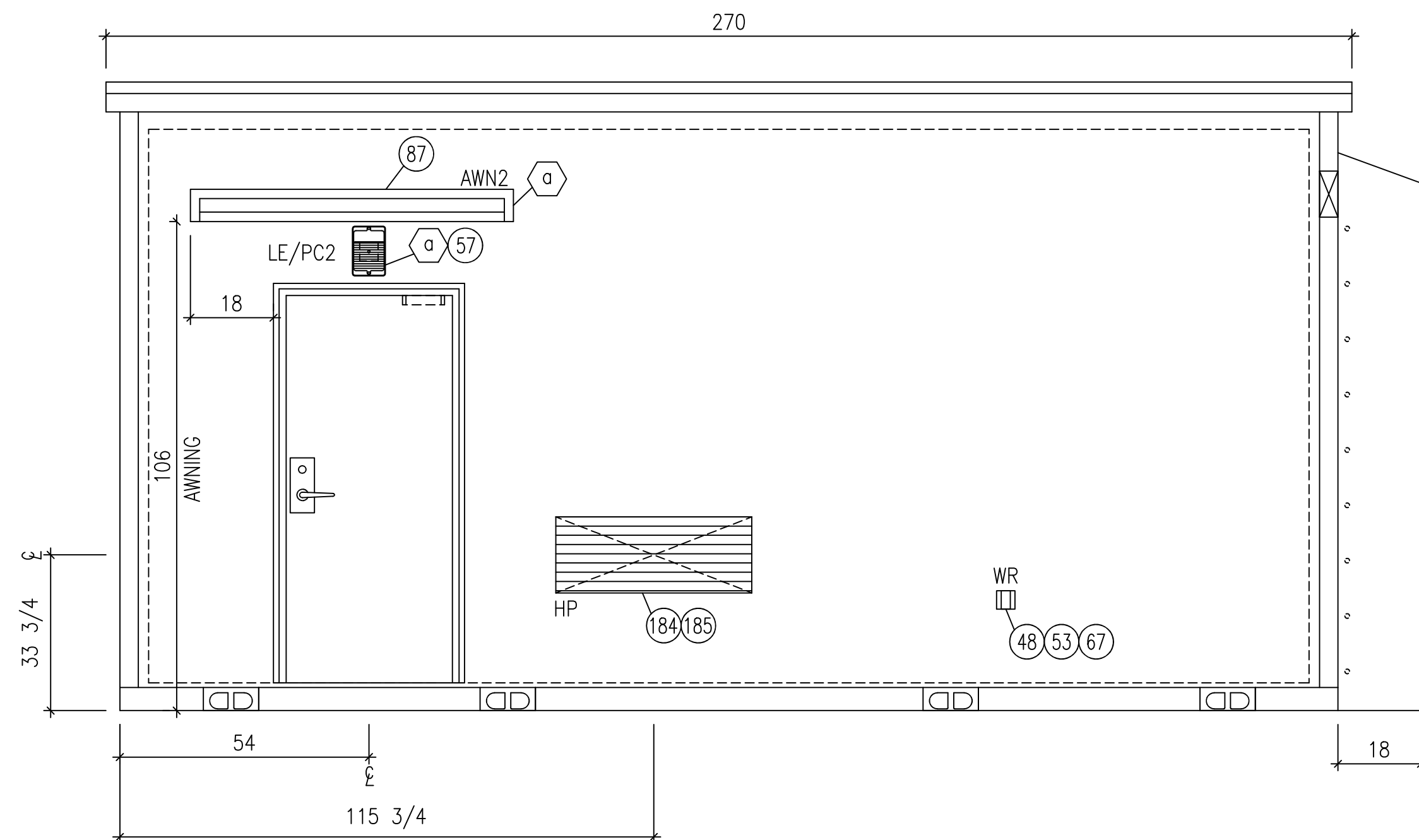
TOLERANCES

ALL DIMENSIONS ARE IN INCHES
UNLESS SPECIFIED OTHERWISE

STANDARD:
FRACTIONS $\pm 1/2"$
DECIMALS $\pm 0.5"$
ANGLES $\pm 3"$

IF NOTED WITH SYMBOL:
▲ FRACTIONS $\pm 1/4"$
DECIMALS $\pm 0.25"$
ANGLES $\pm 1"$

IF NOTED WITH SYMBOL:
● FRACTIONS $\pm 1"$
DECIMALS $\pm 1.0"$
ANGLES $\pm 5"$



VERMIN GUARD PLATE SUPPLIED
BY VFP. TO BE INSTALLED AT SITE.
MOUNT HOOD FLUSH WITH
BOTTOM OF SHELTER.

WARNING

ALL PENETRATIONS, AND (OR) ELECTRICAL DIMENSIONS SHOWN
ARE TO BE CONSIDERED FOR REFERENCE ONLY.
THE MEASUREMENTS MAY DIFFER AS A RESULT OF PROPER
EQUIPMENT INSTALLATION.
PLEASE CONTACT VFP, INC. ENGINEERING FOR PRECISE
LOCATIONS

* ALL PENETRATIONS FOR CIE/CFE EQUIPMENT NEEDED IN
THE FIELD WILL BE THE RESPONSIBILITY OF OTHERS.

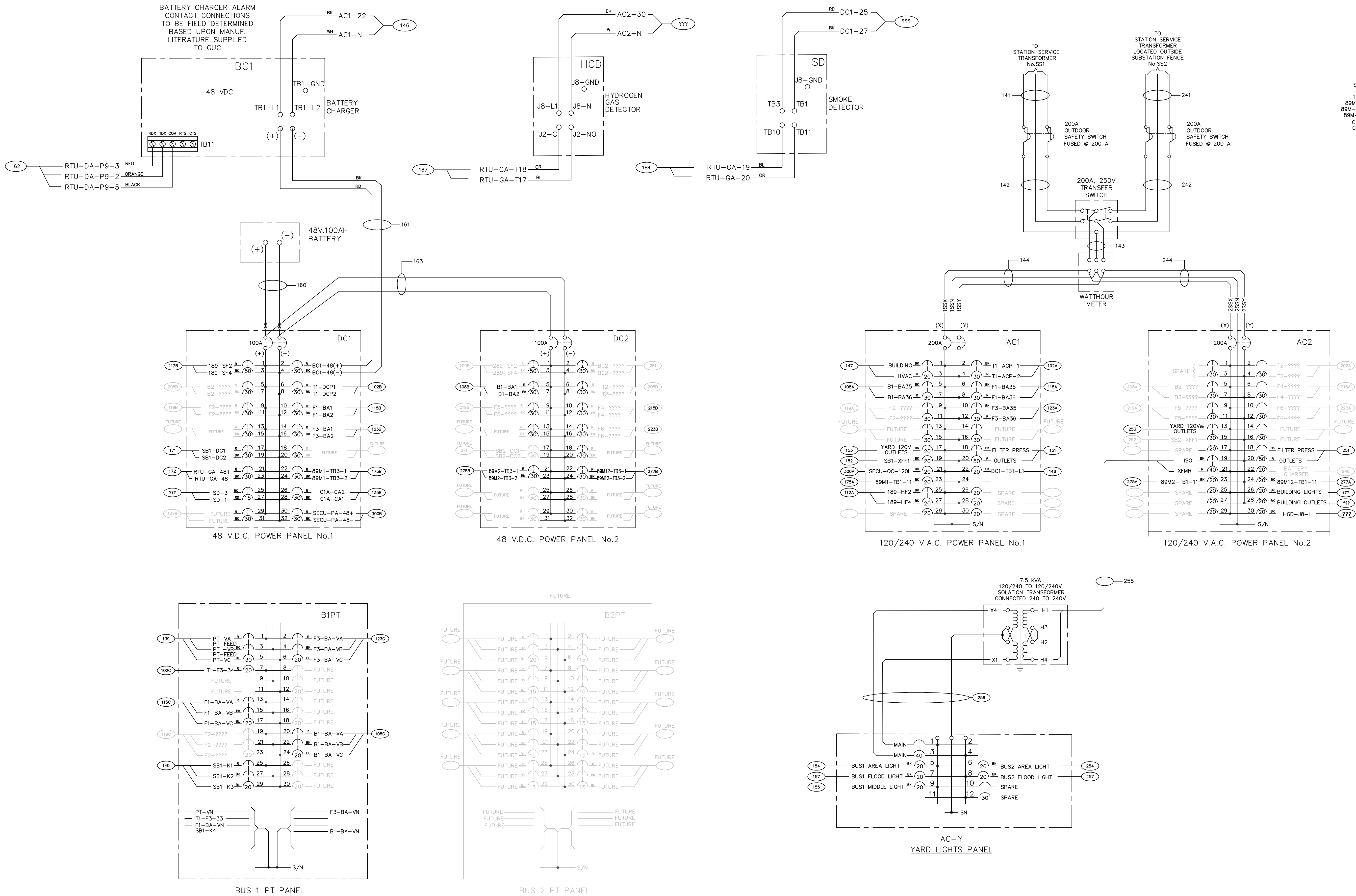
NOTES

- PRE-INSTALL AND REMOVE FOR SHIPPING. DO NOT CAULK.
LABEL COMPONENTS ON BACK SIDE IN PERMANENT
MARKER WITH WALL DESIGNATION & DRAWING LABEL
(EXAMPLE: A-WALL-FN1)

EXTERIOR ELEVATIONS

MARK UP

GREENVILLE UTILITIES Greenville, North Carolina		
TYPICAL SUBSTATION 115 TO 15 kV CONTROL ARRANGEMENY No.3		
DWN.	DATE	DWG. NO.
CKD.	APPD.	
SCALE: NONE		



- DEVICES**
- B1 BUS BREAKER No. 1
 - F1 FEEDER CIRCUIT BREAKER No. 1
 - F3 FEEDER CIRCUIT BREAKER No. 3
 - SB1 SWITCHBOARD No. 1
 - T1 TRANSFORMER No. 1
 - T1 TRANSFORMER No. 1
 - 89M-1 MOTOR OPERATED AIR BREAK SWITCH No. 1519
 - 89M-12 MOTOR OPERATED AIR BREAK SWITCH No. 1520
 - 89M-2 MOTOR OPERATED AIR BREAK SWITCH No. 1521
 - C1A CAP BANK 1A
 - C1B CAP BANK 1B

REVISIONS	1	SUBSTATION BUILD PRELIMINARY DESIGN EVS 2-17-2021 RELEASED FOR CONSTRUCTION EVS 5/13/2021 MARKUP PER BED SCANNED BY JGF CADD MARKUP BY EVS 11-8-2022 CADD AS-BUILT EVS 11-21-2022	GREENVILLE UTILITIES Greenville, North Carolina SUGG PARKWAY SUBSTATION 115 TO 15 kV STATION SERVICE INTERCONNECTION DIAGRAM No.1	DWN. GKD. SCALE: NONE	DATE APPD.	DWG. NO.

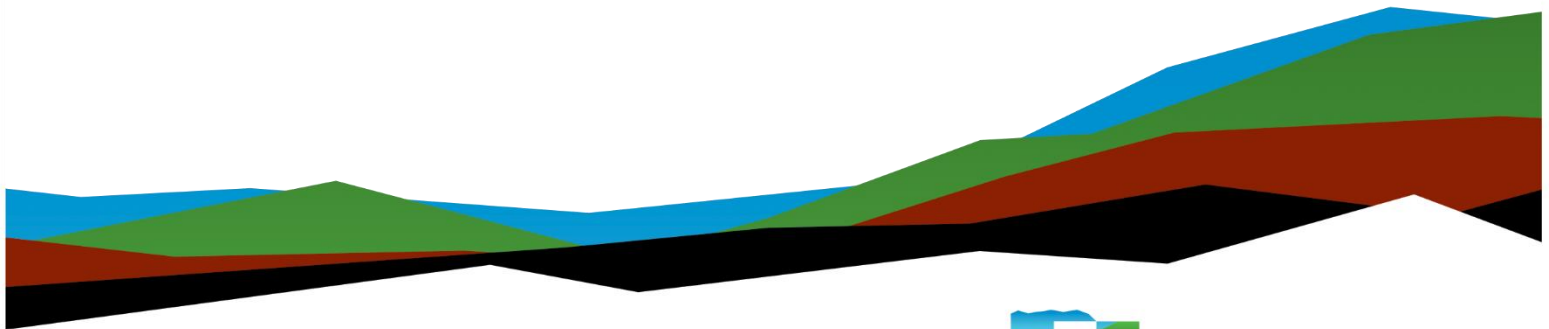
Fox Pen Road Substation

Geotechnical Engineering Report

December 22, 2023 | Terracon Project No. 72235120

Prepared for:

Greenville Utilities Commission
PO Box 1847
Greenville, North Carolina 27835



Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials



314 Beacon Drive
Winterville, NC 28590
P (252) 353-1600
North Carolina Registered Firm: F-0869

Terracon.com

December 22, 2023

Greenville Utilities Commission
PO Box 1847
Greenville, North Carolina 27835

Attn: Mr. Anthony C. Cannon, CEO
P: (252) 551-1501
E: CannonAC@GUC.com

Re: Geotechnical Engineering Report
Fox Pen Road Substation
NCSR 1769 & NCSR 1755
Greenville, North Carolina
Terracon Project No. 72235120

Dear Mr. Cannon:

We have completed the scope of Geotechnical Engineering services for the above-referenced project in general accordance with Terracon Proposal No. P72235120-R1 dated November 28, 2023. This report presents the findings of the subsurface exploration and provides geotechnical recommendations for the proposed project.

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

Sincerely,

Terracon

Rachel E. Zelinsky, EI
Geotechnical Project Manager

Andrew A. Nash, PE
Department Manager

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Site Location and Exploration Plans

Exploration and Laboratory Results

Design Soil Parameters for Drilled Piers

Supporting Information

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

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed substation to be located at NCSR 1769 & NCSR 1755 in Greenville, North Carolina. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Exploration logs with field and laboratory data
- Stratification based on CPT data
- Groundwater levels observed during and after the completion of drilling
- Site Location and Exploration Plans
- Subsurface exploration procedures
- Description of subsurface soil conditions
- Description of groundwater conditions
- Seismic site class on the subsurface exploration
- Earthwork recommendations including site/subgrade preparation
- Recommended foundation design parameters
- Estimated settlement of foundations
- Recommended soil subgrade design parameters for assumed gravel and concrete pavement

The geotechnical engineering Scope of Services for this project included the advancement of Cone Penetration Test (CPT) soundings, Macro-Core sampling, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and CPT sounding locations are shown on the [Site Location](#) and [Exploration Plan](#), respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the Macro-Core logs and as separate graphs and tables in the [Exploration Results](#) section.

Project Description

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

Item	Description
Information Provided	This proposal is based on an email from Mr. Nicholas Peaden with GUC received November 1, 2023. The email included a copy of the site boundary survey with proposed equipment & requested bore locations.
Project Description	The project includes a new substation on a 2-acre site.
Proposed Structure	The project includes a new substation with associated above-ground power lines.
Building Construction	Concrete drilled pier foundations are anticipated for the power lines. Mat foundations for transformers and small equipment pads are assumed.
Finished Floor Elevation	Not provided; finished ground elevations were assumed to be no more than 3 feet above or below existing grades.
Maximum Loads	Anticipated structural loads were not provided. In the absence of information provided by the design team, we used the following loads in estimating settlement based on our experience with similar projects. <ul style="list-style-type: none"> ■ Equipment: 150 to 495 kips (assumed) ■ Poles: 4,500 kip-feet overturning at ground surface (assumed)
Grading/Slopes	Approximately 2 feet of cut and 2 feet of fill will be required to develop final grade, excluding foundations, underground utilities, and stormwater system.
Pavements	We assume gravel sections will be used for the drive and equipment laydown areas. Concrete pavements will be used for ingress and egress areas.
Building Code	2018 North Carolina

Terracon should be notified if any of the above information is inconsistent with the planned construction, as modifications to our recommendations may be necessary.

Site Conditions

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

Item	Description
Parcel Information	The project is located at NCSR 1769 & NCSR 1755 in Greenville, North Carolina. The project parcel survey presents 2.0 acres in total size. See Site Location
Existing Improvements	According to information on Google Earth, the site is an agriculture farm since at least 1993. A structure existed on the parcel's southeast corner as evident by an image taken in March 1983. The structure appears to be razed sometime before January 1998.
Current Ground Cover	Earthen, vegetated
Existing Topography	According to information obtained from Pitt County GIS website and Google Earth, average elevation of the site is approximately 55 feet and only varies about 2 feet in elevation across the site.

Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based upon our review of the previous subsurface explorations by others, the recent Terracon subsurface explorations, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the [Exploration Results](#) and the GeoModel can be found in the [Figures](#) attachment of this report.

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

Model Layer	Layer Name	General Description
1	Coastal Plain – Silts and Clays	Fat clay (CH) and lean clay (CL) with variable amounts of sand and/or behaves like silts and clays
2	Coastal Plain - Sand	Behaves like sands – clean clayey to silty sand

The site is located within the Coastal Plain physiographic province. The Coastal Plain is typically characterized by marine, alluvial, and aeolian sediments that were deposited during periods of fluctuating sea levels and moving shorelines. Overburden soils include sedimentary marine and alluvial interbedded gravel, sand, silt, and clay. Many of the clays have been preconsolidated by desiccation from frequent rising and lowering of the sea level and groundwater table. Deeper basal formations are typical of those laid down in a shallow sloping sea bottom; dense sand, consolidated clay, limestone, chalk, marl, claystone, and sandstone.

The CPT soundings encountered groundwater or indications of groundwater at depths of 4 to 5 feet. Groundwater conditions may be different at the time of construction. Groundwater conditions may change because of seasonal variations in rainfall, runoff, and other conditions not apparent at the time of drilling. Long-term groundwater monitoring was outside the scope of services for this project.

Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration test (SPT) resistance (N-values), or undrained shear strength in accordance with the 2018 North Carolina Building Code. Based on the soil properties observed at the site and as described on the exploration logs and results, our professional opinion is that a **Seismic Site Classification of D** be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 50 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area.

Liquefaction

Liquefaction occurs when a rapid buildup in water pressure, caused by ground motion, pushes sand particles apart, resulting in a loss of strength and later densification as the water pressure dissipates. This loss of strength can cause bearing capacity failure while the densification can cause excessive settlement.

The amount of settlement is dependent on the magnitude and distance from a seismic event, and geologic age of the soil deposit. Our analysis based on subsurface information obtained indicates that the potential for liquefaction settlement is moderate with the soils encountered within the soil profile. Geophysical testing should be performed to confirm these conditions.

Geotechnical Overview

The borings in the substation area encountered silty clayey sand and sandy lean clay underlain by relatively denser sand.

We understand drilled piers are proposed as foundations for the poles. Shallow groundwater and sandy soils as encountered in the borings are conditions where caving of the sidewalls or “blow out” of the bottom can occur in the pier excavation. The “blow out” is caused by hydrostatic pressures causing water to flow upward into the excavation and lift soil from the bottom. Excavation for the piers utilizing slurry drilling techniques will reduce the potential blow out by counter-balancing the hydrostatic pressure.

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

Earthwork

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

Site Preparation

Prior to placing fill, existing vegetation, topsoil, and rootmat should be removed. Complete stripping of the topsoil and rootmat should be performed in the proposed substation.

After stripping, proofrolling should be performed on the exposed subgrade soils in areas to receive fill or at the subgrade elevation with a fully loaded, tandem-axle dump truck (20-ton minimum) or similar rubber-tired construction equipment. Proofrolling is recommended as a means of detecting areas of soft or unstable subgrade soils. The proofrolling should be performed during a period of dry weather to avoid degrading an otherwise suitable subgrade. The proofrolling operations should be observed by a representative of the geotechnical engineer. Subgrade soils that exhibit excessive rutting or deflection during proofrolling should be repaired as directed by the field representative. Typical repairs include overexcavation followed by replacement with either properly compacted fill or by a subgrade stabilization fabric in conjunction with a sand fill or crushed stone.

Subgrade Preparation

Structural fill placed beneath the entire footprint of the structures should extend horizontally a minimum distance of 5 feet beyond the outside edge of footings. On-site soils are considered suitable to be used as structural fill materials. Please note, however, that moisture-conditioning of on-site soils may be required to achieve adequate compaction.

The subgrade should be proofrolled with an adequately loaded vehicle (20 tons minimum) such as a tandem-axle or tri-axle dump truck. The proofrolling should be performed under the observation of the Geotechnical Engineer or representative. Areas excessively deflecting or considered unstable under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer. Such areas should either be removed or modified by treating/applying/mixing with lime or cement. Excessively wet or dry material should either be removed or moisture conditioned and recompacted.

Compacted structural fill soils should then be placed to the proposed design grade and the moisture content and compaction of subgrade soils should be maintained until foundation or pavement construction.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable; however, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Soil Stabilization

Very soft to soft near-surface soils were encountered in Borings B-1, B-5, and B-6. Stabilization of these soils will likely be required prior to fill placement or overlying construction in these areas and in other localized areas at the site.

Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction, removal of unstable materials and replacement with granular fill (with or without geosynthetics), and chemical stabilization. The appropriate method of improvement, if required, would be dependent on factors such as schedule, weather, the size of area to be stabilized, and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade stabilization occurs. Performing site grading operations during warm seasons and dry periods would help reduce the amount of subgrade stabilization required.

If the exposed subgrade is unstable during proofrolling operations, it could be stabilized using one of the methods outlined below.

- **Scarification and Recomaction** - It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.
- **Crushed Stone/Processed Fill** - The use of well-graded crushed stone or processed fill (i.e., screenings) is a common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 12 to 24 inches below finished subgrade elevation. The use of high modulus geotextiles (i.e., engineering fabric or geogrid) could also be considered after underground work such as utility construction is completed. Prior to placing the fabric or geogrid, we recommend that all below grade construction, such as utility line installation, be completed to avoid damaging the fabric or geogrid. Equipment should not be operated above the fabric or geogrid until one full lift of crushed stone fill is placed above it. The maximum particle size of granular material placed over geotextile fabric or geogrid should not exceed 1-1/2 inches.
- **Chemical Modification** - Improvement of subgrades with Portland cement or lime could be considered for improving unstable soils. Chemical modification should be performed by a pre-qualified contractor having experience with successfully stabilizing subgrades in the project area on similar sized projects with similar soil conditions. Results of chemical analysis of the additive materials should be provided to the geotechnical engineer prior to use. The hazards of chemicals blowing across the site or onto adjacent property should also be considered. Additional testing would be needed to develop specific recommendations to improve subgrade stability by blending chemicals with the site soils. Additional testing could include, but not be limited to, determining the most suitable stabilizing agent and the optimum amounts required.

Further evaluation of the need and recommendations for subgrade stabilization can be provided during construction as the geotechnical conditions are exposed.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below or within 10 feet of structures and pavements. General fill is material used to achieve grade outside of these areas.

Reuse of On-Site Soil: Excavated on-site soil may be selectively reused as fill. Please note, however, that moisture-conditioning of on-site soils may be required to achieve adequate compaction.

Material property requirements for on-site soil for use as general fill and structural fill are noted in the table below:

Property	General Fill	Structural Fill
Composition	Free of deleterious material	Free of deleterious material
Maximum particle size	6 inches (or 2/3 of the lift thickness)	3 inches
Fines content	Not limited	Not limited
Plasticity	Not limited	Maximum liquid limit of 50 Maximum plasticity index of 30

1. Based on subsurface exploration. Actual material suitability should be determined in the field at time of construction.

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, structural fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

Soil Type ¹	USCS Classification	Acceptable Parameters (for Structural Fill)
Low-Plasticity, Fine Grained Soil	CL, CL-ML ML	Liquid Limit less than 50 Plasticity index less than 30
Coarse-Grained Soil	GW, GP, GM, GC, SW, SP, SM, SC	Less than 50% passing No. 200 sieve Liquid Limit less than 50 Plasticity index less than 30
Select Granular Fill ²	SP, SP-SM, SW, or SW-SM	Less than 12% passing No. 200 sieve Plasticity index less than 10

1. Structural and general fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site. Additional geotechnical consultation should be provided prior to use of uniformly graded gravel (GP) on the site.
2. NCDOT Class II, Type 1 Select Material. Manufactured materials such as processed fill (i.e., screenings) meeting this specification can be used.

Fill Placement and Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	10 inches in loose thickness when heavy, self-propelled compaction equipment is used 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as structural fill
Minimum Compaction Requirements^{1,2,3}	95% of max. above foundations, below floor slabs	92% of max.
Water Content Range¹	Low-plasticity fine-grained soil: -3% to +3% of optimum High-plasticity fine-grained soil: 0 to +3% of optimum Coarse-grained soil: -3% to +3% of optimum	As required to achieve min. compaction requirements and stability

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. High plasticity fine grained fill should not be compacted to more than 100% of standard Proctor maximum dry density.
3. Materials not amenable to density testing should be placed and compacted to a stable condition observed by the Geotechnical Engineer or representative.

Grading and Drainage

All grades must provide effective drainage away from the structures during and after construction and should be maintained throughout the life of the structure. Water retained next to the structures can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements and cracked slabs.

Earthwork Construction Considerations

Subgrade Protection

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab and pavement construction.

In order to provide a stable subgrade at the bottom of the anticipated substation excavation during construction, we recommend either placing a concrete mud mat, a layer of compacted ABC or crushed concrete, or cement-stabilized soil. Geosynthetics may also be beneficial in providing a stable construction subgrade, depending on the effectiveness of the contractor's dewatering system and the subgrade conditions at the time of construction.

Construction Dewatering

The groundwater table could affect excavation efforts, especially for foundation construction and subgrade stabilization. A temporary dewatering system consisting of sumps with pumps may be necessary to achieve the required depth of excavation and recommended depth of subgrade stabilization depending on groundwater conditions at the time of construction.

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. However, some of the utility excavations will likely encounter groundwater. The contractor should be prepared to remove any 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.

If design grades, footing depths, pile cap depths, or other below-grade structures required excavation more than 10 feet below the existing ground surface, additional dewatering measures such as well points, wells, and/or sheet pile cutoff walls may be necessary.

The responsibility for dewatering of construction excavations and preventing excessive settlement of existing structures and other site features due to dewatering should lie solely with the contractor.

This information is provided only as a service and under no circumstance should Terracon be assumed to be responsible for the effectiveness of the construction dewatering method(s) selected by the contractor.

Excavation Safety

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

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

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of structural fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of structural fill in the building areas and 5,000 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 100 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. A representative of the geotechnical engineer should use a combination of hand auger borings and dynamic cone penetrometer (DCP) testing to determine the suitability of the bearing materials for the design bearing pressure. DCP testing should be performed to a depth of 3 to 5 feet below the bottom of foundation excavation. If unanticipated conditions are observed, the Geotechnical Engineer should recommend mitigation options.

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

Mat Foundations

If the site has been prepared in accordance with the requirements noted in [Earthwork](#), the following design parameters are applicable for the substation mat foundations. Equipment pads with maximum plan dimensions of 12 feet x 12 feet can be designed using the parameters in the following table.

Description	Value
Maximum Net allowable bearing pressure	1,000 psf
The required embedment below lowest adjacent finished grade for frost protection and protective embedment ¹	7 inches
Modulus of subgrade reaction (k_v)	10 pounds per square inch per inch (psi/in)
Estimated approximate total settlement ²	Up to 1 inch
Estimated differential settlement ²	Up to ½ inch
Ultimate coefficient of sliding friction	0.35
Uplift Resistance	Weight of foundation concrete.

1. For frost protection and to reduce effects of seasonal moisture variations in subgrade soils.
2. The actual magnitude of settlement that will occur beneath the foundations will depend upon the variations within the subsurface soil profile, the structural loading conditions and the quality of the foundation excavation. The estimated total and differential settlements listed assume that the foundation-related earthwork and the foundation design are completed in accordance with our recommendations.

The subgrade modulus (K_v) for the mat is affected by the size of the mat foundation and would vary according to the following equation:

$$K_v = K_{v1} * ((B+1)/2B)^2$$

where: K_v is the modulus for the size footing being analyzed
B is the width of the mat foundation.

Mat Construction Considerations

The mat foundation subgrade should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the subgrade soils become excessively disturbed or saturated, the affected soil should be removed prior to placing concrete.

The foundation bearing materials should be further evaluated at the time of the foundation excavation. A representative of the geotechnical engineer should use a combination of hand auger borings and dynamic cone penetrometer (DCP) testing to determine the suitability of the bearing materials for the design bearing pressure. Excessively soft, loose, or wet bearing soils should be overexcavated to a depth recommended by the geotechnical engineer. The footings could then bear directly on these soils at the lower level, NCDOT No. 57 stone that is wrapped on all sides with a filter fabric and tamped, or the excavated soils could be replaced with compacted engineered fill as described in this report.

Drilled Pier Foundations

Drilled Pier Design Parameters

The upper 3 feet of surficial material should be ignored due to the potential effects of frost action and construction disturbance. To avoid a reduction in uplift and lateral resistance caused by variable soil depths and quality, we recommend that a minimum pier length be stated on the design drawings.

The poles are to be supported by drilled piers installed with the slurry method of drilling to help prevent blow out. Design parameters for the lateral resistance and end bearing capacity of drilled piers are presented in [Design Soil Parameters for Drilled Piers](#).

Drives and Parking Areas

Subgrade Preparation

On most project sites, the site grading is accomplished relatively early in the construction phase. Fills are typically placed and compacted in a uniform manner. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall/snow melt. As a result, the aggregate-surfaced roadway or parking area subgrade may not be suitable for construction and corrective action will be required.

The subgrade should be carefully evaluated at the time of construction for signs of disturbance or instability. We recommend the subgrade be thoroughly proofrolled with a loaded tandem-axle dump truck prior to final grading. All aggregate-surfaced roadway or parking subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the aggregate surfacing.

Design Recommendations

Roadway thickness design is dependent upon:

- The anticipated traffic conditions during the life of the pavement
- Subgrade and paving material characteristics
- Climatic conditions of the region

Based on empirical data and our experience with similar soils, we selected a design CBR value of 4.0 for the roadway subgrade. As previously noted, we expect the road to service occasional maintenance vehicles and potentially emergency service vehicles. A traffic loading of 2,500 18-kip equivalent single axle loads (ESALs) over an assumed design life of 20 years was assumed in our pavement design.

In consideration of these factors, we recommend a section of 12 inches of compacted crushed aggregate base course (NCDOT ABC) is suitable for this site. Base course materials should conform to the North Carolina Department of Transportation (NCDOT ABC).

Aggregate-surfaced roadways performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of aggregate-surfaced roadways:

- Site grades should slope a minimum of 10 percent away from the roadways;
- The subgrade and the aggregate-surfaced roadways have a minimum 10 percent slope to promote proper surface drainage;
- Consider appropriate edge drainage; and
- Install pavement drainage in surrounding areas anticipated for frequent wetting.

Ingress and Egress Pavement Sections

For areas subject to concentrated and repetitive loading conditions, i.e. ingress and egress areas, we recommend using a Portland cement concrete pavement with a thickness of at least 7 inches underlain by at least 4 inches of aggregate base course (ABC). Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

Concrete pavement sections should be checked for concentrated loading conditions. A modulus of subgrade reaction of 150 pci can be used for the subgrade soils. The value was empirically derived based upon our experience with the subgrade soils and our expectation of the quality of the subgrade as prescribed by the conditions as outlined in **Earthwork**. A modulus of rupture of 600 psi can be used for the concrete (based on correlations with a minimum 28-day compressive strength of 4,000 psi).

Although not required for structural support, a minimum 4-inch thick base course layer is recommended to help reduce potential for slab curl, shrinkage cracking, and subgrade pumping through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its "green" state typically reduces the potential for micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.

Maintenance

Periodic maintenance extends the service life of the aggregate-surfaced roadways and parking areas and should include re-grading and replacement of aggregate base course in any deteriorated areas. Thicker aggregate base course sections could be used to reduce the required maintenance and extend the service life of the aggregate-surfaced roadways. Design alternatives which could reduce the risk of subgrade saturation and improve long-term performance include installing surface drains next to any areas where surface water could pond. Properly designed and constructed subsurface drainage will reduce the time subgrade soils are saturated and can also improve subgrade strength and performance.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction.

Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

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

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

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Geotechnical Engineering Report

Fox Pen Road Substation | Greenville, North Carolina

December 22, 2023 | Terracon Project No. 72235120

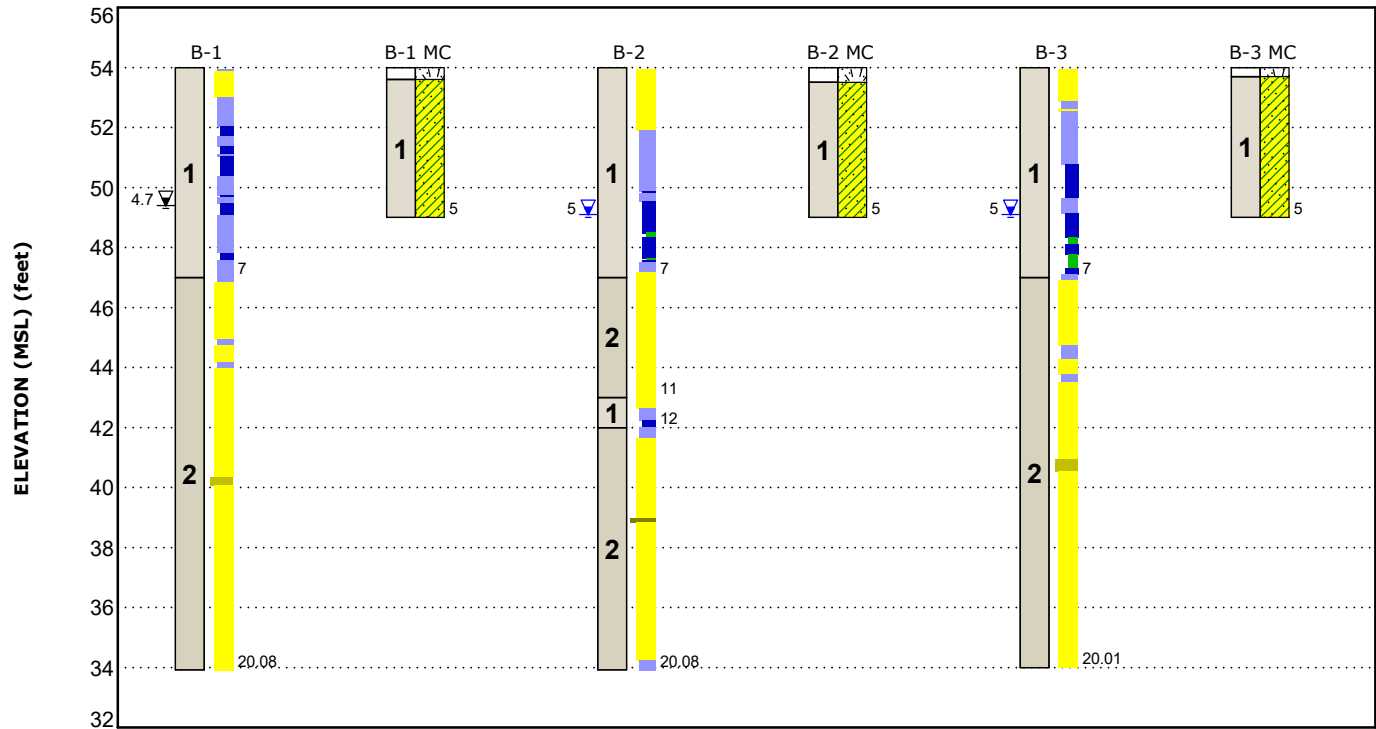


Figures

Contents:

GeoModel

GeoModel



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

Model Layer	Layer Name	General Description	Legend	
1	Coastal Plain - Silts and Clays	Sampled as fat clay (CH) & lean clay (CL) with variable amounts of sand and/or behaves like silts and clays	Topsoil	Sandy Lean Clay
2	Coastal Plain - Sand	Behaves like sands - clean to silty sand		

- 1 Sensitive, fine grained

2 Organic soils - clay

3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay

5 Sand mixtures - silty sand to sandy silt




6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand










8 Very stiff sand to clayey sand

9 Very stiff fine grained

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

[illegible]

Model Layer	Layer Name	General Description	Legend	
1	Coastal Plain - Silts and Clays	Sampled as fat clay (CH) & lean clay (CL) with variable amounts of sand and/or behaves like silts and clays	 Topsoil	 Silty Clayey Sand
2	Coastal Plain - Sand	Behaves like sands - clean to silty sand	 Sandy Lean Clay	

- | | | | | | |
|---|---|---|--|---|------------------------------------|
|  | 1 Sensitive, fine grained |  | 2 Organic soils - clay |  | 3 Clay - silty clay to clay |
|  | 4 Silt mixtures - clayey silt to silty clay |  | 5 Sand mixtures - silty sand to sandy silt |  | 6 Sands - clean sand to silty sand |
|  | 7 Gravelly sand to dense sand |  | 8 Very stiff sand to clayey sand |  | 9 Very stiff fine grained |

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

Geotechnical Engineering Report

Fox Pen Road Substation | Greenville, North Carolina

December 22, 2023 | Terracon Project No. 72235120



Attachments

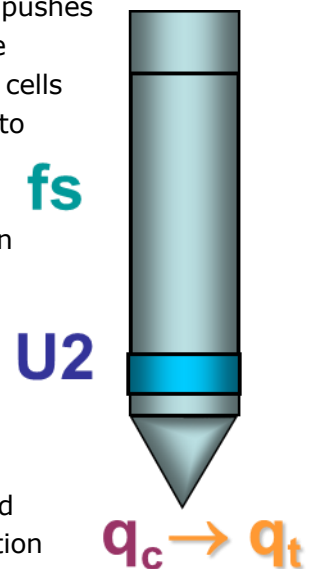
Exploration and Testing Procedures

Field Exploration

Number of CPT Soundings	Approximate CPT Sounding Depths (feet)	Location
6	17 to 50	substation

CPT Sounding Layout and Elevations: Terracon personnel provided the CPT sounding layout using handheld GPS equipment (estimated horizontal accuracy of about ± 10 feet) and referencing existing site features. Approximate ground surface elevations were obtained by interpolation from the Pitt County GIS website.

Cone Penetration Testing (CPT) Procedures: The CPT hydraulically pushes an instrumented cone through the soil while nearly continuous readings are recorded to a portable computer. The cone is equipped with electronic load cells to measure tip resistance and sleeve resistance and a pressure transducer to measure the generated ambient pore pressure. The face of the cone has an apex angle of 60° and an area of 10 cm^2 . Digital data representing the tip resistance, friction resistance, pore water pressure, and probe inclination angle are recorded about every 2 centimeters while advancing through the ground at a rate between $1\frac{1}{2}$ and $2\frac{1}{2}$ centimeters per second. These measurements are correlated to various soil properties used for geotechnical design. No soil samples are gathered through this subsurface investigation technique.



CPT testing is conducted in general accordance with ASTM D5778 "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils." Upon completion, the data collected was downloaded and processed by geotechnical staff.

Macro-Core soil samples were obtained using the CPT rig in the upper 5 feet at Borings B-01 through B-06. The samples were taken to our soil laboratory for testing and were classified by geotechnical staff.

Laboratory Testing

Geotechnical staff reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

Geotechnical Engineering Report

Fox Pen Road Substation | Greenville, North Carolina
December 22, 2023 | Terracon Project No. 72235120



- Moisture Content
- Atterberg Limits
- Grain Size Analysis

The laboratory testing program included examination of soil samples by geotechnical staff. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Site Location and Exploration Plans

Contents:

Site Location Plan

Exploration Plan

Note: All attachments are one page unless noted above.

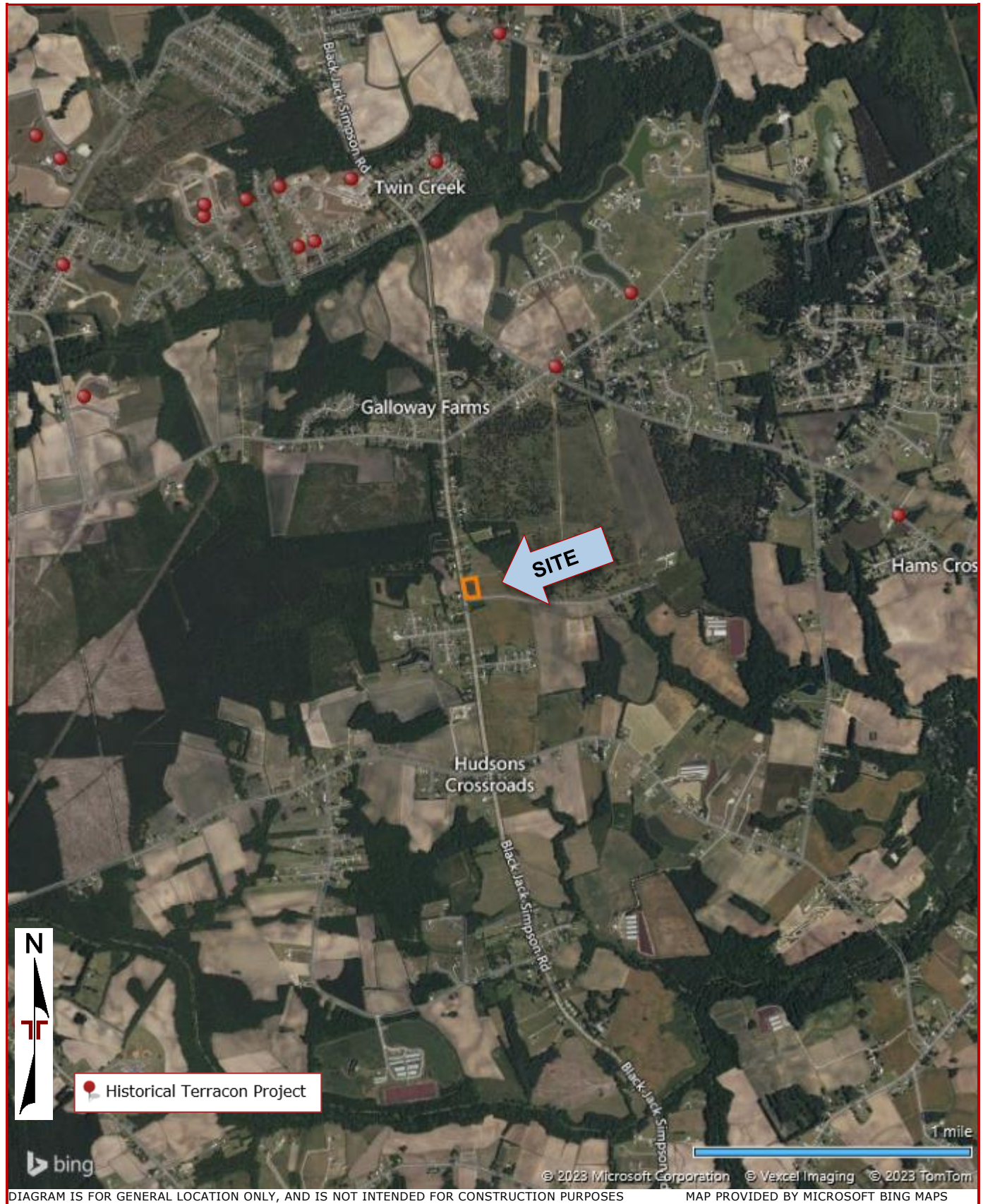
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Site Location



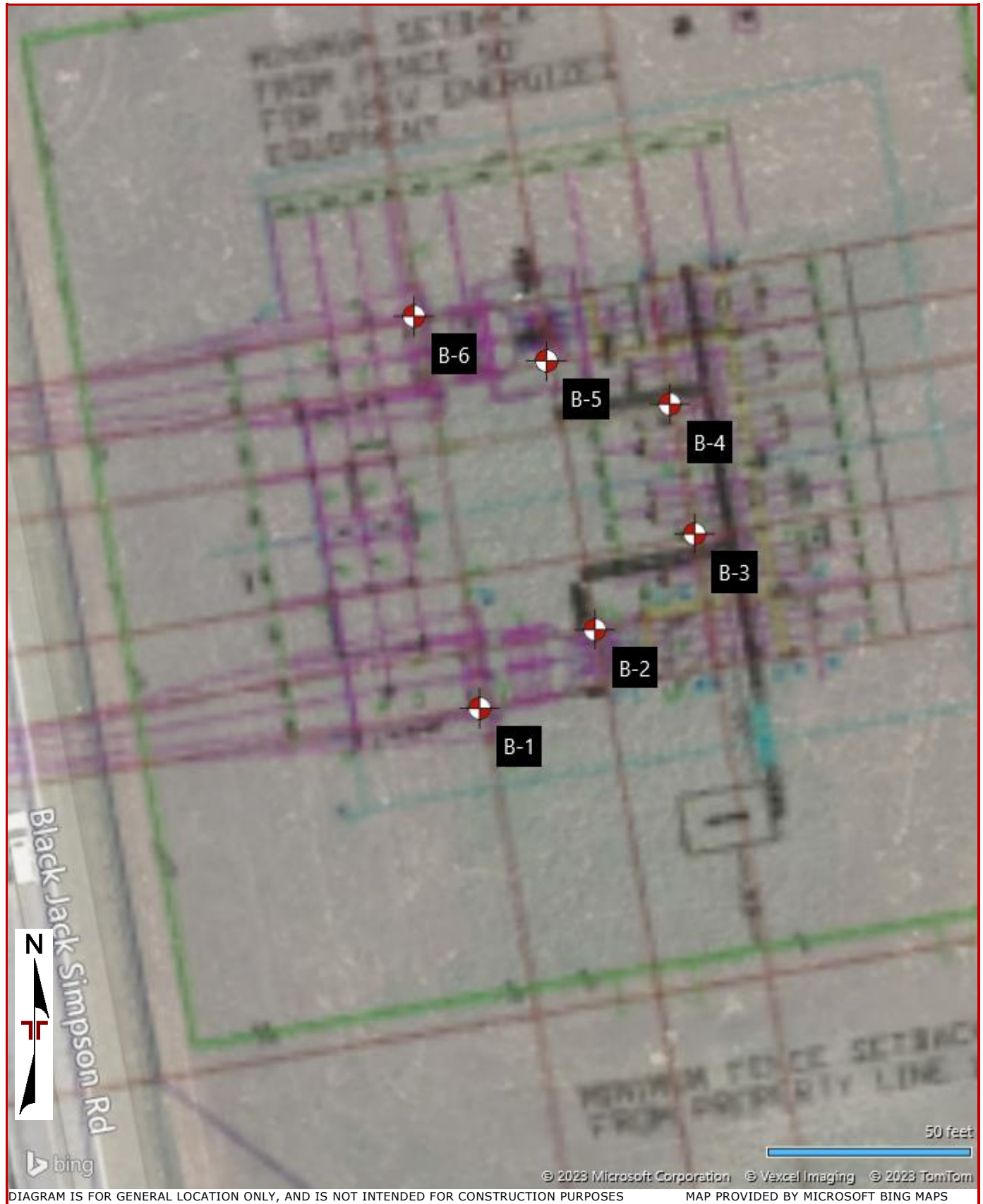
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Exploration Plan



Exploration and Laboratory Results

Contents:

CPT Logs

Macro-Core Logs

Atterberg Limits

Grain Size Distribution

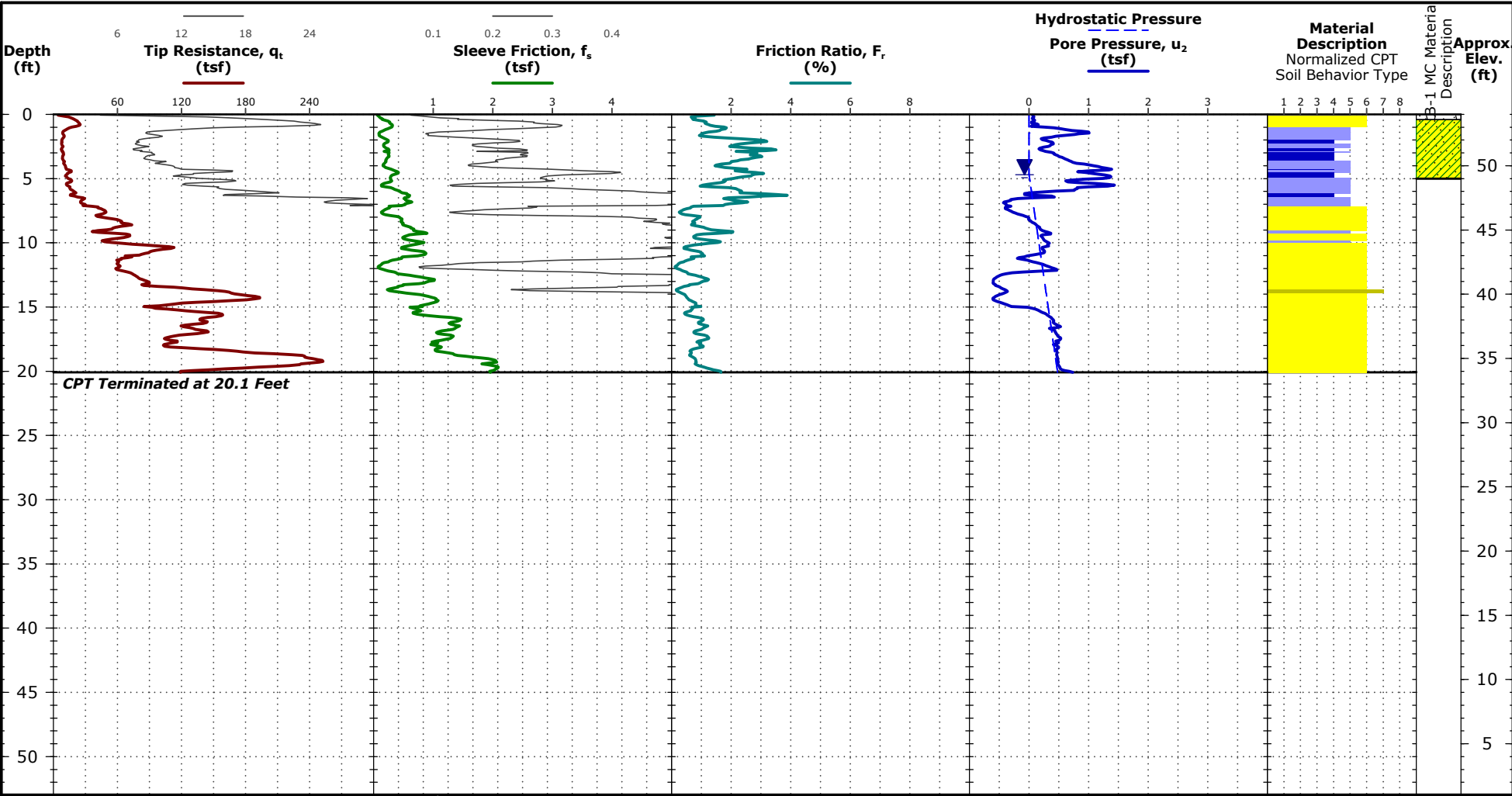
Note: All attachments are one page unless noted above.

CPT Sounding ID B-1

Elevation: 54 (ft) +/-
Elevation Reference: Elevations were estimated from Pitt County GIS website.

Latitude: 35.5389° Longitude: -77.2613°

CPT Started: 12/8/2023
CPT Completed: 12/8/2023



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Test Location: See [Exploration Plan](#)
See B-1 MC for the adjacent test's full details.
Topsoil = 5 inches
Cave = 4.8ft, dry

CPT Equipment

CPT Rig: Geoprobe
Operator: R. Rascot - Bridger
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5944 with net area ratio of 0.84
Manufactured by Geotech A.B.- Calibrated 3/20/2023
Tip and sleeve areas of 10 cm² and 150 cm²

Water Level Observation

▼ 4.7 ft estimated water depth
(used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

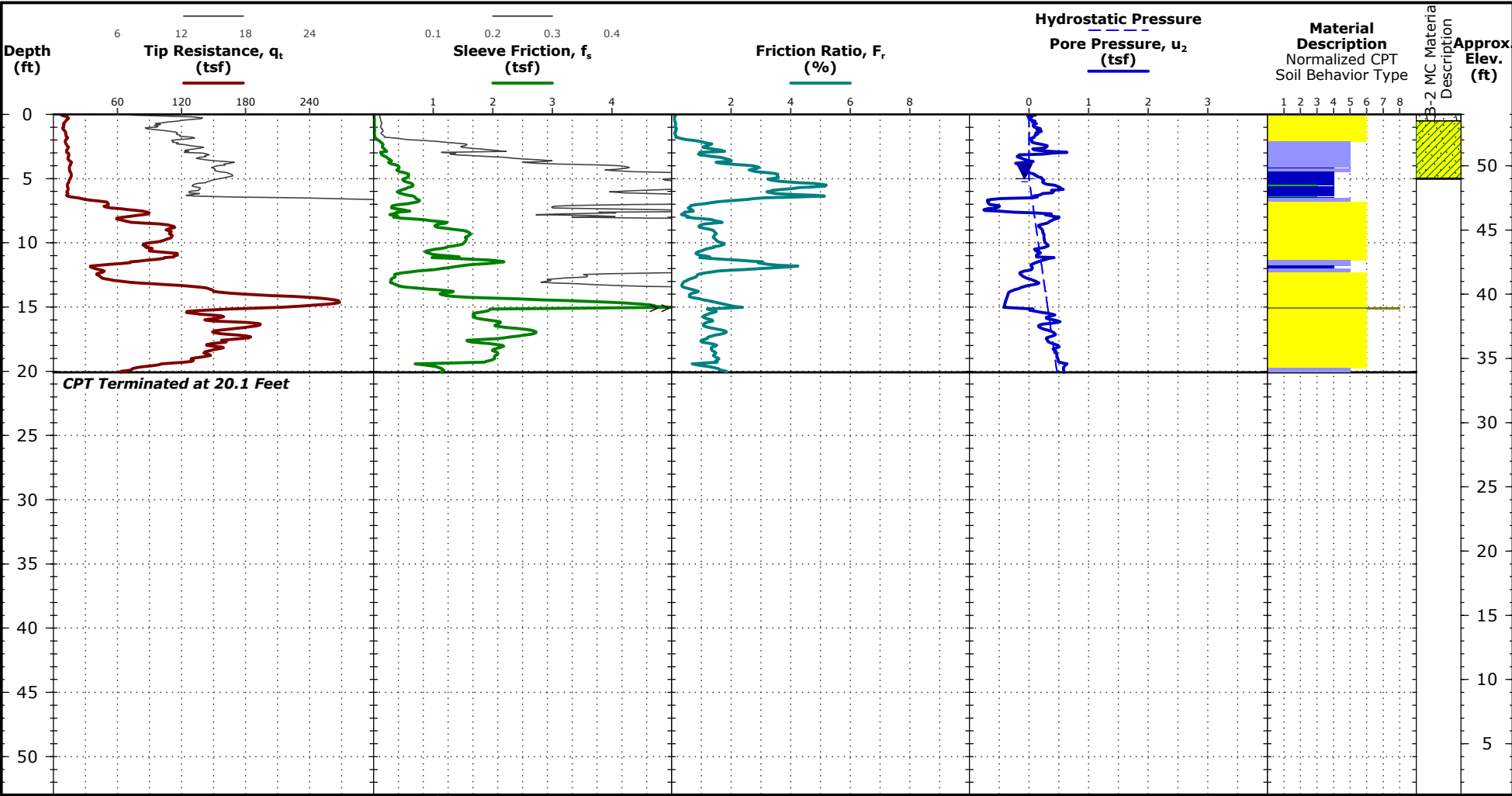
- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

CPT Sounding ID B-2

Elevation: 54 (ft) +/-
Elevation Reference: Elevations were estimated from Pitt County GIS website.

Latitude: 35.5389° Longitude: -77.2612°

CPT Started: 12/8/2023
CPT Completed: 12/8/2023



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Test Location: See [Exploration Plan](#)
See B-2 MC for the adjacent test's full details.
Topsoil = 6 inches
Water = 5ft, Cave = 5.5ft

CPT Equipment

CPT Rig: Geoprobe
Operator: R. Rascot - Bridger
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5944 with net area ratio of 0.84
Manufactured by Geotech A.B.- Calibrated 3/20/2023
Tip and sleeve areas of 10 cm² and 150 cm²

Water Level Observation

5 ft measured water depth
(used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

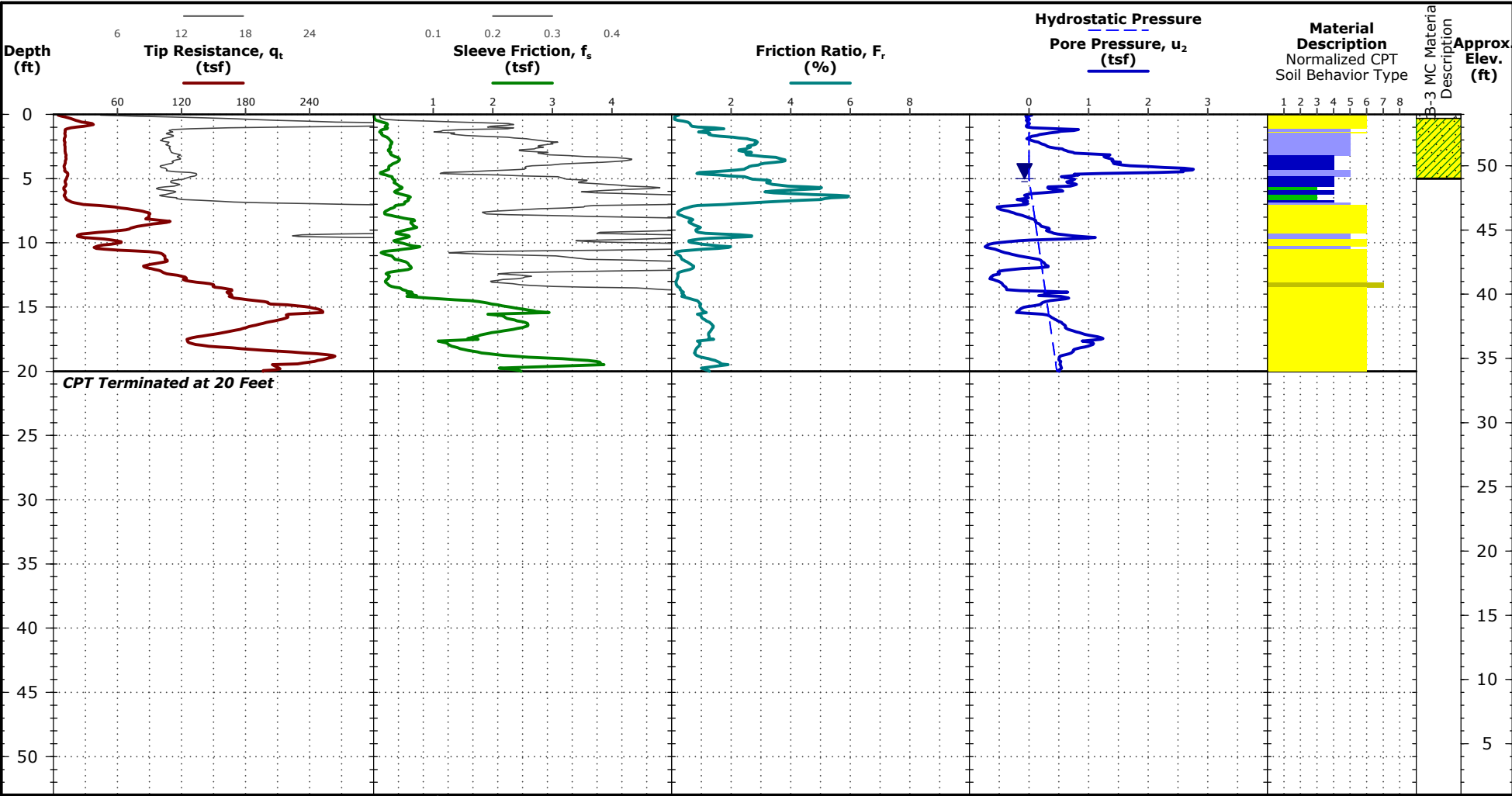
- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

CPT Sounding ID B-3

Elevation: 54 (ft) +/-
Elevation Reference: Elevations were estimated from Pitt County GIS website.

Latitude: 35.5390° Longitude: -77.2611°

CPT Started: 12/8/2023
CPT Completed: 12/8/2023



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Test Location: See [Exploration Plan](#)
See B-3 MC for the adjacent test's full details.
Topsoil = 4 inches
Water = 5ft, Cave = 5ft

CPT Equipment

CPT Rig: Geoprobe
Operator: R. Rascot - Bridger
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5944 with net area ratio of 0.84
Manufactured by Geotech A.B.- Calibrated 3/20/2023
Tip and sleeve areas of 10 cm² and 150 cm²

Water Level Observation

▼ 5 ft measured water depth
(used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

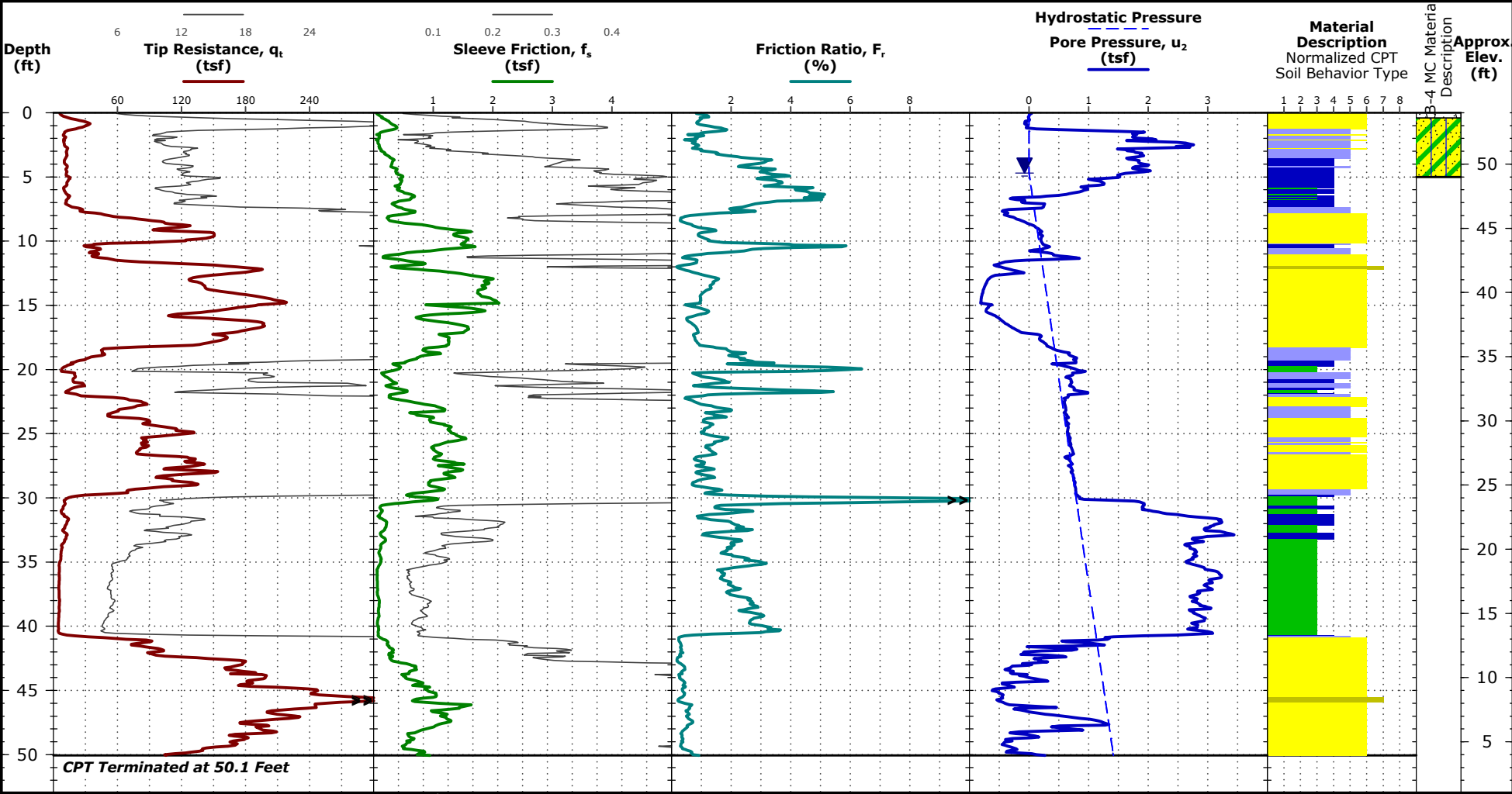
- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

CPT Sounding ID B-4

Latitude: 35.5391° Longitude: -77.2612°

Elevation: 54 (ft) +/-
Elevation Reference: Elevations were estimated from Pitt County GIS website.

CPT Started: 12/8/2023
CPT Completed: 12/8/2023



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes
Test Location: See [Exploration Plan](#)
See B-4 MC for the adjacent test's full details.
Topsoil = 5 inches
Cave = 4.6ft, dry

CPT Equipment
CPT Rig: Geoprobe
Operator: R. Rascot - Bridger
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5944 with net area ratio of 0.84
Manufactured by Geotech A.B.- Calibrated 3/20/2023
Tip and sleeve areas of 10 cm² and 150 cm²

Water Level Observation
4.7 ft estimated water depth
(used in normalizations and correlations)

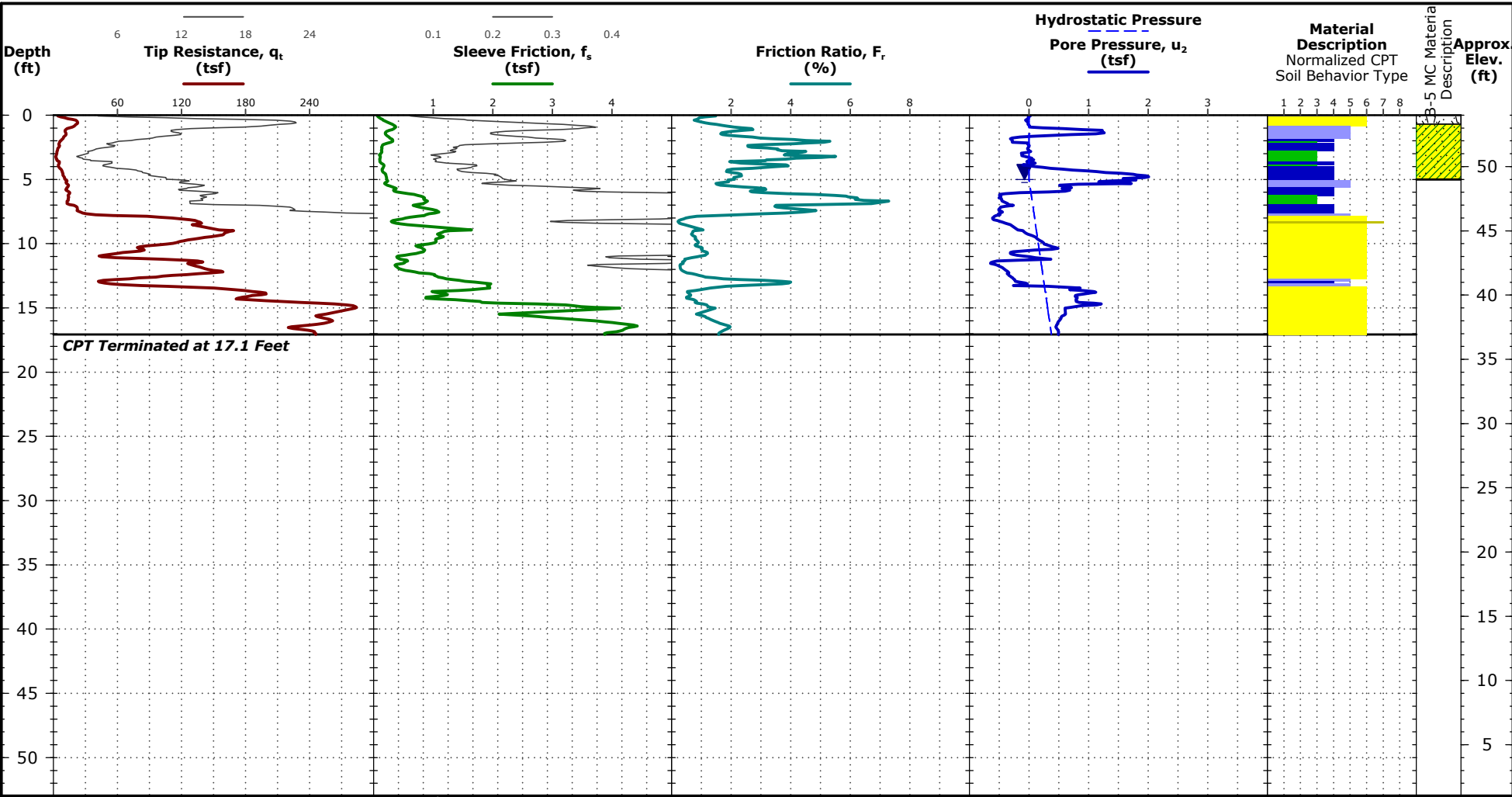
Normalized Soil Behavior Type (Robertson 1990)
1 Sensitive, fine grained
2 Organic soils - clay
3 Clay - silty clay to clay
4 Silt mixtures - clayey silt to silty clay
5 Sand mixtures - silty sand to sandy silt
6 Sands - clean sand to silty sand
7 Gravelly sand to dense sand
8 Very stiff sand to clayey sand
9 Very stiff fine grained

CPT Sounding ID B-5

Elevation: 54 (ft) +/-
Elevation Reference: Elevations were estimated from Pitt County GIS website.

Latitude: 35.5391° Longitude: -77.2613°

CPT Started: 12/8/2023
CPT Completed: 12/8/2023



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Test Location: See [Exploration Plan](#)
See B-5 MC for the adjacent test's full details.
Topsoil = 7 inches
Water = 5ft, Cave = 6ft

CPT Equipment

CPT Rig: Geoprobe
Operator: R. Rascot - Bridger
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5944 with net area ratio of 0.84
Manufactured by Geotech A.B.- Calibrated 3/20/2023
Tip and sleeve areas of 10 cm² and 150 cm²

Water Level Observation

5 ft measured water depth
(used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

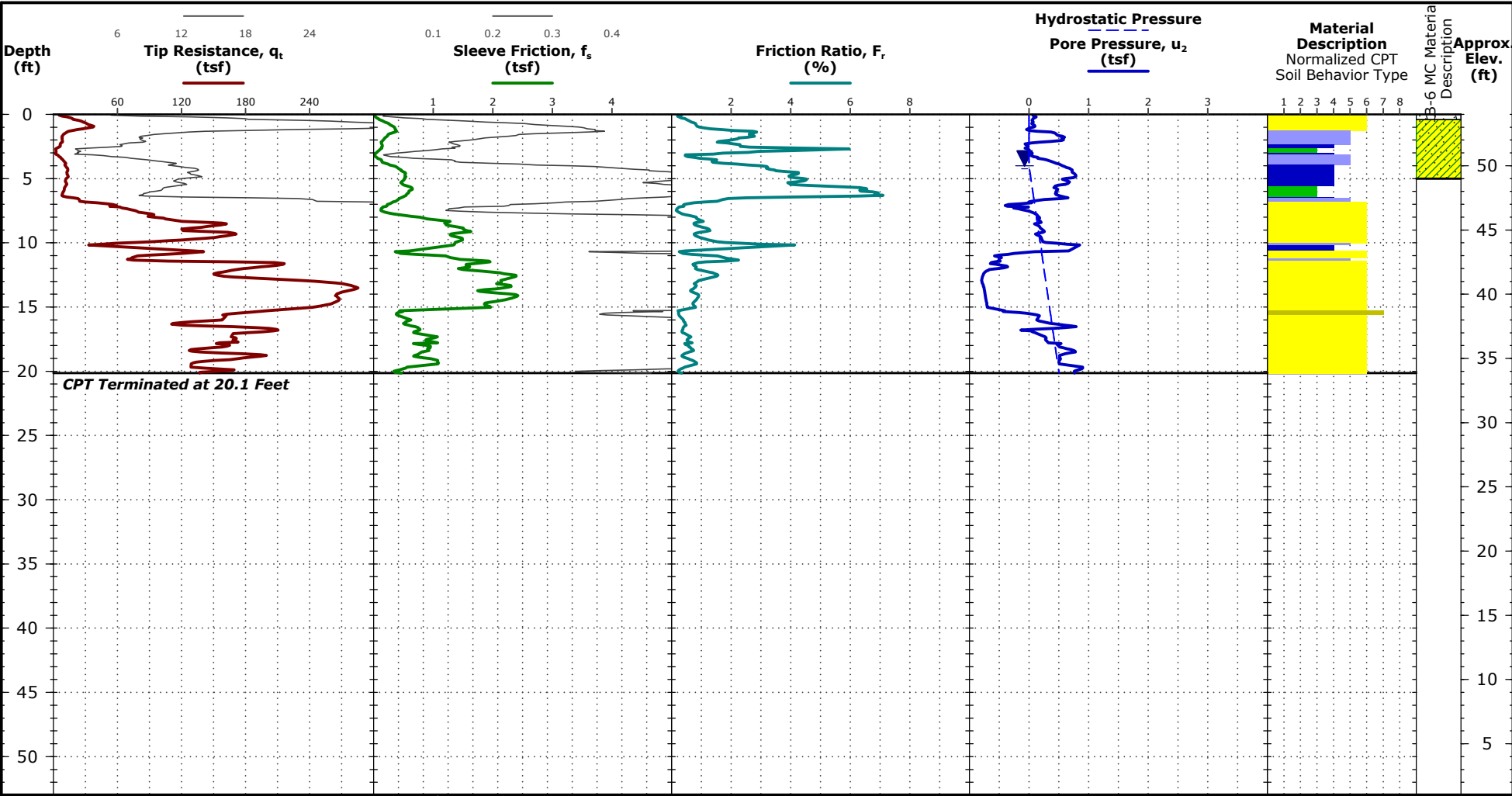
- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

CPT Sounding ID B-6

Elevation: 54 (ft) +/-
Elevation Reference: Elevations were estimated from Pitt County GIS website.

Latitude: 35.5391° Longitude: -77.2614°

CPT Started: 12/8/2023
CPT Completed: 12/8/2023



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data, if any.
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Test Location: See [Exploration Plan](#)
See B-6 MC for the adjacent test's full details.
Topsoil = 5 inches
Water = 4ft, Cave = 5.5ft

CPT Equipment

CPT Rig: Geoprobe
Operator: R. Rascot - Bridger
Auger anchors used as reaction force
CPT sensor calibration reports available upon request
Probe No. 5944 with net area ratio of 0.84
Manufactured by Geotech A.B.- Calibrated 3/20/2023
Tip and sleeve areas of 10 cm² and 150 cm²



Water Level Observation

4 ft measured water depth
(used in normalizations and correlations)

Normalized Soil Behavior Type (Robertson 1990)

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

Boring Log No. B-1 MC

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.5389° Longitude: -77.2613° Depth (Ft.) Elevation: 54 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits	Percent Fines
							LL-PL-PI	
		TOPSOIL , 5 inches 0.4 53.6						
1		SANDY LEAN CLAY (CL) , brown and gray with wood fragments 5.0 49	1 2 3 4 5			20.7	21-11-10	52
		Boring Terminated at 5 Feet						

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Elevation Reference: Elevations were estimated from Pitt County GIS website.

Water Level Observations

See CPT log (B-1)

Drill Rig
Geoprobe

Driller
R. Rascot - Bridger

Logged by
G. Goslin



Boring Started
12-08-2023

Boring Completed
12-08-2023



Advancement Method
Macrocore

Abandonment Method

Boring Log No. B-2 MC

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.5389° Longitude: -77.2612° Depth (Ft.) Elevation: 54 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits	Percent Fines
							LL-PL-PI	
		TOPSOIL , 6 inches						
		0.553.5						
1		SANDY LEAN CLAY (CL) , brown and gray	1					
			2					
			3					
			4					
		5.049	5					
		Boring Terminated at 5 Feet						
<p>See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.</p>			Water Level Observations See CPT log (B-2)			Drill Rig Geoprobe		
Notes Elevation Reference: Elevations were estimated from Pitt County GIS website.			Advancement Method Macrocore			Driller R. Rascot - Bridger		
			Abandonment Method			Logged by G. Goslin		
						Boring Started 12-08-2023		
						Boring Completed 12-08-2023		

Boring Log No. B-3 MC

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.5390° Longitude: -77.2611° Depth (Ft.) Elevation: 54 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits	Percent Fines
							LL-PL-PI	
		TOPSOIL , 4 inches 0.3 53.7						
1		SANDY LEAN CLAY (CL) , brown and gray 5.0 49	1 2 3 4 5			16.3	25-13-12	54
		Boring Terminated at 5 Feet						

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Elevation Reference: Elevations were estimated from Pitt County GIS website.

Water Level Observations

See CPT log (B-3)

Drill Rig
Geoprobe

Driller
R. Rascot - Bridger

Logged by
G. Goslin



Boring Started
12-08-2023

Boring Completed
12-08-2023

Advancement Method
Macrocore

Abandonment Method

Boring Log No. B-4 MC

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.5391° Longitude: -77.2612° Depth (Ft.) Elevation: 54 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits	Percent Fines
							LL-PL-PI	
		TOPSOIL , 5 inches 0.4 53.6						
2		SILTY CLAYEY SAND (SC-SM) , brown and gray 5.0 49	1 2 3 4 5			13.6	18-11-7	47
		Boring Terminated at 5 Feet						

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Elevation Reference: Elevations were estimated from Pitt County GIS website.

Water Level Observations

See CPT log (B-4)

Drill Rig
Geoprobe

Driller
R. Rascot - Bridger

Logged by
G. Goslin

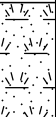
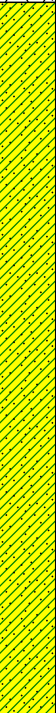
Boring Started
12-08-2023

Boring Completed
12-08-2023



Advancement Method
Macrocore

Abandonment Method

Boring Log No. B-5 MC

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.5391° Longitude: -77.2613° Depth (Ft.) Elevation: 54 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits	Percent Fines
							LL-PL-PI	
		TOPSOIL , 7 inches 0.753.3						
1		SANDY LEAN CLAY (CL) , brown and gray 5.049	1 2 3 4 5					
		Boring Terminated at 5 Feet						
<p>See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.</p> <p>Notes Elevation Reference: Elevations were estimated from Pitt County GIS website.</p>			<p>Water Level Observations See CPT log (B-5)</p> <p>Advancement Method Macrocore</p> <p>Abandonment Method</p>			<p>Drill Rig Geoprobe</p> <p>Driller R. Rascot - Bridger</p> <p>Logged by G. Goslin</p> <p>Boring Started 12-08-2023</p> <p>Boring Completed 12-08-2023</p>		

Boring Log No. B-6 MC

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.5391° Longitude: -77.2614° Depth (Ft.) Elevation: 54 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Water Content (%)	Atterberg Limits	Percent Fines
							LL-PL-PI	
		TOPSOIL , 5 inches 0.4 53.6						
1		SANDY LEAN CLAY (CL) , brown and gray 5.0 49	1 2 3 4 5			17.8	25-12-13	51
		Boring Terminated at 5 Feet						

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Elevation Reference: Elevations were estimated from Pitt County GIS website.

Water Level Observations

See CPT log (B-6)

Drill Rig
Geoprobe

Driller
R. Rascot - Bridger

Logged by
G. Goslin

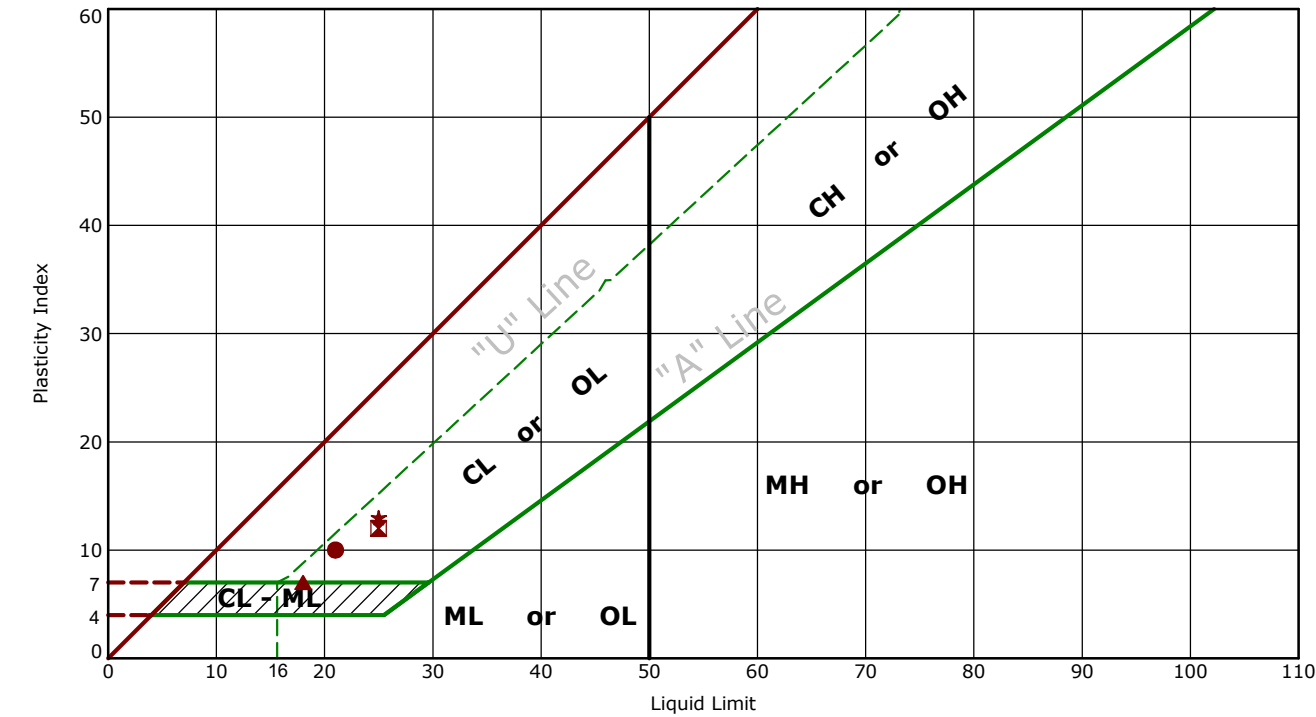
Boring Started
12-08-2023

Boring Completed
12-08-2023

Advancement Method
Macrocore

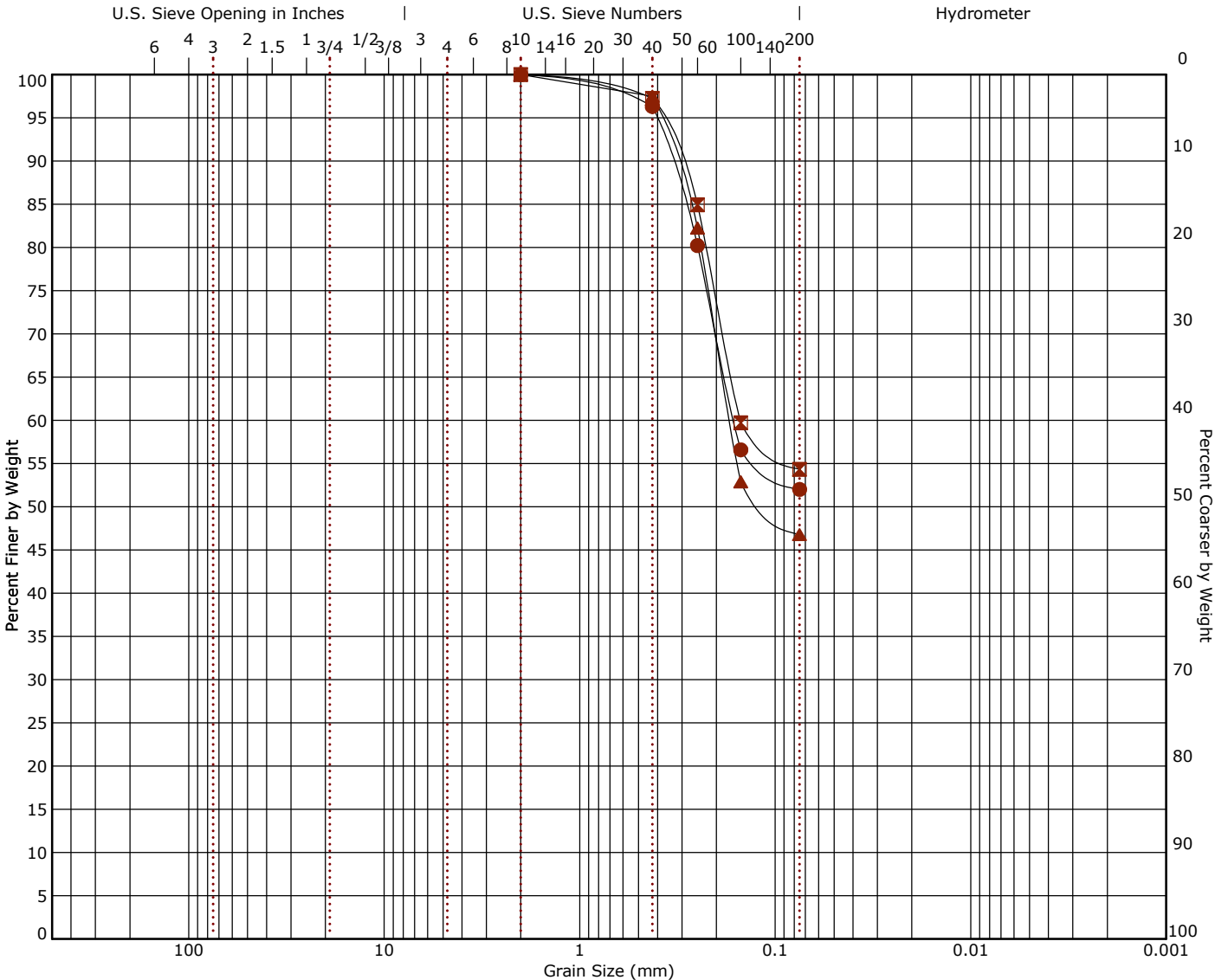
Abandonment Method

Atterberg Limit Results
ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-1 MC	0.4 - 2	21	11	10	52.0	CL	SANDY LEAN CLAY
⊠	B-3 MC	0.3 - 2	25	13	12	54.3	CL	SANDY LEAN CLAY
▲	B-4 MC	0.4 - 2	18	11	7	46.8	SC-SM	SILTY, CLAYEY SAND
★	B-6 MC	0.4 - 2	25	12	13	50.9	CL	SANDY LEAN CLAY

Grain Size Distribution
ASTM D422 / ASTM C136



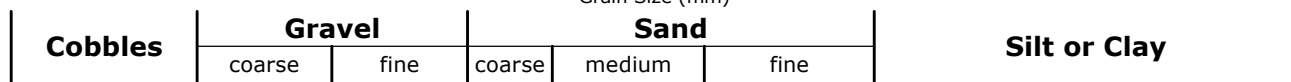
		Gravel		Sand			Silt or Clay	
		coarse	fine	coarse	medium	fine		
Boring ID	Depth	% Cobbles	% Gravel	% Sand	% Fines	% Silt	% Clay	USCS
● B-1 MC	0.4 - 2	0.0	0.0	48.0	52.0			CL
☒ B-3 MC	0.3 - 2	0.0	0.0	45.7	54.3			CL
▲ B-4 MC	0.4 - 2	0.0	0.0	53.2	46.8			SC-SM

Description	●	☒	▲	Grain Size		
	Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
● SANDY LEAN CLAY	#10	100.0	#10	100.0	#10	100.0
☒ SANDY LEAN CLAY	#40	96.29	#40	97.26	#40	97.49
▲ SILTY, CLAYEY SAND	#60	80.22	#60	84.93	#60	82.24
	#100	56.58	#100	59.71	#100	52.89
	#200	52.0	#200	54.34	#200	46.79

Remarks	Coefficients		
	●	☒	▲
●			
☒			
▲			

	●	☒	▲
D ₆₀	0.162	0.151	0.17
D ₃₀			
D ₁₀			
C _c			
C _u			

ASTM D422 / ASTM C136



Description		●						Grain Size			
●	SANDY LEAN CLAY	Sieve	% Finer	Sieve	% Finer	Sieve	% Finer		●		
		#10	100.0					D ₆₀	0.159		
		#40	97.8					D ₃₀			
		#60	84.69								
		#100	56.7					D ₁₀			
		#200	50.9								
Remarks								Coefficients			
●									●		
								C _c			
								C _u			

Design Soil Parameters for Drilled Piers

Applicable to the following tables:

- The thickness of the bottom layer is undetermined due to the boring termination depth.
- Soil classifications are based on visual examination of soil samples.
- We have considered groundwater at a depth of 4 to 5 feet.
- The upper 3 feet of soil profile should be reduced or ignored due to surface disturbance and frost action.
- AASHTO LRFD design values with a resistance factor (factored loads) have been provided for use with the design.
- The noted bearing pressure should be considered applicable to a depth 25 feet below the existing ground surface, this allows for 5 feet of data below the maximum tip depth of the shaft assuming shaft diameters of approximately 36 inches. Should it be necessary to extend the shaft bottom below that depth or increase the diameter of the shaft at a depth of 25 feet, we recommend that a supplemental exploration be performed to collect deeper soil data.

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**Boring B-1**

Layer (feet)		Soil Type	Effective Unit Weight of Soil (pcf)	Cohesion (ksf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom							
0	5	Clay	105	---	---	---	---	---
5	6.5	Sand	47.6	0.5	1.55	28	240	3,600
6.5	13.5	Sand	47.6	---	1.94	30	400	9,000
13.5	18.5	Sand	57.6	---	2.18	32	640	10,000
18.5	30	Sand	62.6	---	2.14	34	910	10,000

1. General notes applicable to the above values are included at the beginning of this section.

Boring B-2

Layer (feet)		Soil Type	Effective Unit Weight of Soil (pcf)	Cohesion (ksf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom							
0	5	Clay	105	---	---	---	---	---
5	8.5	Sand	47.6	---	2.17	30	360	9,000
8.5	11.5	Sand	57.6	---	2.43	32	510	10,000
11.5	13.5	Sand	47.6	---	1.77	30	440	9,000
13.5	30	Sand	62.6	---	2.08	34	830	10,000

1. General notes applicable to the above values are included at the beginning of this section.

Boring B-3

Layer (feet)		Soil Type	Effective Unit Weight of Soil (pcf)	Cohesion (ksf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom							
0	5	Clay	105	---	---	---	---	---
5	12.5	Sand	52.6	---	2.09	30	410	10,000
12.5	30	Sand	62.6	---	2.21	34	820	10,000

- General notes applicable to the above values are included at the beginning of this section.

Boring B-4

Layer (feet)		Soil Type	Effective Unit Weight of Soil (pcf)	Cohesion (ksf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom							
0	5	Sand	105	---	1.96	26	140	2,820
5	18.5	Sand	57.6	---	2.38	32	590	10,000
18.5	25.5	Sand	47.6	---	1.32	30	530	7,800
25.5	30	Sand	57.6	---	1.63	32	780	10,000

- General notes applicable to the above values are included at the beginning of this section.

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**Boring B-5**

Layer (feet)		Soil Type	Effective Unit Weight of Soil (pcf)	Cohesion (ksf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom							
0	5	Clay	105	---	---	---	---	---
5	13.5	Sand	57.6	---	2.40	32	500	10,000
13.5	30	Sand	62.6	---	2.31	34	960	10,000

1. General notes applicable to the above values are included at the beginning of this section.

Boring B-6

Layer (feet)		Soil Type	Effective Unit Weight of Soil (pcf)	Cohesion (ksf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom							
0	4	Clay	105	---	---	---	---	---
4	13	Sand	57.6	---	2.70	32	500	10,000
13	15.5	Sand	62.6	---	2.90	34	800	10,000
15.5	30	Sand	62.6	---	1.87	34	780	10,000

1. General notes applicable to the above values are included at the beginning of this section.

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Supporting Information







Contents:

General Notes

CPT General Notes

Unified Soil Classification System

General Notes

Sampling	Water Level	Field Tests
 Grab Sample  GeoProbe Macro Core or Large Bore	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered <p>Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.</p>	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

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

Location And Elevation Notes

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

Strength Terms

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

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

CPT GENERAL NOTES



DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS

To be reported per ASTM D5778:

- Uncorrected Tip Resistance, q_c
Measured force acting on the cone divided by the cone's projected area
 - Corrected Tip Resistance, q_t
Cone resistance corrected for porewater and net area ratio effects
 $q_t = q_c + u_2(1 - a)$
Where a is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85
 - Pore Pressure, u
Pore pressure measured during penetration
 u_1 - sensor on the face of the cone
 u_2 - sensor on the shoulder (more common)
 - Sleeve Friction, f_s
Frictional force acting on the sleeve divided by its surface area
 - Normalized Friction Ratio, F_r
The ratio as a percentage of f_s to q_t , accounting for overburden pressure
- To be reported per ASTM D7400, if collected:
- Shear Wave Velocity, V_s
Measured in a Seismic CPT and provides direct measure of soil stiffness

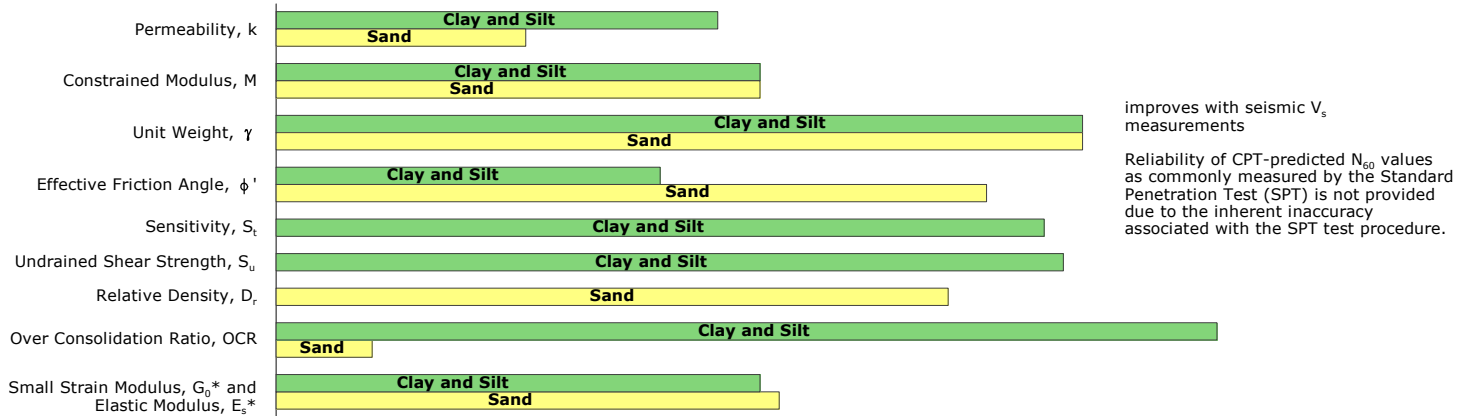
DESCRIPTION OF GEOTECHNICAL CORRELATIONS

- Normalized Tip Resistance, Q_{tn}
 $Q_{tn} = ((q_t - \sigma_{v0})/P_a)(P_a/\sigma'_{v0})^n$
 $n = 0.381(I_c) + 0.05(\sigma'_{v0}/P_a) - 0.15$
- Over Consolidation Ratio, OCR
 $OCR(1) = 0.25(Q_{tn})^{1.25}$
 $OCR(2) = 0.33(Q_{tn})$
- Undrained Shear Strength, S_u
 $S_u = Q_{tn} \times \sigma'_{v0}/N_{kt}$
 N_{kt} is a soil-specific factor (shown on S_u plot)
- Sensitivity, S_t
 $S_t = (q_t - \sigma_{v0}/N_{kt}) \times (1/f_s)$
- Effective Friction Angle, ϕ'
 $\phi'(1) = \tan^{-1}(0.373[\log(q_t/\sigma'_{v0}) + 0.29])$
 $\phi'(2) = 17.6 + 11[\log(Q_{tn})]$
- Unit Weight, γ
 $\gamma = (0.27[\log(F_r)] + 0.36[\log(q_t/atm)] + 1.236) \times \gamma_{water}$
 σ_{v0} is taken as the incremental sum of the unit weights
- Small Strain Shear Modulus, G_0
 $G_0(1) = \rho V_s^2$
 $G_0(2) = 0.015 \times 10^{(0.55I_c + 1.68)}(q_t - \sigma_{v0})$
- Soil Behavior Type Index, I_c
 $I_c = [(3.47 - \log(Q_{tn}))^2 + (\log(F_r) + 1.22)^2]^{0.5}$
- SPT N_{60}
 $N_{60} = (q_t/atm) / 10^{(1.1268 - 0.2817I_c)}$
- Elastic Modulus, E_s (assumes $q_t/q_{ultimate} \sim 0.3$, i.e. FS = 3)
 $E_s(1) = 2.6\psi G_0$ where $\psi = 0.56 - 0.33\log Q_{tn, clean sand}$
 $E_s(2) = G_0$
 $E_s(3) = 0.015 \times 10^{(0.55I_c + 1.68)}(q_t - \sigma_{v0})$
 $E_s(4) = 2.5q_t$
- Constrained Modulus, M
 $M = \alpha_M(q_t - \sigma_{v0})$
For $I_c > 2.2$ (fine-grained soils)
 $\alpha_M = Q_{tn}$ with maximum of 14
For $I_c < 2.2$ (coarse-grained soils)
 $\alpha_M = 0.0188 \times 10^{(0.55I_c + 1.68)}$
- Hydraulic Conductivity, k
For $1.0 < I_c < 3.27$ $k = 10^{(0.952 - 3.04I_c)}$
For $3.27 < I_c < 4.0$ $k = 10^{(-4.52 - 1.37I_c)}$
- Relative Density, D_r
 $D_r = (Q_{tn} / 350)^{0.5} \times 100$

REPORTED PARAMETERS

CPT logs as provided, at a minimum, report the data as required by ASTM D5778 and ASTM D7400 (if applicable). This minimum data include q_t , f_s , and u . Other correlated parameters may also be provided. These other correlated parameters are interpretations of the measured data based upon published and reliable references, but they do not necessarily represent the actual values that would be derived from direct testing to determine the various parameters. To this end, more than one correlation to a given parameter may be provided. The following chart illustrates estimates of reliability associated with correlated parameters based upon the literature referenced below.

RELATIVE RELIABILITY OF CPT CORRELATIONS



WATER LEVEL

Low Reliability

High Reliability

The groundwater level at the CPT location is used to normalize the measurements for vertical overburden pressures and as a result influences the normalized soil behavior type classification and correlated soil parameters. The water level may either be "measured" or "estimated:"

Measured - Depth to water directly measured in the field

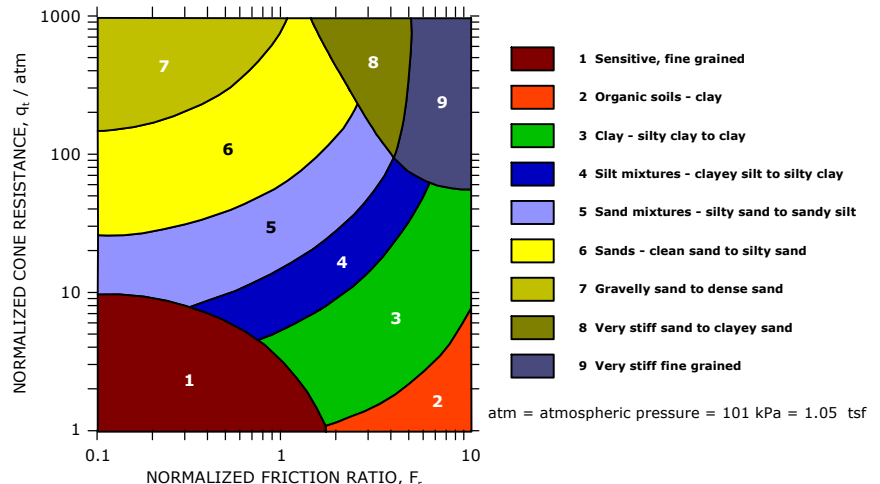
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

While groundwater levels displayed as "measured" more accurately represent site conditions at the time of testing than those "estimated," in either case the groundwater should be further defined prior to construction as groundwater level variations will occur over time.

CONE PENETRATION SOIL BEHAVIOR TYPE

The estimated stratigraphic profiles included in the CPT logs are based on relationships between corrected tip resistance (q_t), friction resistance (f_s), and porewater pressure (u_2). The normalized friction ratio (F_r) is used to classify the soil behavior type.

Typically, silts and clays have high F_r values and generate large excess penetration porewater pressures; sands have lower F_r 's and do not generate excess penetration porewater pressures. The adjacent graph (Robertson *et al.*) presents the soil behavior type correlation used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.



REFERENCES

- Kulhawy, F.H., Mayne, P.W., (1997). "Manual on Estimating Soil Properties for Foundation Design," Electric Power Research Institute, Palo Alto, CA.
- Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institute of Technology, Atlanta, GA.
- Robertson, P.K., Cabal, K.L. (2012). "Guide to Cone Penetration Testing for Geotechnical Engineering," Signal Hill, CA.
- Schmertmann, J.H., (1970). "Static Cone to Compute Static Settlement over Sand," *Journal of the Soil Mechanics and Foundations Division*, 96(SM3), 1011-1043.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification	
				Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F
			$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I
			$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	SP	Poorly graded sand ^I
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots above "A" line ^J	CL	Lean clay ^{K, L, M}
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay ^{K, L, M, N} Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K, L, M}
			PI plots below "A" line	MH	Elastic silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OH	Organic clay ^{K, L, M, P} Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

^A Based on the material passing the 3-inch (75-mm) sieve.

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

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

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

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

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

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

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

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

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

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

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

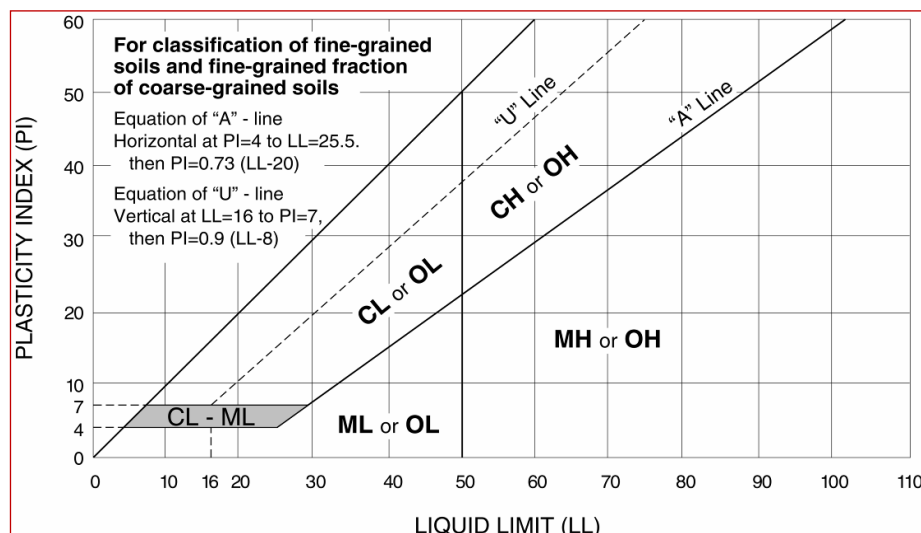
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



GREENVILLE UTILITIES COMMISSION

PROPOSAL FORM

The undersigned bidder hereby declares that he has carefully examined the enclosed detailed specifications for the furnishing of Greenville Utilities with the items listed below. The undersigned bidder further agrees, if this proposal is accepted within sixty (60) days from the date of the opening, to furnish any or all of the items upon which prices are quoted at the price set opposite each item. Delivery shall be FOB Greenville, North Carolina, within the time indicated below:

ITEM NO.	QUANTITIES	DESCRIPTION	DELIVERY TIME DAYS	PRICE
I	1	<u>Precast Concrete Relay Control House, including shipping, delivery, off-loading, setting on pad, and dress out/tie down</u>		\$ _____
II	1	Foundation Design		\$ _____
III	1	Materials per Tech Spec. Section 6.2		\$ _____
		<u>Complete and Check All Math:</u> It is the responsibility of the Bidder to extend unit prices and supply a total for all items.	Total	\$ _____

Method of Award: Items/ Project will be awarded as a total bid.

Complete and Check All Math: It is the responsibility of the Bidder to extend bid prices and supply a total for all items. It is certified that this proposal is made in good faith and without collusion or connection with any other person bidding on the same above listed items. It is also certified that this proposal is made in good faith and without collusion or connection with any GUC employee(s).

[Balance of page left blank intentionally]

It is certified that this proposal is made in good faith and without collusion or connection with any other person bidding on the same above listed items. It is also certified that this proposal is made in good faith and without collusion or connection with any GUC employee(s).

Each Proposal shall be accompanied by cash, cashier's check, or certified check drawn on a bank insured with the Federal Deposit Insurance Corporation or the Savings Association Insurance Fund, payable to the Owner, in an amount not less than five percent (5%) of the total bid as a guarantee that a Purchase Order, if awarded, will be accepted. In lieu thereof, a Bid Bond may be submitted by the Bidder in an amount not less than five percent (5%) of the total bid (see attached Bid Bond form). The total bid price for which the five percent (5%) applies shall be the total of all schedules.

Certified check or cash for \$_____ or bid bond for \$_____ attached.

Firm Name _____ Phone (____) _____

Address _____

City _____ State _____ Zip Code _____

Fax (____) _____ E-Mail _____

Authorized Official _____ Title _____
Typed Name

Signature Date _____

**Three (3) copies of your proposal should be received no later than
August 22, 2024 at 3:00 PM (EDST).**

NO BIDS CONSIDERED UNLESS SUBMITTED ON THIS FORM(S)

RETURN ONLY THIS FORM(S)

GREENVILLE UTILITIES COMMISSION

EXCEPTION/VARIATION FORM

PRECAST CONCRETE RELAY CONTROL HOUSE FOR THE HUDSON SUBSTATION

Provider's Certification: This is to certify that it is our intent to furnish equipment, material, services, etc. in absolute compliance with the bid specification except where expressly noted below.

Instructions: List all exceptions or variations to these bid specifications. Providers shall identify each exception or variation by specification page. The omission of exception or variation information shall be deemed by the Commission as the Provider's intent to absolutely comply with the bid specification. If additional space is required, Provider may reproduce this form as necessary.

<u>Page #</u>	<u>Exception/Variation</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Authorized Signature of Certification: _____

Print Name: _____

Title: _____

Firm Represented: _____

Address: _____

Date: _____

Letter of Compliance to E-Verify for Greenville Utilities Commission

1. I have submitted a bid for contract or desire to enter into a contract with the Greenville Utilities Commission;
2. As part of my duties and responsibilities pursuant to said bid and/or contract, I affirm that I am aware of and in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):
3. ____ After hiring an employee to work in the United States I verify the work authorization of said employee through E-Verify and retain the record of the verification of work authorization while the employee is employed and for one year thereafter; or
4. ____ I employ less than twenty-five (25) employees in the State of North Carolina.
5. As part of my duties and responsibilities pursuant to said bid and/or contract, I affirm that to the best of my knowledge and subcontractors employed as a part of this bid and/or contract, are in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):
6. ____ After hiring an employee to work in the United States the subcontractor verifies the work authorization of said employee through E-Verify and retains the record of the verification of work authorization while the employee is employed and for one year thereafter; or
7. ____ Employ less than twenty-five (25) employees in the State of North Carolina.
Specify subcontractor: _____

_____ (Company Name)

By: _____ (Typed Name)

_____ (Authorized Signatory)

_____ (Title)

_____ (Date)

BID BOND

KNOW ALL MEN BY THESE PRESENT, THAT WE _____

as Principal, and _____
as Surety, who is duly licensed to act as Surety in North Carolina, are held and firmly bound unto
the Greenville Utilities Commission, Greenville, NC, as Obligee, in the penal sum of _____
_____ DOLLARS (\$ _____) (5% Bid Bond),
lawful money of the United States of America, for the payment of which, well and truly to be
made, we bind ourselves, our heirs, administrators, successors and assigns, jointly and severally,
firmly by these present.

SIGNED, Sealed and dated this _____ day of _____, 2024.

WHEREAS, the said Principal is herewith submitting a Proposal for

**PRECAST CONCRETE RELAY CONTROL HOUSE FOR THE HUDSON
SUBSTATION**

and the Principal desires to file this Bid Bond in Lieu of making the cash deposit as required by
the bidding documents contained herein;

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such that if the
principal shall be awarded the Purchase Order for which the bid is submitted and shall accept the
Purchase Order within ten (10) days after the award of same to the principal, then this obligation
shall be null and void; but if the principal fails to so accept such purchase order as required by
the bidding documents contained herein, the Surety shall, upon demand, forthwith pay to the
Obligee the amount set forth in the first paragraph hereof, and upon failure to forthwith make
such payment, the Surety shall pay the Obligee an amount equal to double the amount of this Bid
Bond as set forth in the first paragraph hereof. Power of Attorney from the surety to is Attorney-
in-Fact is attached hereto.

Principal

By _____(SEAL)

Corporate Surety

By _____(SEAL)

SECTION III

TERMS AND CONDITIONS FOR THE PURCHASE OF

APPARATUS, SUPPLIES, MATERIALS, LABOR AND EQUIPMENT

These Terms and Conditions, made and entered into on this the ____ day of _____, by and between GREENVILLE UTILITIES COMMISSION OF THE CITY OF GREENVILLE, PITT COUNTY, NORTH CAROLINA, with one of its principal offices and places of business at 401 S. Greene Street, Post Office Box 1847, Greenville, Pitt County, North Carolina 27835-1847, hereinafter referred to as "GUC" and _____, a _____ organized and existing under and by virtue of the laws of the State of _____, with one of its principal offices and places of business at _____, hereinafter referred to as "PROVIDER";

1.0 TAXES

No taxes shall be included in any bid prices. GUC is exempt from Federal Excise Tax. GUC is not exempt from North Carolina state sales and use tax or, if applicable, Pitt County sales and use tax. Such taxes shall be shown as a separate item on the invoice.

2.0 INVOICES

It is understood and agreed that orders will be shipped at the established contract prices and quantities in effect on dates orders are placed. Invoicing at variance with this provision may subject the contract to cancellation. Applicable North Carolina sales tax shall be invoiced as a separate line item. All invoices must bear the GUC purchase order number. Mail all invoices to Greenville Utilities Commission, Finance Department, P. O. Box 1847, Greenville, NC 27835-1847.

3.0 PAYMENT TERMS

Payments for equipment, materials, or supplies will be made after the receipt and acceptance of the equipment, materials, supplies or services and after submission of a proper invoice. GUC's normal payment policy is thirty (30) days. GUC will not be responsible for any goods delivered without a purchase order having been issued. Payment will be made in U. S. currency only.

4.0 QUANTITIES

Quantities specified are only estimates of GUC's requirements. GUC reserves the right to purchase more or less than the stated quantities at prices indicated in the submitted Proposal Form based on our actual needs.

5.0 AFFIRMATIVE ACTION

The Provider will take affirmative action in complying with all Federal and State requirements concerning fair employment and employment of the handicapped, and concerning the treatment of all employees, without discrimination by reason of race, color, religion, sex, national origin, or physical handicap.

6.0 CONDITION AND PACKAGING

Unless otherwise indicated in the bid, it is understood and agreed that any item offered or shipped shall be new and in first class condition, that all containers shall be new and suitable for storage or shipment, and that prices include standard commercial packaging.

7.0 SAMPLES

Samples of items, if required, must be furnished free of expense to GUC, and if not destroyed, will, upon request, be returned at the Provider's expense. Request for the return of samples must be made at the bid opening, otherwise, the samples will become GUC's property. Each individual sample must be labeled with Provider's name.

8.0 SPECIFICATIONS

Any deviation from specifications must be clearly pointed out, otherwise, it will be considered that items offered are in strict compliance with specifications, and the Provider will be held responsible. Deviations must be explained in detail. **The Provider shall not construe this paragraph as inviting deviation or implying that any deviation will be acceptable.**

9.0 INFORMATION AND DESCRIPTIVE LITERATURE

Providers are to furnish all information requested. Further, as may be specified elsewhere, each Provider must submit with its proposal: cuts, sketches, descriptive literature, and/or complete specifications covering the products offered. Reference to literature submitted with a previous bid does not satisfy this provision. Bids which do not comply with these requirements will be subject to rejection.

10.0 AWARD OF CONTRACT

As directed by statute, qualified bids will be evaluated and acceptance made of the lowest responsible, responsive bid most advantageous to GUC as determined upon consideration of such factors as prices offered, the quality of the article(s) offered, the general reputation and performance capabilities of the Provider, substantial conformity with the specifications and other conditions set forth in the bid, the suitability of the article(s) for the intended use, the related services needed, the date(s) of delivery and performance, and such other factors deemed by GUC to be pertinent or peculiar to the purchase in question.

Acceptance of the order includes acceptance of all terms, conditions, prices, delivery instructions, and specifications as shown on this set of Terms and Conditions and in this order or attached to and made a part of this order.

The conditions of this order cannot be modified except by written amendment in the form of "Amended Purchase Order," which has been approved by GUC's Procurement Manager.

In the event of a Provider's failure to deliver or perform as specified, GUC reserves the right to cancel the order or any part thereof, without prejudice to GUC's other rights. The Provider agrees that GUC may return part of or all of any shipment at Provider's expense. GUC may charge the Provider with all reasonable expenses resulting from such failure to deliver or perform.

11.0 MEDIATION/BINDING ARBITRATION

In the event of any dispute between the Parties, the Parties agree to submit any dispute to non-binding mediation before a mutually agreeable Mediator prior to initiating litigation. If the Parties are unable to agree upon a Mediator within thirty (30) days after demand therefore, either Party may petition a Court of competent jurisdiction for the designation of a qualified Mediator for these purposes. Each Party shall bear its own costs and expenses of participating in the mediation (including, without limitation, reasonable attorneys' fees), and each Party shall bear one-half (1/2) of the costs and expenses of the Mediator. Unless otherwise agreed, the Parties will hold the mediation in Greenville, North Carolina. The matters discussed or revealed in the mediation session shall not be disclosed in any subsequent litigation.

In the event the matter is not resolved in mediation, either Party may request arbitration. The parties shall jointly select an Arbitrator, and shall be bound by the decision of the Arbitrator with respect to any dispute between the parties with respect to this Agreement. If the parties are unable to mutually agree upon an Arbitrator, the Parties shall each select an Arbitrator, and the two Arbitrators so selected shall select a third Arbitrator, and the decision of the majority of the Arbitrators shall be conclusive and binding upon the Parties. The Parties at all times agree to equally split the costs of any Arbitrator(s) selected in an effort to resolve the dispute between the Parties. Any party desiring to resolve a dispute under the terms of this Agreement shall notify the other Party in writing, and the Parties shall seek to agree upon a mutually agreed-upon Arbitrator within a period of ten (10) days from the date of such written demand. If the Parties are unable to agree within such ten (10) day period, the Parties shall each select an Arbitrator, and the two (2) Arbitrators so selected shall select a third Arbitrator within fifteen (15) days from the date of the written demand for arbitration, and a decision shall be rendered by the Arbitrator(s) so selected within five (5) days after such Arbitrator(s) is selected.

12.0 GOVERNMENT RESTRICTIONS

In the event any Governmental restrictions may be imposed which would necessitate alteration of the material, quality, workmanship, or performance of the items offered on this bid prior to their delivery, it shall be the responsibility of the successful Provider to notify the GUC Procurement Manager, at once, indicating in its letter the specific regulation which required such alterations. GUC reserves the right to accept any such alterations, including any price adjustments occasioned thereby, or, in the sole discretion of GUC, to cancel the contract.

13.0 INSURANCE

13.1 Coverage – During the term of the contract, the Provider at its sole cost and expense shall provide commercial insurance of such type and with the following coverage and limits:

13.1.1 Workers' Compensation – The Provider shall provide and maintain Workers' Compensation Insurance, as required by the laws of North Carolina, as well as employer's liability coverage with minimum limits of \$1,000,000 each accident, covering all Provider's employees who are engaged in any work under the contract. If any work is sublet, the Provider shall require the subcontractor to provide the same coverage for any of its employees engaged in any work under the contract.

13.1.2 General Liability – Commercial Liability Coverage written on an “occurrence” basis in the minimum amount of \$1,000,000 per occurrence.

13.1.3 Automobile – Automobile Liability Insurance, to include coverage for all owned, hired, and non-owned vehicles used in connection with the contract with a minimum combined single limit of \$1,000,000 per accident.

13.2 Requirements - Providing and maintaining adequate insurance coverage is a material obligation of the Provider. All such insurance shall meet all laws of the State of North Carolina. Such insurance coverage shall be obtained from companies that are authorized to provide such coverage and that are authorized to do business in North Carolina by the Commissioner of Insurance. The Provider shall at all times comply with the terms of such insurance policies and all requirements of the insurer under any of such insurance policies, except as they may conflict with existing North Carolina laws or this contract. The limits of coverage under each insurance policy maintained by the Provider shall not be interpreted as limiting the Provider’s liability and obligations under the contract. It is agreed that the coverage as stated shall not be canceled or changed until thirty (30) days after written notice of such termination or alteration has been sent by registered mail to GUC’s Procurement Manager.

14.0 PATENTS AND COPYRIGHTS

The Provider shall hold and save GUC, its officers, agents, and employees, harmless from liability of any kind, including costs and expenses, including reasonable attorney fees, on account of any copyrighted articles or any patented or unpatented invention, device or appliance manufactured or used in the performance of this contract.

15.0 PATENT AND COPYRIGHT INDEMNITY

The Provider will defend or settle, at its own expense, any action brought against GUC to the extent that it is based on a claim that the product(s) provided pursuant to this agreement infringe any U.S. copyright or patent; and will pay those costs, damages, and attorney fees finally awarded against GUC in any such action attributable to any such claim, but such defense, settlements, and payments are conditioned on the following: (1) that Provider shall be notified promptly in writing by GUC of any such claim; (2) that Provider shall have sole control of the defense of any action on such claim and of all negotiations for its settlement or compromise; (3) that GUC shall cooperate with Provider in a reasonable way to facilitate the settlement of defense of such claim; (4) that such claim does not arise from GUC modifications not authorized by the Provider or from the use of combination of products provided by the Provider with products provided by GUC or by others; and (5) should such product(s) become, or in the Provider’s opinion likely to become, the subject of such claim of infringement, then GUC shall permit Provider, at Provider’s option and expense, either to procure for GUC the right to continue using the product(s), or replace or modify the same so that it becomes non-infringing and performs in a substantially similar manner to the original product.

16.0 EXCEPTIONS

All proposals are subject to the terms and conditions outlined herein. All responses will be controlled by such terms and conditions and the submission of other terms and conditions, price catalogs, and other documents as part of a Provider’s response will be waived and have no

effect on this Request for Proposal or any other contract that may be awarded resulting from this solicitation. The submission of any other terms and conditions by a Provider may be grounds for rejection of the Provider's proposal. The Provider specifically agrees to the terms and conditions set forth in this set of Terms and Conditions by affixing its name on the signatory page contained herein.

17.0 CONFIDENTIAL INFORMATION

Except as provided by statute and rule of law, GUC will keep trade secrets which the Provider does not wish disclosed confidential. Each page shall be identified in boldface at the top and bottom as "CONFIDENTIAL" by the Provider. Cost information shall not be deemed confidential. The determination of whether a matter is confidential will be determined by North Carolina law.

18.0 ASSIGNMENT

No assignment of the Provider's obligations or the Provider's right to receive payment hereunder shall be permitted without the express written consent of GUC, provided however, upon written request approved by the GUC Procurement Manager, solely as a convenience to the Provider, GUC may:

- Forward the Provider's payment check directly to any person or entity designated by the Provider, and
- Include any person or entity designated by Provider as a joint payee on the Provider's payment check.
- In no event shall such approval and action obligate GUC to anyone other than the Provider, and the Provider shall remain responsible for fulfillment of all contract obligations.

19.0 ACCESS TO PERSON AND RECORDS

GUC shall have reasonable access to persons and records of Provider as a result of all contracts entered into by GUC.

20.0 INSPECTION AT BIDDER'S SITE

GUC reserves the right to inspect, at a reasonable time, the item, plant, or other facilities of a prospective Provider prior to contract award and during the contract term as necessary for GUC's determination that such item, plant, or other facilities conform with the specifications/requirements and are adequate and suitable for the proper and effective performance of the contract. Provider may limit GUC's access to restricted areas.

21.0 AVAILABILITY OF FUNDS

Any and all payments of compensation of this specific transaction and any continuation or any renewal or extension are dependent upon and subject to the allocation of GUC funds for the purpose set forth in this Agreement.

22.0 GOVERNING LAWS

All contracts, transactions, agreements, etc., are made under and shall be governed by and construed in accordance with the laws of the State of North Carolina.

23.0 ADMINISTRATIVE CODE

Bids, proposals, and awards are subject to applicable provisions of the North Carolina Administrative Code and General Statutes and Laws of the State of North Carolina.

24.0 EXECUTION

In the discretion of GUC, failure of a duly authorized official of Provider to sign the Signatory Page may render the bid invalid.

25.0 CLARIFICATIONS/INTERPRETATIONS

Any and all questions regarding these Terms and Conditions must be addressed to the GUC Procurement Manager. Do not contact the user directly. **These Terms and Conditions are a complete statement of the parties' agreement and may only be modified in writing signed by Provider and the GUC Procurement Manager.**

26.0 SITUS

The place of all contracts, transactions, agreements, their situs and forum, shall be North Carolina, where all matters, whether in contract or tort, relating to the validity, construction, interpretation, and enforcement shall be determined.

27.0 TERMINATION OF AGREEMENT

GUC or Provider may terminate this Agreement for just cause at any time. Provider will be paid for all time and expenses incurred as of the termination date. Termination for just cause by either party shall be by certified letter and shall be effective thirty (30) days after signed and acknowledged receipt of said letter. Just cause shall be based on reasonable grounds, and there must be a fair and honest cause or reason for such action. The causes for termination, include, but are not limited to: (1) Provider's persistent failure to perform in accordance with the Terms and Conditions, (2) Provider's disregard of laws and regulations related to this transaction, and/or (3) Provider's substantial violation of the provisions of the Terms and Conditions.

28.0 DELIVERY

Shipments will be made only upon releases from a purchase order issued by GUC in accordance with GUC's current needs.

Time is of the essence with respect to all deliveries under this Agreement.

Delivery of all equipment, materials, or supplies shall be made Free on Board (FOB) GUC Warehouse, 701 Utility Way, Greenville, North Carolina 27834, unless otherwise specified. The agreed price for such equipment, materials, or supplies shall include all costs of delivery and ownership, and risks of loss shall not be transferred from Provider to GUC until express written acceptance of delivery and inspection by GUC. Delivery hours are between 8:00 AM and 4:30 PM Monday-Friday only. **GUC's purchase order number is to be shown on the packing slip**

or any related documents. GUC reserves the right to refuse or return any delivery with no purchase order number or which is damaged. GUC will not be charged a restocking fee for any delivery which is refused or returned.

29.0 INDEMNITY PROVISION

Provider agrees to indemnify and save GREENVILLE UTILITIES COMMISSION of the City of Greenville, Pitt County, North Carolina, and the City of Greenville, North Carolina, its co-owners, joint venturers, agents, employees, and insurance carriers harmless from any and all losses, claims, actions, costs, expenses including reasonable attorney fees, judgments, subrogations, or other damages resulting from injury to any person (including injury resulting in death), or damage (including loss or destruction) to property of whatsoever nature of any person arising out of or incident to the performance of the terms of this Contract by Provider, including, but not limited to, Provider's employees, agents, subcontractors, and others designated by Provider to perform work or services in, about, or attendant to, the work and services under the terms of this Contract. Provider shall not be held responsible for any losses, expenses, claims, subrogations, actions, costs, judgments, or other damages, directly, solely, and proximately caused by the negligence of Greenville Utilities Commission of the City of Greenville, Pitt County, North Carolina. Insurance covering this indemnity agreement by the Provider in favor of Greenville Utilities Commission of the City of Greenville, Pitt County, North Carolina, and the City of Greenville, North Carolina, shall be provided by Provider.

30.0 FORCE MAJEURE

Neither party shall be considered in default in the performance of its obligations hereunder to the extent that the performance of any such obligation is prevented or delayed by any cause, existing or future, which is beyond the reasonable control of such party. In any such event of force majeure, the parties shall advise each other of such event, and the parties shall negotiate an equitable adjustment to their respective obligations under this Agreement.

31.0 WARRANTY(IES)

The Provider hereby includes all warranties, whether expressed or implied, including, but not limited to, the Implied Warranty of Merchantability and the Implied Warranty of Fitness for a Particular Purpose.

32.0 INTEGRATED CONTRACT

These Terms and Conditions, Instructions to Bidders, Specifications, and the selected Provider's bid represents the entire contract between the Parties. No verbal or other written agreement(s) shall be held to vary the provisions of this Agreement.

33.0 CONTRACT PROVISIONS

Each of the provisions of these Terms and Conditions shall apply to the full extent permitted by law, and the invalidity in whole or in part of any provision shall not affect the remainder of such provision or any other provisions.

34.0 E-VERIFY

E-Verify - I understand that E-Verify is the federal E-Verify program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program used to verify the work authorization of newly hired employees pursuant to federal law in accordance with NCGS §64-25 et seq. I am aware of and in compliance with the requirements of E-Verify and Article 2 of Chapter 64 of the North Carolina General Statutes. To the best of my knowledge, any subcontractors employed by me as a part of this contract are in compliance with the requirements of E-Verify and Article 2 of Chapter 64 of the North Carolina General Statutes.

35.0 IRAN DIVESTMENT ACT CERTIFICATION

By acceptance of this purchase order, Vendor/Contractor certifies that, as of the date of the purchase order or contract, it is not on the Final Divestment List as created by the State Treasurer pursuant to N.C.G.S. § 143-6A-4. In compliance with the requirements of the Iran Divestment Act and N.C.G.S. § 143C-6A-5(b), Vendor/Contractor shall not utilize in the performance of the contract any subcontractor that is identified on the Final Divestment List.

36.0 UNIFORM GUIDANCE

Contracts funded with federal grant or loan funds must be procured in a manner that conforms with all applicable federal laws, policies, and standards, including those under the Uniform Guidance (2 C.F.R. Part 200).

37.0 SAFETY STATEMENTS

Safety Culture Commitment Statement:

At Greenville Utilities, we are committed to a culture of safety that prioritizes the well-being of our employees, contractors, and the communities we serve.

We believe that everyone deserves to work in a safe environment, and we are dedicated to fostering a culture where **safety is a core value, not just a priority.**

Here's what that means to us:

- **Employee and Contractor Safety:** We are committed to providing a safe work environment for all employees and contractors. We will invest in safety training, resources, and equipment to prevent accidents and injuries.
- **Open Communication:** We encourage open and honest communication about safety concerns. We believe everyone has a right and responsibility to speak up about unsafe work practices and potential hazards.
- **Continuous Improvement:** We are committed to continuous improvement in safety performance. We will learn from incidents and near misses, and we will actively seek ways to improve our safety processes and procedures.
- **Accountability:** We hold ourselves and our contractors accountable for safe work practices. This includes providing clear safety expectations, enforcing safety rules, and recognizing safe behavior.
- **Collaboration:** We believe in working collaboratively with employees, contractors, and regulatory agencies to achieve the highest level of safety.

Our commitment to safety extends beyond our employees. We work closely with our contractors to ensure they share our safety values. We expect them to implement robust safety programs, train their workers thoroughly, and adhere to all safety regulations.

We are confident that by working together, we can create a culture of safety where everyone goes home safe and healthy every day.

This commitment statement is a public declaration of our unwavering dedication to safety. We will continue to strive for zero incidents while promoting a positive safety culture that prioritizes the well-being of everyone involved in our utility operations.

Safety Management System Commitment Statement:

At Greenville Utilities, we are unwavering in our commitment to delivering safe and reliable utility service through a robust Safety Management System (SMS). This system forms the foundation of our safety culture, ensuring the well-being of our employees, contractors, and the communities we serve.

Our SMS commitment emphasizes:

- **Zero Incidents:** We believe all incidents are preventable. We strive for zero incidents by proactively managing risks and continuously improving our safety practices.
- **Empowered Workforce:** We foster a culture where safety is everyone's responsibility. This includes providing comprehensive safety training for both employees and contractors, empowering them to identify and report hazards.
- **Data-Driven Decisions:** We utilize data from inspections, incident investigations, and performance metrics to make informed decisions for risk mitigation and continuous improvement of our SMS.
- **Leadership Engagement:** Our leadership team actively demonstrates a commitment to safety by participating in safety reviews, audits, and promoting safety as a core value.
- **Contractor Collaboration:** We extend our safety commitment to our contractors. We require contractors working on our system to adhere to SMS principles, participate in safety briefings, and maintain strong safety programs within their own organizations.
- **Transparent Communication:** We believe in open communication about safety. We encourage employees and contractors to report concerns without fear of reprisal. We also maintain transparent communication with stakeholders about SMS performance.

This SMS commitment is a continuous journey, not a destination. We are dedicated to regularly reviewing and updating our system to reflect best practices and emerging technologies. Through continuous improvement and a commitment to a positive safety culture, we aim to remain an industry leader in safe and reliable utility service.

38.0 NOTICES

Notices to the Parties should be sent to the names and addresses specified below:

Cleve Haddock, Lifetime CLGPO
Procurement Manager
Greenville Utilities Commission
P.O. Box 1847
Greenville, NC 27835-1847

Vendor Specified on Page 1 of Section III when awarded.

GREENVILLE UTILITIES COMMISSION

By: _____
Anthony C. Cannon

Title: General Manager/CEO
(Authorized Signatory)

Date: _____

Attest: _____

Name (Print): Amy Wade

Title: Executive Secretary

Date: _____

(OFFICIAL SEAL)

COMPANY NAME:

By: _____

Name (Print): _____

Title: _____
(Authorized Signatory)

Date: _____

Attest: _____

Name (Print): _____

Title: Corporate Secretary

Date: _____

(CORP. SEAL)

APPROVED AS TO FORM AND LEGAL CONTENT:

By: _____
Phillip R. Dixon

Title: General Counsel

Date: _____