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 4:00 pm (EDST) on June 30, 2020 and immediately thereafter publicly opened and read for the furnishing of Sugg Parkway Substation Structures, Equipment, and Foundation Design.

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.

Notice to Bidders:

Greenville Utilities Commission is committed to the health and safety of our customers and employees. We are taking the spread of COVID-19 very seriously and continue to monitor the latest Local, State, and Federal guidance. We are receiving FedEx, UPS, US Mail.

We are requesting that you also send a scanned copy of your bid or electronic copy via e-mail to my attention at: haddocge@guc.com Please note to send the scanned copy of your bid or electronic copy via e-mail on July 1, 2020 by 4:00 pm. Do not send before July 1, 2020.

We must still receive your sealed proposal/bid (paper hardcopy) by 4:00 pm (EDST) on June 30, 2020 per the bid instructions for your sealed proposal/bid to be considered.
SECTION I
GENERAL INSTRUCTIONS FOR FORMAL BIDS
RELATED TO THE PURCHASE OF APPARATUS, SUPPLIES,
MATERIALS, AND EQUIPMENT

1. 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 4:00 pm (EDST) on June 30, 2020, the day of
opening. Bids submitted in a fax or e-mail in response to this Invitation for Bids will not be
acceptable.

2. 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. 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 PROCUREMENT MANAGER,
GREENVILLE UTILITIES COMMISSION, 401 S. GREENE STREET, GREENVILLE,
NORTH CAROLINA 27834.

4. 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. BID SECURITY

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.
6. **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. **FEDERAL EXCISE TAX**

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

8. **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. **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. **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. **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. **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. **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. **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.

15. **DELIVERY**

Shipments will be made only upon individual releases from a blanket 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) Sugg Parkway Substation, 1390 Sugg Parkway, Greenville NC 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 Tuesday-Thursday 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. **CONTRACT PERIOD**

TBD

17. **MANUFACTURER**

Bidder is to specify the manufacturer of items being quoted if applicable.

18. **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.
19. CONTACT INFORMATION

Questions regarding this bid request should be directed to Cleve Haddock, CLGPO, Procurement Manager, at (252) 551-1533, haddocgc@guc.com. All questions regarding this bid must be received by or before 5:00 pm (EDST) on June 15, 2020.

20. 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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SECTION II
GREENVILLE UTILITIES COMMISSION
SPECIFICATIONS FOR SUGG
PARKWAY SUBSTATION STRUCTURES, EQUIPMENT, AND FOUNDATION DESIGN

1.0 GENERAL

1.1 Scope
These specifications are for furnishing FOB job site structures, equipment, and foundation design for Sugg Parkway Substation project.

Sugg Parkway Substation – 1390 Sugg Parkway, Greenville, NC 27834
The structures and equipment shall be furnished complete and ready for installation, connection, and immediate service and shall include:

- Tubular aluminum bus conductor, cable connectors and accessories
- Bus support insulators
- (2) 115 kV H-frame dead-end structure with 115 kV switch & motor operator
- Six (6) 15 kV equipment bays
- 15 kV group operated switches and hook stick switches

Foundation design for the circuit switcher and for all vendor supplied structures will be provided by the vendor.

1.2 Delivery
The equipment shall be delivered FOB to Sugg Parkway Substation, 1390 Sugg Parkway, Greenville NC 27834 by truck shipment and unloaded by Greenville Utilities. Greenville Utilities shall receive shipping notice at least 48 hours before delivery.

The Contractor shall submit to Greenville Utilities duplicate copies of shipping notices describing each shipment of material or equipment.

The Contractor shall contact Ken Wade, Substation Engineer at least 72 hours prior to arrival of equipment at the delivery site, to notify Greenville Utilities of the method of shipment and date of arrival. Telephone notification shall be made between 8:00 a.m. and 5:00 p.m., Monday through Friday, telephone 252-551-1570.

The Contractor shall pay all demurrage costs resulting from delays in unloading, if those delays are caused by failure of the Contractor to notify Greenville Utilities of shipment or to schedule shipment as specified above.

1.3 Shipping Requirements
All materials shall be suitably protected to prevent damage and loss during shipment. Special care shall be exercised in loading the members for shipment to assure that members will not be deformed by overburdened loads and that wearing of the galvanized surfaces will not occur during shipment.
The steel structures shall be shipped assembled where shipping conditions permit.

Each bidder shall furnish with his proposals, under the Section PROPOSAL DATA, a list of the structure items that will require field assembly and describe the shipping sections. All small items shall be bagged, identified and shipping in boxes or crates. The contents of all boxes and crates shall be identified with a packing slip.

1.4 Codes and Standards

Except where specifically stated otherwise, all equipment furnished under these specifications shall conform to the latest applicable standards of ASTM, NEMA, NESC, ANSI, IEEE, NEC, and EEI and shall be in accordance with the applicable requirements of the Federal “Occupational Safety and Health Standards.”

The requirements of the drawings and the written text of these specifications shall govern in case of conflict between them and any of the referenced codes and standards except the mandatory standards which shall govern in all cases. Any conflict between standards shall be referred to Greenville Utilities to determine which standard shall govern.

1.5 Correction of Manufacturing Errors

Equipment and materials shall be complete in all respects within the limits herein outlined. All manufacturing errors or omissions required to be corrected in the field shall be done by the manufacturer or his duly authorized representative and at the Supplier’s expense.

1.6 Arrangement and Ratings

This project is for the construction of an 115 to 13.2 kV substation. The substation will include a new transformer rated 20/26.7/33.3 MVA OA/FA/FA @ 55°C rise (22.4/29.8/37.3 MVA OA/FA/FA @ 65°C rise) with load tap changer (LTC). The 115 kV system will include a 115 kV feed through with three motor operated air break switches. The 115 kV bus will be designed for two transformer taps. The 13.2 kV substation section will include a main and transfer 13.2 kV bus and a six bay distribution structure. Initially four 1200 ampere circuit breakers and one 2000 ampere main bus breaker will be installed. The distribution feeders will exit the substation underground.

The arrangement of the structures is depicted in Appendix B. Section 4.1 lists the equipment details.

1.7 Material to be Furnished

Material and equipment shall be furnished in accordance with the drawings and bill of material as listed in Appendix A, Appendix B and these specifications. The bill of material included in this specification represents GUC’s standard substation package. The quantities are not exact. The vendor is responsible to furnish all structures and equipment to ensure a complete substation.

2.0 ENGINEERING DATA

2.1 General

This section covers the requirements for moment and loading data, manufacturer’s drawings, instruction manuals, and other engineering data that the Contractor shall submit to Greenville Utilities for design information and review.
### 2.2 Correspondence

Correspondence forwarding drawings, instruction manuals, and other engineering data shall be addressed as follows:

<table>
<thead>
<tr>
<th>Electronic</th>
<th>Correspondence</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ken Wade</td>
<td>Greenville Utilities</td>
<td>Greenville Utilities</td>
</tr>
<tr>
<td><a href="mailto:wadekr@guc.com">wadekr@guc.com</a></td>
<td>PO Box 1847</td>
<td>801 Mumford Road</td>
</tr>
<tr>
<td>John Powell</td>
<td>Greenville, NC 27835-1847</td>
<td>Greenville, NC 27834</td>
</tr>
<tr>
<td><a href="mailto:powelljl@guc.com">powelljl@guc.com</a></td>
<td>Attention: Mr. Ken Wade</td>
<td>Attention: Mr. Ken Wade</td>
</tr>
</tbody>
</table>

Always include the Manufacturer’s order number.

### 2.3 Drawings, Bills of Material, and Loading Data

#### 2.3.1 Shop drawings, bills of material, and loading reaction data covering all fabricated materials furnished under this Specification shall be submitted to Greenville Utilities for approval within 35 days after award of contract. Drawings shall be a maximum of 24 by 36 inches. No work shall be performed in connection with fabrication or manufacture of materials until the drawings and data have been approved.

#### 2.3.2 Loading data shall show the worst-case loads at the foundations in the “X”, “Y”, and “Z” directions, and resulting moments at the foundation surfaces.

#### 2.3.3 Drawings and necessary data which show the kind, size, arrangement, weights of each component, and operation of component materials and devices; the external connections, anchorage, and supports required; and the dimensions needed for installation and correlation with other materials and equipment shall be submitted to the Greenville Utilities for review.

#### 2.3.4 Approval drawings and reaction data, either preliminary or certified, shall be submitted to Greenville Utilities electronically. Each drawing submitted shall be clearly marked with the name of the project, the order number, the Contractor’s name, and references to applicable specification paragraphs. When catalog pages are submitted, the applicable items shall be indicated, and the pages shall be included in the Substation Equipment Manual.

#### 2.3.5 Drawings, data, and equipment manuals will be reviewed by Greenville Utilities and returned to the Contractor marked APPROVED, APPROVED AS NOTED, or RETURN FOR CORRECTIONS.

#### 2.3.6 When the drawings, data, and equipment manuals are returned marked APPROVED AS NOTED or RETURNED FOR CORRECTIONS, the changes and/or corrections shall be made as noted thereon and corrected copies shall be submitted electronically to Greenville Utilities for final approval and distribution.
2.3.7 When the drawings are returned marked RETURNED FOR CORRECTIONS, the corrections shall be made as noted thereon and as instructed by Greenville Utilities, and shall be submitted electronically.

2.3.8 Greenville Utilities’ review of drawings and data will cover only general conformity to the Specifications and the external connections and dimensions. Greenville Utilities’ review of drawings returned marked APPROVED will not constitute a blanket approval of all dimensions, quantities, and details of the material, equipment, device, or item shown and does not relieve the Contractor from any responsibility for errors or deviations from the contract requirements. All drawings and data, after final approval by the Greenville Utilities, shall become a part of the contract documents and the work shown or described thereby shall be performed in conformity therewith unless otherwise required by Greenville Utilities. After all drawings have been approved, the Contractor will submit the drawings to Greenville Utilities in AutoCAD format, 2013 version. The Substation Equipment Manual shall be bound in one binder with four copies delivered to Greenville Utilities and one copy sent electronically in Adobe (pdf) format.

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3.0 SUBSTATION STEEL STRUCTURES

3.1 General
This section covers materials and fabrication for substation wide flange steel structures to be incorporated in the Sugg Parkway Substation in Greenville, North Carolina.

The structures furnished under these specifications shall include all new structures indicated on the drawings listed in Appendix B.

The structures shall be complete with all field connection bolts required for erecting the structures and all bolts required for mounting the equipment furnished under other sections of these specifications. In addition, mounting bolts shall be furnished for mounting other equipment as indicated on the drawings.

All testing and welding specifications required by these specifications shall be performed by an independent testing laboratory retained by the Fabricator and accepted by Greenville Utilities. All testing qualification expenses shall be paid by the Fabricator.

Certain dimensions indicated on Greenville Utilities' drawings shall be adjusted as required to suit the equipment furnished by the Contractor under other sections of these specifications. The dimensions required for the equipment furnished shall be shown on the Contractor’s detail shop drawings and the materials and fabrication required shall be provided as part of the contract work. There will be no adjustment in price because of these requirements.

The following minimum clearances shall be maintained:

<table>
<thead>
<tr>
<th>Clearance</th>
<th>115 kV</th>
<th>13.2 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal-to metal phase spacing (inches)</td>
<td>53”</td>
<td>12”</td>
</tr>
<tr>
<td>Vertical break disconnect switch center-to center phase spacing (inches)</td>
<td>84”</td>
<td>24”</td>
</tr>
<tr>
<td>Horn gap switch (if used to interrupt transmission line charging currents, loop currents, or transformer magnetizing currents) and expulsion type fuses center-to-center phase spacing (inches)</td>
<td>120”</td>
<td>36”</td>
</tr>
<tr>
<td>Phase-to-ground (inches)</td>
<td>47”</td>
<td>10”</td>
</tr>
<tr>
<td>Vertical clearance from energized parts or jumpers to grade (feet-inches)</td>
<td>12'-0&quot;</td>
<td>9'-0&quot;</td>
</tr>
<tr>
<td>Clearance from un guarded live parts to working platform (feet-inches)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>11'-7&quot;</td>
<td>9'-0&quot;</td>
</tr>
<tr>
<td>Horizontal</td>
<td>6'-1&quot;</td>
<td>3'-6&quot;</td>
</tr>
<tr>
<td>Low bus height above top of foundation (feet)</td>
<td>12'-0&quot;</td>
<td>14'-0&quot;</td>
</tr>
<tr>
<td>High bus height above top of foundation (feet)</td>
<td>20'-0&quot;</td>
<td>23'-8&quot;</td>
</tr>
</tbody>
</table>
Detail sealed engineering calculations, shop drawings, foundation drawings and erection drawings shall be prepared, checked, and submitted, to Greenville Utilities in accordance with the requirements of Section 2. Engineers seal on calculations shall be for the State of North Carolina or the state of the Engineers’ primary residence.

### 3.2 Codes and Standards

All material furnished under this section shall conform to the applicable codes or standards of the technical societies or organizations listed in these specifications, to the specific standards mentioned in this section, and the latest edition of North Carolina Building Code.

Reference to technical societies or organizations may be made by abbreviation in accordance with the following list.

- **AHDGA** - American Hot-Dip Galvanizers Association
- **AISC** - American Institute of Steel Construction
- **AISI** - American Iron and Steel Institute
- **ANSI** - American National Standards Institute
- **ASCE** - American Society of Civil Engineers
- **ASTM** - American Society of Testing and Materials
- **AWS** - American Welding Society
- **IEEE** - Institute of Electrical and Electronic Engineers
- **NEMA** - National Electrical Manufacturers Association

Except as otherwise specified or specifically indicated on the drawings, all materials furnished and work performed in connection with substation structure work under this section shall be in conformity with the AISC Manual of Steel Construction, Ninth Edition.

### 3.3 Structure Loads

The following structure loads shall be considered.

#### 3.3.1 Apparatus Loads

Apparatus loads include the following:

- Weight of equipment
- Conductor and bus weight
- Friction forces, moments, and torque due to mechanical operation of apparatus such as air break switches

#### 3.3.2 Climatological Loading

- **Ice Loading:** The Ice Loading Condition is 0.5 inch radial ice thickness, at 0 degrees F, with a wind pressure of 2.3 pounds per square foot (psf).
- **Extreme Wind:** The extreme wind condition shall be a 31 psf horizontal wind pressure, with no ice, at a temperature of 60 degrees F.
### 3.3.3 Application of Wind Loads and Ice Loads on Structures

The wind pressures for Section 3.3.2 will be applied to the vertical projection of the structural members for the first bent. A bent consists of one or more columns effectively all in one plane, including bracing between the members. For successive bents, the wind pressure will be reduced in proportion to the shade factor \( K \), where \( K \) is defined as follows:

\[
K = \frac{L}{4W}
\]

- \( L \) = Distance from front of the first bent to front of the following bent.
- \( W \) = The least dimension perpendicular to the wind direction.

If \( L \) is greater than \( 4W \), then shading is ineffective and full wind pressure is applied to the next bent (\( K=1 \)).

Shape factors for applying wind force will be applied as follows:

- Round shapes 1.0
- Octagonal shapes 1.4
- Flat shapes 1.6

For lattice towers, lattice box columns and trusses, the exposed area is assumed to be 1.5 times the total exposed area of the component members.

### 3.4 Allowable Stresses and Deflections

Allowable stresses shall be calculated according to the methods outlined in the latest edition of the AISC Manual of Steel Construction. The following deflection limits shall apply when the structure is under a set of compatible loads without short circuit forces.

#### 3.4.1 Class “A” Structures

Intended for the support of high voltage equipment, i.e., air break switches and other circuit interrupting devices

- Horizontal deflection of vertical members: 1.0% of the vertical height
- Vertical deflection of horizontal members: 0.5% of the span
- Horizontal deflection of horizontal members: 0.5% of the span

#### 3.4.2 Class “B” Structures

Where deflections within the limits do not affect the performance of support equipment, i.e., dead-end structures without switches, bus supports, and miscellaneous equipment supports

- Horizontal deflection of vertical members: 2.0% of the vertical height
- Vertical deflection of horizontal members: 0.5% of the span
- Horizontal deflection of horizontal members: 1.0% of the span
3.5 Materials

All materials shall be new and undamaged and shall conform to pertinent AISC and ASTM standard specifications and the following requirements.

Steel shapes and plates for structures
- ASTM A36 steel. Minimum yield point of 36,000 psi including appurtenant materials. Galvanized after fabrication.

Structural tubing members
- ASTM 500, Grade B. Minimum yield point of 46,000 psi. ¼ inch minimum wall thickness, galvanized after fabrication.

Welding electrodes
- AWS D1.1-80 (as specified in Table 4.1.1 “Matching Filler Metal Requirements”). Low hydrogen types, tensile strength range of 70,000 psi minimum.

Structural members bolted connections
- ASTM A325, heavy hex bolts and install high strength threaded fasteners in accordance with AISC “specifications for structural joints using ASTM A325 or A490 bolts.”

Connection bolts and bolts for equipment mounting
- ASTM A394; hexagon bolts and nuts, flat or beveled washers, and MacLean-Fogg “M-F Lock Nut #1” locking devices. All bolting materials shall be galvanized.

Galvanizing
- ASTMA384, ASTMA385, and ASTMA386

Shapes and plates
- ASTM A123

Bolts, nuts, and washers
- Galvanized as specified in ASTMA394 and ASTMA153.

Anchor bolts
- ASTMA153

3.6 Anchor Bolts

The contractor shall provide detailed design of the anchor bolts. Detailed design calculations and design drawings to verify the anchor bolt design shall be provided to Greenville Utilities for review. Design shall be based on equipment weights and loads, line tensions and climatological design criteria as listed in these specifications.

Anchor bolts shall be fabricated from ASTM A36 steel rods and shall have heavy hexagon nuts conforming to ASTM A307, Grade B. Anchor bolts, nuts and washers shall be hot-dip galvanized after fabrication, threads being undercut to provide a tolerance equal to ANSI Class 2A. Each bolt shall be furnished with two nuts and sufficient threads to permit a nut to be installed on each side of the or template.

The Contractor shall provide anchor bolts for columns and stands. Greenville Utilities will provide anchor bolts for the circuit breakers.
3.7 Field Connection Bolts

Field connection bolts, nuts, and washers shall be furnished for all structure field connections and equipment mounting with the overage of five per cent plus five bolts of each type, size, and length. The length of bolts shall be determined with sufficient projection for washer, nut, and locknut.

With locknuts in place, bolt projection beyond the locknut shall be from \( \frac{1}{4} \) inch to \( \frac{1}{2} \) inch inclusive.

Smooth beveled washers shall be furnished for use when the bearing faces of the bolted parts will have a slope of 1:20 or greater with respect to a plane normal to the bolt axis.

Bolting materials shall be shipped in sturdy kegs or pails which shall be marked with the size, length, count, and other descriptive data as required to fully describe the contents.

3.8 Fabrication

The structures shall be fabricated in conformity with the dimensions, arrangements, sizes, and weights or thicknesses indicated on the drawings or stipulated in the specifications. All members shall be detailed and fabricated in accordance with AISC standards, specifications, and details unless otherwise indicated on the drawings or specified herein and shall have been pre-assembled at the factory prior to shipping to ensure proper fit.

The structures shall be shipped assembled where shipping conditions permit. Each bidder shall furnish with his proposal, under the heading PROPOSAL DATA, a list of the structure items that will require field assembly and describe the shipping sections. When proposals are submitted without statements describing sectional shipments, it will be understood that no field assembly of the structures will be required.

When delivered, members shall be straight, free from warp, unauthorized splices and bends, or local deformations. Holes and other provisions for field connections shall be accurate and shop checked so that when the structure is field assembled, proper fit will be provided. All punching, drilling, and reaming of the holes shall be done in the shop before galvanizing.

All fabricated materials shall conform to the tolerances specified in the AISC Manual and ASTM A6. In additions, the allowable tolerance for sweep shall be no more than 1/8 inch in 10 feet of length regardless of the type of steel section. If necessary, the Contractor shall cull out or straighten materials that do not comply with the specified tolerances. Materials that do not comply with the specified sweep and camber requirements may be rejected.

Baseplates shall also be checked after fabrication and will be rejected if anchor bolt holes are not within 1/32 inch of their specified location with respect to the center of the anchor bolt group or cluster.

Contact surfaces at all column splices and at all other compression joints depending upon contact bearing shall have the bearing surfaces prepared to a common plane by milling, sawing, or other acceptable means. Only milling will be acceptable where milling is specifically indicated on the drawings.

Shearing, flame cutting, and chipping shall be done carefully and accurately. Baseplates, fillers, stiffeners, and connection plates shall be neatly fitted and shall not have ragged edges. Holes shall be cut, drilled, or punched at right angles to the surface and shall not be made or enlarged by burning. Holes shall be clean-cut without torn or
ragged edges, and burrs resulting from drilled or reaming operations shall be removed with the proper tool.

Bolt holes shall be provided for mounting equipment, conduit, and grounding attachments as indicated on the drawings.

Except as otherwise indicated on the drawings or specified herein, shop connections shall be all welded and field connections shall be all bolted. Bolted connections shall be bearing type with all threads excluded from the shear planes of the connected parts.

3.9 Nondestructive Testing
Nondestructive testing shall be provided in accordance with the requirements of Article 6.7 of the referenced AWS code as follows.

Magnetic particle inspection or ultrasonic inspection shall be provided at all circumferential welds and all other critical welds.

Inspection and evaluation of the test data shall be performed by persons fully qualified by training and experience to inspect, evaluate, and accept or reject these welds. Copies of the test reports covering this inspection shall be furnished to Greenville Utilities. Any defective weld shall be removed, rewelded, and re-inspected at the Contractor’s expense.

3.10 Identification
All separate structural members and parts shall be plainly marked, as an aid in assembly, with the identifying mark on the member corresponding to the identical mark on the erection drawings. Marks shall be metal stamped into each member in characters not less than ½ inch high. Stamping shall be done before galvanizing, but marks shall be clearly legible after galvanizing. Marks shall also be painted on the galvanized members with nonpermanent paint in characters not less than one inch high. Connection materials shall be packaged in separate containers with durable fade proof and weatherproof markings.

3.11 Galvanizing
All steel materials furnished under this section shall be hot-dip galvanized after fabrication. Materials shall be prepared for galvanizing by being properly cleaned, pickled, rinsed, and dried.

A durable, high quality, relatively smooth coating is required. The Contractor’s attention is directed to the requirements of ASTM A384, ASTM A385, and ASTM A386 in this regard. Greenville Utilities may at its option inspect the galvanizing in process. Grounds for rejection of members because of galvanizing defects shall be as listed in Table II of the “Inspection Manual for Hot-dip Galvanized Products” published by the American Zinc Institute except that excessive general roughness, pimples, lumpiness, and runs shall be cause for rejection. Greenville Utilities will determine whether defects are excessive or not.

After all cutting, punching, reaming, welding, drilling, capping, and cleaning have been completed, all steel members shall be degreased, pickled, rinsed, pre-fluxed, and galvanized in accordance with the latest recommendations of AHDGA for compliance with the ASTM specifications.
The galvanizing coating shall cover all interior surfaces of hollow members as well as exteriors surfaces, channels, angles, and all other unsymmetrical sections shall be straightened after galvanizing as required to meet the specified tolerance requirements. Anchor bolts shall be galvanized over their entire length.

4.0 DESCRIPTION OF SUBSTATION EQUIPMENT

4.1 General

This section covers materials and equipment to be supplied by the Contractor and incorporated in to the Sugg Parkway Substation. All material and equipment furnished under this section shall conform to the applicable codes or standards of the technical societies or organizations mentioned in this section.

4.2 Bus Materials

Bus materials furnished shall conform to the following:

The rigid substation bus shall be aluminum alloy 6063-T6 seamless pipe manufactured in accordance with ASTM Specification B-241. Schedule 40 pipe size (IPS) pipe shall be used. Jumper cables shall be provided and sized as shown on the drawings unless otherwise noted.

All shop welding shall be by the inert-gas electric-arc welding method.

End enclosure plugs shall be furnished for all bus pipe.

All aluminum bus sections shall be individually packaged in fiber boxes for shipment.

Current carrying connections to bus tube shall be radial swage compression type manufactured by Deutsch Metal Components. Qualified personnel, using manufactures’ recommended methods, shall install swage radial compression connections. Welded and bolted connections shall not be used for electrical bus tube connections.

Current carrying connections to AAC and ACSR cable shall be compression terminal type with factory installed corrosion inhibitor. Current carrying connections to copper cable shall be bolted type.

Where aluminum to copper connections are to be made, the contact surfaces will be tinned, or copper lined as appropriate for the metal-to-metal contact. Terminal pad connection bolts, Belleville lock washers, and nuts will be stainless steel or bronze as appropriate and of appropriate length for the connection. A sufficient number including a 5% overage amount shall be provided to make all electrical connections. An ample quantity of recommended electrical joint compound shall be furnished that will be used to prevent oxidation between the dissimilar metals and to prevent possible entrance of contaminants between the contact surfaces.

The Contractor shall provide complete information for tightening of all electrical connections secured with bolts or studs. The information furnished shall include torque wrench settings or complete details of other tightening procedures recommended for bus joints and connector attachments.

Bus received at the job site with scratches, burrs, or abrasions will be returned to the Contractor for repair or replacement. All other blemishes including black marks, scuff marks, etc., shall be repaired in the field under the direction of a manufacturer’s
representative. The costs of field repairing the bus, repackaging, and shipping the bus back to the manufacturer shall be borne by the Contractor.

Bus fittings and jumpers shall be individually wrapped and packed in wooden crates. Sawdust or other similar non-deleterious shock absorbing material shall be used as a filler material to further protect the fittings and jumpers during shipping and handling. The sizes of the crates used shall be as large as practical to permit ease of handling by normal handling equipment.

4.3 Insulators

All 115 kV insulators shall be porcelain station post type, NEMA Technical Reference 286, ANSI 70 sky gray color. All 13.2 kV insulators shall be porcelain station post type, NEMA Technical Reference 205, ANSI 70 sky gray color.

4.4 Arrestors

All 115kV arrestors shall be Eaton Cooper Cat. No. UHAA096076A5249A11.

All 15kV arrestors shall be Eaton Cooper Cat. No. UHAA010008A1411A11.

4.5 Disconnect Switches

Switches shall be in accordance with applicable paragraphs of the NEMA, IEEE, and ANSI specifications and shall conform to the following additional conditions.

Insulators shall be as specified in Section 4.3.

Switch bases, operating mechanisms, and operating rods shall be hot-dip galvanized after all machining and threading operations. Operating rods and levers shall be cut to length and all machining operations and threading shall be completed at the factory. The operating mechanisms shall have provisions for grounding and for padlocking in the open and closed positions. All operating mechanisms shall be mounted on the structures. Each switch operator for group operator switches shall be furnished complete with all operating pipes, interphase spaces, pipe couplings, guide bearings, ground braids and offsets required to operate the switch from the ground.

All 15 kV switches shall be furnished with copper live parts.

All group-operated switches shall be furnished with a galvanized steel operator grounding platform with dimensions of 3 feet by 6 feet. Two compression terminals per grounding platform, one on each end of the platform, shall be provided by the Contractor.

Contractor shall provide Burndy Type GG, Anderson Type GC-109, or equivalent ground clamp for attaching ground braids to the operating pipe.

Switch bearings shall be of the sealed greaseless type.

All switches shall be manufactured by Cleveland Price.

4.6 Voltage Transformers

Voltage transformers shall be rated in accordance with the ratings shown on the drawings, applicable paragraphs of the NEMA, IEEE, and ANSI specifications.
4.7 Power Fuses

Power fuses shall be rated in accordance with the ratings shown on the drawings, applicable paragraphs of the NEMA, IEEE, and ANSI specification. Insulators shall be as specified under Section 4.3.

4.8 Ground Conductor and Connectors

No. 2/0 AWG copper ground stingers will be furnished by others for connection of each steel structure column to the below grade ground grid. The Owner shall furnish above grade No. 2/0 AWG copper ground conductor to connect the ground stingers to switch operating handles, switch operating platforms, voltage transformers, and surge arresters.

The Contractor shall provide all above grade ground connectors required for connecting ground stingers and above grade ground conductor to the steel structures. Above grade ground conductors shall be supported by bronze ground clamps at interval not to exceed four feet. Connectors shall be bronze ground clamps, cable-to-flat, type GC as manufactured by Anderson, or equal. Connectors on material listing have been specified for 1/2” thick steel structure. If thickness is other than 1/2”, fabricator shall coordinate appropriate change order to specify connectors for correct steel thickness.

All equipment and switch operating platforms shall be bonded at two diagonally separating locations. All equipment shall be grounded with single 2/0 AWG copper except the power transformer shall be grounded with dual 4/0 AWG copper.

The switch platform shall have a continuous ground stinger from the below grade ground grid, to each diagonal corner pad, to the steel column and to the operating mechanism. The operating control pipe shall be bonded with a flexible braid strap. A separate ground stinger shall be bonded to both switch platform pads with the first ground stinger with a parallel groove grounding connector.

The static mast shall be a 2” x 10’ galvanized pipe. There shall be a continuous 2/0 AWG copper ground from the static mast to the below grade ground grid. The copper conductor shall be bonded to the steel column every 4 to 6 feet.

4.9 Stranded Conductor Current Carrying Connections

Current carrying connections to AAC and ACSR cable shall be compression terminal type with factory installed corrosion inhibitor. Current carrying connections to copper cable shall be bolted type.

Where aluminum to copper connections are to be made, the contact surfaces will be tinned, or copper lined as appropriate for the metal-to-metal contact. Terminal pad connection bolts, Belleville lock washers, and nuts will be stainless steel or bronze as appropriate and of appropriate length for the connection. A sufficient number including a 5% overage amount shall be provided to make all electrical connections. An ample quantity of recommended electrical joint compound shall be furnished that will be used to prevent oxidation between the dissimilar metals and to prevent possible entrance of contaminants between the contact surfaces.

The Contractor shall provide complete information for tightening of all electrical connections secured with bolts or studs. The information furnished shall include torque wrench settings or complete details of other tightening procedures recommended for bus joints and connector attachments.
4.10 Equipment Details

**BUS Dimensions**

<table>
<thead>
<tr>
<th>Bus Size</th>
<th>Bus Dimensions</th>
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<tbody>
<tr>
<td>3” Schedule 40</td>
<td>115 kV main bus</td>
</tr>
<tr>
<td>3” Schedule 40</td>
<td>115 kV tap bus</td>
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<tr>
<td>3” Schedule 40</td>
<td>15 kV main bus</td>
</tr>
<tr>
<td>2” Schedule 40</td>
<td>15 kV main bus tap</td>
</tr>
<tr>
<td>2” Schedule 40</td>
<td>15 kV transfer bus</td>
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**CONDUCTOR Sizes**

<table>
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<tr>
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<th>Size</th>
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</thead>
<tbody>
<tr>
<td>1272 AAC</td>
<td>Transmission incoming line – 115 kV</td>
</tr>
<tr>
<td>336 ACSR</td>
<td>Power Transformer High Side – 115 kV</td>
</tr>
<tr>
<td>2-795 AAC</td>
<td>Power Transformer Low Side – 15 kV</td>
</tr>
<tr>
<td>2-795 AAC</td>
<td>Bus Breaker – 15 kV</td>
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<tr>
<td>1272 AAC</td>
<td>Feeder Breaker – 15 kV</td>
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<tr>
<td>1000 MCM UG</td>
<td>Distribution outgoing line – 15 kV</td>
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**Device Quantities**

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<tr>
<td>1</td>
<td>115 kV Circuit Switchers</td>
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<tr>
<td>1</td>
<td>15 kV Source Breakers (2000A)</td>
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<td>15 kV Feeder Breakers (1200A)</td>
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<td>1</td>
<td>Potential Transformer Sources</td>
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<td>Station Service Transformers</td>
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**Preferred Equipment Manufacturers**

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<tr>
<td>Deutsch Power Products</td>
</tr>
<tr>
<td>Hubbell CCLS</td>
</tr>
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</table>

4.11 Other Equipment

The Bill of Material Appendix A provides the recommended manufacturer and catalog number. The items provided by Greenville Utilities are identified by “Owner” as the manufacturer. The Contractor shall use the same item number in the developed Bill of Material and drawings. The Bill of Material and drawings can be provided electronically upon request.
5.0 Foundation Design

5.1 General
Vendor shall design foundations for all structures provided by the Vendor.

Vendor shall design foundation for one Owner provided S&C Series 2000 Circuit Switcher Model 2010 Catalog No. 197838AE12H2KMTT2VW1Y. Manufacturer approval drawings included in Appendix C. Foundation loading per pedestal is included in the manufacturer approval drawings.

5.2 Codes and Standards
All designs furnished under this section shall conform to the applicable codes or standards of the technical societies or organizations listed in these specifications, to the specific standards mentioned in this section, and the latest edition of North Carolina Building Code.

Reference to technical societies or organizations may be made by abbreviation in accordance with the following list.

ACI - American Concrete Institute
ANSI - American National Standards Institute
ASCE - American Society of Civil Engineers
ASTM - American Society of Testing and Materials
RUS - Rural Utilities Service

5.3 Foundation Design Criteria and Types
All drilled shaft (augered pier) and spread footing foundations shall conform to the standards listed in RUS 1724E-300 Chapter 8 Foundations.

The vendor shall utilize the geotechnical subsurface engineering report is included in this document, Appendix D, in the design of foundations. **Borings B-1 and B-2** included in the report yield the soil conditions at Sugg Parkway Substation.

The vendor shall design the foundations to address the allowable load-bearing capacity of the subsurface materials and the allowable deformations permitted upon the structure/foundation under loading.

Drilled shaft foundations are the preferred foundation type. Spread footing foundations will be allowed in lieu of drilled shaft foundations where soil conditions dictate the necessity for spread footings.
# APPENDIX A

## BILL OF MATERIAL

**GREENVILLE UTILITIES COMMISSION**

<table>
<thead>
<tr>
<th>ITEM</th>
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<td>AE</td>
<td>TLS-42-L</td>
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<td>GROUND RODS</td>
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<td>83</td>
<td></td>
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<td>OWNER</td>
<td>BELOW GRADE CADWELD MOLDS AND WELD METALS</td>
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<td>BF&amp;MAR</td>
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<td>SOL</td>
<td>8M89301</td>
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Appendix B
Substation Section Views 1-6
Appendix C
S&C Circuit Switcher
Appendix D

Geotechnical Report
October 15, 2019

Greenville Utilities Commission
PO Box 1847
Greenville, NC 27835

Attn: Mr. Ken Wade – Substation and Controls Engineer
   P: (252) 551-1570
   E: wadekr@guc.com

Re: Geotechnical Engineering Report
   Sugg Parkway Substation
   Sugg Parkway and Old Creek Road
   Greenville, Pitt County, NC
   Terracon Project No. 72195082

Dear Mr. Wade:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P72195082 dated September 6, 2019. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations for the proposed project.

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

Sincerely,

Terracon Consultants, Inc.

Seth A. Bowman
Staff Professional
Geotechnical Services

Reviewed by: Kevin Szczech, PE

Terracon Consultants, Inc.  314 Beacon Drive  Winnsboro, NC 29180
P (252) 353-1600  F (252) 353-0002  terracon.com  Registered NC F-0059
REPORT TOPICS

INTRODUCTION........................................................................................................1
SITE CONDITIONS ....................................................................................................1
PROJECT DESCRIPTION ..........................................................................................2
GEOTECHNICAL CHARACTERIZATION ................................................................2
GEOTECHNICAL OVERVIEW ..................................................................................3
EARTHWORK ............................................................................................................4
SUBSTATION MAT FOUNDATIONS .........................................................................7
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LIQUEFACTION .......................................................................................................8
GENERAL COMMENTS ............................................................................................8
FIGURES ................................................................................................................10

Note: This report was originally delivered in a web-based format. Orange 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 GeoReport logo will bring you back to this page. For more interactive features, please view your project online at client.barranco.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
DESIGN SOIL PARAMETERS FOR DRILLED PIERS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.
# REPORT SUMMARY

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<th>Topic</th>
<th>Overview Statement</th>
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<td><strong>Project Description</strong></td>
<td>The project includes a new substation with associated above-ground power lines off</td>
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<td>Sugg parkway and Old Creek Road in Greenville, NC.</td>
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<tr>
<td><strong>Geotechnical Characterization</strong></td>
<td>The borings encountered very loose to medium dense sand underlain by denser sand.</td>
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<td></td>
<td>Groundwater is anticipated at a depth of 3 to 4 feet below the existing ground</td>
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<tr>
<td></td>
<td>surface.</td>
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<tr>
<td><strong>Earthwork</strong></td>
<td>After stripping topsoil, the substation footprint should be densified in place using a</td>
</tr>
<tr>
<td></td>
<td>medium weight vibratory roller. The purpose of the vibratory rolling is to densify</td>
</tr>
<tr>
<td></td>
<td>the loose, near surface disturbed soils and potentially improve foundation support.</td>
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<tr>
<td><strong>Substation Mat Foundations</strong></td>
<td>Shallow foundations will be sufficient</td>
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<tr>
<td></td>
<td>Allowable bearing pressure = 1,000 psf</td>
</tr>
<tr>
<td></td>
<td>Expected settlements: &lt; 1-inch total, &lt; 1/2-inch differential</td>
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<tr>
<td><strong>Pole Deep Foundations</strong></td>
<td>The poles to be supported by drilled piers installed with the slurry method of drilling</td>
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<tr>
<td></td>
<td>to help prevent blow out. Design parameters for the lateral resistance and bearing</td>
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<tr>
<td></td>
<td>capacity of drilled piers are presented in this report.</td>
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<tr>
<td><strong>General Comments</strong></td>
<td>This section contains important information about the limitations of this geotechnical</td>
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<td>engineering report.</td>
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1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.
Geotechnical Engineering Report
Sugg Parkway Substation
Sugg Parkway and Old Creek Road
Greenville, Pitt County, NC
Terracan Project No. 72195082
October 15, 2019

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed substation and poles to be located at Sugg Parkway and Old Creek Road in Greenville, Pitt County, NC. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Foundation design and construction
- Groundwater conditions
- Seismic site classification per IBC
- Site preparation and earthwork

The geotechnical engineering Scope of Services for this project included the advancement of four test borings to a depth of approximately 30 feet below existing site grades.

Maps showing the site and boring locations are shown in the Site Location and Exploration Plan sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and as separate graphs in the Exploration Results section.

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 geologic and topographic maps.

<table>
<thead>
<tr>
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<th>Description</th>
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<tr>
<td>Parcel Information</td>
<td>The project is located along Sugg Parkway and Old Creek Road in Greenville, Pitt County, NC. Coordinates: 35.6523°N, 77.3334°W (approximate) See Site Location</td>
</tr>
<tr>
<td>Existing Improvements</td>
<td>Undeveloped fields near existing above-ground power lines.</td>
</tr>
<tr>
<td>Current Ground Cover</td>
<td>Grass and cultivated soils</td>
</tr>
<tr>
<td>Existing Topography</td>
<td>Relatively level</td>
</tr>
</tbody>
</table>

Responsive ■ Resourceful ■ Reliable
Geotechnical Engineering Report
Sugg Parkway Substation  Greenville, Pitt County, NC
October 15, 2019  Terracon Proj No. 72195082

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>Geology</td>
<td>The subject site is located in the Coastal Plain Physiographic Province. The Coastal Plain soils consist mainly of marine sediments that were deposited during successive periods of fluctuating sea level and moving shoreline. The soils include sands, silts, and clays with irregular deposits of shells, which are typical of those lain down in a shallow sloping sea bottom. Recent alluvial sands, silts, and clays are typically present near rivers and creeks. According to USGS Mineral Resources On-Line Spatial Data based on the 1998 digital equivalent of the 1985 Geologic Map of North Carolina updated in 1998, the site is mapped within the Yorktown Formation and Duplin Formation, Undivided (Tertiary)</td>
</tr>
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</table>

**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:

<table>
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<th>Item</th>
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<tr>
<td>Information Provided</td>
<td>Email communication with requested boring locations on August 29, 2019.</td>
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<tr>
<td>Proposed Structures</td>
<td>The project includes a new substation with associated above-ground power lines off Sugg Parkway and Old Creek Road in Greenville, NC.</td>
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<tr>
<td>Building Construction</td>
<td>Concrete drilled pier foundations or vibratory driven piles are anticipated for the power lines. Mat foundations for transformers and small equipment pads are assumed.</td>
</tr>
<tr>
<td>Maximum Loads</td>
<td>- Substation: 15 to 100 kips (assumed)</td>
</tr>
<tr>
<td></td>
<td>- Poles: 4,500 ft-kips overturning at the ground surface (assumed)</td>
</tr>
<tr>
<td>Grading/Slopes</td>
<td>Up to 2 feet of cut and/or fill placement</td>
</tr>
<tr>
<td>Estimated Start of Construction</td>
<td>Early 2020</td>
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</table>

**GEOTECHNICAL CHARACTERIZATION**

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the Exploration Results section and the GeoModel can be found in the Figures section 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.

<table>
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<th>Model Layer</th>
<th>Layer Name</th>
<th>General Description</th>
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<tr>
<td>1</td>
<td>Looser Sand</td>
<td>Very loose to loose Clayey Sand (SC) and Silty Clayey Sand (SC-SM)</td>
</tr>
<tr>
<td>2</td>
<td>Loose to Medium Dense Sand</td>
<td>Generally Silty Sand (SM) and Poorly Graded Sand (SP)</td>
</tr>
<tr>
<td>3</td>
<td>Medium Dense to Dense Sand</td>
<td>Poorly Graded Sand (SP), Clayey Sand (SC), Silty Sand (SM)</td>
</tr>
</tbody>
</table>

Groundwater

Groundwater was measured at depths of 3.5 to 4 feet during drilling using hollow stem augers. Based on the moisture condition of the soil samples, groundwater is anticipated at depths of 3 to 4 feet below the existing ground surface.

The groundwater level can change due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

The borings in the substation area encountered very loose to loose sand underlain by relatively denser sand. The borings along the proposed alignment encountered loose to medium dense sand underlain by relatively denser sand.

After stripping top soil, the substation footprint should be densified in place using a medium weight vibratory roller. The purpose of the vibratory rolling is to densify the loose, near surface disturbed soils and potentially improve foundation support.

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 site preparation, excavations, and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations.

Site Preparation

Site preparation should begin with the complete removal of the surface vegetation and topsoil in the proposed substation area. Based on site observations during the drilling process, topsoil should be stripped up to a depth of approximately 3 inches. A Terracon representative should field verify the stripping depth during construction. Topsoil may be reused in areas of the site to be landscaped but should not be used for fill.

After stripping, the exposed subgrade soils in the substation footprint should be densified in place using a medium weight vibratory roller. The purpose of the vibratory rolling is to densify the exposed subgrade soils to potentially improve the foundation bearing soils. The roller should make at least six passes across the site, with the second set of three passes perpendicular to the first set of three passes. If water is brought to the surface by the vibratory rolling, the operation should be discontinued until the water subsides. Vibratory rolling should be completed during dry weather.

After the vibratory rolling, pore pressures should be allowed to dissipate for a minimum of 16 hours. After the waiting period, 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.

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 5 feet of structures, pavements or constructed slopes. General fill is material used to achieve grade outside of these areas. Earthen materials used for structural and general fill should meet the following material property requirements:


<table>
<thead>
<tr>
<th>Soil Type</th>
<th>USCS Classification</th>
<th>Acceptable Parameters (for Structural Fill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imported Soil</td>
<td>SC, SM, SP</td>
<td>All location and elevations.</td>
</tr>
<tr>
<td>On-Site Soils</td>
<td>SC, SM, SP</td>
<td>On site soils that meet these soil classifications are generally suitable for fill if properly moisture conditioned.</td>
</tr>
</tbody>
</table>

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the geotechnical engineer for evaluation.

On-site near surface clays, if encountered, are not recommended for use as structural fill due to their high fines content and moisture sensitivity relative to sandy soils available. Near surface clay could be considered for use as general fill.

**Fill Compaction Requirements**

Structural and general fill should meet the following compaction requirements.

<table>
<thead>
<tr>
<th>Item</th>
<th>Structural Fill</th>
<th>General Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Lift Thickness</td>
<td>9 inches or less in loose thickness when heavy, self-propelled compaction equipment is used. 4 to 6 inches in loose thickness when hand-guided equipment (i.e., jumping jack or plate compactor) is used.</td>
<td>Same as Structural fill</td>
</tr>
<tr>
<td>Minimum Compaction Requirements 1, 2</td>
<td>95% of max. above and below foundations</td>
<td>92% of max.</td>
</tr>
<tr>
<td>Water Content Range 1</td>
<td>-2% to +2% of optimum</td>
<td>As required to achieve min. compaction requirements</td>
</tr>
</tbody>
</table>

1. Fill should be tested for moisture content and compaction during placement. If in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the tests should be reworked and retested as required until the specified moisture and compaction requirements are achieved.

2. It is not necessary to achieve 95% compaction on the existing ground prior to placing fill or beginning construction. However, the subgrade should be evaluated by a representative of the geotechnical engineer prior to placing fill or beginning construction.

It is important to note that the use of rubber-tired traffic, such as tulls, may impact the prepared subgrade soils leading to re-grading. We recommend that the use of rubber-tired traffic be limited on the prepared subgrades or that the stabilized area be prepared for their travel.
Grading and Drainage

During construction, grades should be sloped to promote runoff away from the construction area. Final surrounding grades should be sloped away from the structure on all sides to prevent ponding of water.

Earthwork Construction Considerations

Shallow excavations for the proposed structures are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction. 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 construction.

The groundwater table could affect excavations, especially for the deeper excavations for utilities. A temporary dewatering system consisting of sumps with pumps could be necessary to achieve the anticipated depths of excavation. The actual dewatering system should be selected and designed by a specialty contractor.

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 monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proofroll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved 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 compacted fill in the building areas. One density and water content test should be performed for every 50 linear feet of compacted utility trench backfill.
In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe 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 opportunity to maintain the Geotechnical Engineer’s evaluation of subsurface conditions, including assessing variations and associated design changes.

**SUBSTATION 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.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Net allowable bearing pressure</td>
<td>1,000 psf</td>
</tr>
<tr>
<td>The required embedment below lowest adjacent finished grade for frost protection and protective embedment</td>
<td>12 inches</td>
</tr>
<tr>
<td>Modulus of subgrade reaction</td>
<td>3 pounds per square inch per inch (psi/in)</td>
</tr>
<tr>
<td>Estimated approximate total settlement</td>
<td>Up to 1 inch</td>
</tr>
<tr>
<td>Estimated differential settlement</td>
<td>Up to ½ inch</td>
</tr>
<tr>
<td>Ultimate coefficient of sliding friction</td>
<td>0.35</td>
</tr>
<tr>
<td>Uplift Resistance</td>
<td>Weight of foundation concrete.</td>
</tr>
</tbody>
</table>

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.

**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.
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.

SEISMIC CONSIDERATIONS

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 resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC).

Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the Seismic Site Classification is D. Subsurface explorations at this site were extended to a maximum depth of 30 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. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

LIQUEFACTION

Based on the results of the borings, liquefaction is not expected based on the relatively low level of ground motions associated with the design earthquake and density of the soils.

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. Natural 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 or collaboration through this system 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 impact 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. 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.
FIGURES

Contents:
GeoModel

Note: All attachments are one page unless noted above.
This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

<table>
<thead>
<tr>
<th>Model Layer</th>
<th>Layer Name</th>
<th>General Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Looser Sand</td>
<td>Very loose to loose Clayey Sand (SC) and Silty Clayey Sand (SC-GM)</td>
</tr>
<tr>
<td>2</td>
<td>Loose to Medium Dense Sand</td>
<td>Generally Silty Sand (SC) and Poorly graded Sand (SP)</td>
</tr>
<tr>
<td>3</td>
<td>Medium Dense to Dense Sand</td>
<td>Poorly Graded Sand (SP), Clayey Sand (SC), Silty Sand (SC)</td>
</tr>
</tbody>
</table>

**LEGEND**

- Topsoil
- Clayey Sand
- Silty Sand
- Silt
- Poorly-grained Sand


---

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after sitting. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

**NOTES:**
Layering shown on this figure has been developed by the geotechnical engineer to provide a framework for modeling the subsurface conditions as required for the subsequent geotechnical engineering for the project. Numbers adjacent to soil column indicate depth below ground surface.
EXPLORATION AND TESTING PROCEDURES

Field Exploration

<table>
<thead>
<tr>
<th>Number of Borings</th>
<th>Boring Depth (feet)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two</td>
<td>30</td>
<td>New Substation and requested boring locations</td>
</tr>
</tbody>
</table>

Boring Layout and Elevations: Boring locations were marked in the field by the client. The location of the borings should be considered accurate only to the degree implied by the means and methods used to define it.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted rotary drilling using hollow stem auger and mud rotary drilling techniques. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with soil cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer’s interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.
- ASTM D2216 Standard Test Method of Determination of Water Content of Soil and Rock by Mass
- ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D2488 Standard Practice of Description and Identification of Soils (Visual Manual Method)
- ASTM D422 Standard Test Method for Particle Size Analysis of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than No. 200 Sieve in Soils by Washing

The laboratory testing program often included examination of soil samples by an engineer. Based on the material’s texture and plasticity, 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.
EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-4)
Grain Size Distribution
Atterberg Limits

Note: All attachments are one page unless noted above.
**BORING LOG NO. B-1**

**PROJECT:** Sugg Parkway Substation

**SITE:** Sugg Parkway and Old Creek Road
Greenville, NC

**CLIENT:** Greenville Utilities Commission
Greenville, NC

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>LOCATION</th>
<th>MATERIALS</th>
<th>CLASS</th>
<th>SAMPLE TYPE</th>
<th>FIELD TEST RESULTS</th>
<th>WATER CONTENT (%)</th>
<th>LAB RESULTS</th>
<th>PERCENTILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td></td>
<td>TOPSOIL</td>
<td>CLAYET SAND (SC)</td>
<td>3-3-3</td>
<td>19</td>
<td>20-15-11</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td></td>
<td>SILTY CLAYET SAND (SC-EM)</td>
<td>3-4-4</td>
<td>19</td>
<td>11-17-13</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td></td>
<td>4-3-3</td>
<td>19</td>
<td>11-17-13</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td></td>
<td>0-1-1</td>
<td>34</td>
<td>21-17-4</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td></td>
<td>1-2-1</td>
<td>34</td>
<td>21-17-4</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td></td>
<td>0-0-0</td>
<td>18</td>
<td>21-17-4</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.0</td>
<td></td>
<td>0-5-7</td>
<td>18</td>
<td>21-17-4</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.0</td>
<td></td>
<td>5-4-5</td>
<td>29</td>
<td>21-17-4</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Termination:**
Boring Terminated at 30 Feet

**Assessment Method:**
2.5Inch hollow stem augers

**Supporting Information:**
See supporting information for explanation of symbols and abbreviations.

**Notes:**
Boring terminated with soil cuttings upon completion.

**Water Level Observations:**
At completion of digging

**Conclusion:**
Sugg Parkway Substation

---

**TERRACON**
314 Beacon Dr
Winston-Salem, NC

**Project No:** T220502

**Date:**
Boring Started: 09-20-2019
Boring Completed: 09-20-2019

**Dirt/Rip Track:**
Dirt RS

---

**Cave in depth:**
**BORING LOG NO. B-2**

**PROJECT:** Sugg Parkway Substation  
**SITE:** Sugg Parkway and Old Creek Road, Greenville, NC  
**CLIENT:** Greenville Utilities Commission, Greenville, NC

<table>
<thead>
<tr>
<th>GRAPHIC LOG</th>
<th>DEPTH</th>
<th>LOCATION</th>
<th>SAMPLE TYPE</th>
<th>FIELD TEST RESULTS</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>2.0</td>
<td>See SDR</td>
<td>CLAYYET SAND (SO)</td>
<td>3-4</td>
<td>N/10</td>
</tr>
<tr>
<td>2.0</td>
<td>4.0</td>
<td></td>
<td>CLAYYET SAND (SO)</td>
<td>4-5</td>
<td>N/11</td>
</tr>
<tr>
<td>4.0</td>
<td>6.0</td>
<td></td>
<td>POORLY GRADED SAND (SP)</td>
<td>1-1-2</td>
<td>N/3</td>
</tr>
<tr>
<td>6.0</td>
<td>8.0</td>
<td></td>
<td>SILT SAND (SM)</td>
<td>2-2-2</td>
<td>1</td>
</tr>
<tr>
<td>8.0</td>
<td>10.0</td>
<td></td>
<td></td>
<td>10-5-4</td>
<td>N/9</td>
</tr>
<tr>
<td>10.0</td>
<td>12.0</td>
<td></td>
<td></td>
<td>6-3-5</td>
<td>N/11</td>
</tr>
<tr>
<td>12.0</td>
<td>14.0</td>
<td></td>
<td></td>
<td>5-4-4</td>
<td>N/8</td>
</tr>
</tbody>
</table>

Boring Terminated at 30 Feet

Drill Rig Track: Driller RS  
Boring Started: 09-28-2019  
Boring Completed: 09-29-2019

---

**Terrain Log:**
- **UNITED CIVIL ENGINEERING**
- **TERRA CON**
- **314 Beacon Dr**
- **WILLOW, NC**

**Notes:**
- Driller: RS  
- Boring Started: 09-28-2019  
- Boring Completed: 09-29-2019

**Water Level Observations:**
- At completion of drilling
- Case in depth
# Boring Log No. B-3

**Project:** Sugg Parkway Substation  
**Client:** Greenville Utilities Commission  
**Site:** Sugg Parkway and Old Creek Road, Greenville, NC

<table>
<thead>
<tr>
<th>Depth</th>
<th>Soil Type</th>
<th>Sample</th>
<th>Field Test Results</th>
<th>Weather Cont.</th>
<th>CTS %</th>
<th>LFL %</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>Clayey Sand (SC)</td>
<td>0-3-3</td>
<td>N=8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>Silty Sand (SM)</td>
<td>3-8-8</td>
<td>N=12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td></td>
<td>7-8-8</td>
<td>N=10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>Poorly Graded Sand (SP)</td>
<td>8-5-8</td>
<td>N=13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td>Clayey Sand (SC)</td>
<td>4-5-5</td>
<td>N=10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td></td>
<td>7-5-4</td>
<td>N=9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td>Clayey Sand (SC)</td>
<td>5-5-13</td>
<td>N=18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.5</td>
<td></td>
<td>11-5-22</td>
<td>N=37</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Boring Terminated at 30 Feet**

**Drift:**  
**Drill Method:**  
**Drill Rig:**  
**Drill Rig Type:**

**Water Level Observations:**  
**Date:** 04/23/19

---

**Notes:**  
- Boring Started: 09/21/19  
- Boring Completed: 04/27/19

**Client:**  
**Contact:**  
**Address:**  
**Phone:**  
**Fax:**  

---

**Client:**  
**Contact:**  
**Address:**  
**Phone:**  
**Fax:**  

---

**Drill Rig:**  
**Type:**

---

**Drill Rig:**  
**Type:**
# Atterberg Limits Results

**ASTM D4518**

### Table

<table>
<thead>
<tr>
<th>Boring ID</th>
<th>Depth</th>
<th>LL</th>
<th>PI</th>
<th>Fines</th>
<th>USCS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>1-2.5</td>
<td>26</td>
<td>15</td>
<td>11</td>
<td>33.7</td>
<td>SC  CLAYEY SAND</td>
</tr>
<tr>
<td>B-1</td>
<td>8.5-10</td>
<td>21</td>
<td>17</td>
<td>4</td>
<td>19.2</td>
<td>SC-SM  SILTY, CLAYEY SAND</td>
</tr>
<tr>
<td>B-4</td>
<td>8.5-10</td>
<td>NP</td>
<td>NP</td>
<td>NP</td>
<td>2.3</td>
<td>SP  POORLY GRADED SAND</td>
</tr>
</tbody>
</table>

---

**Project:** Sugg Parkway Substation

**Site:** Sugg Parkway and Old Creek Road, Greenville, NC

**Client:** Greenville Utilities Commission, Greenville, NC

**Project Number:** 72198082

---

![Graph showing Atterberg limits results](image-url)
DESIGN SOIL PARAMETERS FOR DRILLED PIERS

LANDSCAPE 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.
- Soil parameters are ultimate values, appropriate safety factors should be applied by the designer.
- We have considered groundwater at a depth of 3 to 4 feet.
- The upper 3 feet of soil profile should be ignored due to surface disturbance and frost action.
- Only 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 pile 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.

Boring B-1

<table>
<thead>
<tr>
<th>Layer (feet)</th>
<th>Soil Type (Clay/Sand)</th>
<th>Effective Unit Weight of Soil (pcf)</th>
<th>Cohesion (psf)</th>
<th>Coefficient of Horizontal Soil Stress (K)</th>
<th>Friction Angle (degrees)</th>
<th>Pile k-value (psi)</th>
<th>Factored Skin Friction (psf)</th>
<th>Factored End Bearing Pressure (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Sand</td>
<td>112</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Sand</td>
<td>50.6</td>
<td>—</td>
<td>1.76</td>
<td>29</td>
<td>35</td>
<td>260</td>
<td>4,800</td>
</tr>
<tr>
<td>8</td>
<td>Sand</td>
<td>42.6</td>
<td>0.98</td>
<td>1.62</td>
<td>32</td>
<td>75</td>
<td>540</td>
<td>10,000</td>
</tr>
<tr>
<td>18</td>
<td>Sand</td>
<td>57.6</td>
<td>—</td>
<td>1.24</td>
<td>31</td>
<td>60</td>
<td>520</td>
<td>7,200</td>
</tr>
</tbody>
</table>

1. General notes applicable to the above values are included at the beginning of this section.
Boring B-2

<table>
<thead>
<tr>
<th>Layer (feet)</th>
<th>Soil Type (Clay/Sand)</th>
<th>Effective Unit Weight of Soil (pcf)</th>
<th>Cohesion (psf)</th>
<th>Coefficient of Horizontal Soil Stress (k)</th>
<th>Friction Angle (degrees)</th>
<th>L-Pile k-value (pci)</th>
<th>Factored Skin Friction (psf)</th>
<th>Factored End Bearing Pressure (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Sand</td>
<td>112</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Sand</td>
<td>50.6</td>
<td>—</td>
<td>1.67</td>
<td>29</td>
<td>36</td>
<td>250</td>
<td>4,200</td>
</tr>
<tr>
<td>8</td>
<td>Sand</td>
<td>43.6</td>
<td>—</td>
<td>1.05</td>
<td>26</td>
<td>20</td>
<td>260</td>
<td>2,400</td>
</tr>
<tr>
<td>18</td>
<td>Sand</td>
<td>52.6</td>
<td>—</td>
<td>1.22</td>
<td>30</td>
<td>50</td>
<td>470</td>
<td>6,000</td>
</tr>
</tbody>
</table>

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

Boring B-3

<table>
<thead>
<tr>
<th>Layer (feet)</th>
<th>Soil Type (Clay/Sand)</th>
<th>Effective Unit Weight of Soil (pcf)</th>
<th>Cohesion (psf)</th>
<th>Coefficient of Horizontal Soil Stress (k)</th>
<th>Friction Angle (degrees)</th>
<th>L-Pile k-value (pci)</th>
<th>Factored Skin Friction (psf)</th>
<th>Factored End Bearing Pressure (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Sand</td>
<td>112</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>Sand</td>
<td>53.6</td>
<td>—</td>
<td>2.60</td>
<td>31</td>
<td>60</td>
<td>340</td>
<td>7,000</td>
</tr>
<tr>
<td>13</td>
<td>Sand</td>
<td>52.6</td>
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<td>2.08</td>
<td>30</td>
<td>50</td>
<td>420</td>
<td>6,000</td>
</tr>
<tr>
<td>23</td>
<td>Sand</td>
<td>57.6</td>
<td>—</td>
<td>1.35</td>
<td>32</td>
<td>75</td>
<td>620</td>
<td>10,000</td>
</tr>
<tr>
<td>28</td>
<td>Sand</td>
<td>67.6</td>
<td>—</td>
<td>1.47</td>
<td>35</td>
<td>100</td>
<td>860</td>
<td>10,000</td>
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</tbody>
</table>

1. General notes applicable to the above values are included at the beginning of this section.
### Boring B-4

<table>
<thead>
<tr>
<th>Layer (feet)</th>
<th>Soil Type (Clay/Sand)</th>
<th>Effective Unit Weight of Soil (psf)</th>
<th>Cohesion (psf)</th>
<th>Coefficient of Friction</th>
<th>Angle (degrees)</th>
<th>L-Pile k-value (psi)</th>
<th>Factored Skin Friction (psf)</th>
<th>Factored End Bearing Pressure (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Sand</td>
<td>113</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sand</td>
<td>52.6</td>
<td></td>
<td>1.75</td>
<td>31</td>
<td>60</td>
<td>370</td>
<td>6,000</td>
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<tr>
<td>23</td>
<td>Sand</td>
<td>57.6</td>
<td></td>
<td>0.95</td>
<td>32</td>
<td>75</td>
<td>500</td>
<td>0.000</td>
</tr>
<tr>
<td>28</td>
<td>Sand</td>
<td>67.6</td>
<td></td>
<td>1.02</td>
<td>35</td>
<td>100</td>
<td>510</td>
<td>10,000</td>
</tr>
</tbody>
</table>

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

Contents:

General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted above.
### GeoReport

**Sugg Parkway Substation**

**Terreno Project No. 7219582**

<table>
<thead>
<tr>
<th>SAMPLING</th>
<th>WATER LEVEL</th>
<th>FIELD TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Split Spoon</td>
<td>Water Initially Encountered</td>
<td>N Standard Penetration Test Resistance (Blow/Ft)</td>
</tr>
<tr>
<td></td>
<td>Water Level After a Specified Period of Time</td>
<td>(HP) Hand Penetrometer</td>
</tr>
<tr>
<td></td>
<td>Water Level After a Specified Period of Time</td>
<td>(T) Torsion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(DCP) Dynamic Cone Penetrometer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UC Unconfined Compressive Strength</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(PID) Photoionization Detector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(OVA) Organic Vapor Analyzer</td>
</tr>
</tbody>
</table>

### Descriptive Soil Classification

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 60% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

### Location and Elevation Notes

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with **+** indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

### Strength Terms

<table>
<thead>
<tr>
<th>Descriptive Term</th>
<th>Standard Penetration N-Value Blows/Ft</th>
<th>Descriptive Term</th>
<th>Unconfined Compressive Strength Qua. (tsf)</th>
<th>Standard Penetration N-Value Blows/Ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>0 - 3</td>
<td>Very Soft</td>
<td>less than 0.25</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Loose</td>
<td>4 - 9</td>
<td>Soft</td>
<td>0.25 to 0.50</td>
<td>2 - 4</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>10 - 20</td>
<td>Medium Stiff</td>
<td>0.50 to 1.00</td>
<td>4 - 8</td>
</tr>
<tr>
<td>Dense</td>
<td>30 - 50</td>
<td>Stiff</td>
<td>1.00 to 2.00</td>
<td>8 - 16</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt; 50</td>
<td>Very Stiff</td>
<td>2.00 to 4.00</td>
<td>16 - 30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hard</td>
<td>&gt; 4.00</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>

### Relative Proportions of Sand and Gravel

<table>
<thead>
<tr>
<th>Descriptive Term(s) of other constituents</th>
<th>Percent of Dry Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace</td>
<td>&lt;15</td>
</tr>
<tr>
<td>With</td>
<td>15-29</td>
</tr>
<tr>
<td>Modifier</td>
<td>&gt;30</td>
</tr>
</tbody>
</table>

### Relative Proportions of Fines

<table>
<thead>
<tr>
<th>Descriptive Term(s) of other constituents</th>
<th>Percent of Dry Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace</td>
<td>&lt;5</td>
</tr>
<tr>
<td>With</td>
<td>5-12</td>
</tr>
<tr>
<td>Modifier</td>
<td>&gt;12</td>
</tr>
</tbody>
</table>

### Grain Size Terminology

<table>
<thead>
<tr>
<th>Major Component of Sample</th>
<th>Particle Size</th>
<th>Term</th>
<th>Plasticity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel</td>
<td>2-3 in. (50mm to 76mm)</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boulders</th>
<th>Over 12 in. (300 mm)</th>
<th>Large</th>
<th>High</th>
<th>&gt; 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobble</td>
<td>12 in. to 3 in. (300mm to 76mm)</td>
<td>Medium</td>
<td>Medium</td>
<td>11 - 30</td>
</tr>
<tr>
<td>Gravel</td>
<td>3 in. to 4 in. (75mm to 125 mm)</td>
<td>Medium</td>
<td>Medium</td>
<td>11 - 30</td>
</tr>
<tr>
<td>Sand</td>
<td>1/8 in. to 2 mm (0.13mm to 0.075mm)</td>
<td>High</td>
<td>High</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>

### Plasticity Description

<table>
<thead>
<tr>
<th>Particle Size</th>
<th>Plasticity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel</td>
<td>Low</td>
</tr>
<tr>
<td>Boulders</td>
<td>Large</td>
</tr>
<tr>
<td>Cobble</td>
<td>Medium</td>
</tr>
<tr>
<td>Gravel</td>
<td>Medium</td>
</tr>
<tr>
<td>Sand</td>
<td>High</td>
</tr>
</tbody>
</table>
**UNIFIED SOIL CLASSIFICATION SYSTEM**

### Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests

<table>
<thead>
<tr>
<th>Soil Classification</th>
<th>Group Symbol</th>
<th>Group Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Gravels:</td>
<td>Cu ≥ 4 and 1 ≤ Cs ≤ 2</td>
<td>GW</td>
</tr>
<tr>
<td>Gravel with Fines:</td>
<td>Cu &lt; 4 and/or</td>
<td>Poorly graded gravel</td>
</tr>
<tr>
<td></td>
<td>(Cl&lt;1 or Co&lt;3.0)</td>
<td></td>
</tr>
<tr>
<td>Sands with Fines:</td>
<td>Fines classify as</td>
<td>Fines classify as CL or CH</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>G</td>
</tr>
</tbody>
</table>

**Coarse-Grained Soils:**
- More than 50% retained on No. 4 sieve
- Gravels: More than 20% of coarse fraction retained on No. 4 sieve
- Sands: 5% or more of coarse fraction passes No. 4 sieve

**Fine-Grained Soils:**
- 50% or more passes the No. 100 sieve

- Silt and Clay: Liquid limit less than 5
- Silt and Clay: Liquid limit 50 or more

**Highly Organic Soils:** Primarily organic matter, dark in color, and organic odor

- Peat

**Clay and Shale:**
- **Inorganic:**
  - PI > 7 and plots on or above “A” line
  - PI < 4 or plots below “A” line

- **Organic:**
  - PI plots on or above “A” line
  - PI plots below “A” line

**Shale:**
- PI < 4 or plots below “A” line

**Plasticity Chart:**
- PL vs. LI
- CL, ML, OL

---

**Notes:**
- Based on the material passing the 3-inch (75-mm) sieve.
- If field sample contained cobbles or boulders, or both, add “with cobbles” or “cobbles, or both” to group name.
- Gravels with s to 12% fines require dual symbols: GW-OM well-graded gravel with silt, GW-GC poorly graded gravel with silt.
- Sands with 5 to 12% fines require dual symbols: SW-GC well-graded sand with silt, SW-SC poorly graded sand with silt.
- Peat
- If fines are organic, add “with organic fines” to group name.
- If soil contains ≥ 15% gravel, add “with gravel” to group name.
- If Atterberg limits plot in shaded area, soil is a CL-ML, silt clay.
- If soil contains 15 to 25% plus No. 200, add “with sand” or “with gravel,” whichever is predominant.
- If soil contains ≥ 30% plus No. 200 predominant sand, add “sandy” to group name.
- If soil contains ≥ 30% plus No. 200 predominantly gravel, add “gravely” to group name.
- If PI < 4 plots on or above “A” line.
- PI plots on or above “A” line
- PI plots below “A” line
- PI plots below “A” line

---

**For classification of fine-grained soils and fine-grained fraction of coarse-grained soils:**

- **Equation of “A” line**
  - Horizontal at PI = 10 to LL = 25.5
  - Then PI = 0.73 (LL-20)

- **Equation of “U” line**
  - Vertical at LL = -16 to PI = 7
  - Then PI = 0.9 (LL-8)
The undersigned bidder hereby declares that it has carefully examined the enclosed detailed specifications for furnishing GUC with the below listed item(s). The undersigned bidder further agrees, if this proposal is accepted within thirty (30) days from the date of the opening, to furnish any or all of the item(s) upon the quoted price.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
<th>TOTAL PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Steel Structures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight of Steel __________________ lbs.</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Equipment and Components</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Foundation Design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delivery Time __________________ weeks</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Method of Award:** GUC will award this bid 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 item(s).
GREENVILLE UTILITIES COMMISSION

Exception/Variation Form

Specifications for: Sugg Parkway Substation Structures, Equipment, and Foundation Design

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.

<table>
<thead>
<tr>
<th>Page #</th>
<th>Exception/Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Authorized Signature of Certification: _____________________________________________
Print Name: _____________________________________________
Firm Represented: _____________________________________________
Address: _____________________________________________
It is certified that this bid 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 bid is made in good faith and without collusion or connection with any GUC employee(s).

Each Bid 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    Date _________________  

Signature
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, executors, administrators, successors and assigns, jointly and severally, firmly by these
present.

SIGNED, Sealed and dated this_______ day of____________, 2020.

WHEREAS, the said Principal is herewith submitting a Proposal for
______________________________

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 its Attorney-in-Fact is attached hereto.

_____________________________________________
Principal

By_______________________________________________ (SEAL)

________________________________________________
Corporate Surety

By________________________________________________(SEAL)
PERFORMANCE BOND/PAYMENT BOND

Date of Execution: __________________________

Name of Principal: __________________________

(Contractor) _______________________________________________________________________

Name of Surety: ____________________________

Name of Contracting Body: _______________________________________________________________________

Amount of Bond: ____________________________

Project: ____________________________

KNOW ALL THESE MEN BY THESE PRESENT, That We, the Principal and Surety above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these present.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal entered into a certain Contract with the Contracting Body, identified as shown above and hereto attached.

NOW, THEREFORE, if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term of said Contract and any extensions there of that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any guaranty required under the Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under the several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed, and these present duly signed by its undersigned representative, pursuant to authority of its governing body.
Executed in five (5) counterparts.

Witness:

(Proprietorship or Partnership)

ATTEST:

By: ____________________________

Title: __________________________

(Corporate Secretary or Assistant Secretary Only)

CONTRACTOR:

(Trade or Corporate Name)

By: ____________________________

Title: __________________________

(CORPORATE SEAL)

SURETY COMPANY:

By: ____________________________

Title: __________________________

(Attorney-in-Fact)

(SURETY SEAL)

Witness:

Countersigned:

N.C. Licensed Resident Agent

(Name and Address – Surety Agent)

Surety Company Name and N.C. Regional or Branch Office Address

SPACE FOR ATTACHING POWER OF ATTORNEY

(Performance Bond)
SECTION III

TERMS AND CONDITIONS FOR THE PURCHASE OF

APPARATUS, SUPPLIES, MATERIALS, 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, PITTCOUNTY, 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 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 Providers’ 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 in 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 to 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 Statues 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 SITU

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, 801 Mumford Road, 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 Tuesday-Thursday 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 **NOTICES**

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

Cleve Haddock, CLGPO  
Procurement Manager  
Greenville Utilities Commission  
401 South Greene Street  
Greenville, NC 27834

**Vendor Specified on Page 1 of Section III when awarded.**
This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

By: __________________________
    Jeff W. McCauley

Title: Chief Financial Officer

Date: __________________________

APPROVED AS TO FORM AND LEGAL CONTENT:

By: __________________________
    Phillip R. Dixon

Title: General Counsel

Date: __________________________
## CHANGE ORDER

**GREENVILLE UTILITIES COMMISSION**

**PROJECT CHANGE ORDER**

<table>
<thead>
<tr>
<th>Department:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
</tr>
<tr>
<td>Capital Project Number:</td>
</tr>
<tr>
<td>Project Name:</td>
</tr>
<tr>
<td>Vendor Name:</td>
</tr>
<tr>
<td>Initiating By:</td>
</tr>
<tr>
<td>Owner</td>
</tr>
<tr>
<td>Vendor Address:</td>
</tr>
<tr>
<td>Vendor Contact:</td>
</tr>
<tr>
<td>Change Order Number: CO-</td>
</tr>
</tbody>
</table>

1. **TYPE OF CHANGE:**
   - [ ] Design
   - [ ] Engineering
   - [ ] Scope
   - [ ] Other:

2. **REASON FOR CHANGE:**
   - [ ] Owner
   - [ ] Vendor
   - [ ] Safety
   - [ ] Construction
   - [ ] Cost
   - [ ] Schedule

3. **CHANGE ORDER DESCRIPTION:**

   Change Order Justification:

4. **ACCOUNT NUMBER:**

5. **SCHEDULE IMPACT:**
   - [ ] No Impact
   - [ ] Schedule Impact
   - [ ] Delay Of:
     - [ ] Days
     - [ ] Weeks
     - [ ] Months
   - [ ] Check One

   Start Date: __________ Finish Date: __________ Total Time Delay: __________

6. **ESTIMATED COST:**
   - Project Mgmt: 
   - Engr/Design: 
   - Construction: 
   - Labor: 
   - Materials: 
   - Other Direct: 
   - Indirect: 
   - Total Change Order Amount: 

   [ ] Add | [ ] Deduct
   [ ] Add | [ ] Deduct
   [ ] Add | [ ] Deduct
   [ ] Add | [ ] Deduct
   [ ] Add | [ ] Deduct

7. **REVISED CAPITAL PROJECT COST:**
   - Original Budget: $__________ Revised Estimate to Complete: $________

8. **APPROVED [ ] DISAPPROVED [ ]**
   - Project Manager: 
   - Date: 

   - Department Head: 
   - Date: 

   - Assistant General Manager/Chief Operating Officer: 
   - Date: 

   - General Manager/Chief Executive Officer: 
   - Date: 

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RETURN TO FINANCE AFTER GMICEO SIGNATURE