GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

SPECIFICATIONS AND BID DOCUMENTS FOR THE INSTALLATION OF GREENVILLE SOUTH 230kV POD NO. 3 FOUNDATIONS

ISSUED FOR BIDS

GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

SPECIFICATIONS AND BID DOCUMENTS FOR THE INSTALLATION OF GREENVILLE SOUTH 230kV POD NO. 3 FOUNDATIONS

ISSUED FOR BIDS

6/31/16

Booth & Associates, LLC
Consulting Engineers
5811 Glenwood Avenue, Suite 109
Raleigh, North Carolina 27612
Firm License No. F-0221

GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

SPECIFICATIONS AND BID DOCUMENTS
FOR THE INSTALLATION OF
GREENVILLE SOUTH 230kV POD NO. 3 FOUNDATIONS

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NOTICE TO PROSPECTIVE BIDDERS

Sealed Proposals for the installation of the Greenville South 230kV POD No. 3 Foundations, complete and conforming to the bid documents, as set forth in the Bid Schedule, will be received by Greenville Utilities Commission, North Carolina (hereinafter referred to as the Owner) at the offices of the Buyer II, Greenville Utilities Commission, 401 S. Greene Street, Greenville, NC 27834 on or before **2:00 PM, local time, Wednesday, September 14 2016**, at which time the Proposals will be opened and read. Any Proposal received subsequent to that time will be promptly returned to the Bidder unopened.
All questions concerning this bid must be received by **Friday, September 9, 2016.**

The Specifications, together with all necessary forms and other documents for the Bidder, may be obtained from the Owner's Engineer, Booth & Associates, LLC, 5811 Glenwood Avenue, Suite 109, Raleigh, North Carolina 27612, Attention: Michael L. Clements, PE.

Proposals and all supporting instruments must be submitted on and in the format of the forms furnished in the Form of Proposal of these bid documents and must be delivered in a sealed envelope addressed to the Owner. Proposals must be filled in with indelible ink. No alteration or interlineations will be permitted unless made before submission and initialed and dated.

Prior to the submission of the Proposal, the Bidder shall make and shall be deemed to have made a careful examination of the bid documents on file with the Owner and with the Engineer and of all other matters that may affect the cost and the time of the work.

The name and address of the Bidder, its license number (if a license is required by the State), and the following description must appear on the envelope in with the Proposal is submitted:

"BID FOR THE INSTALLATION OF
GREENVILLE SOUTH 230kV POD NO. 3 FOUNDATIONS
2:00 PM, LOCAL TIME, WEDNESDAY, SEPTEMBER 14, 2016"

Each Proposal shall be accompanied by a cashier's check, or certified check drawn on a bank or trust company insured by the Federal Deposit Insurance Corporation, or the Savings Association Insurance Fund, or a Bid Bond in an amount equal to not less than five percent (5%) of the total amount of the Proposal; said deposit to be retained by the Owner as liquidated damages in event of failure of the Successful Bidder to execute the Contract within ten (10) days after the award.

The Owner reserves the rights to (1) waive minor irregularities or minor errors in any Proposal if it appears to the Owner that such irregularities or errors were made through inadvertence. Any such irregularities or errors so waived must be corrected on the Proposal prior to its acceptance by the Owner; (2) reject any or all Proposals and to hold any or all Proposals for a period of sixty (60) days from the date of opening thereof; (3) accept the bid, in its opinion, that represents the lowest responsible, responsive bid from the standpoint of quality, performance, and price; and (4) award purchase order(s) to Bidder(s) for any schedule(s) individually or collectively from the Bid Schedules.

GREENVILLE UTILITIES COMMISSION OF THE
CITY OF GREENVILLE, NORTH CAROLINA

By: Anthony C. Cannon Date: August 31, 2016
General Manager/ CEO

DEFINITIONS

Whenever the following terms or pronoun in place of them are used in these "Instructions to Bidders", "Form of Proposal", "Technical Specifications", "Contract", bond, etc., the intent and meaning shall be interpreted as follows:

Owner	Greenville Utilities Commission Greenville, North Carolina
General Manager/ CEO	Anthony C. Cannon; or his authorized assistant
Consulting Engineer	Booth & Associates, LLC
Observer	An authorized representative of the Owner assigned to make any or all necessary observations of work performed and equipment and/or apparatus furnished by the Bidder
Bidder	Any individual, firm, or corporation submitting a Proposal for the work contemplated, acting directly or through a duly authorized representative; or party of the second part of the Contract, acting directly or through a duly authorized representative
Subcontractor	An individual, firm, or corporation who contracts with the Bidder to perform part of the latter's Contract
Surety	The body, corporate or individual, approved by the Owner, which is bound with and for the Bidder who is primarily liable and which engages to be responsible for his acceptable performance of the work for which he has contracted
Form of Proposal, Proposal	The approved, prepared form on which the Bidder is to submit or has submitted his Proposal for the work contemplated
Bid Security	To all bids there shall be attached cash, cashier's check, or certified check from the Bidder upon a bank or trust company insured by the Federal Deposit Insurance Corporation or the Savings Associates Insurance Fund, or in lieu thereof, a Bid Bond
Plans, Drawings	All Drawings or reproductions of Drawings pertaining to the construction under the Contract
Technical Specifications	The directions, provisions, and requirements contained herein pertaining to the method and manner of performing the work or to the quantities and qualities of materials to be furnished under the Contract
Contract	The agreement covering the furnishing of equipment and/or apparatus and the performance of the work. The Contract shall include the "Instructions to Bidders", "General Conditions", "Form of Proposal", "Plans", "Technical Specifications", and Acknowledgments
Performance Bond	The approved form of security to be approved by the Owner furnished by the Bidder and his Surety as a guarantee of good faith on the part of the Bidder to accept the work in accordance with the terms of the Specifications and Contract

Payment Bond	The approved form of security to be approved by the Owner furnished by the Bidder and his Surety as a guarantee for payment of all Subcontractors on the part of the Bidder in acceptance of the work in accordance with the terms of the Specifications and Contract
Work	The performance of the project covered by the Specifications or the furnishing of labor, machinery, equipment, tools, or any other article or item being purchased by the Owner
Emergency	A temporary unforeseen occurrence or combination of circumstances which endangers life and property and calls for immediate action or remedy
Work at Site of Project	Work to be performed, including work normally done on the location of the project
Bid Documents	Include all sections of the Request for Bids, Form of Proposal, Technical Specifications and Appendices, Addendum/Clarifications/Bulletins, and Drawings

The subheadings in these Specifications are intended for convenience or reference only and shall not be considered as having any bearing on the interpretations thereof.

INSTRUCTIONS TO BIDDERS

1.0 Proposals

1.1 Only those Proposals made in accordance with these instructions will be considered.

1.2 Bids not received on Booth & Associates, LLC *Form of Proposal* contained herein will be considered unresponsive. The forms shall be filled out complete; any omissions may cause the entire Proposal to be rejected.

1.3 Proposals must be made on the *Form of Proposal* provided herein and must not be altered, erased, or interlined in any manner. The Bidder shall fill in the *Form of Proposal* as detailed in the Terms and Conditions. The Bidder may retain one (1) copy, but the original, fully executed, must be inserted in or attached to the Bid Documents. Also, one (1) additional copy of all executed forms and supporting information shall be supplied.

1.4 Proposals must be enclosed in a sealed envelope, addressed to the Owner. The outside of the envelope must be marked as required in the "Notice to Prospective Bidders" and the Bidder's name, bid opening date and time and the Bidder's license number shall be shown thereon.

1.5 Additional copies of these Specifications may be obtained upon request from the Engineer by approved Bidders upon payment of a fifty dollar ($50.00) non-refundable fee per copy.

1.6 Proposals shall include a *Form of Exceptions* utilizing forms provided which shall itemize each and every exception from the Specifications. The *Form of Exceptions* shall state the section, subsection, and paragraph designations from the part of the Specifications to which exception is taken and explain in detail the nature of the exception. A copy of this *Form of Exceptions* is included in the Form of Proposals. Exceptions will not necessarily eliminate a Bidder from consideration, even if bids without exceptions are received from others. The treatment of exceptions will be based entirely on the overall best interests of the Owner.

1.7 Modifications to bids must be by removal of the Bidder's original bid and the submittal of a completely revised bid package in full compliance with the Drawings, Specifications, and Bid Documents. This is required prior to the time of opening bids. No oral or telephonic Proposals will be accepted.

1.8 Should the Bidder find discrepancies in or omissions from the Drawings or Documents or should he be in doubt as to their meaning, he shall at once notify the Engineer who will send written instructions to all Bidders. Neither the Owner nor the Engineer will be responsible for any oral instructions. If Plans and Specifications are found to disagree after Contract is awarded, the Engineer shall be the judge as to what was intended. The Successful Bidder is hereby made responsible for the furnishing of the necessary labor, tools and equipment reasonably inferred or evidently necessary for the proper execution and completion of the work; for any additional work involved in the correction of apparent errors or inconsistencies, and in executing the true intent and meaning of the Drawings and Specifications as interpreted by the Engineer and all such labor and equipment shall be provided at the Contractor's expense, and under no condition will any such labor and equipment be allowed as an extra.

If, within 24 hours after bids are opened, any Bidder files a duly signed written notice with the Owner and promptly thereafter demonstrates to the reasonable satisfaction of the Owner that there was a substantial mistake in the preparation of its bid, that Bidder will not be permitted to modify its bid, but may withdraw its bid in its entirety, and the Bid Security will be returned. Thereafter, the bidder will be disqualified from further bidding on the installation of the project herein specified.

2.0 Payment

Payment by the Owner to the Successful Bidder shall be made periodically based on the actual percentage of completion, and it is demonstrated that any equipment or materials furnished meets the Specifications.

Invoices for labor shall be submitted in triplicate to the Owner's Engineer for review and approval. There shall be a ten-percent (10%) retainage until the equipment and installation, as per Specifications, have been approved and accepted by the Owner and the Owner's Engineer.

The address for submittal of all invoices is Booth & Associates, LLC at 5811 Glenwood Avenue, Suite 109, Raleigh, North Carolina 27612, Attention: Michael L. Clements, PE.

3.0 Bid Security

3.1 Each Proposal shall be accompanied by a cashier's check, or certified check drawn on a bank or trust company insured by the Federal Deposit Insurance Corporation, or the Savings Association Insurance Fund, or a Bid Bond in an amount equal to not less than five percent (5%) of the total amount of the Proposal; said deposit to be retained by the Owner as liquidated damages in event of failure of the Successful Bidder to execute the Contract within ten (10) days after the award.

3.2 Bid Bond shall be conditioned that the Surety will upon demand forthwith make payment to the Obligee upon said Bond if the Bidder fails to execute the Contract in accordance with the Bid Bond, and upon failure to immediately make payment, the Surety shall pay to the Obligee an amount equal to double the amount of said Bond. Standard Form of Bid Bond is included in these Specifications.

3.3 Only one (1) bid Surety is required, the amount of which shall be based on the total amount of all bid schedules.

4.0 Bulletins and Addenda

Any bulletins issued during the time of bidding or addenda to Specifications are to be considered covered in the Proposal, and in executing a Contract will become a part thereof. Receipt of addenda shall be acknowledged by the Bidder in the *Form of Proposal*.

5.0 Award of Contract

5.1 The award of the Contract will be made to the lowest acceptable Bidder as soon as practicable. The bid shall be awarded to the Bidder who, in the judgment of the Owner, offers the best value to the Owner. Factors to be considered by the Owner are specified in Paragraph 5.3. The Owner reserves the right to reject any and all bids.

5.2 The Owner reserves the right to waive minor irregularities or minor errors in any Proposal if it appears to the Owner that such irregularities or errors were made through inadvertence. Any such irregularities or errors so waived must be corrected on the Proposal prior to its acceptance by the Owner.

5.3 In estimating the lowest cost to the Owner as one of the factors in deciding the award of the Contract, the Owner will consider, in addition to the prices quoted in the Proposal, the following:

1. Completion date,
2. Adherence to the Plans and Specifications,
3. Contractor capabilities, crew experience, and past performance,
4. Conditional quotations (Only firm fixed prices in U.S. dollars),
5. Any additional factors deemed appropriate by the Owner.

5.4 In the event the Bidder proposes any change or deviation from the Engineer's Plans and Specifications, such proposed changes or deviations must be submitted at the time bids are opened on the *Form of Exceptions* included. The Owner reserves the right to reject any proposed changes or deviations. All exceptions must be stated on the *Form of Exceptions*. Failure to provide a *Form of Exceptions* with the Proposal shall imply strict adherence to all details of the Plans and Specifications.

5.5 The Contract, when awarded, shall be deemed to include the Specifications for the equipment, and the Bidder shall not claim any modification thereof resulting from any representative or

promise made at any time by any officer, agent, or employee of the Owner or by any other person.

6.0 Performance and Payment Bonds

6.1 The Successful Bidder shall be required to furnish separate Performance and Payment Bonds executed on the forms bound herein in amounts at least equal to one hundred percent (100%) of the Contract price as security for the faithful performance of this Contract and as security for the payment of all persons performing labor and furnishing materials and equipment in connection with this Contract.

6.2 Performance and Payment Bonds shall be with a Surety company authorized and licensed to do business in the State of North Carolina and shall be for the full Contract sum.

7.0 Examination of Conditions

Prior to the submission of the Proposal, the Bidder shall make and shall be deemed to have made a careful examination of the Plans and Specifications on file with the Owner and with the Engineer, and all other matters that may affect the cost and the time of completion of the work.

8.0 Subcontractors

The Bidder shall include in the Proposal a listing of all subcontractors (if any) and their respective support services to be utilized during the course of the project. All subcontractors will be subject to approval by the Owner and Engineer.

9.0 Completion

a. The award of this Contract shall be issued as soon as possible, subsequent to the bid opening, by issuance of written contract to the Contractor by the Engineer or notification from the Owner. Work on the projects shall begin within fifteen (15) days after award of Contract.

b. The completion date for the projects' on-site activities shall be November 1, 2016.

c. Time for completion shall be extended for delays due to bad weather days or other special cases with the written consent of the Owner and/or Engineer.

d. The Contractor shall include in the Proposal a project construction schedule using the completion date above, indicating each major construction activity with duration and the total number of calendar days of construction time he proposes to perform his work based on the above completion date.

10.0 Liquidated Damages

Time is of the essence, and it is critical that the work be performed on schedule and time is allowed for the completion of the work in the Contract Agreement included herewith. Damages for delay shall be at the rate of one thousand dollars ($1,000.00) per calendar day for failure of the Contractor to complete the work within the Construction Schedule. No credit shall be given for early completion of the work.

11.0 Bids to be Retained

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of sixty (60) days pending the execution of a Contract by the Successful Bidder. Should the Successful Bidder default and not execute a Contract, the Contract will be offered to the next lowest responsible Bidder.

12.0 Delivery Location

The prices quoted shall include delivery of any Contractor-furnished materials and equipment to the project site, and complete installation of said materials and equipment and installation of the Owner-furnished materials. The location of the station is shown on the Vicinity Map in the Appendices.

13.0 Form of Proposal

Those bids not received on the Booth & Associates, LLC Form of Proposal contained herein will be considered unresponsive. The forms shall be filled out completely. Any omissions may cause the entire Proposal to be rejected.

14.0 Contractor's Insurance

14.1 General Liability

Commercial General Liability Insurance, (with coverage consistent with ISO Form CG 00 01 12 07 or its equivalent) with a limit of not less than One Million Dollars ($1,000,000) per occurrence and Two Million Dollars ($2,000,000) per project or per location general aggregate, and a deductible or self-insured retention not to exceed Twenty-five Thousand Dollars ($25,000) per occurrence, covering liability for bodily injury and property damage, arising from premises, operations, independent contractors, personal injury/advertising injury, contractual liability, and products/completed operations for not less than two (2) years from the Substantial Completion Date.

14.2 Automobile Liability

Commercial Automobile Liability Insurance, including coverage for liability arising out of the use of owned (if any), non-owned, leased or hired automobiles, for both bodily injury and property damage in accordance with Applicable Legal Requirements, with a limit of not less than One Million Dollars ($1,000,000) combined single limit per occurrence.

14.3 Workers Compensation

Worker's Compensation Insurance, with statutory limits, covering all of Subcontractor's employees, on terms and conditions as required by applicable Law and imposed by worker's compensation, occupational disease or similar laws, including the Longshore and Harbor Workers' Act, the Federal Employers' Liability and the Jones Act, if applicable.

14.4 Employers Liability

Employers' Liability Insurance with limits of not less than One Million Dollars ($1,000,000) each accident for bodily injury by accident, One Million Dollars ($1,000,000) each employee for bodily injury by disease, and One Million Dollars ($1,000,000) policy limit.

14.5 Umbrella Liability

Subcontractor must provide an Umbrella form (not Excess Liability form) that provides additional liability for underlying General Liability, Auto Liability, and Employer Liability.

- Level 1 Contracts (Contract Value $200,000 to $499,999) - $1,000,000
- Level 2 Contracts (Contract Value $500,000 to $999,999) - $3,000,000
- Level 3 Contracts (Contract Value $1,000,000 & up)- $5,000,000

15.0 Contractor's License

In accordance with the State of North Carolina General Statues, Contractors performing work of this caliber in the State must be licensed to do so. A current copy of the Contractor's State of North Carolina Board for General Contractor's License must be submitted with this Proposal in the Form of Proposal. Additionally, a valid license must be maintained during the course of the work.

Contractor represents and warrants that it is fully experienced in projects of the nature, scope and magnitude of the Work, properly qualified, registered, licensed, equipped, organized and financed to perform the Work.

GENERAL CONDITIONS

1.0 Drawings and Specifications

The Drawings and Specifications are complementary, one to the other. That which is shown on the Drawings or called for in the Specifications shall be as binding as if it were both called for and shown. The intention of the Drawings and Specifications is to include all labor, materials, transportation, equipment and any and all other items necessary to do a complete job which may include manufactured items and field service assistance. In case of discrepancy or disagreement in the Contract, the order of precedence shall be: Contract, Specifications, Drawings.

2.0 Clarifications and Detailed Drawings

In such cases where the nature of the work requires clarification by the Engineer, such clarification shall be furnished by the Engineer with reasonable promptness by means of written instructions or Detail Drawings or both. Clarifications and Drawings shall be consistent with the intent of Contract Documents, and shall become a part thereof.

3.0 Change in Drawings and/or Specifications

The Owner, or the Engineer on behalf of the Owner, may make changes to Drawings and/or Specifications after award of the Contract or while construction is in progress. The compensation for such changes shall be agreed upon in writing between the Contractor and the Owner prior to commencement of work involving the change. No payment shall be made to the Contractor for correcting work not in compliance with Specifications. Once the change of work has been agreed upon between all parties, the Engineer will initiate a change order.

Records of conditions above and below ground, water records or other observations which may have been made by or for Owner shall be made available to Contractor for its information, upon request. Site subsurface conditions which differ materially from the results reasonably indicated in any reports furnished by Owner or undertaken by Contractor shall be deemed to be changed work.

Except as otherwise set forth in the Contract, all loss or damage to Contractor arising out of the Work or from the action of the elements, or from any unforeseen circumstance in the prosecution of the Work including inefficiencies or claims of inefficiencies, shall be sustained and borne by Contractor at its own cost and expense.

4.0 Copies of Bid Documents

The Engineer will furnish free of charge to each pre-qualified Bidder one (1) copy of bid documents. Additional sets of these Specifications for approved Bidders, and sets for Bidders seeking approval may be obtained upon request for a non-refundable payment of Fifty Dollars ($50) per set.

5.0 Working Drawings and Specifications at the Job Site

Contractor shall maintain, in readable condition at his office, one (1) complete set of as-built working Drawings and Specifications for his work. Such Drawings and Specifications shall be available for use by the Engineer or Owner. During the course of construction, the Contractor will work diligently to keep the Owner abreast of electric system conditions, so as not to interfere with normal or emergency operations.

6.0 Ownership of Drawings and Specifications

All Drawings and Specifications are instruments of service and remain the property of the Engineer whose name appears thereon. The use of these instruments on work other than this Contract without permission is prohibited. All copies of Drawings and Specifications other than Contract copies shall be returned to the Engineer upon request after completion of the work.

7.0 Materials, Equipment, And Employees

7.1 The Contractor shall, unless otherwise specified, supply and pay for all labor, equipment, transportation, tools, apparatus, lights, heat, sanitary facilities, water, and incidentals necessary for the entire proper and substantial completion of his work. The Contractor shall install, maintain, and remove all equipment of the construction and be responsible for the safe, proper,

and lawful construction, maintenance, and use of same. The Contractor shall construct, in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the Plans, stated in the Specifications, or reasonably implied there from, all in accordance with the Contract Documents. Some of the major material items required for the work will be furnished by the Owner as outlined in the Technical Specifications. **All other necessary materials are to be furnished by the Contractor as outlined in** the Technical Specifications.

7.2 The Contractor shall not re- use any "removed" materials in the completion of this project unless indicated as a transfer unit on the construction drawings. Materials damaged or lost during construction of the work due to carelessness of the Contractor's personnel, shall be replaced in kind by the Contractor at no cost to the Owner.

7.3 If at any time during the construction and completion of the work covered by these Specifications, the conduct of any workman of the various crafts is adjudged ungentlemanly and a nuisance to the Owner or the Engineer, or if any workman is considered incompetent or detrimental to the work, the Contractor shall order such parties to be immediately removed from the grounds.

7.4 Any superintendent or foreman of the Contractor who ignores or refuses to follow written instructions of the Owner or the Engineer or his representative at the site shall be immediately removed and replaced.

7.5 The Contractor shall insure that at all times he has sufficient crew compliments, both in terms of numbers and experience of personnel to perform work tasks safely, both for workers and the general public. Any instance noted to the contrary of this requirement may result in the complete shutdown of work on the project.

8.0 Royalties, Licenses, and Patents

It is the intention of the Contract Documents that the work covered herein will not constitute in any way on an infringement on any patent whatsoever. The Contractor shall protect and save harmless the Owner against suit on account of alleged or actual infringement. The Contractor shall pay all royalties and/or license fees required on account of patented articles or processes, whether or not the patent rights are evidenced hereinafter.

9.0 Indemnification

9.1 Bidder agrees to indemnity and save GUC 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 Third Party claims, actions, costs, expenses, including reasonable attorney fees, judgments, or other damages resulting from injury to any person (including injury resulting in death), or damage (including loss or destruction) to third party tangible property arising out of the negligent performance of the terms of this Contract by Bidder; including, but not limited to, Bidder's employees, agents, subcontractors, and others designated by Bidder to perform work or services in, about, or attendant to, the work and services under the terms of this Contract. Bidder shall not be held responsible for any losses, expenses, claims, subrogation, actions, costs, judgments, or other damages, directly 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 Bidder 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 the Bidder.

10.0 Surveys

Unless otherwise specified, the Owner, will furnish all surveys and locations for locating the principal component parts of the work. Stakes missing at the time of construction will be replaced within a reasonable amount of time after notification by the Contractor.

11.0 Uncorrected Faulty Work

The Contractor shall be notified of faulty or damaged work and shall have the option to respond in a reasonable period of time. Should the correction of faulty or damaged work be considered inadvisable or inexpedient by the Owner or the Engineer, the Owner shall be reimbursed by the Contractor for the same by a deduction in the Contract prices arrived at by a fair estimate of the probable cost of correction, approved by the Engineer.

12.0 Delays and Extension of Time

12.1 The time to be allowed for construction of these facilities is stated in the Instructions to Bidders. The Contractor, upon notice of award of Contract, shall prepare a construction schedule based on the allowed time, and submit such schedule to the Engineer for approval. A Pre-Construction Conference will be scheduled for all parties concerned.

12.2 If the Contractor is delayed at any time in the progress of the work by any act of negligence by the Owner or the Engineer, or by any separate Contractor employed by the Owner or by changes ordered in the work, then the time of completion shall be extended for such reasonable time as the Engineer may decide.

12.3 No extension of time for completion will be made for ordinary delays and accidents. Extensions may be granted for delays ordered by the Owner or the Engineer if the request has been made in writing within forty-eight (48) hours after the order to cease work has been given.

13.0 Liquidated Damages

Time is of the essence, and it is critical that the work be performed on schedule and time is allowed for the completion of the work in the Contract Agreement included herewith. Damages for delay shall be at the rate of one thousand dollars ($1,000.00) per calendar day for failure of the Contractor to complete the work within the Construction Schedule. No credit shall be given for early completion of the work.

14.0 Correction of Work Before Final Payment

14.1 Any work, materials, or other parts of the work which have been condemned or declared not in accordance with the Contract by the Owner or the Engineer shall be removed from the work site by the Contractor and shall be immediately replaced by new work in accordance with the Contract at no additional cost to the Owner. Work or property of others or the Owner damaged or destroyed by virtue of such faulty work shall be made good at the expense of the Contractor whose work is faulty.

14.2 Correction of condemned work described above shall commence within twenty-four (24) hours after receipt of notice from the Owner or the Engineer and shall be pursued to completion.

14.3 Final payment will not be made until certificates of the Engineer have been duly issued.

15.0 Correction of Work AFTER Final Payment

Neither the final certificate, final payment, acceptance of the premises by the Owner, nor any provision of the Contract, nor any other act or instrument of the Owner or Engineer shall relieve the Contractor from responsibility for negligence, or faulty materials or workmanship, or failure to comply with the Drawings and Specifications. He shall correct or make good any defects due thereto and repair any damage resulting there from which may appear during the period of the guarantee following final acceptance of the work by the Owner. The Owner will report any defects as they may appear to the Engineer who will give the instructions for a time limit for completion of corrections to the Contractor.

16.0 The Owner's Right to Perform Work

The Owner may perform or have performed by others work which is described in the Specifications to be performed by the Contractor, due to early delivery of equipment prior to the execution of this

Contract. Upon the execution of the contract, the work performed will be deducted from the Contractor's price by the unit price set forth in the *Form of Proposal*.

If during the progress of the work or during the period of guarantee, the Contractor fails to execute the work properly or to perform any provision of the Contract, the Owner, after five (5) days' written notice to the Contractor from the Engineer or the Owner, may perform or have performed that portion of the work and may deduct the cost thereof from any amounts due or to become due the Contractor, such action and cost of same having been first approved by the Engineer. Should the cost of such action of the Owner exceed the amount due or to become due the Contractor, then the Contractor or his surety, or both, shall be liable for and shall pay to the Owner the amount of said excess.

17.0 Contractor's Affidavit

The final payment of retained amount due the Contractor on account of the Contract shall not become due until the Contractor has furnished to the Owner, with a copy to the Engineer, an affidavit signed, sworn and notarized to the effect that all payments for materials, services, or any other reason in connection with his Contract have been satisfied and that no claims or liens exist against the Contractor in connection with this Contract. In the event that the Contractor cannot obtain similar affidavits from Subcontractors to protect the Contractor and the Owner from possible liens or claims against the Subcontractor, the Contractor shall state in his affidavit that no claims or liens exist against any Subcontractor to the best of his (the Contractor's) knowledge and if any appear afterwards, the Contractor shall save the Owner harmless on account thereof.

18.0 Assignments

The Contractor shall not assign any portion of this Contract nor subcontract it in its entirety. Except as may be required under terms of the Payment and/or Performance Bond, no funds or sums of money due or to become due the Contractor under this Contract may be assigned.

19.0 Guarantee

The Contractor shall guarantee his work against defect due to faulty workmanship or negligence for a period of two (2) years following final acceptance of the work. He shall make good such defective workmanship and any damage resulting therefrom without cost to the Owner.

20.0 Engineer's Status

The Engineer has authority to stop the work whenever such stoppage may be necessary to ensure the proper execution of the Contract. He shall also have authority to reject all work and materials which do not conform to the Contract, to direct the application of forces to any portion of the work as in his judgment is required, to order the forces increased or diminished, and to decide questions which arise in the execution of the work.

The Engineer is the interpreter of the conditions of the Contract and the judge of its performance, and he shall use his powers under the Contract to enforce its faithful performance.

21.0 Engineer's Decisions

The Engineer shall, within a reasonable time after their presentation to him, make decisions on all claims of the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the Contract Documents. All such decisions by the Engineer shall be final.

22.0 Right-Of-Way

The Owner will obtain all easements and/or rights-of-way required for the project.

23.0 Accidents

The Contractor shall provide at the site such equipment and medical facilities as are necessary to supply first-aid service to anyone who may be injured in connection with the work. The Contractor will provide a written report to the Owner of all accidents within twenty-four (24) hours of the event.

24.0 Equal Employment Opportunity

During the performance of this Contract, the Contractor agrees as follows:

24.1 The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, political affiliation or belief, age, or physical handicap. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or physical handicap. Such action shall include but not be limited to the following employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices setting forth the provisions of the nondiscrimination clause.

24.2 The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or physical handicap.

24.3 The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or other understanding, a notice advertising the labor union or workers' representative of the Contractor's commitments under the Equal Employment Opportunity Section of this Contract and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

24.4 In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Owner contracts.

24.5 The owner has adopted an Affirmative Action & Minority & Women Business Enterprise Plan (M/WBE) Program. Contractors 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 supplies of material and/or labor.

25.0 Mediation/Binding Arbitration

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

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

fifteen (15) days from the date of the written demand for arbitration, and a decision shall be rendered by the Arbitrator(s) so selected within five (5) days after such Arbitrator(s) is selected.

26.0 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 Bidder to notify the GUC Buyer II, 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

27.0 Patents and Copyrights

The Bidder 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.

28.0 Patent and Copyright Indemnity

The Bidder 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 Bidder shall be notified promptly in writing by GUC of any such claim; (2) that Bidder 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 Bidder 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 Bidder or from the use of combination of products provided by the Bidder with products provided by GUC or by others; and (5) should such product(s) become, or in the Bidder's opinion likely to become, the subject of such claim of infringement, then GUC shall permit Bidder, at Bidder'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.

29.0 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 Bidder'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 Bidder may be grounds for rejection of the Bidder's proposal. The Bidder 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.

30.0 Confidential Information

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

31.0 Assignment

No assignment of the Bidder's obligations or the Bidder'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 Buyer II, solely as a convenience to the Bidder, GUC may:

- Forward the Bidder's payment check directly to any person or entity designated by the Bidder, and

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

32.0 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.

33.0 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.

34.0 Administrative Code

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

35.0 Execution

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

36.0 Clarifications/Interpretations

Any and all questions regarding these Terms and Conditions must be addressed to the GUC Buyer II. 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 Bidder and the GUC Buyer II.**

37.0 Situs

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

38.0 Termination of Agreement

GUC or Bidder may terminate this Agreement for just cause at any time. Bidder 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) Bidder's persistent failure to perform in accordance with the Terms and Conditions, (2) Bidder's disregard of laws and regulations related to this transaction, and/or (3) Bidder's substantial violation of the provisions of the Terms and Conditions

39.0 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.

40.0 Integrated Contract

These Terms and Conditions, Instructions to Bidders, Specifications, and the selected Bidder'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.

41.0 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.

42.0 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.

43.0 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.

44.0 Notices

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

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

SPECIAL CONDITIONS

1.0 Defective Workmanship

The acceptance of any workmanship by the Owner shall not preclude the subsequent rejection thereof if such workmanship shall be found to be defective after installation, and any such workmanship found defective before final acceptance of the work or within two (2) years after completion shall be remedied or replaced, as the case may be, by and at the expense of the Contractor. In the event of failure by the Contractor to do so, the Owner may remedy such defective workmanship and in such event the Contractor shall pay to the Owner the cost and expense thereof. The Contractor shall not be entitled to any payment hereunder so long as any defective workmanship, of which the Contractor shall have had notice, shall not have been remedied or replaced, as the case may be.

2.0 Materials

2.1 At or prior to the commencement of construction, the Owner shall make available to the Contractor all materials which the Owner has on hand, and from time to time as such additional deliveries of materials, if any, are received by the Owner, the Owner shall make such materials available to the Contractor; Provided, however, that the Contractor or his authorized representative shall give to the Owner a receipt in such form as the Owner shall approve for all materials furnished to the Contractor by the Owner. Upon completion of the project, the Contractor shall return all materials furnished by the Owner which are in excess of those required for the construction. Excess will be determined by comparison of Contractor's material receipts with final inventory as approved by the Owner. The Contractor shall also return to the Owner all material, usable and scrap, removed during construction. The Contractor will reimburse the Owner, at the current invoice cost to the Owner, for loss and/or breakage resulting from Contractor's negligence, of materials furnished to the Contractor by the Owner.

The winning Bidder will use the material package supplied by the Owner. The structures and equipment list is located in the Appendices.

2.2 The Control House foundation details will be provided to the Contractor prior to start of construction. The Contractor's per unit pricing for pad-type foundations, provided in the Bid Proposal, will be used for payment of the Control House foundation.

3.0 Defective Materials (Supplied by Contractor)

3.1 All materials supplied by the Contractor shall be subject to the inspection, tests and approval of the Owner. The Contractor shall furnish all information required concerning the nature or source of any materials and provide adequate facilities for testing and inspecting the materials at the plant of the Contractor.

3.2 The materials furnished hereunder shall become the property of the Owner when delivered at the point to which shipment is to be made. The Owner may, however, reject any materials and/or warranties of the Contractor and manufacturers. Recognition and subsequent rejection of any defective materials may occur either before or after incorporation of such materials into the work, provided such rejection is made within one (1) year of date of delivery of the materials. Upon any such rejection, the Contractor shall replace the rejected materials with materials complying with the Specification for Materials and warranties at the substation site. The Owner shall return the rejected materials F.O.B. truck at the same destination. In the event of the failure of the Contractor to so replace rejected materials, the Owner shall make such replacement and the cost and expense thereof shall be paid by and recoverable from the Contractor.

4.0 Storage of Materials

The substation structures, equipment, poles, and hardware for this construction will be delivered and stored at the Station site, shown on the Vicinity Map in the Appendices. All driveways and public roadways must be kept clear. No parking, storage or staging of materials shall be placed in a driveway or roadway, causing said roadway impassable any time.

5.0 Protection to Persons and Property

The Contractor shall at all times take all reasonable precautions for the safety of employees on the work and of the public, and shall comply with all applicable provisions of Federal, State, and Municipal safety laws and building and construction codes, as well as the safety rules and regulations of the Owner. All machinery and equipment and other physical hazards shall be guarded in accordance with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America unless such instructions are incompatible with Federal, State, or Municipal laws or regulations.

The following provisions shall not limit the generality of the above requirements:

5.1 The Contractor shall so conduct the substation construction as to cause the least possible obstruction of public highways or streets.

5.2 The Contractor shall provide and maintain all such guard lights and other protection for the public as may be required by applicable statutes, ordinances, and regulations or by local conditions.

5.3 The Contractor shall do all things necessary or expedient to protect properly any and all parallel, converging, and intersecting lines, joint line poles, highways, railways and any and all property of others from damage, and in the event that any such parallel, converging and intersecting lines, joint line poles, highways, railways or other property are damaged in the course of the construction of the line, the Contractor shall at his own expense immediately restore any or all of such damaged property to as good a state as before such damage occurred.

5.4 The Contractor shall enter and exit the right-of-way at those locations specified by Owner or the Engineer.

It shall be the responsibility of the Contractor to maintain safe and unobstructed control of traffic along all state roads, highways, and all other streets within the project area. The Contractor shall obtain sufficient and suitable traffic cones, barriers, warning signs, and other devices necessary to maintain a safe work environment for crews and the general public. Traffic control must be provided for in accordance with the Manual of Uniform Traffic Control Devices (MUTCD), the North Carolina Department of Transportation (NC D.O.T.) Supplement to the MUTCD, all local ordinances, and as approved by local and state authorities.

5.5 All ditches and access ways disturbed shall be returned to their pre-existing condition at the end of construction.

5.6 Any and all excess earth, rock, debris, underbrush, and other useless material shall be removed by the Contractor from the site of the work as rapidly as practicable as the work progresses.

5.7 Before beginning work in or around any areas where underground facilities are known to exist, the Contractor shall locate all such facilities including water, sewer, gas, telephone and electrical lines.

5.8 Upon violation by the Contractor of any provisions of this section, after written notice of such violation given to the Contractor by the Owner, the Contractor shall immediately correct such violation. Upon failure of the Contractor to do so, the Owner may correct such violation at the Contractor's expense.

5.9 The Contractor shall submit to the Owner monthly reports in duplicate of all accidents, giving such data as may be prescribed by the Owner.

6.0 Supervision and Inspection

6.1 The Contractor shall cause the construction work to receive constant supervision by a competent superintendent (hereinafter called the "Superintendent") who shall be present at all times during working hours where construction is being carried on. The Contractor shall also employ, in connection with the construction of the substation capable, experienced, and reliable foremen and such skilled workmen as may be required for the various classes of work

to be performed. Directions and instructions given to the Superintendent by the Owner shall be binding upon the Contractor.

6.2 The Owner reserves the right to require the removal from the project of any employee of the Contractor if, in the judgment of the Owner, such removal shall be necessary in order to protect the interest of the Owner. The Owner shall have the right to require the Contractor to increase the number of his employees and to increase or change the amount or kind of tools and equipment if at any time the progress of the work shall be unsatisfactory to the Owner; the failure of the Owner to give any such directions shall not relieve the Contractor of his obligations to complete the work within the time and in the manner specified in this Proposal.

6.3 The manner of performance of the work, and all equipment used therein, shall be subject to the inspection, tests and approval of the Owner. The Contractor shall have an authorized agent accompany the Owner when final inspection is made and, if requested by the Owner, when any other inspection is made.

6.4 In the event that the Owner shall determine that the construction contains or may contain numerous defects, it shall be the duty of the Contractor, if requested by the Owner to have an inspection made by the Engineer for the purpose of determining the exact nature, extent, and location of such defects.

7.0 Temporary Construction

All temporary construction required to accomplish the work covered in these Specifications shall be the sole responsibility of the Contractor. The Contractor shall furnish all labor and materials necessary for temporary construction including the installation and removal of structures, poles, insulators, hardware, guys, anchors, etc. All materials used for temporary construction shall be removed from the site as soon as practicable and the site restored to as good a state as before such construction. All temporary materials supplied by the Contractor will remain the property of the Contractor. All temporary construction shall be performed and shall adhere to the same safety and code requirements as the proposed work and shall be covered by all requirements of these Plans, Specifications, and Contract Documents.

No extra pay item will be issued for temporary construction, or for subsequent removal of same.

8.0 Normal Work Week

8.1 The Contractor shall provide the Owner quoted prices on a per-hour basis, for various personnel and equipment, assuming a normal work week as being forty (40) hours.

8.2 The Contractor shall state in the Proposal his normal work week for the project.

8.3 Work on weekends or generally accepted holidays will only be allowed if specific outage arrangements are required or the Contractor falls behind in meeting the project's scheduled completion date.

8.4 The Contractor will not be paid for inclement weather days or for travel time to and from the job site, unless expressly requested by the Contractor as a written stipulation to his original Proposal.

9.0 Job-Site Obligations

9.1 Except as otherwise provided in the Contract, necessary sanitary conveniences for use by the Contractor's employees and Subcontractors at the Jobsite shall be furnished and maintained by the Contractor in such manner and at such locations as shall be approved by the Company Representative and their use shall be strictly enforced.

9.2 The Contractor shall, at all times, keep its work areas in a neat, clean, and safe condition. The Contractor shall be responsible for continuous clean up and removal of its trash, debris, waste materials and scrap and disposal of same off the Jobsite. Upon completion of any portion of the Work, the Contractor shall immediately remove all of its equipment, construction plant, temporary structures and surplus materials not to be used at or near the same location during later stages of the Work. Upon completion of the Work and before final payment is made, the

Contractor shall, at its expense, satisfactorily dispose of all plant, buildings, rubbish, unused materials, and other equipment and materials belonging to it or used in the performance of the Work, including return to the Owner's warehouse or designated lay down area(s), at the Owner's option of any salvageable materials for which the Owner has reimbursed the Contractor or that has been supplied by the Owner for incorporation into the Work but not used; and the Contractor shall leave the premises in a neat, clean and safe condition acceptable to the Company Representative. In the event of the Contractor's failure to comply with the foregoing, the same may be accomplished by the Owner at the Contractor's expense.

9.3 The Owner reserves the right to authorize its agents or designees to enter the Jobsite as it may elect for the purpose of inspecting the Work, or constructing or installing such collateral work as it may desire, or testing, boring or surveying, or any other purpose.

9.4 The Contractor understands and agrees that duly authorized representatives of government agencies having appropriate jurisdiction may enter the Jobsite at any time and from time to time.

9.5 If any Work or part thereof shall be covered contrary to the requirements of the Contract or the request of the Owner or Engineer, it must, if required by the Company Representative, be uncovered for observation and inspection and covered again at the Contractor's sole expense.

9.6 If any other Work that the Company Representative has not specifically requested to observe and inspect prior to being covered has been covered, the Owner or Engineer may request to see such Work or part thereof and it shall be uncovered by the Contractor. If such Work or part thereof is found to be in accordance with the Contract, the cost of uncovering and covering again shall, by appropriate Change Form, be charged to the Owner. If such Work or part thereof fails to meet the requirements of the Contract, the Contractor shall pay all costs of uncovering, correcting, and covering again and any additional costs resulting there from.

9.7 The Contractor shall conduct daily and weekly on-site safety meetings at the beginning of each work period. These meetings should not preclude the Contractor from conducting tailgate safety meetings before each new work period, after break, different work assignments, etc. as determined by OSHA and other applicable safety laws and regulations. In addition, the Contractor shall be required to attend onsite safety meetings with the Owner.

9.8 All personnel / visitors / individuals shall have a safety briefing by the Contractor prior to entering the energized substation area.

9.9 The Contractor shall facilitate a formal safety program for all individuals entering the site.

9.10 The Contractor shall provide the Owner a copy of the Contractor’s Safety Manual, outlining policies, procedures, documentation and training. The Owner will provide the Contractor with a copy of the Owner’s Safety Manual. The Contractor shall perform the work using the more stringent of the two policies.

CONTRACT AGREEMENT

THIS CONTRACT, made this _____ day _____, 2016, by _____, hereinafter called Bidder, and GREENVILLE UTILITIES COMMISSION (GUC) OF THE CITY OF GREENVILLE, PITT COUNTY, NORTH CAROLINA, a corporation, hereinafter called the Owner.

WITNESSETH

THAT WHEREAS, a Contract for

GREENVILLE UTILITIES COMMISSION
SUBSTATION WORK FOR
GREENVILLE SOUTH 230kV POD NO. 3 FOUNDATIONS

has recently been awarded to Bidder by the Owner at and for a total price of _____ AND 00/100 ($_____) named in the Bidder's Proposal attached hereto;

AND WHEREAS, it was provided in said award that a formal Contract would be executed by and between Bidder and Owner, evidencing the terms of said award, and that Bidder would commence the work to be performed under this agreement on a date to be specified in a written order of Owner, and would fully complete all work thereunder no later than 60 days from the date of contract.

NOW, THEREFORE, Bidder doth hereby covenant and agree with Owner that it will well and faithfully perform and execute such work and furnish such work and furnish such materials and equipment in accordance with each and every one of the conditions, covenants, stipulations, terms, and provisions contained in said Specifications in accordance with the Plans, at the total price named therefore in the Bidder's Proposal attached hereto, and will well and faithfully comply with and perform each and every obligation imposed upon it by said Plans and Specifications and the terms of said award.

Bidder shall promptly make payments to all laborers and others employed thereon.

Bidder shall be responsible for all damages to the property of the Owner that may be consequent upon the normal procedure of its work or that may be caused by or result from the negligence of Bidder, its employees, or agents during the progress of or connected with the prosecution of the work, whether within the limits of the work or elsewhere. Bidder must restore all property so injured to a condition as good as it was when Bidder entered upon the work.

By execution of this Contract, both parties acknowledge the following conditions as a part of their respective obligations:

a) Governing Law - This Contract shall be construed and enforced in accordance with the laws of the State of North Carolina. All parties agree to the jurisdiction of the Courts of North Carolina with respect to any action or dispute arising between the parties.

b) Further Assurances - The parties hereto agree to execute and deliver any and all papers and documents which may be necessary to carry out the terms of this Contract.

c) Entire Contract - This Contract (including materials incorporated herein by reference) constitutes the entire agreement between the parties hereto and there are no agreements, representations, or warranties which are not set forth herein. All prior negotiations, agreements, and understandings are superseded hereby. This Contract may not be amended or revised except by a writing signed by all parties hereto. This Contract shall be construed and interpreted without any presumption either for or against the party who caused its preparation.

d) Binding Effect - This Contract shall be binding upon an inure to the benefit of the heirs, legal representatives, successors and assigns of the respective parties hereto, provided that this Contract and all rights hereunder may not be assigned by any party hereto without the written consent of the other party.

e) Time of Performance - Time is of the essence with regard to the performance of this Contract.

f) Survivability - The terms of this Contract shall survive execution and delivery of any deeds or bills of sale called for hereunder.

g) Headings - The headings in the paragraphs of this Contract are inserted for convenience only and do not constitute a part hereof.

Bidder shall furthermore be responsible for and required to make good at its expense any and all damages of whatever nature to persons or property arising during the period of the Contract caused by carelessness, neglect, or want of due precaution on the part of Bidder, its agents, employees, or workmen. Bidder shall also indemnify and save harmless the Owner, and the officers and agents thereof, from all third party claims, suits, and proceedings of every name and description which may be brought against the Owner, or the officers and agents thereof, for or on account of any injuries or damages to persons or property received or sustained by any person or persons, firm, or corporation, by or in consequence of any materials used in said work, to the extent caused by the negligence of Bidder, its agents, employees, servants, or workmen.

It is agreed and understood that the Notice to Prospective Bidders, Definitions, Instructions to Bidders, and Technical Specifications, the accepted Bidder's Proposal, and the enumerated addenda are incorporated in this Contract by reference and are an integral part thereof as set forth herein.

And the Owner doth hereby covenant and agree with Bidder that it will pay to Bidder, when due and payable under the terms of said Specifications and said award, the above-mentioned sum; and that it will well and faithfully comply with and perform each and every obligation imposed upon it by said Specifications and the terms of said award.

Bidder shall, upon completion of all work awarded under this Contract, furnish to the Owner invoices or copies of invoices for all materials purchased for said work; and such invoices shall state the amount of North Carolina sales tax paid for said materials. Bidder shall also furnish the Owner an affidavit certifying the total costs of materials purchased for all work performed under the Contract and the total amount of state sales tax paid for said materials.

Whenever used herein, the singular shall include the plural, the plural the singular, and the use of any genders shall be applicable to all genders as the context may require.

PROVIDE CURRENT LIABILITY INSURANCE CERTIFICATE(S)
Instructions to Bidders, 14.0 Contractor's Insurance

COVERAGES:

1. Workmen's Compensation Insurance shall include all of the Bidder's employees employed at the site of the project under his Contract. In case any class of employees engaged in hazardous work under this Contract at the site of the project is not protected under the Workmen's Compensation Statute, the Bidder shall provide adequate coverage for the protection of his employees not otherwise protected.

2. Public Liability and Property Damage Insurance shall be in such amounts as to adequately protect the Owner and the Bidder from claims for damages for personal injury, including accidental death, as well as from claims for property damages which may arise from operations under this Contract, whether such operations be by himself or by anyone directly or indirectly employed by him. The amount of such insurance shall be for the following:

   Public Liability Insurance for bodily injury or death $1,000,000 for one person, and $2,000,000 for each accident.

   Property Damage Insurance $2,000,000 for each accident and $2,000,000 aggregate for accidents during the policy period.

3. Motor Vehicle Liability Insurance shall be for the following amounts:

   Bodily injury or death $1,000,000 for one person and $2,000,000 for each accident.

   Property damage is $2,000,000 for each accident.

Copies of Certificates of Insurance for all aforementioned policies shall be furnished by the Bidder and shall be attached to the respective pages of the Contract Agreement at the time of signing.

It shall be understood that the above-required insurance 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 the certificate holder.

CERTIFICATE HOLDER:

Greenville Utilities Commission
401 South Green Street
Greenville, NC 27835-1847
Contact: Mr. Cleve Haddock
Phone: 252-551-1533

EXPIRATION:

Each certificate must not terminate before the contract completion date.

IN TESTIMONY WHEREOF, Bidder and Owner have duly signed and sealed this Contract.

BIDDER:

(Imprint Corporate Seal Below this line) _____(SEAL)

By _____(SEAL)

Title _____

ATTEST:

By: _____

Title: _____

GREENVILLE UTILITIES COMMISSION (GUC) OF THE CITY OF GREENVILLE, PITT COUNTY, NORTH CAROLINA

By_____
Anthony C. Cannon

Title: General Manager / CEO

ATTEST:

By: _____
Amy Carson Quinn

Title: Executive Secretary

APPROVED AS TO FORM AND LEGALITY:

By: _____
Phillip R. Dixon

Title: General Counsel

CONTRACT INSTRUCTIONS

INSTRUCTIONS FOR PROPER SIGNING

If Bidder is an individual, sign on first line only and designate trade name below first line, thus:

John Jones (SEAL)
Trading as Jones Paving Company

If Bidder is a partnership, sign partnership name on first line; have at least one general (not limited) partner sign on second line, and put his designation as partner on third line, thus:

JONES PAVING COMPANY (SEAL)

By John Jones (SEAL)

Title General Partner

If Bidder is a corporation, sign corporate name on first line (exactly) as such appears on the corporate seal, have the President or a Vice President sign on second line, put his title on third line, have the Secretary or Assistant Secretary sign on the left "Attest" line (adding the word "Assistant" before the word "Secretary" if the Assistant Secretary is signing), and imprint corporate seal above the word "Attest", thus:

JONES PAVING COMPANY, INC. (SEAL)

By John Jones (SEAL)

Title President

ATTEST:

Thomas Jones
Assistant Secretary

CERTIFICATE OF ATTORNEY

GREENVILLE UTILITIES COMMISSION (GUC)
OF THE CITY OF GREENVILLE,
PITT COUNTY, NORTH CAROLINA

This is to certify I have examined the attached Contract Documents, and after such examination I am of the opinion that such Documents conform to the laws of the State of North Carolina, the execution of the Contract is in due and proper form, the representatives of the respective contracting parties have full power and authority to execute such Contract on behalf of the respective contracting parties, and the foregoing agreements constitute valid and binding obligations on such parties.

By: _____
Phillip R. Dixon

Title: General Counsel

Date: _____

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: _____

FORM OF PROPOSAL

Contractor's Proposal
Terms and Conditions
Addenda / Clarifications / Bulletins
Labor, Material, and Unit Pricing Proposals
Proposed Construction Schedule
Certificate of Insurance
Copy of Contractor's License
Form of Exceptions
Equal Employment Opportunity Affidavit
Proposed Project Management Staff
References
List of Subcontractors
E-Verify Compliance
Iran Divestment Act Certification
Bid Bond
Performance Bond

GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

SUBSTATION INSTALLATION CONTRACT FOR
GREENVILLE SOUTH 230KV POD NO. 3 FOUNDATIONS

1.2.FORM OF PROPOSAL

1.3. (Provide two (2) copies)

Respectfully submitted this ____ day of _____, 2016.

OWNER:	**BIDDER:**
Greenville Utilities Commission 401 South Greene Street Greenville, North Carolina 27834 P.O. Box 1847 Greenville, North Carolina 27835 Mr. Cleve Haddock, CLGPO Procurement Coordinator Office: 252-551-1533 Cell: 252-551-3302	NAME TITLE STREET ADDRESS CITY/STATE/ZIP PHONE: FAX: E-MAIL: SIGNATURE
MANUFACTURER OF PROPOSED EQUIPMENT MANUFACTURER STREET ADDRESS CITY / STATE / ZIP	

TERMS AND CONDITIONS

1. The undersigned, hereafter called the Contractor, hereby declares that the only person or persons interested in this Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the Contract to be entered into; that this Proposal is made without connection with any other person, company or parties making a bid or Proposal; and that it is in all respects fair and in good faith without collusion or fraud.
2. The Contractor further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the locations where the work is to be done; that he has examined the Technical Specifications for the work and Contract Documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.
3. The Contractor proposes and agrees, if this Proposal is accepted, to contract with the Owner in the form of Contract specified, to furnish all necessary labor, equipment, and materials, except materials and equipment specified to be furnished by the Owner, required for the installation of the station, complete in accordance with the Plans, Specifications and Contract Documents, to the full and entire satisfaction of the Owner with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and Contract Documents, as filed on Change Order forms. No changes in work shall begin without prior written approval by the Owner or its representative Engineer.
4. The Bid Schedule is subject to the following terms and conditions which, by reference, are made a part of this Proposal.
5. The prices of materials set forth herein do not include any sums which are or may be payable by the Contractor on account of North Carolina Sales Tax upon the sale, purchase, or use of the materials hereunder, the amount thereof shall be added to the purchase price and paid by the Owner after the Contractor has ascertained the actual sales tax to be included in the Contract price.
6. The prices quoted in the Proposal shall be firm unless otherwise clearly noted in the Proposal.
7. The price quoted includes delivery FOB substation site of any equipment and materials and complete installation at substation site. The prices of the equipment and installation set forth herein shall include the cost of delivery at the Contractor's risk to the site.
8. The Contractor shall provide the Owner quoted prices on a per-hour basis, for various personnel and equipment, assuming a normal work week as being forty (40) hours.
9. The Contractor shall state his normal work week for the project:

   _____ Five (5), eight (8) hour days (Monday through Friday)

   _____ Four (4), ten (10) hour days (Monday through Thursday)

   _____ Other, _____

10. Work on weekends or generally accepted holidays will only be allowed if specific outage arrangements are required, or if the Contractor falls behind in meeting the project's scheduled completion date. If the Contractor deems this necessary, he must receive the Owner's written approval five (5) business days prior to beginning the revised work scheme.
11. The time of completion for the project is of the essence.
12. The Contractor shall submit a proposed project construction schedule with the Proposal for review and approval by the Owner and Engineer. The targeted date for completion is November 1, 2016. If this date is not possible, please present an alternate date.
13. The time for delivery and installation shall be extended for the period of any reasonable delay due exclusively to causes beyond the control and without fault of the Contractor, including acts of God, fires, floods, strikes, and delay in transportation

14. The Contractor will not be paid for inclement weather days or for travel time to and from the job site, unless expressly requested by the Contractor as a written stipulation to his original Proposal.
15. The Contractor-furnished materials shall conform to the "Technical Specifications" attached hereto and made a part hereof.
16. Title to the materials furnished by the Contractor shall pass to the Owner upon completion of the installation at the point above specified.
17. This Proposal is made pursuant to the provisions of the Notice and Instructions to Bidders, the Specifications, and the Contractor agrees to the terms and conditions thereof.
18. The Contractor warrants the accuracy of all statements contained in the Bidders Qualifications, if any shall be submitted, and agrees that the Owner shall rely upon such accuracy as a condition of the Contract in the event that this Proposal is accepted.
19. The Contractor warrants that the Contractor-furnished Materials will conform to the performance data and guarantees attached which, by this reference, are made a part of this Proposal. Any exceptions or deviations from the Plans and Specifications must be clearly stated in the Proposal to warrant consideration.
20. The Contractor assumes liability for the proper care, handling, storage, and security of all materials furnished to the Contractor by the Owner for the project.
21. The undersigned further agrees that in case of failure on his part to execute said Contract within ten (10) consecutive calendar days after written notice has been given of the Award of the Contract, bid security accompanying this bid, and the monies payable thereon, shall be paid into the funds of the Owner's account set aside for this project, as liquidated damages for such failure, otherwise, the check, cash, or Bid Bond accompanying the Proposal shall be returned to the undersigned.
22. The Contractor shall maintain during the course of the project and shall provide the Owner/Engineer one (1) complete set of “as-constructed” drawings upon the completion of the project.
23. The Contractor warrants that it possesses Electric Utility Contractor’s License for the State of North Carolina. A copy of the license shall be included in this *Form of Proposal*.
24. The Contractor shall submit, in the *Form of Proposal*, the proposed project management staff, i.e., project manager, site superintendent, general foreman, etc. The qualifications / work experience level of the Bidder’s proposed work force shall be included as well. The Contractor shall provide evidence of a minimum of 60% of the proposed work force having five (5) years or more tenure with the Bidder’s firm. If other personnel are actually assign to the project, similar information will be required prior to construction assignment.
25. The Contractor shall provide a list of recent projects of similar voltage class and complexity, along with the Owner and contact information of the representative who was reported to directly.
26. If the proposed staff along with their qualifications is not provided, the bid may be subject to non-compliance, thus, making it unacceptable.
27. The Contractor shall provide a list of subcontractors (if any) in the proposal and their respective support services which will be used by the Contractor when undertaking this project. All subcontractors will be subject to review and approval by the Owner.
28. **A mandatory <u>pre-construction meeting</u> will be scheduled at a later time based on the construction schedule at the POD No.3 site.**

INSERT

ADDENDA / CLARIFICATIONS / BULLETINS

Instructions to Bidders, 4.0 Bulletins and Addenda

LABOR AND MATERIAL PROPOSAL

CLIENT: GREENVILLE UTILITIES COMMISSION
PROJECT: INSTALLATION OF GREENVILLE SOUTH 230kV POD NO. 3
PROJECT NO.: 14-7796-8015
CONTRACTOR:
DATE:

GROUP	DESCRIPTION	QTY	UNIT	UNIT PRICING		LABOR AND MATERIAL EXTENDED COST
				LABOR	CONTRACTOR-FURNISHED MATERIAL	
3.12	Foundations	1	Lot			
3.17	Oil Containment Systems	1	Lot			
		TOTAL LABOR AND MATERIAL PROPOSAL:				
		TOTAL LABOR AND MATERIAL:				

Booth & Associates CONSULTING ENGINEERS

UNIT PRICING PROPOSAL

CLIENT:	GREENVILLE UTILITIES COMMISSION
PROJECT:	INSTALLATION OF GREENVILLE SOUTH 230kV POD NO. 3
PROJECT NO.:	14-7796-8015
CONTRACTOR:	
DATE:	

MATERIAL COST

DESCRIPTION	LABOR	MATERIAL	TOTAL
COST PER INSTALLED CUBIC YARD OF CONCRETE			
Pad-Pier Type Foundation			
Pad-Type Foundation			
Conduit Encasement			
COST PER INSTALLED POUND OF REBAR			
ROCK EXCAVATION - COST PER CUBIC YARD			
Foundations			
Pad-Pier Type			
Pad-Type			
Oil Containment Pit			

LABOR

DESCRIPTION	HOURLY RATE	
	REGULAR	OVERTIME
Supervisor		
General Foreman		
Foreman		
Journeyman Lineman / Wireman		
Equipment Operator		
Groundman		

EQUIPMENT

DESCRIPTION	UNIT (per day, hour, week)	COST
Pickup Truck		
Backhoe		
Bucket Truck - 40' - 55'		
Bucket Truck - 60' +		
Trencher		
Air Compressor		
Crane Truck - 20 Ton		
All-Terrain Crane - 45 Ton		

Unit Pricing shall be used in the event work is added or deleted from the project

Unit Pricing shall be used in the event work is added or deleted from the project

INSERT

PROPOSED CONSTRUCTION SCHEDULE

Instructions to Bidders, 9.0 Completion
Form of Proposal, Terms and Conditions – Item 12

INSERT

CERTIFICATE(S) OF INSURANCE

Instructions to Bidders, 14.0 Contractor's Insurance

INSERT

CONTRACTOR'S LICENSE

Instructions to Bidders, 15.0 Contractor's License
Form of Proposal, Terms and Conditions – Item 23

FORM OF EXCEPTIONS

Instructions to Bidders, 5.0 Award of Contract

BIDDER**:** _____

OWNER: GREENVILLE UTILITES COMMISSION, NORTH CAROLINA

PROJECT DESCRIPTION: INSTALLATION OF THE GREENVILLE SOUTH 230kV POD NO.3 SUBSTATION FOUNDATIONS

INSTRUCTIONS**:** The following is a list of exceptions to the Bidding Documents and/or Technical Specifications pertaining to the furnishing of the subject materials. Bidders shall identify each exception by Specification page and paragraph number on this form. The omission of exception implies complete compliance with Plans and Specifications.

BID DOCUMENT/ SPECIFICATION PAGE NO. AND PARAGRAPH	**EXCEPTION/VARIATION**

EQUAL EMPLOYMENT OPPORTUNITY AFFIDAVIT

General Conditions, 24.0 Equal Employment Opportunity

The Contractor shall include the provisions of the Equal Employment Opportunity, as found in General Conditions section, in every Subcontract unless exempted by rules, regulations, or orders of the Owner so that such provisions will be binding upon each Subcontractor.

Bidder: _____

By: _____

Date: _____

Special Instructions to Bidders

City of Greenville/Greenville Utilities Commission
Minority and/or Women Business Enterprise (M/WBE) Program

GUC
Construction Guidelines and Affidavits
$100,000 and above

These instructions shall be included with each bid solicitation.

City of Greenville/Greenville Utilities Commission
Minority and/or Women Business Enterprise Program

$100,000 and Construction Guidelines for M/WBE Participants

Policy Statement

It is the policy of the City of Greenville and Greenville Utilities Commission to provide minorities and women equal opportunity for participating in all aspects of the City's and Utilities' contracting and procurement programs, including but not limited to, construction projects, supplies and materials purchases, and professional and personal service contracts.

Goals and Good Faith Efforts

Bidders responding to this solicitation shall comply with the M/WBE program by making Good Faith Efforts to achieve the following aspiration goals for participation.

	GUC	
	MBE	**WBE**
Construction This goal includes Construction Manager at Risk.	7%	4%

Bidders shall submit M/WBE information with their bids on the forms provided. This information will be subject to verification by GUC prior to contract award. **As of July 1, 2009, contractors, subcontractors, suppliers, service providers, or M/WBE members of joint ventures intended to satisfy GUC M/WBE goals shall be certified by the NC Office of Historically Underutilized Businesses (NC HUB) only.** Firms qualifying as "WBE" for GUC's goals must be designated as a "women-owned business" by the HUB Office. Firms qualifying as "MBE" for the GUC's goals must be certified in one of the other categories (i.e.: Black, Hispanic, Asian American, American Indian, Disabled, or Socially and Economically Disadvantaged). Those firms who are certified as both a "WBE" and "MBE" may only satisfy the "MBE" requirement. A complete database of NC HUB certified firms may be found at http://www.doa.nc.gov/hub/. An internal database of firms who have expressed interest to do business with the City and GUC is available at www.greenvillencmwbe.org. However, the HUB status of these firms must be verified by the HUB database. GUC shall accept NCDOT certified firms on federally funded projects only. Please note: A contractor may utilize any firm desired. However, for participation purposes, all M/WBE vendors who wish to do business *as a minority or a female* must be certified by NC HUB.

The Bidder shall make good faith efforts to encourage participation of M/WBEs prior to submission of bids in order to be considered as a responsive bidder. Bidders are cautioned that even though their submittal indicates they will meet the M/WBE goal, they should document their good faith efforts and be prepared to submit this information, if requested.

The M/WBE's listed by the Contractor on the **Identification of Minority/Women Business Participation** which are determined by the GUC to be certified shall perform the work and supply the materials for which they are listed unless the Contractors receive prior authorization from the GUC to perform the work with other forces or to obtain materials from other sources. If a contractor is proposing to perform all elements of the work with his own forces, he must be prepared to document evidence satisfactory to the owner of similar government contracts where he has self-performed.

The Contractor shall enter into and supply copies of fully executed subcontracts with each M/WBE or supply signed Letter(s) of Intent to the Project Manager after award of contract and prior to Notice to Proceed. Any amendments to subcontracts shall be submitted to the Project Manager prior to execution.

Instructions

The Bidder shall provide with the bid the following documentation:

☐ Identification of Minority/Women Business Participation
(if participation is zero, please mark zero—Blank forms will be considered nonresponsive)

☐ Affidavit A (if subcontracting)

OR

☐ Identification of Minority/Women Business Participation
(if participation is zero, please mark zero—Blank forms will be considered nonresponsive)

☐ Affidavit B (if self-performing; must attest that bidder does not customarily subcontract work on this type of project—includes supplies and materials)

Within 72 hours or 3 business days after notification of being the apparent low bidder who is subcontracting anything must provide the following information:

☐ Affidavit C (if aspirational goals are met or are exceeded)

OR

☐ Affidavit D (if aspirational goals are not met)

After award of contract and prior to issuance of notice to proceed:

☐ Letter(s) of Intent or Executed Contracts

****With each pay request, the prime contractors will submit the Proof of Payment Certification, listing payments made to M/WBE subcontractors.**

*****If a change is needed in M/WBE Participation, submit a Request to Change M/WBE Participation Form. Good Faith Efforts to substitute with another M/WBE contractor must be demonstrated.**

Minimum Compliance Requirements:

All written statements, affidavits, or intentions made by the Bidder shall become a part of the agreement between the Contractor and the GUC for performance of contracts. Failure to comply with any of these statements, affidavits or intentions or with the minority business guidelines shall constitute a breach of the contract. A finding by the GUC that any information submitted (either prior to award of the contract or during the performance of the contract) is inaccurate, false, or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract. It shall be solely at the option of the GUC whether to terminate the contract for breach or not. In determining whether a contractor has made Good Faith Efforts, the GUC will evaluate all efforts made by the Contractor and will determine compliance in regard to quantity, intensity, and results of these efforts.

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

Identification of Minority/Women Business Participation

I,_____.
(Name of Bidder)

do hereby certify that on this project, we will use the following minority/women business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work type	*M/WBE Category

*M/WBE categories: Black, African American (**B**), Hispanic, Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

If you will not be utilizing M/WBE contractors, please certify by entering zero "0"

The total value of MBE business contracting will be ($)_____.

The total value of WBE business contracting will be ($)_____.

Greenville Utilities Commission AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

(Name of Bidder)

Affidavit of_____

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- ❑ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ❑ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ❑ **3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ❑ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ❑ **5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- ❑ **6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ❑ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ❑ **8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ❑ **9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ❑ **10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority/Women Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority/women business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of_____, County of_____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

MBForms 2002-
Revised July 2010

Greenville Utilities Commission --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

County of _____

Affidavit of _____
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the _____

_____ contract.
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____

SEAL

State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20___

Notary Public _____

My commission expires _____

Do not submit with bid Do not submit with bid Do not submit with bid Do not submit with bid

Greenville Utilities Commission - AFFIDAVIT C - Portion of the Work to be Performed by M/WBE Firms

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by M/WBE businesses as defined in GS143-128.2(g) and the COG/GUC M/WBE Plan sec. III is equal to or greater than 11% of the bidders total contract price, then the bidder must complete this affidavit. This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____ Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises and a minimum of _____% of the total dollar amount of the contract with women business enterprises. Minority/women businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. Attach additional sheets if required

Name and Phone Number	*M/WBE Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with M/WBE Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of _____, County of _____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires_____

MBForms 2002-
Revised July 2010

Greenville Utilities Commission AFFIDAVIT D – Good Faith Efforts

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 11% participation by minority/women business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____ Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises and a minimum of _____% of the total dollar amount of the contract with women business enterprises. Minority/women businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*M/WBE Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**),Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

Examples of documentation required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.

E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.

F. Copy of pre-bid roster.

G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.

H. Letter detailing reasons for rejection of minority business due to lack of qualification.

I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with M/WBE Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of _____, County of _____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

LETTER OF INTENT
M/WBE Subcontractor Performance

Please submit this form or executed subcontracts with M/WBE firms after award of contract and prior to issuance of notice to proceed.

PROJECT: _____
(Project Name)

TO: _____
(Name of Prime Bidder/Architect)

The undersigned intends to perform work in connection with the above project as a:

____Minority Business Enterprise _____Women Business Enterprise

The M/WBE status of the undersigned is certified the NC Office of Historically Underutilized Businesses (required). ___ Yes ___ No

The undersigned is prepared to perform the following described work or provide materials or services in connection with the above project at the following dollar amount:

Work/Materials/Service Provided	Dollar Amount of Contract	Projected Start Date	Projected End Date

_____
(Date)

_____ _____
(Address) (Name & Phone No. of M/WBE Firm)

_____ _____
(Name & Title of Authorized Representative of M/WBE) (Signature of Authorized Representative of M/WBE)

REQUEST TO CHANGE M/WBE PARTICIPATION

(Submit changes only if notified as apparent lowest bidder, continuing through project completion)

Project: _____

Bidder or Prime Contractor: _____

Name & Title of Authorized Representative: _____

Address: _____ **Phone #:** _____

_____ **Email Address:** _____

Total Contract Amount (including approved change orders or amendments): $_____

Name of subcontractor: _____

Good or service provided: _____

Proposed Action:

___Replace subcontractor
___Perform work with own forces

For the above actions, you must provide one of the following reasons (Please check applicable reason):

___ The listed MBE/WBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract.

___The listed MBE/WBE is bankrupt or insolvent.

___The listed MBE/WBE fails or refuses to perform his/her subcontract or furnish the listed materials.

___The work performed by the listed subcontractor is unsatisfactory according to industry standards and is not in accordance with the plans and specifications; or the subcontractor is substantially delaying or disrupting the progress of the work.

If replacing subcontractor:

Name of replacement subcontractor: _____

The M/WBE status of the contractor is certified by the NC Office of Historically Underutilized Businesses (required). ___Yes ___No

Dollar amount of original contract $_____

Dollar amount of amended contract $ _____

Other Proposed Action:

___Increase total dollar amount of work
___Decrease total dollar amount of work
___Add additional subcontractor
___Other

Please describe reason for requested action: _____

_____

If adding additional subcontractor:*

The M/WBE status of the contractor is certified by the NC Office of Historically Underutilized Businesses (required).___Yes ___No

**Please attach Letter of Intent or executed contract document*

Dollar amount of original contract $_____

Dollar amount of amended contract $ _____

Interoffice Use Only:

Approval __Y __N

Date_____

Signature_____

Pay Application No. _____

Purchase Order No. _____

Proof of Payment Certification

M/WBE Contractors, Suppliers, Service Providers

Project Name: _____

Prime Contractor: _____

Current Contract Amount (including change orders): $_____

Requested Payment Amount for this Period: $_____

Is this the final payment? ___Yes ___No

Firm Name	M/WBE Category*	Total Amount Paid from this Pay Request	Total Contract Amount (including changes)	Total Amount Remaining

*Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

Date:_____

Certified By: _____
Name

_____
Title

_____
Signature

PROPOSED PROJECT MANAGEMENT STAFF

Form of Proposal, Terms and Conditions – Item 24

Title/Function	Name	Years with Firm	Total Years Experience
Project Manager			
Site Superintendent			
General Foreman - Foundations			

CONTRACTOR HAS ☐ DOES NOT HAVE☐ SIXTY PERCENT (60%) OF PROPOSED WORK FORCE WITH FIVE (5) YEARS CONTINUOUS SERVICE WITH BIDDER'S FIRM.

REFERENCES

Form of Proposal, Terms and Conditions – Item 25

CONTACT INFORMATION FOR RECENT SIMILAR PROJECTS

Owner Name	Project Description	Contact Name and Phone Number

LIST OF SUBCONTRACTORS

Form of Proposal, Terms and Conditions – Item 27

SUBCONTRACTOR	PROPOSED WORK TO BE PERFORMED

Letter of Compliance to E-Verify for Greenville Utilities Commission

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

Specify subcontractor: _____

_____ (Company Name)

By: _____ (Typed Name)

_____ (Authorized Signatory)

_____ (Title)

_____ (Date)

LETTER OF COMPLIANCE TO THE IRAN DIVESTMENT ACT CERTIFICATION

Name of Vendor or Bidder: _____

_____

IRAN DIVESTMENT ACT CERTIFICATION
REQUIRED BY N.C.G.S. 143C-6A-5(a)

As of the date listed below, the vendor or bidder listed above is not listed on the Final Divestment List created by the State Treasurer pursuant to N.C.G.S. 143-6A-4.

The undersigned hereby certifies that he or she is authorized by the vendor or bidder listed above to make the foregoing statement.

Signature Date

Printed Name Title

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 _____, 2016.

WHEREAS, the said Principal is herewith submitting a Proposal for

INSTALLATION OF THE
GREENVILLE SOUTH 230KV POD NO.3 FOUNDATIONS

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

Date of Execution: _____

Name of Principal: _____
(Contractor)

_____

Name of Surety: _____

Name of Contracting Body: GREENVILLE UTILITY COMMISSION

GREENVILLE, NORTH CAROLINA

Amount of Bond: _____

Project: INSTALLATION OF THE

GREENVILLE SOUTH 230 kV POD NO. 3 FOUNDATIONS

KNOW ALL THESE MEN BY THESE PRESENTS, 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 presents.

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 presents 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: _____
(Owner, Partner, or Corporate President or Vice President, Only)

(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)

TECHNICAL SPECIFICATIONS

GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

SUBSTATION SITE WORK CONTRACT FOR
GREENVILLE SOUTH 230KV POD NO. 3

TECHNICAL SPECIFICATIONS

1.0 General

The Contractor shall furnish and install the reinforced concrete foundations as shown on the drawings, complete with excavation, off-site disposal of excavated spoils, grading, backfilling, and compaction of all excavations to restore existing grade levels, foundation layout, concrete, rebar, tie wire, and forming materials.

The reinforced concrete foundations, footings, piers and pads shall be installed as indicated on the Drawings, and to undisturbed earth. Dimensions indicated for anchor bolt settings shall be checked against the manufacturer's erection drawings, structural steel and/or equipment to be installed prior to the construction of the formwork.

1.1. Concrete

This section specifies the minimum materials, workmanship, and performance standards for cast-in-place concrete including reinforcing steel, forms, finishing, curing, and other associated work.

Cast-in-place concrete shall be in accordance with the latest applicable requirements of the ACI, ASTM, and CRSI, except as modified by these Specifications. For the purposes of mix design, cast-in-place concrete is considered to be of Exposure Category F2 as defined by ACI 318.

Requirements for Concrete by Exposure Class				
Exposure Class	**Max *w/cm***	**Minimum Compressive Strength**	**Air Content**	**Cement Type**
F2	0.45	4,500	6 ± 1	I

**Source: ACI 318-11, Table 4.3.1

The Owner shall be informed at least 24 hours in advance of the times and places at which concrete will be placed.

1.2. Materials

1.2.1. Cement

Only one (1) brand of cement shall be used for exposed concrete. Cement reclaimed from cleaning bags or leaking containers shall not be used. Cement shall be used in the sequence of receipt of shipments, unless otherwise directed by the Engineer. Cement will be accepted on the basis of the manufacturer's mill certificate of compliance with the Specification requirements. Portland cement shall conform to the "Standard Specifications for Portland Cement", serial designation C150, Type I of the ASTM.

1.2.2. Cementitious Materials

Fly ash shall conform to the latest edition of ASTM C 618 and be of type Class F.

1.2.3. Fine Aggregate

Fine aggregate shall consist of washed natural siliceous sand, composed of clean, hard and durable grains, and shall be of a quality and gradation approved by the Engineer. Manufactured sand will not be accepted. All fine aggregate shall be free from injurious amounts of alkaline and organic impurities. Fine aggregate shall be graded from coarse to fine and shall conform to ASTM C33.

1.2.4. Coarse Aggregate

Coarse aggregate shall consist of crushed stone or other approved inert material with similar characteristics. It shall be clean, hard, durable, and free from injurious amounts of deleterious matter. Clay and shale particles shall not exceed 1 percent (1%). Course aggregate shall be graded from coarse to fine and shall conform to ASTM C33.

1.2.5. Water

Water shall be clean, fresh, and free from injurious amounts of mineral and organic substances. Iron in water shall not exceed 0.25 ppm.

1.2.6. Admixtures

All admixtures are to be supplied by one of the following approved manufacturers: Master Builders, WR Grace & Co., or Sika Chemical. Admixtures shall conform to the following standards:

Water Reducing (plasticizer)	ASTM C494, Type A
Water Reducing and Retarding	ASTM C494, Type D
High Range Water Reducer	ASTM C494, Type F
High Range Water Reducer and Retarder	ASTM C494, Type G
Air-Entraining Agent	ASTM C260

1.2.7. Reinforcing Steel

a. Reinforcing Bars - All reinforcing steel bars shall be of the deformed type conforming to the requirements of the "Standard Specifications for Bars, Deformed, and Plain, Billet-Steel for Concrete Reinforcement". Steel shall be Type A615 or A996-Grade 60.

b. Welded Wire Fabric – Welded wire fabric reinforcement used in slabs shall conform to the requirements of ASTM A1064. It shall be continuous, shall have joints lapped at least one full mesh, and shall be supported at proper elevations by standard accessories. Lapping of sheets shall be staggered to avoid continuous lap in either direction.

c. Accessories – Accessories such as chairs, ties, bolsters, spacers, etc., shall be of suitable type, as approved, adequate to prevent displacement during construction.

d. Mechanical Splices – Classified Type 2 in accordance with ACI 318-11 and approved by Engineer. Dayton/Richmond "Dowel Bar Splicer" or "Coupler Splice" system, Bar-Lock "Coupler Systems" or Barsplice Products.

1.2.8. Forms

Forms shall be made of rigid, straight, and uniform material that is free of injurious chemicals or organic matter.

Plywood	Product Standard PS1, waterproof, resin-bonded, exterior type Douglas fir; face adjacent to concrete Grade B plywood or better.
Metal	Of sufficient gauge to resist deformation.
Fiberboard	Fed Spec LLL-B-810, Type II; tempered, waterproof, screenback.
Lumber	Straight, uniform width and thickness, and free from knots, offsets, holes, dents, and other surface defects.
Chamfer strips	Clear pine, surface against concrete shall be planed.
Form coating	Nonstaining and nontoxic after 30 days, VOC compliant; Burke "Form Release (WB)," L&M Chemical "E Z Strip," Nox-Crete "Form Coating," or Symons "Thrift Kote E."
Polyethylene film	Fed Spec L-P-378D, Type I; 6 mil.

1.2.9. Finishing Compounds

Epoxy bonding compound	Sika Chemical "Sikadur Hi-Mod"; Five Star Products, Inc. "Five Star Epoxy"; or acceptable equal.
Membrane Curing compound	ASTM C1315, Type I, Class A, maximum VOC 5.8 lb/gal (700 g/L), minimum 25 percent solids, acrylic, nonyellowing, unit moisture loss 0.40 kb/m^2 maximum in 72 hours; L&M Chemical "Dress & Seal 30," Sonneborn "Kure-N-Seal 30," or Symons "Cure & Seal 30%."

1.3. Submittals

Three copies of all reports shall be submitted to the Owner and Engineer prior to any concreting operations.

1.3.1. Material Reports

The report should include the source and quality of concrete materials and the concrete proportions proposed for the work. Complete certified reports covering the materials and proportions proposed and tested in accordance with ACI 318 shall be submitted to the Owner and Engineer. Reports shall be prepared by an independent testing laboratory. Owner and Engineer review of these reports will be for general acceptability only; continued compliance with all contract provisions will be required.

Reports on cement shall include the type, brand, manufacturer, composition, and method of handling (sack or bulk).

Reports on admixtures shall include the ASTM C260 or ASTM C494 classification, brand, manufacturer, and active chemical ingredients. All admixtures shall be the products of one manufacturer.

Reports on aggregates shall include the source, type, gradation, deleterious substances, soundness, potential for harmful materials, and potential for alkali reactivity. The results of all tests and field service records to verify potential reactivity are required to verify compliance with ASTM C33, including Appendix XI.

A certification that the reinforcing steel furnished complies with the requirements specified in the section titled "Materials" shall be furnished to the Owner and Engineer. The certification shall be signed by the Contractor and the reinforcing steel fabricator.

1.3.2. Mix Design Reports

A tentative concrete mix shall be designed and tested for each size and gradation of aggregates and for each mix class specified. Mix Design Reports shall be provided to the Owner and Engineer for each mix class to be utilized in the project and intended use identified on each mix report. Design quantities and test results of each mix shall be submitted to Owner and Engineer for review. With Engineer's and/or Owner's approval, acceptable mixes may be field adjusted as necessary to meet the requirements of these Specifications.

The report for each tentative concrete mix submitted shall contain the following information:

a. Intended use and placement method.
b. Design Slump.
c. Total gallons of water per cubic yard.
d. Cement content.
e. Cementitious materials content.
f. Ratio of fine to total aggregates.
g. Weight (surface dry) of each aggregate per cubic yard.
h. Quantity of each admixture.
i. Air content.
j. Compressive strength based on 7 day and 28 day compression test.
k. Times of initial set.
l. Documentation of average compressive strength or mix proportioning data per ACI 318.

Initial set tests shall be made at ambient temperatures of 70º F and 90º F to determine compliance with the initial set time specified hereinafter. The test at 70º F shall be made using concrete containing the specified plasticizing and air-entraining admixtures. The test at 90º F shall be made using concrete containing the specified plasticizing retarder and air-entraining admixtures. The initial set shall be determined in accordance with ASTM C403.

1.3.3. Mix Class

Each concrete mix class shall be designed and controlled within the limits specified in the following table:

Mix Class Table Coarse					
Usage	**28 Day Strength (psi)**	**Aggregate Size No. 4 Sieve**	**Slump ± 1"**	**Min Cement (lb/cu yd)**	**Max Water/ Cement Ratio**
General Usage	4,500	1"	4"	535	0.45

Drilled Piers (dry, uncased, or permanent casing)	4,500	3/4"	5" (1)	560	0.45
Drilled Piers (temporary casing)	4,500	3/4"	7" (1)	560	0.45
Drilled Piers (slurry displacement)	4,500	3/4"	8" (1)	560	0.45
Underwater	5,000	3/4"	8"	658	0.41
Note: A plasticizer or plasticizing retarder shall be included in all general usage and drilled piers concrete mixes. High range water reducer (Type F or G) shall be included in all underwater mixes. (1) Slump requirement during placement with any admixtures.					

**Source: ACI 318-11, Table 4.3.1; ACI 336.1-01, Table 2.4.3; ACI 350-06, Table 4.1.2.1

Concrete shall not be deposited under water, except with specific permission of the Owner and Engineer.

1.4. Mix Requirements

The acceptability of concrete will be judged on compliance with the specified requirements listed in the Mix Class Table and not on the basis of strength alone.

1.4.1. Total Water Content

Total water content of concrete shall not exceed the amount calculated using the maximum water to cement ratio in the Mix Class Table.

1.4.2. Slump

Slump shall not be greater than that indicated in the Mix Class Table for each mix, unless otherwise authorized by the Owner.

1.4.3. Total Air Content

The total volumetric air content of concrete after placement shall be six percent plus or minus one percent (6% ± 1%).

1.4.4. Admixtures

The admixture content, batching method, and time of introduction to the mix shall be in accordance with the manufacturer's recommendations for compliance with these Specifications.

A plasticizing or plasticizing retarder admixture shall be included in all concrete, unless otherwise accepted by the Owner.

Plasticizing retarder admixture shall be adjusted as specified under the initial set.

1.4.5. Strength

The minimum 28-day acceptable compressive strength for each mix class as determined by ASTM C39 shall not be less than that indicated in the Mix Class Table.

All concrete shall exceed the specified minimum compressive strengths. Each test cylinder will be evaluated separately, and the Owner will be the sole judge of the validity and representative qualities of the tests.

In cases where the strength of the test cylinders for any portion of the work falls below the requirements specified herein, the Owner or Engineer may require the Contractor to secure test specimens of the hardened concrete represented by these

cylinders. Specimens shall be secured and tested in accordance with ASTM C42 and shall have a minimum diameter of 3 inches.
Dependent upon the location of the concrete section in question, the Owner or Engineer may approve low frequency ultrasonic testing or other nondestructive techniques as an alternate to cone drilling and testing.

If the additional investigation verifies the existence of defective concrete, one of the following remedial actions shall be implemented as determined by the Owner:

a. Assume the costs to remove and replace all defective concrete.
b. Assume the cost of design and construction changes necessary to incorporate the inferior concrete.
c. Provide satisfactory reimbursement or allowance to the Owner for the acceptance of the lower quality concrete.

1.4.6. Initial Set

The initial set as determined by ASTM C403 shall not be attained until at least 2.5 hours after the water and cement are added to the aggregates. The quantity of retarding admixture shall be adjusted as necessary to compensate for variations in temperature and job conditions.

1.5. Storage of Materials

Cement shall be stored in suitable moisture proof enclosures. Reclaimed cement or cement that has become caked or lumpy shall not be used.
Aggregates shall be stored so that segregation and the inclusion of foreign materials are prevented. The bottom 6 inches of aggregate piles that have been in contact with the ground shall not be used.

Reinforcing steel and embedments shall be carefully handled and stored on supports that will keep the steel from contact with the ground.

1.6. Batching and Mixing

Batching and mixing may be performed at the jobsite with suitable equipment, or by an acceptable ready-mix concrete supplier. Personnel performing the batching and mixing shall be qualified and experienced. Mixing and transporting concrete shall be in accordance with ASTM C94 unless otherwise indicated herein.

1.6.1. Batching

Aggregates and cement shall be measured by weight. Aggregate weights shall be adjusted for moisture content.

Each admixture shall be dispensed by a mechanical device that will ensure accurate and automatic measurement.

The minimum amount of water required to produce the desired slump shall be batched automatically. Any additional water required to produce and maintain a uniform slump shall be added manually by the mixer operator. Slump shall be kept uniform. Aggregates shall float uniformly throughout the mass and the concrete shall flow sluggishly when vibrated.

1.6.2. Mixing

Concrete shall be mixed in a rotating drum as specified in ASTM C94 until all ingredients are uniformly distributed throughout the batch. Mixers shall not be

loaded in excess of their rated capacities. Each batch shall be completely discharged before the mixer is recharged.

1.6.3. Ready-Mix Concrete

Ready-mixed concrete shall conform to ASTM C94, except as otherwise specified herein.

Truck mixers shall be revolving drum type and shall be equipped with a mixing water tank. Only the prescribed amount of mixing water shall be placed in the tank for any one batch, unless the tank is equipped with a device by which the amount of water added to each batch can be readily verified by the Owner.

A delivery ticket shall be prepared for each load of ready-mixed concrete delivered. The truck operator shall hand a copy of each ticket to the Owner at the time of delivery. Tickets shall indicate the mix identification, the number of yards delivered, the quantities of each material in the batch, the outdoor temperature in the shade, the time at which the cement was added, and the numerical sequence of the delivery.

When a truck mixer or agitator is used for transporting concrete, the concrete shall be delivered to the jobsite and completely discharged within 45 minutes, or before the drum has revolved 150 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates, unless a retarding agent is used, in which case the time may be doubled. Longer time periods must be approved by the Owner. In hot weather, or under conditions contributing to quick stiffening of the concrete, a time less than that specified above may be required by the Owner. When a truck mixer is used for the complete mixing of the concrete, the mixing operation shall begin within 30 minutes after the cement has been mixed with the aggregates.

1.7. Placement Temperature

The temperature of concrete, when being placed, shall be checked in accordance with ASTM C1064 and be as follows:

a. Not less than 40°F in moderate weather.
b. Not less than 50°F in weather during which the mean daily temperature drops below 40°F.
c. Not greater than 90°F during hot weather.

1.8. Hot Weather Concreting

Except as modified herein; hot weather concreting shall comply with ACI 305R. A water-reducing retarder shall be added to the concrete mix when the placement temperature of the concrete exceeds 75°F.

At air temperatures of 90°F or above, special procedures shall be applied to keep the concrete as cool as possible during placement and curing. The temperature of the concrete during placement shall not exceed 90°F.

1.9. Cold Weather Concreting

Cold weather concreting shall comply with ACI 306R.

1.10. Field Control Testing

The Contractor shall engage an independent professional testing company and laboratory to provide all necessary equipment and personnel to perform all concrete testing at the

Contractor's expense. The testing company and laboratory must be approved by the Owner and Engineer, prior to commencing work. Personnel performing tests shall be certified ACI Grade 1 Concrete Field Testing Technician. Copies of the test results shall be sent directly from the testing company to the Engineer for review. Structures or equipment shall not be placed on the foundations until acceptance of test results by the Engineer.

The frequency hereinafter specified for each field control test is a minimum. Refer to the appropriate section of this specification for further information on testing of different concrete placements. If directed to do so by the Owner, any additional field control tests required shall be made.

1.10.1. Sampling

All concrete used for testing purposes shall be obtained in accordance with ASTM C172.

1.10.2. Slump

Consistency will be determined in the field by the slump test in accordance with ASTM C143. A minimum of one (1) slump test shall be performed on each load of concrete. If water is added at the job site to increase the slump, the recorded slump shall be tested after the addition of water. The specified slump for each class and usage of concrete can be found in the Mix Class Table.

1.10.3. Air Entrainment

Air entrained concrete shall be used in all applications where concrete will be exposed to moisture and cycles of freezing and thawing. Air content shall be determined in accordance with ASTM C231 or ASTM C173. A minimum of one (1) air entrainment test shall be performed for each batch of concrete used on the project and from which concrete compression test cylinders are made. The specified air content shall be between five and seven percent (5% and 7%).

1.10.4. Compression Test Cylinders

A set of compression test cylinders is required for each batch of concrete used on the project. Each set will consist of five (5), four inch by eight inch (4" x 8") compressive test cylinders prepared, cured, and delivered in accordance with ASTM C31. Each cylinder shall be labeled with the project name, date, and cylinder identification number. An information card or field report shall be completed for each set of cylinders and shall include the following:

a. Date sampled
b. Time batched
c. Time sampled
d. Ticket number
e. Air temperature
f. Concrete temperature
g. Gallons of water added
h. Specified 28-day strength
i. Slump
j. Air Content
k. Admixtures
l. Concrete mix identification
m. Specific location of pour

The test cylinders shall be transported to a professional testing laboratory at least 8 hours after final set and within 20 to 24 hours from the time they were made. Transportation time of test cylinders shall not exceed 4 hours.

Testing of the cylinders shall be handled by the Contractor through a qualified testing laboratory in accordance with ASTM C39 in accordance with the following schedule:

a. One (1) cylinder at seven (7) days
b. Three (3) cylinders at twenty-eight (28) days
c. One (1) cylinder reserved for a fifty-six (56) day test, if necessary

The Contractor shall require the laboratory to send three sets of compressive test reports to the Owner, in addition to those copies furnished to the Contractor. One (1) copy of the test reports shall be forwarded directly to the Engineer for review within two (2) working days after the tests are performed.

In the event a test fails to meet the specified compressive strength requirements, the Engineer may require the Contractor to obtain core samples of the hardened concrete in question. Core samples shall be secured and tested in accordance with ASTM C42 and shall have a minimum diameter of three inches (3”). If tests further substantiates that the concrete represented by the cylinders and core samples is below the strength requirements specified herein, the Engineer may order such concrete removed and replaced at the expense of the Contractor.

At the location of pole foundations one of the cylinders shall be taken from the concrete used in the top 5 feet of each pole foundation. Such cylinders shall be individually identified by pole number and tested prior to pole erection.

1.10.5. Test Reports

Certified reports of all tests made by the testing laboratory shall be promptly furnished to the Owner and Engineer, and all other persons designated by the Owner.

1.11. Compaction

The contractor shall engage an independent professional Geotechnical engineering company to provide all necessary equipment and personnel to perform excavation inspections of foundation subgrade. If unsuitable material is encountered at the proposed subgrade elevation shown on the drawings, the contractor shall, under the direction of the geotechnical engineer, remove the unsuitable material and backfill with well compacted six inch (6″) layers of stone or gravel base material, or concrete.

1.12. Protection Against Moisture Loss

Immediately after placing or finishing, concrete surfaces not covered by forms shall be protected against moisture loss (cured) for not less than seven (7) days by covering with white opaque polyethylene sheets lapped four inches (4”) at edges and ends. Burlap may be used only for unexposed concrete surfaces and shall be in at least two (2) layers. Surface from which forms are removed before the curing period has elapsed shall be protected as specified for surfaces not covered by forms. All materials used for prevention of moisture loss shall be in accordance with ASTM C171.

1.13. Curing

Curing of concrete shall be by methods which will keep the concrete surfaces adequately wet during the specified curing period and in accordance with ACI 308R. Troweled surfaces shall be cured, except those which will receive a separate finish or coating, with the membrane curing compound specified in the article titled “Materials” in this section.

Float finished surfaces shall be cured, except those which will receive a separate finish, with either the membrane curing compound specified or with water. Only water curing will be permitted on surfaces that will receive a separate finish or coating.
Water saturation of concrete surfaces shall begin as quickly as possible, but no later than 12 hours in dry weather and 24 hours in damp weather after initial set of the concrete. The rate of water application shall be regulated to provide complete surface coverage with a minimum of runoff. The application of water to formed surfaces may be interrupted for surface rubbing only over the areas being rubbed at the time. The concrete surface shall not be allowed to become dry during such interruption.

After rubbing has been completed, rubbed surfaces shall be covered with saturated burlap for the remainder of the curing period.

Membrane curing compound shall be applied within 30 minutes after final finishing of the surface. Membrane curing compound shall be spray applied at a coverage of not more than 300 square feet per gallon. Membrane curing shall not be used on surfaces that will be covered at a later date with grout, mortar, concrete, or other coating.

1.14. Protection

The Contractor shall protect all concrete against injury until final acceptance by Owner. The Contractor shall be prepared to protect all concrete in accordance with the requirements of this paragraph. Temperature shall be controlled by controlling the temperature of aggregate and mixing water. Mixing time shall be kept at a minimum and elapsed time between mixing and placing shall be minimized. The interior surfaces of forms and ground upon which concrete is to be placed shall be thoroughly wetted before concrete is poured. After the first frost and until the mean daily temperature in the vicinity of the work rises above 40°F for more than 1 day, the concrete shall be protected against freezing for not less than 48 hours after it is placed.

1.15. Earthwork

1.15.1. Surveying

Prior to commencing earthwork, the Owner shall provide staking at the site. This will include substation centerline, transmission line center line, including points of intersection (PIs) and line of sight points, and new structure pole and anchor locations. Excavation work shall not proceed until Owner approves staked structure locations.

The Contractor shall be responsible for all necessary environmental and roadway surveying necessary to complete the project. The Contractor shall perform all subsequent layout work necessary to ensure that the foundation is constructed to the correct dimensions and in the locations specified on the Drawings. If the Contractor finds that any staking has been disturbed, is missing or is in error, he shall notify the Engineer promptly. The Contractor shall exercise caution to protect all reference staking.

1.15.2. Subsurface Conditions

The Contractor shall familiarize himself with the subsurface conditions as shown on the boring logs, and exercise his own judgment as to the nature and difficulty of the proposed work. It should be noted in particular that the ground water level may change from the level existing at the time of the test borings.

1.15.3. Excavations

All excavation will be classified as “common excavation.” All excavation, including soft shale, gravel or other material, which can be moved by hand or machine, is defined as common excavation. Owner shall be notified if excavated

material is significantly different from that indicated in the soil borings. Excavation work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the contract work, regardless of the type, character, composition, or condition thereof. Over-excavation shall be backfilled with well compacted six inch (6″) layers of stone or gravel base material, or concrete. If the over-excavation is unnecessary, the cost of the backfill shall be borne by the Contractor. The quality of the soil and the adequacy of its bearing value shall be decided by the Engineer before backfill or concrete is placed in any excavation. Where water is encountered, the excavation shall be kept dry by pumping during the installation of the structure and during the backfilling process. If unsuitable material is encountered at the proposed bearing surface under the concrete foundation, the Geotechnical Engineer may require further excavation to reach sound bearing. Proposed washed stone or no frost structural fill indicated under foundations is required as an integral part of the foundations. The dimensions indicated on the drawings are a minimum and required for adequate foundations.

All existing underground pipes, conduits, drains, and other underground facilities uncovered or otherwise affected by the excavation work shall be located, protected, shored, braced, supported, and maintained.

Excavation for structures shall be performed according to lines and elevations indicated on the drawings and to the limits required to perform the line construction work. Machine excavation shall be controlled to prevent undercutting the proper subgrade elevations. Machine excavation shall not be used within 5 feet of existing permanent structures and facilities. Only hand tools shall be used for excavation around existing permanent structures and facilities.

Work shall be performed so that construction areas will be as free as possible from obstructions and from interference with the transportation, storage, or handling of materials. Excavated materials free of trash, rocks, roots, and other foreign materials, and that meet the specified requirements, may be used as required for backfills constructed under these Specifications.

Excavations shall be maintained in a safe, clean, and sound condition up to the time of placement of concrete. All excavations shall be suitably protected when not attended. Whenever necessary, the Contractor shall re-excavate materials which have accumulated in previously prepared excavations. Any muck or other unsatisfactory bearing material resulting from frost, action or entrance of water into excavations previously prepared to the required bearing shall be removed and replaced with well-compacted stone or gravel, backfill or concrete at the Contractor's expense.
Subgrades for structures shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workers.

Subgrades that are otherwise solid but become mucky on top due to construction operations shall be reinforced with one or more layers of crushed rock or gravel subgrades.

The finished elevation of stabilized structure subgrades shall not be above the subgrade elevations indicated on the drawings.

1.15.4. Rock Excavation

The Contractor shall be responsible for the removal and proper disposal of solid rock when encountered in holes for concrete foundations. Solid rock shall be defined as solid, naturally-occurring mineral formations that cannot be effectively removed by conventional trenchers, backhoes, or pressure augers. Loose rock or limestone in intermittent layers that result in "difficult digging" shall not be defined as solid rock excavations. "Solid rock" shall require the use of air hammers, blasting or other specialized equipment (Note: Blasting must be approved by the Owner or Engineer in accordance with local ordinances). When solid rock, boulders, or detached stones are encountered and cannot be removed by normal power-driven drills or augers, the Owner shall be notified. Rock excavation techniques shall be used to achieve the desired excavated dimensions. Rock excavation shall consist of igneous, metamorphic, and sedimentary stones, each having a volume of 1/2 cubic yard or more, as determined by physical or visual measurements and approved by Owner.

If rock is encountered, it shall be removed and replaced with suitable materials in such a manner as to provide fully compacted earth in all areas disturbed external to foundations. In the event that rock is encountered in the excavation, the Contractor shall be compensated for such rock removal, based upon unit price as set forth by the Contractor in the Form of Proposal. In the event such rock is encountered, it shall be the duty of the Contractor to notify the Engineer and/or Owner and arrange a meeting to agree upon the approximate total cost for the removal of the rock, prior to any removal of the rock. Quantities will be agreed upon jointly by the Contractor and the Owner (or Engineer) as excavations occur. Over-excavation to remove rock will not be counted in the quantity of rock excavations.

An accurate record shall be kept of the dates and amounts of rock excavation at each location. The Owner will authorize payment for rock excavation at each location by signing the Contractor's record as excavations occur. Payment will be on a cubic yard basis as measured in place in the hole requiring rock excavation. This measurement will be based on the foundation excavation or normal trench width and depth, as if no rock were encountered.

In cases where the extent of rock excavation is questioned, the Engineer and/or Owner may require the Contractor to prove that material should be classified as rock excavation. The Contractor shall provide a demonstration that the material cannot be removed with a backhoe equipped with a minimum one-half (1/2) cubic yard heavy-duty trenching bucket placed on a machine capable of a lifting capacity of 7,500 pounds at a trench depth of ten feet (10'). The Contractor may be required to provide equipment specification data verifying that the above minimum-rated equipment will be used for demonstration purposes. The equipment is to be in good repair and in proper working condition.

1.15.5. Blasting

Blasting or other use of explosives will not be permitted without Owner's approval.

1.15.6. Sheeting and Shoring

The Contractor shall do all bracing, sheeting, and shoring necessary to perform and protect all excavations as required for safety and to conform to laws and regulations of all governmental bodies having jurisdiction. When sheeting is used, it shall be removed during or upon completion of backfilling.

The stability of previously constructed structures and facilities shall not be impaired or endangered by new excavation work. Previously constructed structures and facilities include those existing when this construction begins and those provided under these Specifications.

Adequate sheeting and shoring shall be provided as required to protect and maintain the stability of previously constructed structures and facilities and the sides of excavations until they are backfilled. Sheeting, bracing, and shoring shall be designed and built to withstand all loads that might be caused by earth movement or pressure. Sheeting and shoring shall maintain the shape of the excavation under all circumstances.

2.0 Special Conditions

The contractor is responsible to review and become familiar with the soil boring report by Terracon Consultants, Inc. for the Proposed GUC Greenville 230kV South Substation Project No. 72145022 attached in appendices of the project specifications.

Remediation of the loose or soft near surface soils should be performed by the grading contractor per the Geotechnical Engineer's recommendations prior to foundation installation.

Over excavation and replacement are anticipated, at a minimum, as detailed on the drawings. See Section 1.12 Compaction and Section 1.16 Earthwork.

The use of casing or slurry drilling should be anticipated for construction of the drilled piers. See Section 3.0 Drilled Cylindrical Foundations for specifications regarding construction and installation procedures and Section 1.4.3 Mix Class for concrete mix requirements.

3.0 Slabs on Grade and Mat Foundations

3.1. General

This section covers general installation of concrete slabs on grade, mat foundations, and vertical surfaces; formwork; testing of concrete for slabs on grade and mat foundations; and other appurtenant work. All work shall be in accordance with the Plans, Specifications, and Assembly Drawings.

3.2. Concrete

The Contractor shall supply ready mixed concrete prepared in accordance with ASTM C94, "Standard Specification for Ready-Mixed Concrete" with a minimum compressive strength of 4,500 psi at twenty-eight (28) days when tested in accordance with ASTM C39. Concrete shall conform to specifications in Mix Class Table. Air content for concrete in slabs on grade and mat foundations shall be six percent plus or minus one percent (6% ± 1%).

3.3. Subgrade

The subgrade shall be brought to an even plane and compacted solid. Washed stone or no frost structural fill shall be installed, at a minimum, as indicated on the drawings. All slabs on grade and mat foundations shall be placed on a minimum six inch (6") thick layer of washed stone. An independent professional Geotechnical engineering company shall inspect all subgrades for adequate bearing capacity as specified on the Foundation Drawings.

3.4. Formwork

Forms shall be constructed to the shape, form, line, and grade required and shall be maintained sufficiently rigid to prevent deformation under the load imposed by supported

inserts or by wet concrete. The top edges of forms shall be finished to a specified elevation, slope, or contour. They shall be brought to a true line and grade so that the top concrete surface can be finished with a screed or template resting on the top edges of the forms.

Design and construction tolerances shall be in accordance with ACI 117. Forms shall be designed and constructed in proper position and accurate alignment. Formed surfaces exposed to view shall have a Class C finish, and concealed surfaces may have a Class D finish as defined by ACI 301.

Concrete shall be placed against job-built plywood forms or forms that are lined with plywood or fiberboard, except as otherwise specified. At Owner's discretion, prefabricated forms or metal frames may be permitted only for surfaces that are not normally exposed to view when construction has been completed. Plywood and fiberboard shall be new when brought to the construction site and shall be properly coated, protected, and maintained throughout its use. All plywood and fiberboard materials that are damaged, cracked, weathered, or otherwise unsuitable, in the Owner's opinion, for producing smooth, uniformly textured formed surfaces will be rejected as form material.

Vertical surfaces of footings extended above grade shall be formed.

Form ties shall be of the removable end, permanently embedded body type, and shall have sufficient strength, stiffness, and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders. Outer ends of the permanently embedded portions of form ties shall be at least 1 inch back from adjacent outer concrete faces. Permanently embedded portions of form ties that are not provided with threaded ends shall be constructed so that the removable ends can be broken off by twisting, without chipping or spalling the concrete surface. The type of form ties used shall be acceptable to the Owner.

Form ties shall be uniformly spaced in exposed surfaces and aligned in horizontal and vertical rows.

Chamfer strips shall be placed in forms to bevel all salient edges and corners except edges which are to be buried and edges which are indicated on the drawings as requiring special treatment. Foundations shall have formed beveled salient edges for all vertical and horizontal corners unless specifically indicated otherwise on the drawings. Bevel dimensions shall be 3/4 by 3/4 inch unless indicated otherwise on the drawings.

3.4.1. Coating
Forms shall be coated with form oil before reinforcement is placed.

3.4.2. Removal
Forms shall not be removed until permission of the Engineer has been obtained.

3.5. Expansion Joints

Expansion joints and joints between slabs and vertical surfaces shall be installed according to the Drawings. Premolded fibrated asphalt expansion joint material shall be in accordance with ASTM 1751 and shall be one-half inch (½") wide and extend from the bottom of the slab to one half inch (½") from the top of the slab. The premolded fibrated asphalt expansion joint material shall then be covered by a one-half inch (1/2") wide strip of polyethylene bond breaker tape. The tape shall be installed along the top of the asphalt expansion joint material only and not on the vertical walls of the slabs. The polyethylene bond breaker tape shall then be covered with one-half inch (½") wide by one-half inch (½") thick by required length of Vulkem #45 polyurethane sealant for horizontal joints

and Vulken #921 sealant for vertical joints according to the manufacturer's installation guidelines.

3.6. Construction Joints

Construction joints not indicated on the Drawings shall be so made and located as to least impair the strength of the structure. Where a joint is to be made, the surface of the placed concrete shall be thoroughly wetted and slushed with a coat of neat cement grout immediately before placing the new concrete. All laitance shall first be removed from the placed concrete.

3.7. Reinforcement

Reinforcements shall be accurately formed. Unless otherwise indicated on the drawings or specified herein, the details of fabrication shall conform to ACI 318.

All bar supports, ties, spacers, bolsters, inserts, screeds, and other concrete accessories required shall be provided to maintain reinforcing in its proper position and permit proper placement of concrete.
Responsibility for the design of all bar support systems shall be assumed by the contractor.

Except where indicated on the drawings, welding of reinforcement for any purpose, and tack welding in particular, is expressly prohibited. Reinforcements upon which unauthorized welding has been performed will be presumed to be damaged and such reinforcing shall be removed and replaced at Contractor's expense. Replacement materials shall conform to all applicable requirements of these specifications.

Welded chairs and supports may be used provided they are clamped or wired to the reinforcement.

Except as otherwise indicated on the drawings, metal reinforcement for concrete shall have the concrete protective cover specified in Chapter 7 of ACI 318.

Steel reinforcing bars shall be placed in the concrete wherever shown on the drawings. Unless otherwise shown on the drawings or directed, measurements made in placing the bars shall be to the center lines of the bars. Before the reinforcing bars are placed, the surfaces of the bars and the surfaces of any metal bar supports shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease, or other foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete. Main reinforcement shall have a minimum clear protective cover to the surface of the concrete as shown on the drawings. Reinforcing bars shall be accurately placed and secured in position so that they will not be displaced during the placing of the concrete, and special care shall be exercised to prevent any disturbance of the reinforcing bars in concrete that already has been place. Rustproof metal chairs, metal hangers, metal spacers, or other satisfactory metal supports may be used for supporting reinforcing bars. Precast concrete blocks may be used for supporting reinforcing bars.

With the exception of lapped portions of spliced bars that are wired or clamped together, the clear distance between parallel bars shall be not less than 1.5 times the maximum size of coarse aggregate in the concrete, or less than 2 inches.

Unless otherwise required by the Specifications or drawings, splices shall conform to ACI 318. Splices shall be Class B or C tension-lapped splices unless a different class is indicated on the drawings.

Splices shall not be used in regions of maximum bending stress. Welded splices shall not be used.

Mechanical splices are acceptable if approved by the Owner.

3.8. Installation of Anchorage Items

Anchorage items, including bolts, dowels, and other similar devices, shall be of sufficient number and size and so located to ensure anchorage sufficient for the purpose intended. Anchorage items shall be checked against equipment base plates and Drawings prior to placing of concrete.

Anchor bolts shall be securely fastened in a template in the dimensions / orientation / spacings to match the structural steel base plate as shown on the Drawings. The template shall be secured to support the anchor bolts independent of the concrete being placed and cast in place during the concrete placement around the anchor bolts to ensure the proper bonding to the concrete.

In the event the anchor bolts are installed and require re-alignment and/or spacing correction, the Contractor shall contact the Owner and Engineer promptly for permission to proceed prior to any realignment methods. Anchor bolt projection shall be installed per the dimensions as shown on the detail drawings.

3.9. Placing

Water shall be removed from excavations before concrete is deposited. Hardened concrete, debris, and other foreign materials shall be removed from the interior of forms and from the inside of mixing and conveying equipment; reinforcement secured in position will be subject to inspection and approval by the Engineer. Runways for buggies or wheelbarrows shall not be supported on reinforcement or formwork

Concrete shall be conveyed from mixer to forms as rapidly as practicable without segregation or loss of ingredients.

Concrete having attained its initial set or having contained its water content for more than one and one half (1 ½) hours shall not be used in the work. Concrete shall not be dropped freely more than five feet (5') in unexposed work nor more than three feet (3') in exposed work. Unless approved by the Engineer, concrete shall be mixed and placed only when the temperature is at least 40°F; concrete footings shall be placed upon surfaces free from frost, ice, mud, loose or unsound rock, and other detrimental substances.
All concrete shall be thoroughly vibrated with appropriate vibrating equipment while concrete is being placed. Settling concrete with shovels only will not be accepted.

Concrete shall be deposited to the required thickness and finished monolithically to a smooth, level surface by floating and troweling.

3.10. Bonding and Grouting

Before depositing new concrete on or against concrete that has set, the existing surfaces shall be roughened and cleaned. Horizontal construction joints shall be given a brush coat of grout consisting of cement and fine aggregate in the same proportion as the concrete to be placed, following by approximately three inches (3") of concrete of regular mix, except that the proportion of coarse aggregate shall be reduced fifty percent (50%). Grout for setting bearing plates and other items shall be composed of equal parts of sand and Portland Cement.

3.11. Finishes of Concrete Other Than Floors and Slabs

Slight honeycomb and minor defects shall be patched with cement mortar made with one (1) part cement and two (2) parts fine aggregate. Exposed surfaces shall be given a rubbed finish. Fins and other projections shall be carefully removed, offsets leveled, and surface damage repaired. The surfaces then shall be rubbed with cement or carborundum bricks and water, leaving the surface uniformly smooth and clean. Projecting ends of all form ties shall be removed. The resulting recesses shall be cleaned, wetted, and filled with patching mortar.

No surface treatment will be required for buried or permanently submerged concrete not forming an integral part of a structure except that required to obtain the surface elevations or contours and surfaces free of laitance. The unformed surfaces of all other concrete shall be screeded and given an initial float finish, followed by additional floating and troweling where required.

Float finished surfaces shall be finished to provide a flat profile per ACI 347 Class C Finishing.

Screeding shall provide a concrete surface conforming to the proper elevation and contour with all aggregates completely embedded in adjacent mortar. Surface irregularities in screeded surfaces shall be limited as required to produce finished surfaces within the tolerances specified. If no further finishing is required, surface irregularities shall not exceed ACI 347 Class C.

Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate that may be disturbed by the float or that causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance with no unnecessary working of the surface with the float.

The initial floating shall be followed with a second floating at the time of initial set. The second floating shall produce a smooth, uniform, and workmanlike float finish of uniform texture and color. Unless additional finishing is specifically required, the completed finish for all unformed surfaces shall be a float finish as produced by the second floating.

Floating shall be performed with hand floats or suitable mechanical compactor floats. Any surfaces designated on the drawings to be troweled shall be steel trowel finished. Troweling shall be performed after the second floating when the surface has hardened sufficiently to prevent an excess of fines being drawn to the surface. Troweling shall produce a dense, smooth, uniform surface free from blemishes and trowel marks.

3.12. Clean-Up

All forms shall be completely removed. All materials, equipment, and rubbish shall be removed and the premises left in a neat condition.

4.0 Drilled Cylindrical Foundations

4.1. General

This section covers general requirements for the installation of drilled cylindrical foundations; testing of concrete for drilled cylindrical foundations; and other appurtenant work. All work shall be in accordance with the Plans, Specifications, Plan & Profile Sheets, and Assembly Drawings.

4.2. Concrete

The Contractor shall supply ready mixed concrete prepared in accordance with ASTM C94, "Standard Specification for Ready-Mixed Concrete" with a minimum compressive strength of 4,500 psi for surface mounted structures and 3,000 psi for direct embedded structures at twenty-eight (28) days when tested in accordance with ASTM C39. Concrete shall conform to specifications in Mix Class Table. Air content shall be six percent plus or minus one percent (6% ± 1%).

4.3. Excavations

The diameter and depth of each hole shall be as required for structures to be placed according to the Plans and Drawings. Holes shall be drilled with such types of drilling equipment that will produce the excavation shown on the drawings. Drill rigs, which do not run true, will not be acceptable.

Holes for direct embedded structures shall be as required for compaction of backfill around the pole, but shall not be less than the pole diameter at the butt plus 12 inches.

Holes for caissons shall be as shown on the Plans and Drawings. The depth noted on the drawings is to be considered minimum. If unsuitable materials affecting required bearing value are encountered, the excavation shall be continued to whatever depth is necessary to obtain suitable material per the approval of the geotechnical engineer on site. When depth required by the Owner is greater than depth shown on the drawings, the neat line excavation and volume of reinforced concrete to fill it will be paid for by the Owner.

Hole excavation shall include removal of stumps, roots, and other obstructions necessary to provide a clean vertical hole to the depth specified on the drawings. Excavation shall be performed with a power driven auger. As soon as the auger is withdrawn, any direct embedded structures shall be set to the depth specified on the drawings and in accordance with these specifications.

Excavated holes shall be covered and protected when the associated structures will not be set during the same working day.

Holes may be excavated by the drilling and mud slurry technique. Prior to start of construction, Owner's approval shall be submitted for a drilling mud procedure for wet hole excavation when sufficient side wall pressure cannot be obtained by use of water void of additives. Drilling mud shall be Super Mud manufactured by Polymer Drilling Systems or acceptable equal. Drilling mud shall be mixed in accordance with manufacturer's recommendations and to the proper consistency for maintaining the sides of the hole. With the Owner's approval, attapulgite clay type drilling mud may be substituted for Super Mud on holes where Super Mud will not provide sufficient side wall pressure to maintain the sides of the hole excavation.

Under no circumstances can bentonitic or kaolinitic clay products be used.

4.4. Removal of Water

Adequate dewatering equipment shall be provided and maintained to remove and dispose of all surface and groundwater entering excavations and other parts of the work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until construction to be provided therein is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result. Disposal of water shall be in accordance with federal, state, and local regulations.

4.5. Temporary Casing

Temporary casing will be required at all excavations where workmen are required to do hand excavation or remove obstructions in the lower portions of the caissons or to re-clean the bottoms of caissons prior to the placement of concrete. Temporary casings will also be required at locations where the soil will not stand without support or where, because of ground water or soil conditions, sloughing of the sides of caissons may seriously delay or endanger the satisfactory completion of excavation and placement of concrete. The Contractor shall have immediately available for use on the job an ample supply of casing for each size that will be required for use in the caissons and shall provide additional amounts, if required, to ensure orderly progress of the job. Such casing may be in short pieces but with jointing pieces of sufficient strength that assembled sections of casing may be pulled complete as concrete is placed or immediately thereafter. The casing shall also be of such strength and rigidity as to maintain the required excavation lines against the pressure of sloughing material from the sides of the caissons. All temporary casing shall be removed from caissons as concrete is placed or immediately thereafter, and in such a manner as to prevent sloughing material from dropping to the bottoms of caissons, falling on top of freshly placed concrete or intruding into the concrete mass.

Permanent casing will not be permitted except by special permission of the Owner or as shown on the drawings.

4.6. Permanent Casing

Smooth wall metal pipe casing shall be installed as indicated on the drawings or as permitted by special permission of the Owner.

The casing shall not extend more than 6 inches below the top of the hole. Any part of the casing extending above this elevation shall be cut off. Casings shall be installed as drilling proceeds or immediately after the auger is withdrawn as required to prevent sloughing or caving of the excavation walls.

4.7. Dimensional Tolerances

The location and dimensions of the drilled caisson shall be as exact as possible to the locations shown on the drawings and staked in the field. The maximum allowable tolerance will be as follows.

Top of the drilled caisson shall be set to the elevation shown on drawings, except where otherwise directed by the Owner or Engineer.

The variation in elevation of the bottom of the drilled caisson from the specified depth shall be from 0 to +6 inches, except where required to be deeper due to soil conditions.

Maximum deviation of the axis of the hole from the vertical shall be no more than 1 inch in 8 feet.

The diameter of any drilled caisson shall not be less than specified or more than 4 inches greater than specified.

4.8. Pier Installation Record

Accurate pier installation records shall be maintained and shall contain the following information for each pier:

a. Contractor's name.
b. Drill rig operator's name.
c. Location/Structure Number.
d. Shaft diameter.
e. Elevation of shaft above grade.
f. Depth of rock.
g. Depth of shaft.
h. Depth of ground water.
i. Caving or sloughing of excavation.
j. Drilling difficulties.
k. Casing insertion, size and length, and whether or not removed.
l. Date and time of start and finish excavation.
m. Length and diameter of reinforcing bar cage.
n. Date and time concrete placed.
o. Calculated volume of excavation based on diameter of shaft.
p. Total quantity of concrete placed.
q. Test Cylinder Numbers in order of placement in foundation (bottom to top)

4.9. Reinforcement

Steel reinforcing bars shall be placed in the concrete wherever shown on the drawings. Unless otherwise shown on the drawings or directed, measurements made in placing the bars shall be to the center lines of the bars. Before the reinforcing bars are placed, the surfaces of the bars and the surfaces of any metal bar supports shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease, or other foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete. Main reinforcement shall have a minimum clear protective

cover to the surface of the concrete as shown on the drawings. Reinforcing bars shall be accurately placed and secured in position so that they will not be displaced during the placing of the concrete, and special care shall be exercised to prevent any disturbance of the reinforcing bars in concrete that already has been place.

4.10. Concrete Placement General

The handling, depositing, and compacting of concrete shall conform to these Specifications subject to adjustment by the Owner for weather or placement conditions.

Concrete shall not be pumped through aluminum pipe or aluminum alloy pipe.

Before concrete is placed, forms and anchor bolts shall be rigidly secured in their proper position; all dirt, mud, water, and debris removed from the space to be occupied by the concrete; and all surfaces cleaned that may have become encrusted with dried mortar or concrete from previous placement operations. The entire installation shall be acceptable to the Owner.

Anchorage items shall be checked against equipment base plates and Drawings prior to placing of concrete. In the event the anchor bolts are installed and require re-alignment and/or spacing correction, the Contractor shall contact the Owner and Engineer promptly for permission to proceed prior to any realignment methods. Anchor bolt projection shall be installed per the dimensions as shown on the detail drawings.

Cold joints are not allowed unless specifically approved by the Owner and Engineer. When a cold joint is approved the surface of hardened concrete upon which fresh concrete is to be placed shall be rough and clean. An epoxy bonding compound shall be applied in accordance with the manufacturer's recommendation.

Concrete shall be brought to the point of final deposit by methods that prevent the separation or loss of the ingredients. Concrete shall be deposited in its final position without moving it laterally in the forms for a distance greater than 5 feet.

4.11. Concrete Placement – Dry Hole

Concrete shall be placed in the drilled caisson as soon after excavation as possible. Immediately prior to the placement of concrete, the caisson shall be cleaned of water, debris, or other materials harmful to concrete including ice, clods, and piles of loose earth. Surfaces against which concrete is being placed shall be free of frost, and in cold weather shall be enclosed or heated, if necessary, prior to placing concrete to ensure this requirement is met. Water in bottom of caissons must be removed or absorbed. Equipment shall include a pump and two vibrators in good working condition, hoppers and elephant trunks for directing the flow of concrete down the caissons, and an ample supply of sacked cement for use in drying the bottom of caissons. The Contractor shall not place any concrete until the excavation and embedded items are checked and approved by the Owner or Engineer. In a drilled caisson where the Contractor can free fall the concrete down the center of the caisson without having the concrete come in contact with the embedded items, which may cause segregation of the aggregate, the Contractor may place the concrete with the use of an elephant trunk or drop chutes and shall use vibrators. The maximum free fall distance shall be no more than 5 feet. If the Owner or Engineer sees the above method cannot be implemented, then the Contractor shall place the concrete for the first lift using hoppers and sections of elephant trunk or drop chutes. Normal procedure expected to be followed by the Contractor will be to place the concrete to an elevation approximately 5 feet above the bottom of the caissons and vibrate this deposit with one pass of the vibrator down to the bottom of the caisson and back to the top of concrete. Following this, the remainder of the concrete may be poured in two or more lifts of equal height with one pass of the vibrator down to the bottom of the lift and back up on each lift. In placing concrete, internally operated vibrators of a minimum diameter of 2-1/4 inches and having a speed of 5,000 rpm or more are to be used. On the

upper lifts of the piles, elephant trunks will not be required, but the placing of the concrete shall be done in such a manner as to prevent segregation of the aggregates.

4.12. Concrete Placement – Wet Hole

Where sufficient groundwater is encountered during excavation to result in standing water in the caisson, the Contractor shall provide pumps with sumps just large enough for pump sections or special pumps, which can extract water from the bottom of the caisson without the requirement of a sump. Immediately prior to the start of the concrete placement, water shall be pumped from the caisson to the elevation of the bottom of the caisson or, if a sump is used, leaving a depth of water not exceeding 4 inches in the sump. The use of dry cement to "dry up" the water left in the sump will then be permissible provided the rate of inflow is sufficiently slow to permit placement of concrete without increasing the water-cement ratio. To follow this procedure, the Contractor must have dry cement ready to place into the caisson immediately after pumping is terminated and also have adequate concrete at the site. If, in the opinion of the Owner or Engineer, the rate of inflow of ground water is too great to obtain concrete of acceptable quality, it will be necessary for the Contractor to place concrete using the tremie method.

4.13. Concrete Placement – Tremie Method

Where the inflow of water into a caisson is too rapid to permit placement of concrete in the dry, the Contractor shall place the concrete underwater by the tremie method. In such cases, a special mix of concrete will be required with coarse aggregate (gravel), ¾ inch maximum size, and a minimum of seven bags of cement per yard. A retarding agent, approved by the Owner and Engineer, may be used. No vibration of the tremie concrete will be required or permitted, but it will be permissible to vibrate the tremie pipe under certain conditions when the flow of concrete becomes sluggish, and it will also be permissible to vibrate the casing, if used, when the caisson is filled with concrete at the time the casing pull is started. The tremie pipe shall have the minimum diameter of 8 inches and shall be equipped with a foot valve or gate at the bottom end, which is watertight and can be positively controlled from the ground surface. If joints are required in the tremic pipe, they shall be watertight. The entire assembly shall be watertight, and under no circumstances will concrete be permitted to flow through water in the tremie. In placing concrete, the lower end of the tremie shall be placed as close to the bottom as possible and no more than 6 inches to the bottom of the caisson and shall not be raised until a seal has been established between the tremie pipe and the concrete sufficient to prevent entry of water into the tremie. The discharge end of the tremie shall be kept submerged in the concrete a sufficient depth to maintain, at all times, an adequate seal during underwater placement. The placing of concrete by tremie in any caisson shall not be started until a sufficient supply of concrete is at the site to complete placing of concrete in the caisson up to the ground surface. Once started, the underwater placement shall proceed without interruption until the top of the concrete has been brought to the above-mentioned elevation. As soon as the level of concrete has reached the above-mentioned level over the tremie pipe, the Contractor shall remove the water being displaced by the concrete. Concrete may be placed by tremie only when authorized by the Owner or Engineer.

4.14. Consolidation

During and immediately after depositing, concrete shall be consolidated thoroughly and worked around reinforcements, embedments, and into the corners of the forms.

Concrete shall be consolidated by means of mechanical vibrating equipment supplemented by hand rodding, spading, and/or tamping. Unless otherwise accepted by the Owner, mechanical vibrators shall be spud type immersion vibrators which will maintain at least 9,000 cycles per minute when immersed in concrete. The number and type of vibrators shall be subject to the acceptance of the Owner.

The vibrator shall be constantly relocated and placed in each location only once for each lift. Lower lifts shall be vibrated with the one immediately above it.

4.15. Finishes of Concrete Other Than Floors and Slabs

Slight honeycomb and minor defects shall be patched with cement mortar made with one (1) part cement and two (2) parts fine aggregate. Exposed surfaces shall be given a rubbed finish. Fins and other projections shall be carefully removed, offsets leveled, and surface damage repaired. The surfaces then shall be rubbed with cement or carborundum bricks and water, leaving the surface uniformly smooth and clean. Projecting ends of all form ties shall be removed. The resulting recesses shall be cleaned, wetted, and filled with patching mortar.

No surface treatment will be required for buried or permanently submerged concrete not forming an integral part of a structure except that required to obtain the surface elevations or contours and surfaces free of laitance. The unformed surfaces of all other concrete shall be screeded and given an initial float finish, followed by additional floating and troweling where required.

Float finished surfaces shall be finished to provide a flat profile per ACI 347 Class C Finishing.
Screeding shall provide a concrete surface conforming to the proper elevation and contour with all aggregates completely embedded in adjacent mortar. Surface irregularities in screeded surfaces shall be limited as required to produce finished surfaces within the tolerances specified. If no further finishing is required, surface irregularities shall not exceed ACI 347 Class C.
Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate that may be disturbed by the float or that causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance with no unnecessary working of the surface with the float.

The initial floating shall be followed with a second floating at the time of initial set. The second floating shall produce a smooth, uniform, and workmanlike float finish of uniform texture and color. Unless additional finishing is specifically required, the completed finish for all unformed surfaces shall be a float finish as produced by the second floating.

Floating shall be performed with hand floats or suitable mechanical compactor floats.

Any surfaces designated on the drawings to be troweled shall be steel trowel finished. Troweling shall be performed after the second floating when the surface has hardened sufficiently to prevent an excess of fines being drawn to the surface. Troweling shall produce a dense, smooth, uniform surface free from blemishes and trowel marks.

4.16. Clean-Up

All forms shall be completely removed. All materials, equipment, and rubbish shall be removed and the premises left in a neat condition.

4.17. Repairing Defective Concrete

Defects in formed concrete surfaces shall be repaired to the satisfaction of the Owner within 24 hours, and defective concrete replaced within 48 hours after the adjacent forms have been removed. All concrete that is porous, honeycombed, or otherwise defective to a depth in excess of 1 inch shall be cut out and removed to sound concrete, with edges square cut to avoid feathering. Surfaces shall be coated with epoxy bonding compound before the repair concrete is placed.

Concrete repair work shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. Mortar and concrete used in repair work shall be adequately cured and finished to match adjacent surfaces.

5.0 References

5.1. American Concrete Institute

1. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials
2. ACI 318 – Building Code Requirements for Structural Concrete and Commentary
3. ACI 301 – Specifications for Structural Concrete
4. ACI 305R –Hot Weather Concreting
5. ACI 306R –Cold Weather Concreting
6. ACI 308R – Guide to Curing Concrete
7. ACI 336.1 – Specification for the Construction of Drilled Piers
8. ACI 347 – Guide to Formwork for Concrete
9. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures and Commentary

5.2. ASTM International

1. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
2. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
3. ASTM C33 – Standard Specification for Concrete Aggregates
4. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
5. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
6. ASTM C94 – Standard Specification for Ready Mixed Concrete
7. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete
8. ASTM C150 – Standard Specification for Portland Cement
9. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete
10. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete
11. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
12. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
13. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete
14. ASTM C403 – Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
15. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
16. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
17. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
18. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

APPENDICES

A. List of Drawings
B. Oil Containment System Specifications
C. Subsurface Investigation
D. Forms:
    1. Change Order
E. Vicinity Map

A

List of Drawings

GREENVILLE UTILITES COMMISSION
GREENVILLE, NORTH CAROLINA

INSTALLATION OF THE GREENVILLE
SOUTH 230kV POD NO. 3 SUBSTATION FOUNDATIONS

LIST OF DRAWINGS

The work shall conform to the following Booth and Associates, LLC Drawings, all of which form a part of these Specifications. The Bidder is responsible for contacting the Engineer if any drawings not indicated to be furnished at a later date are missing from their bid documents. If the Bidder does not contact the Engineer regarding any drawings, their bid will be considered based on all Drawings and Specifications, as issued for bids.

REFERENCE NO.	DESCRIPTION
FP1	Foundation Plan
FD1	Foundation Details - Piers
FD2	Foundation Details - Piers
FD3	Foundation Details - Pads
FD4	Foundation Details - Pads
FD5	Foundation Details - Pads
FD6	Foundation Details - Pads (To be provided at a later date)
FD7	Foundation Details - Pads
OC1	Oil Containment Plan
OC2	Oil Containment Details
OC3	Oil Containment Details

B

Oil Containment System Specifications

GREENVILLE UTILITIES
GREENVILLE, NORTH CAROLINA

OIL CONTAINMENT
SPECIFICATIONS FOR THE
GREENVILLE POD #3 230 TO 115Kv SUBSTATION

Booth & Associates, LLC
Consulting Engineers
5811 Glenwood Avenue
Raleigh, North Carolina 27612
Firm License No.: F-0221

TECHNICAL SPECIFICATIONS

1.0 General

The Greenville POD #3 Substation project includes the placement of the Oil Containment System for the 230 to 115 kV transformer which has been designed to contain accidental spills and/or tank rupture within the area surrounding the power transformer. The installation of this system involves the excavation of a large basin around the transformer foundation. The basin will be permanently formed with reinforced concrete walls and floors.

The containment basin is designed with a sloped concrete floor to allow all rainwater to collect at a single outlet. Beyond the collection basin, a sump tank containing an electric pump will be connected to this outlet to remove the accumulation of rainwater. A special sensor circuit in the pump control will disconnect the pump motor power in the event the rainwater is ever contaminated by transformer oil; otherwise, the rainwater is pumped into an open outlet pipe.

The Contractor shall be responsible for furnishing the labor and materials to install the concrete basins, and shall be responsible for the labor to complete the installation of the pumps and all associated electrical/plumbing materials for a complete system. The Contractor shall furnish the mechanical sump package as outlined in the "List of Materials for the Oil Containment System" following these specifications. The Contractor shall furnish all concrete, reinforcing steel, galvanized steel bar grating, and framing materials for the concrete basin.

2.0 Submittals

Copies of all reports shall be submitted to the Owner and Engineer prior to the performance of any work on the subject project.

2.1. Material Reports

Material reports shall be submitted to the Owner and Engineer certifying approved components as shown in the "List of Materials for the Oil Containment System" or as proposed alternates for the following items:

a) PVC Pipe
b) Joint Sealants
c) Reinforced Concrete Pipe
d) Grating
e) Steel Angle
f) Waterstop

2.2. Equipment Reports

Equipment submittals must include the manufacturer, model, accessory equipment, and performance specifications. Equipment cut sheets shall be submitted to the Owner and Engineer for the following equipment as specified in the "List of Materials for the Oil Containment System":

a) Sump Pump
b) Oil Sensing Device

Alternates of equipment other than that specified in the "List of Materials for the Oil Containment System" must be submitted to the Owner and Engineer for approval.

2.3. Coordination Drawings

Fabrication drawings showing planned size, shape, location, and arrangement shall be submitted to the Owner and Engineer for the following items:

a) Grating
b) Steel Angle

Drawing shall include plan views of elements layout in the oil containment system, as well as detail drawings of the elements.

3.0 Installation

Installation details of the system have been included in the Drawings. Key elements of the system installation are as follows:

3.1. Excavate for the basin about the 230 to 115 kV transformer foundation over an area of approximately 60 feet x 35 feet to elevations as indicated on the drawings. If unsuitable material is encountered, the contractor shall remove the unsuitable material and backfill with well compacted washed stone or no frost structural fill in six inch (6") lifts, or concrete.

3.2. When applicable, install and compact washed stone or no frost structural fill in maximum six inch (6") uncompacted lifts to 80 percent (80%) relative density per ASTM D4253.

3.3. The stone subgrade of this basin area shall be graded for a natural drainage slope as indicated in the Drawings.

3.4. Install the concrete floors and walls to form a permanent basin in accordance with the details shown on the Oil Containment (OC) Drawings. Due care and attention must be given to the placement of conduits, ground conductors, and outlet pipes as illustrated on the Oil Containment Details, the Foundation Details, and the Conduit Plan Drawings. All concrete shall be reinforced with the number and type of steel reinforcing bars or mesh as required by these Drawings. Concrete shall be formed, placed, and cured all in accordance with the provisions of the "Foundations" section of the Technical Specifications.

3.5. When applicable, all galvanized welded steel bar grating must be bonded together in order to form a uniform, continuously grounded area. Individual sheets of welded steel bar grating and galvanized steel angle support members shall be bonded to the grounding loop inside the basin using the appropriate size connectors as shown on the details. Any other type of connector must be approved by the Owner or Engineer.

The oil containment basin ground loop shall be bonded to the substation power transformer ground bar locations as indicated on the Drawings.

3.6. Install the oil containment sump using a thirty-six inch (36") reinforced concrete pipe (RCP) and mechanical sump package outside the basin outlet per the Drawings at subgrade elevations as noted. The mechanical sump package includes the pump, oil-sensing device, control box, and all necessary hardware and connections. The material in the mechanical sump package shall be installed in accordance with the manufacturer's recommendations and as shown on the Drawings.

3.7. The Contractor shall restore the appropriate soil cover after placement of the sump.

3.8. Install and connect drain pipe from the basin to the sump and from the pump to the drainage outlet.

3.9. Tamp all drain system excavations after placement of pipes with specified backfill materials. Compaction density shall be suitable for heavy equipment vehicular traffic.

3.10. Connect pump control wiring to designated station service circuit.

4.0 **Testing**

After installation of the mechanical sump package and prior to the completion of the project, the system shall be checked to ensure it is in proper working order. The Contractor is responsible for notifying the Owner at least twenty-four (24) hours before testing the system, in order for a representative to be present at the time of testing.

GREENVILLE UTILITIES
GREENVILLE, NORTH CAROLINA

GREENVILLE POD #3 230 TO 115kV SUBSTATION

LIST OF MATERIALS FOR THE OIL CONTAINMENT SYSTEM

ITEM	DESCRIPTION	QUANTITY
OC1	Welded Steel Bar Grating – Galvanized with 2" x 3/16" load bearing bars at 1-3/16" o.c., McNichols Company Type GW-200, Serrated Surface (See Drawing OC2 for Panel Arrangement) Distributed by: McNichols Company 251 Wille Road #C Des Plaines, IL 60018-1861 Phone: (847) 635-5100 Fax: (847)635-1115 www.mcnichols.com	1,203 Sq. Ft.
OC2	Galvanized Steel Angle L 3" x 3" x ¼" with ½" x 1" slots at 36" o.c. maximum	397 Lin. Ft.
OC3	2" x 2" x ¼" Galvanized Steel Clips	As Required
OC4	36" Diameter Reinforced Concrete Pipe (RCP) x 8'-0" long	1
OC5	Aluminum Checker-Plate Cap, ¼" thick, to fit 36" diameter reinforced concrete pipe, with side lip and lifting handles	1
OC6	Grundfos Series Unilift AP Stainless Steel Submersible Sump Pump, Part No. AP12.40.04.1, 1/2 hp, 115 Volt ac, 10' Power Cord, No Float Switch Distributed By: Daparak, Inc. 4915 Waters Edge Drive Suite 180 Raleigh, North Carolina 27606 Phone: (919) 851-4411 Fax: (919) 859-4837 www.daparak.com	1

ITEM	DESCRIPTION	QUANTITY
OC7	Oil Smart Simplex Panel with Alarm, Oil Smart Switch 30 amp motor start relay and mounting hardware #OSSIM-30 Distributed by: See Water, Inc. 121 North Dillon Street San Jacinto, California 92583 Phone: (951)-487-8073 or (888)-733-9283 Fax: (951) 487-0557	1
OC8	PVC Pipe	
	1-1/2” Schedule 80	4 Lin. Ft. ±
	2-1/2" Schedule 80	110 Lin. Ft. ±
	4" Schedule 80	38 Lin. Ft. ±
OC9	Schedule 80 PVC Fittings	
	4" 90° Elbow (1/4 Bend, Sanitary Ell, Hub x Hub)	2
	4” Cap	1
	1-1/2” MPT x S	1
	2-1/2” x 1-1/2” Reducer	1
	2-1/2" 90° Elbow	3
	2-1/2" Union	1
	2-1/2" Couplings	As Required
OC10	2" PVC Conduit with fittings	As Required
OC11	Unistrut Mounting Frame (See Detail No. 3, Drawing OC3)	5 Lin. Ft.
OC12	3/8” x 1 ½” Stainless Steel Hex Head Bolt with nut and washer	As Required
OC13	3/8” x 3” Stainless Steel Anchors – HILTI Kwik Bolt III Distributed by: HILTI, Inc. 5400 South 122nd East Avenue Tulsa, Oklahoma 741461 Phone: (800) 879-8000 www.us.hilti.com	As Required
OC14	Drop-in Anchor for ½” Bolt	As Required

ITEM	DESCRIPTION	QUANTITY
OC15	Galvanized Hardware Cloth with ½" square openings	1 Sq. Ft.
OC16	Stainless Steel Pipe Clamps	
	For 4" pipe	1
	For 2½" pipe	1
OC17	#2 Tinned Copper Jumper	As Required
OC18	2/0 AAAC to 2/0 AAAC Split Bolt Type Connector	As Required
OC19	Bronze Ground Clamp for 2/0 AAAC	As Required
OC20	Bronze Straight Bolt Terminal 2/0 AAAC Jumper (See Detail No. 7, Drawing OC3 of 3)	As Required
OC21	Clamp – Hubble Cat. No. GC5002	As Required
OC22	Sika – Swellstop, 3/8" x 3/4" Controlled Expansion Waterstop (Or approved equal)	12 Lin. Ft. ±
OC23	Sika – 6" PVC Waterstop, Type 679 (Or approved equal)	170 Lin. Ft. ±
OC25	PVC Pipe Adhesive	As Required
OC26	Electrical Joint Compound	As Required
OC27	Rip Rap - 2" to 6"	1 Cu. Yd.

C

Subsurface Investigation

Geotechnical Engineering Report

Proposed GUC Greenville 230kV South Substation

Mills Road and Hudson's Crossroads Road

Greenville, North Carolina

June 20, 2014

Project No. 72145022

Prepared for:

Ark Consulting Group

Greenville, North Carolina

Prepared by:

Terracon Consultants, Inc.

Winterville, North Carolina

June 20, 2014

Ark Consulting Group, PLLC
3280 Greenville Boulevard, Suite B
Greenville, North Carolina 27858

Attn: Mr. Bryan Fagundus, PE

Re: Geotechnical Engineering Report
Proposed GUC Greenville 230kV South Substation
Mills Road and Hudson's Crossroads Road
Greenville, North Carolina
Terracon Project No. 72145022

Dear Mr. Fagundus:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal P72140053 dated March 4, 2014. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design of foundations for the proposed substation.

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.

Carl F. Bonner, PE
Principal / Office Manager
Registered, NC 16252

Barney C. Hale, PE
Senior Geotechnical Engineer

Enclosures

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The following items represent a brief summary of the findings of our subsurface exploration, our conclusions and recommendations for the proposed electrical substation to be located near the intersection of Mills Road and Hudson's Crossroads Road in Greenville, North Carolina.

- The proposed substation will steel framed, with drilled pier foundations for each individual column. The proposed transformer pads will be concrete. The control building will have CMU load bearing walls, or may be steel framed and a concrete slab on grade.
- At the time of our site exploration, the proposed site for the substation was an open, grassed field. Native deposits of silty sand, clayey sand, poorly graded sand, lean clay and fat clay were encountered in the borings.
- The primary geotechnical considerations at the site are the loose or soft near surface sands and clays. After the site is stripped, the control building and transformer pad footprints should be compacted using a vibratory roller. After the vibratory rolling, a thorough proofrolling should be performed to detect areas of unsuitable soil that may need to be overexcavated and replaced. We understand that site grades are proposed to be raised 1 to 2 feet.
- The sandy lean clay near the surface is moderately moisture sensitive and can rut or deflect excessively with elevated moisture contents. Performing earthwork operations during warmer, drier periods of the year (May through October) will reduce the potential for problems associated with unstable subgrades. The moisture sensitivity of the on-site soils does not preclude performing earthwork at other times of the year, but does lead to an increased potential for having to perform overexcavation and replacement or some other form of remedial work.
- Support of the proposed substation column foundations on drilled piers is feasible; however, casing and/or slurry drilling will be required to install the piers. We understand that drilled pier design will be performed by others. We have provided design parameters in a table in this report.
- Support of the proposed transformers and control building on conventional shallow spread footings or mat foundations is recommended after vibratory compaction and overexcavation/replacement where required. Due to the soft/loose soils encountered in the borings, isolated undercutting of the footings is expected. Foundations are expected to bear on native soils or the new engineered fill compacted to the recommendations given herein. Foundations bearing on these suitable materials could be designed using a maximum net allowable soil bearing pressure of 1,500 psf for control building wall footings and 1,000 psf for the transformer mat.

This summary should be used in conjunction with the entire report for design purposes. Details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of report limitations.

GEOTECHNICAL ENGINEERING REPORT
PROPOSED GUC GREENVILLE 230kV SOUTH SUBSTATION
GREENVILLE, NORTH CAROLINA

Terracon Project No. 72145022
June 20, 2014

1.0 INTRODUCTION

We have completed the geotechnical engineering report for the proposed electrical substation to be located near the intersection of Mills Road and Hudson's Crossroads Road in Greenville, North Carolina. Four borings were performed to depths of approximately 30 to 40 feet below the existing ground surface at the approximate requested locations. Logs of the borings along with a site location plan and a boring location plan are included in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- earthwork
- foundation design and construction
- seismic considerations
- floor slab design and construction

2.0 PROJECT INFORMATION

2.1 Project Description

ITEM	DESCRIPTION
Site Location	See Appendix A, Exhibit A-1, Site Location Plan
Site layout	See Appendix A, Exhibit A-2, Boring Location Plan
Structures	An electrical substation with concrete transformer pads and a control house.
Building Construction	The proposed substation will be a steel framed structure, with drilled pier foundations for each individual column. The proposed transformers will be supported on concrete pads. The control building will have CMU load bearing walls, or steel framing and a concrete slab on grade.

ITEM	DESCRIPTION
Maximum loads	Substation Structure: Overturning Moment: 750 foot-kips (assumed) Vertical Load: 15 kips (assumed) Shear: 25 kips (assumed) Transformer Pad Slabs: 750 psf (assumed) Control House Walls: 1.5 klf (assumed) Slabs: 100 psf max (assumed)
Finished floor elevation	Not provided
Grading	Up to 2 feet of fill placement (assumed).
Retaining walls	None anticipated
Below grade levels	None anticipated

2.2 Site Location and Description

ITEM	DESCRIPTION
Location	The proposed site is located near the intersection of Mills Road and Hudson's Crossroads Road in Greenville, North Carolina.
Existing improvements	None.
Current ground cover	Grass.
Existing topography	Relatively flat, less than 2 feet of elevation change across the site. A drainage canal bisects the site.

3.0 SUBSURFACE CONDITIONS

3.1 Typical Profile

Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	Consistency/Density
Surface	0.5	Grass/Topsoil	N/A
Stratum 1	6 to 8	Alternating layers of Lean Clay (CL) and Clayey Sand (SC)	Very Loose to Loose (Sand) Very Soft to Medium Stiff (Clay)
Stratum 2	18	Poorly Graded Sand (SP), Silty Sand (SM), Clayey Sand (SC)	Loose to Medium Dense
Stratum 3	33	Fat Clay (CH) and Lean Clay (CL)	Very Soft to Soft
Stratum 4	40	Silty Sand (SM)	Loose to Dense

Laboratory tests for water content, Atterberg limits, and grain size were conducted on selected soil samples and the test results are presented in the appendix of this report and in the following table:

Boring Number	Sample Depth (feet)	Liquid Limit (%)	Plasticity Index (%)	#200 Wash (%)	Natural Moisture (%)
B-1	6 – 7.5	26	14	71	34
B-2	13.5 – 15	69	52	98	54
B-3	3.5 – 5	32	17	64	33

Conditions encountered at the boring locations are indicated on the boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. For a comprehensive description of the conditions encountered in the borings, refer to the boring logs in Appendix A of this report.

3.2 Groundwater

Mud rotary drilling techniques were used to advance the borings. The boreholes were observed while drilling and after completion for the presence and level of groundwater. Groundwater was observed at a depth of approximately 8 to 10 feet in the borings after drilling. The moisture condition of the soil samples supported this groundwater level.

The groundwater level can rise due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Groundwater levels would be expected to be near seasonal lows at the time of our exploration. The possibility of groundwater

level fluctuations should be considered when developing the design and construction plans for the project.

Terracon subcontracted a licensed soil scientist to perform a soil evaluation for stormwater treatment for this project. Based on this testing, the seasonal high groundwater level was determined to be at the surface. Infiltration testing was not performed due to the seasonal high water table and the clayey consistency of the soils encountered. The soil evaluation report for the stormwater treatment area is included in Appendix C.

3.3 Site Geology

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 the *1985 Geologic Map of North Carolina*, the site is mapped within the Yorktown and Duplin Formation, Undivided.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The primary geotechnical considerations at the site are the loose or soft near surface sands and clays. After the site is stripped, the control building and transformer pad footprints should be densified in-place using a vibratory roller. After the vibratory rolling, a thorough proofrolling should be performed to detect areas of unsuitable soil that may need to be overexcavated and replaced. We understand that site grades are proposed to be raised 1 to 2 feet.

Performing earthwork operations during warmer periods of the year (May through October) will reduce the potential for problems associated with unstable subgrades. Site drying conditions are typically enhanced when it is warm. The moisture sensitivity of the on-site soils does not preclude performing earthwork at other times of the year, but does lead to an increased potential for having to perform overexcavation and replacement or some other form of remedial work. Protecting the exposed subgrade soils from infiltration of surface water by keeping the site grades sloped to promote runoff in advance of rain events will also reduce the potential for needing to perform remedial work on wet subgrades. Should unstable subgrade conditions develop, stabilization measures should be employed.

Support of the substation columns on drilled piers is recommended; however casing and/or slurry drilling will be required to construct the piers in the water bearing sands. Design parameters for drilled piers are included in a table in section 4.3 of this report.

Support of the proposed transformer pads and the control building on conventional shallow spread footings or mat foundations is recommended after vibratory compaction and overexcavation/replacement where required. Due to the loose/soft soils encountered in some of the borings, isolated undercutting of the footings is expected. Foundations are expected to bear on native soils or the new engineered fill compacted to the recommendations given herein. Foundations bearing on these suitable materials could be designed using a maximum net allowable soil bearing pressure of 1,500 psf for wall footings and 1,000 psf for the transformer mat.

A more complete discussion of these points and additional information is included in the following sections.

4.2 Earthwork

Grass, topsoil and rootmat at the ground surface should be stripped to a depth of approximately 6 inches, based upon the boring data. However, stripping depths could vary across the site and a Terracon representative should field verify the stripping depth during construction. Topsoil may be re-used in areas of the site to be landscaped. Topsoil should not be used as structural fill or backfill.

After stripping, the exposed subgrade soils in the transformer pad and control building footprints should be densified in place using a medium weight vibratory roller. The purpose of the vibratory rolling is to improve the exposed subgrade soils for slab support and to potentially improve the foundation bearing soils. The roller should make at least 6 passes across the site, with the second set of 3 passes perpendicular to the first set of 3 passes. If water is brought to the surface by the vibratory rolling, the operation should be discontinued until the water subsides and the rolling should be continued in the static mode.

After the vibratory rolling, pore pressures should be allowed to dissipate for a minimum of four hours. After the waiting period, proofrolling should be performed on the exposed subgrade soils in areas to receive fill or at the subgrade elevation in cut areas with a moderately loaded, tandem-axle dump truck 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 overexcavated as directed by the representative and replaced with properly compacted fill. Areas of localized undercut are likely.

Engineered fill should meet the following material property requirements:

Fill Type [1]	Description	Acceptable Location for Placement
Imported Soil >20% Fines	SC or CL	All locations and elevations

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris. A sample of each material type should be submitted to the geotechnical engineer for evaluation.

4.2.1 Compaction Requirements

We recommend that the fill be placed as recommended in the following table.

ITEM	DESCRIPTION
Fill Lift Thickness	9-inches or less in loose thickness (4" to 6" lifts when hand-operated equipment is used)
Compaction Requirements [1]	Compact to a minimum of 95% of the materials standard Proctor maximum dry density (ASTM D 698)
Moisture Content	Within the range of -2% to +2% of optimum moisture content as determined by the standard Proctor test at the time of placement and compaction

1. Engineered 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.

4.2.2 Construction Considerations

The near-surface lean clay and clayey sand is moderately moisture-sensitive and will lose strength and rut or deflect excessively under construction traffic when it becomes wet. Performing earthwork operations during warmer, drier periods of the year (May through October) will reduce the potential for problems associated with unstable subgrades. The moisture sensitivity of the on-site soils does not preclude performing earthwork at other times of the year, but does lead to an increased potential for having to perform overexcavation and replacement or some other form of remedial work. Protecting the exposed subgrade soils from infiltration of surface water by keeping the site grades sloped to promote runoff in advance of rain events will also reduce the potential for needing to perform remedial work on wet subgrades. Should unstable subgrade conditions develop, stabilization measures should be employed.

The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted.

As a minimum, all temporary excavations should be sloped or braced as required by Occupational Safety and Health Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will most likely be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proofrolling; placement and compaction of controlled compacted fills; and backfilling of excavations.

4.3 Foundation Recommendations

4.3.1 Shallow Foundations – Control House and Transformer Mats

In our opinion, the control house and transformers can be supported by a shallow foundation system in conjunction with overexcavation/replacement of the footing excavations where required. The shallow foundations can consist of either isolated column and wall footings or thickened portions of a monolithic slab. Design recommendations for a shallow foundation system are presented in the following table and paragraphs.

DESCRIPTION	VALUE
Max. Net allowable bearing pressure (shallow spread footings) [1]	1,500 psf
Max. Net allowable bearing pressure (mat foundations) [1, 2]	1,000 psf
Minimum embedment below lowest adjacent finished grade for frost protection and protective embedment [3]	16 inches
Minimum width for continuous wall footings	16 inches
Minimum width for isolated column footings	24 inches
Approximate total settlement [4]	Up to 1 inch
Estimated differential settlement [5]	Up to 1/2 inch along 40 feet of wall
Allowable coefficient of sliding friction [6]	0.35

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation.

2. This bearing pressure is valid for a mat size of up to 15 x 15 feet in plan dimensions and a resulting total estimated settlement of about 1-inch. If greater settlement is acceptable, a higher bearing pressure could be used. Please contact Terracon for additional recommendations for larger mats or higher bearing pressures.
3. For perimeter footings and footings beneath unheated areas.
4. 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 and that good construction practices are followed.
5. Differential settlement between adjacent columns or along approximately 40 feet of continuous wall footing. Differential settlement of mat foundations will be a function of the mat stiffness and the load distribution on the mat.
6. For uplift resistance, use the weight of the foundation concrete plus the weight of the soil over the plan area of the footings. 105 pounds per cubic foot should be used for the density of the soil.

Structural mats that support concentrated point or limited area equipment loads distribute their loads over a subgrade area defined by the mat stiffness and the subgrade modulus, therefore the modulus of subgrade reaction value is dependent upon not only the soil properties, but the distribution of loading on the soil and the size of the loaded area. The magnitude and distribution of mat bearing pressure and mat stresses are typically modeled by the structural engineer using a structural mat design program. Some software programs for the evaluation of mats perform this reduction internally, others do not. Care must be exercised when selecting the appropriate k value for mat analysis. Please note that most modulus of subgrade reaction (k) values cited in geotechnical literature are based upon a 1-foot by 1-foot plate load test and are appropriate for design of pavements or other relatively small “point” loaded areas. For this “point” load condition, a k-value of 100 pci could be used. However, for large loaded areas, such as mat foundations, these values need to be reduced to account for stresses imposed at greater depth in the soil profile. Without further information, the mat load could be preliminarily evaluated by evenly distributing it over the entire mat area using an estimated k-value of 10 pci.

4.3.2 Construction Considerations

The foundation bearing materials should be evaluated at the time of the foundation excavation. This is an essential part of the construction process due to the presence of loose native soils. A representative of the geotechnical engineer should use a combination of hand auger borings and dynamic cone penetrometer (DCP) testing to determine the suitability of the bearing materials for the design bearing pressure. DCP testing should be performed to a depth of 3 to 5 feet below the bottom of footing excavation. Excessively soft, loose or wet bearing soils should be overexcavated to a depth recommended by the geotechnical engineer. The footings could then bear directly on these soils at the lower level or the excavated soils could be replaced with compacted soil fill or washed, crushed stone (NCDOT No. 57). Overexcavation and replacement should be anticipated.

The base of all foundation excavations 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 soils at bearing level become excessively disturbed or saturated, the affected soil should be removed prior to placing concrete.

4.3.3 Drilled Pier Foundations

The proposed individual columns for the substation can be supported on a straight-sided drilled pier foundation system. The contribution of soil within 3 feet of the ground surface should be ignored, due to moisture variations and potential drilling disturbance. Table 1 below shows the column foundation design parameters we have calculated based on the results of our borings.

Depth[1] (feet)	Description	Ultimate Skin Friction (psf)[2]	Ultimate End Bearing Pressure (psf)[3]	Internal Angle of Friction (Degree)	Static Lateral Subgrade Modulus (pci)	Strain ε_{50} (in/in)	Cohesion (psf)
0-8	Clay	275	3500	N/A	30	0.010	500
	Sand	70	3500	28	25	N/A	N/A
8-18	Clay	200	3500	N/A	30	0.010	375
	Sand	360	12,000	32	60	N/A	N/A
18-33	Clay	150	3,500	N/A	30	0.020	250
33-40	Sand	980	15,000	34	125	N/A	N/A

1. Depth below existing grade.
2. For compression. Reduce values by 25 % for uplift.
3. Pier embedment length must be at least 3 times the pier diameter to develop listed end bearing.
4. Based upon a water table near the existing ground surface.
5. The sands at the site are considered cohesionless.

The above values for effective unit weight, cohesion, friction angle, lateral subgrade modulus and strain values have no factors of safety. These values are based upon correlations with the SPT values and published data, and should be considered approximate. The static lateral subgrade modulus, and ε_{50} values are specific to the lateral analysis software LPILE^{plus}. If other geotechnical parameters are required for a specific software package or analysis methods, please contact us. We recommend an effective or buoyant unit weight of 43 pcf to be used for soils below the ground surface.

Piers should be spaced a minimum of 3 diameters center-to-center. Closer spacing may require a reduction in axial load capacity. Axial capacity reduction can be determined by comparing the allowable axial capacity determined from the sum of individual piers in a group versus the capacity calculated using the perimeter and base of the group acting as a unit. The lesser of the two capacities should be used in design.

The estimated maximum settlement of drilled shaft foundations designed and constructed in accordance with our recommendations is on the order of 1 inch or less. Lateral deflections of pier foundations should be evaluated using an appropriate design procedure.

A drilled pier foundation should be designed with a minimum shaft diameter of 36 inches to facilitate clean out of the pier excavation. A greater diameter can be used if required by design.

4.3.4 Construction Considerations

Due to the presence of granular soils and a relatively high water table, the use of casing and slurry drilling should be anticipated for construction of the drilled piers. Slurry drilling and/or casing will be required for stabilization of drilled pier excavation during construction. The bottom of the piers should be free of loose soil or debris prior to reinforcing steel and concrete placement. If the method of construction cannot accomplish this, end bearing should be ignored. Concrete will need to be placed using a tremie to prevent contamination of the concrete. If concrete will be placed as the temporary casing is removed, we recommend the concrete mixture be designed and placed with a slump of about 6 to 8 inches to facilitate drilling slurry displacement, casing removal and to reduce the potential for arching when removing casing. While removing the casing from a pier excavation during concrete placement, the concrete inside the casing should be maintained at a sufficient level to resist any earth and hydrostatic pressures outside the casing during the entire casing removal procedure.

Concrete should be placed immediately after reaching design depth to reduce the amount of soil sedimentation at the base of the pier. Excavations that are not filled with concrete at the time drilling is completed should be reamed or re-drilled to remove sedimentation at the base of the pier.

To avoid a potential reduction in soil resistance caused by variable subsurface conditions, we recommend that drawings instruct the contractor to notify the engineer during drilled pier installation of subsurface conditions that are significantly different than those encountered in our borings. Under these circumstances, it may be necessary to adjust the overall length of the pier. To facilitate these adjustments and assure that the pier is embedded in suitable materials, we recommend that a Terracon representative observe the drilled pier excavation.

4.4 Seismic Considerations

Code Used	Site Classification
2012 North Carolina Building Code	Seismic Site Class D Ss = 0.159 S_1 = 0.065 Fa = 1.6 Fv = 2.4 S_{DS} = 0.170 S_{D1} = 0.104

Based on our experience in the area, it is our opinion that the subsurface characteristics reflect those of Site Class D as described in the 2012 North Carolina State Building Code. Liquefaction is not expected due to the relatively low level of ground motions for a design seismic event.

4.5 Floor Slabs – Control House

4.5.1 Design Recommendations

ITEM	DESCRIPTION
Floor slab support	Densified and evaluated existing soils or new engineered fill
Modulus of subgrade reaction	100 pounds per square inch per inch (psi/in) for point loading conditions
Aggregate base course/capillary break	Minimum of 4 inches of free draining granular material (NCDOT No. 57) – Control House only

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual.

For the Control House, the use of a vapor retarder should be considered beneath concrete slabs on grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings. The slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

4.5.2 Construction Considerations

On most project sites, the site grading is generally accomplished early in the construction phase. However as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, rainfall, etc. If such disturbance occurs, the floor slab subgrade may not be suitable for placement of the capillary break layer and concrete and corrective action will be required.

We recommend the area underlying the structure footprint be rough graded and then thoroughly proofrolled with a moderately loaded tandem axle dump truck prior to final grading and placement of the capillary break layer. Particular attention should be paid to high traffic areas that were rutted and disturbed by construction activities and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the affected material with properly compacted fill. Floor slab subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the aggregate base course and concrete.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

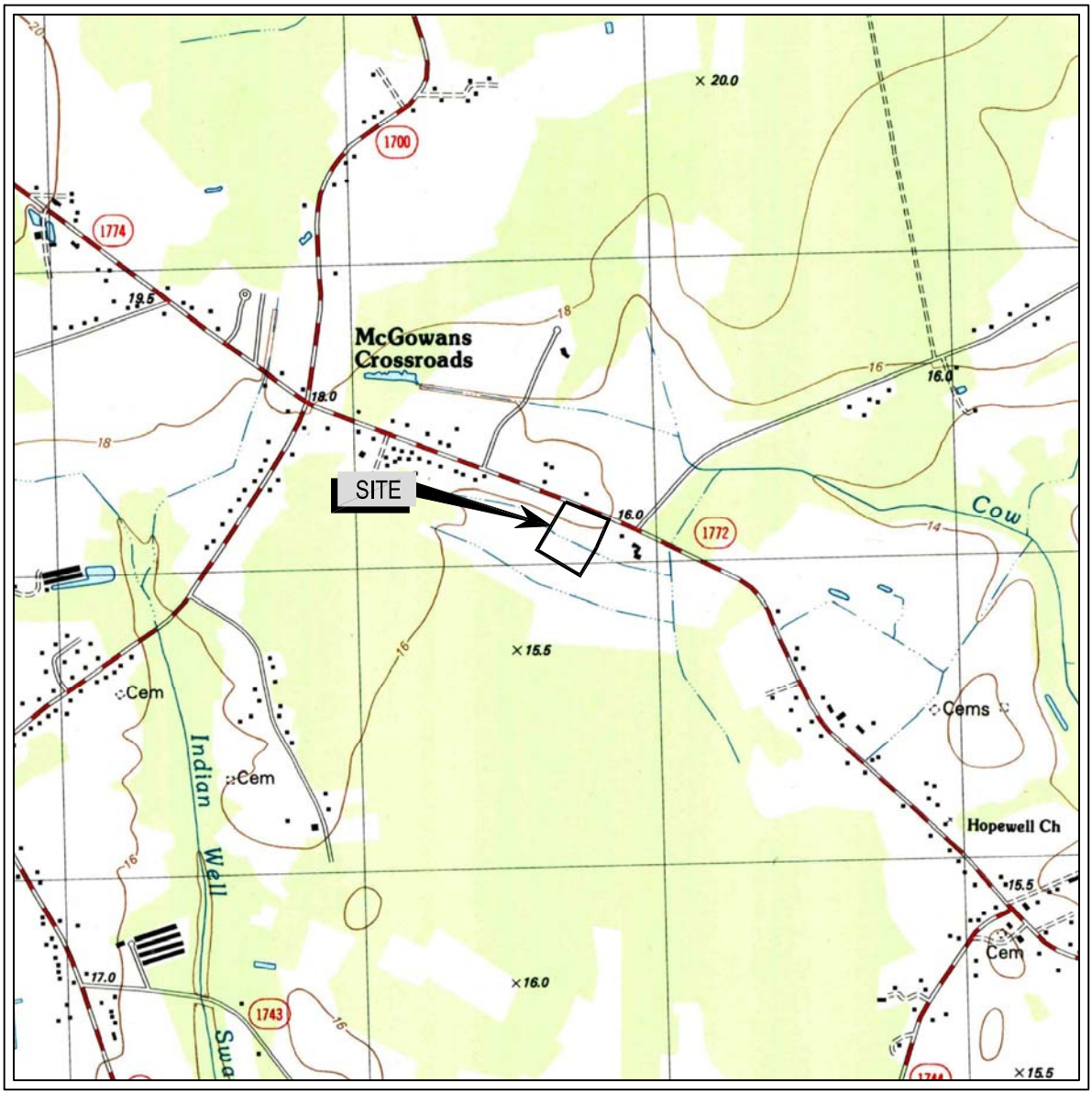
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project 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.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION

UNITED STATES – DEPARTMENT OF THE INTERIOR – GEOLOGICAL SURVEY



SCALE 1:24 000

1 .5 0 KILOMETERS 1 2

1000 0 METERS 1000 2000

1 .5 0 1

MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000

FEET

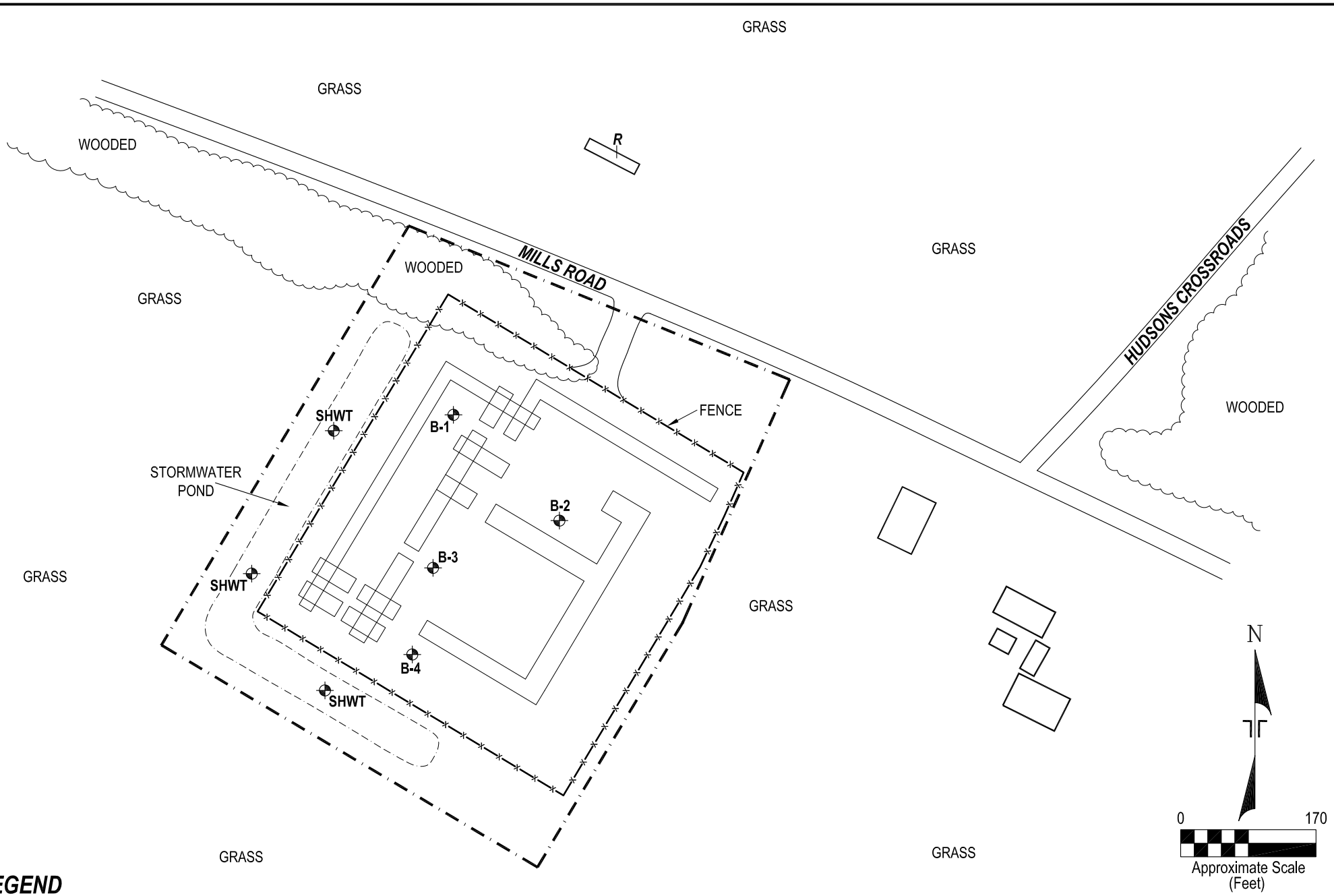
CONTOUR INTERVAL 2 METERS

NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE
GREENVILLE SE, NC
1998
7.5 MINUTE SERIES (TOPOGRAPHIC)

N

Project Mngr: CB	Project No. 72145022	Terracon Consulting Engineers and Scientists 314 Beacon Drive Winterville, NC 28590 (252) 353-1600 (252) 353-0002	SITE LOCATION PLAN GEOTECHNICAL ENGINEERING REPORT GUC SUBSTATION PROJECT MILLS ROAD GREENVILLE, NC	EXHIBIT A-1
Drawn By: RLW	Scale: AS SHOWN			
Checked By: CB/MRF	File No. GEO72145022			
Approved By: CB	Date: JUNE 2014			



LEGEND

- SITE
- APPROXIMATE BORING LOCATION
- R RESIDENCE

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr: CB	Project No. 72145022
Drawn By: RLW	Scale: AS SHOWN
Checked By: CB/MRF	File No. GEO72145022-2
Approved By: CB	Date: JUNE 2014

Terracon
Consulting Engineers and Scientists
314 Beacon Drive Winterville, NC 28590
(252) 353-1600 (252) 353-0002

BORING LOCATION PLAN

GEOTECHNICAL ENGINEERING REPORT
GUC SUBSTATION PROJECT
MILLS ROAD
GREENVILLE, NC

EXHIBIT A-2

Field Exploration Description

The boring locations were marked by representatives of Terracon using a measuring wheel and referencing existing site features using the site plan provided to us. Boring elevation information was not provided. The locations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

The soil test borings were performed by a trailer-mounted power drilling rig utilizing mud rotary drilling procedures to advance the borehole. The drilling tools were removed from the borehole and representative soil samples were obtained at 2.5 to 5 foot intervals using split-barrel sampling procedures. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground with a 140-pound automatic hammer falling a distance of 30 inches. After seating the sampler 6 inches at the bottom of the borehole to penetrate any loose cuttings, the sampler is driven an additional 12 inches. The number of blows required to advance the sampling spoon the last 12 inches is recorded as the standard penetration resistance value (N-value). These N-values are indicated on the boring log at the depths of occurrence.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions.

A field log of each boring was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples. Additional information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions

BORING LOG NO. B-1

PROJECT: Proposed GUC Greenville 230kV South Substation

CLIENT: Ark Consulting Group, PLLC Greenville, NC

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SAMPLES	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	0.3 **Grass/Topsoil/Rootmat**								
	SANDY LEAN CLAY (CL), orange and gray to dark gray, medium stiff			X	3-2-2 N=4	1	25		
	3.0								
	CLAYEY SAND (SC), gray, very loose			X	1-1-2 N=3	2	20		
	6.0	5							
	LEAN CLAY WITH SAND (CL), gray, soft			X	2-2-2 N=4	3	34	26-12-14	71
	8.0		▽						
	POORLY GRADED SAND (SP), gray, medium dense			X	1-5-10 N=15	4	29		
		10							
				X	11-14-15 N=29	5	22		
	18.0	15							
	FAT CLAY (CH), dark gray, very soft			X	1-1-1 N=2	6	64		
	23.0	20							
	LEAN CLAY (CL), dark gray, very soft			X	1-1-1 N=2	7	55		
		25							
	30.0			X	1-1-1 N=2	8	51		
	Boring Terminated at 30 Feet	30							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While Drilling*

Terracon
314 Beacon Drive
Winterville, North Carolina

Boring Started: 5/27/2014 | Boring Completed: 5/28/2014

Drill Rig: 45D-05 | Driller: Carolina Drilling, Inc.

Project No.: 72145022 | Exhibit: A-4

BORING LOG NO. B-2

PROJECT: Proposed GUC Greenville 230kV South Substation

CLIENT: Ark Consulting Group, PLLC Greenville, NC

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SAMPLES	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	0.3 **Grass/Topsoil/Rootmat**								
	SANDY LEAN CLAY (CL), gray and orange, medium stiff			X	3-2-3 N=5	1			
	3.0								
	CLAYEY SAND (SC), gray, loose			X	2-2-4 N=6	2			
	6.0	5							
	POORLY GRADED SAND (SP), light tan, loose			X	4-3-2 N=5	3			
	8.0								
	SILTY SAND (SM), dark gray, loose		▽	X	1-2-3 N=5	4			
	13.0	10							
	FAT CLAY (CH), dark gray, very soft to soft			X	1-1-2 N=3	5	54	69-17-52	98
		15							
				X	1-1-1 N=2	6			
	23.0	20							
	LEAN CLAY (CL), dark gray, very soft			X	1-1-1 N=2	7			
		25							
				X	1-1-1 N=2	8			
		30							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While Drilling*

Terracon
314 Beacon Drive
Winterville, North Carolina

Boring Started: 5/28/2014 | Boring Completed: 5/28/2014

Drill Rig: 45D-05 | Driller: Carolina Drilling, Inc.

Project No.: 72145022 | Exhibit: A-5

BORING LOG NO. B-2

PROJECT: Proposed GUC Greenville 230kV South Substation

CLIENT: Ark Consulting Group, PLLC Greenville, NC

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SAMPLES	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	LEAN CLAY (CL), dark gray, very soft *(continued)*								
	33.0								
	SILTY SAND (SM), with shell fragments, dark gray to gray, loose to dense	35			1-2-2 N=4	9			
					10-16-22 N=38	10			
	40.0	40							
	Boring Terminated at 40 Feet	45							
		50							
		55							
		60							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

While Drilling

Terracon
314 Beacon Drive
Winterville, North Carolina

Boring Started: 5/28/2014 | Boring Completed: 5/28/2014

Drill Rig: 45D-05 | Driller: Carolina Drilling, Inc.

Project No.: 72145022 | Exhibit: A-5

BORING LOG NO. B-3

PROJECT: Proposed GUC Greenville 230kV South Substation

CLIENT: Ark Consulting Group, PLLC Greenville, NC

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

LOCATION See Exhibit A-2

DEPTH	Material Description	FIELD TEST RESULTS	SAMPLES	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	**Grass/Topsoil/Rootmat**					
	SANDY LEAN CLAY (CL), dark brown and light gray, very soft to medium stiff	2-2-2 N=4	1	22		
		1-1-2 N=3	2	33	32-15-17	64
		2-1-1 N=2	3	32		
8.0						
	POORLY GRADED SAND (SP), gray, medium dense	3-5-5 N=10	4	26		
		4-5-3 N=8	5	19		
18.0						
	FAT CLAY (CH), dark gray, very soft	2-1-1 N=2	6	47		
		1-1-2 N=3	7	54		
30.0		1-2-1 N=3	8	60		
	Boring Terminated at 30 Feet					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

While Drilling

Terracon
314 Beacon Drive
Winterville, North Carolina

Boring Started: 5/28/2014 | Boring Completed: 5/28/2014

Drill Rig: 45D-05 | Driller: Carolina Drilling, Inc.

Project No.: 72145022 | Exhibit: A-6

BORING LOG NO. B-4

PROJECT: Proposed GUC Greenville 230kV South Substation

CLIENT: Ark Consulting Group, PLLC Greenville, NC

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

GRAPHIC LOG	LOCATION See Exhibit A-2 / DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SAMPLES	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	0.3 **Grass/Topsoil/Rootmat**								
	SANDY LEAN CLAY (CL), dark brown, soft			X	3-2-2 N=4	1			
	3.0								
	CLAYEY SAND (SC), dark gray brown, loose			X	1-2-4 N=6	2			
	6.0	5							
	POORLY GRADED SAND (SP), gray brown, loose			X	5-3-3 N=6	3			
	8.0		▽						
	CLAYEY SAND (SC), gray, medium dense			X	2-2-8 N=10	4			
	13.0	10							
	POORLY GRADED SAND (SP), gray, loose			X	7-9-6 N=15	5			
	18.0	15							
	LEAN CLAY (CL), dark gray, very soft			X	1-1-1 N=2	6			
	28.0	20							
	FAT CLAY (CH), dark gray, very soft			X	1-1-1 N=2	7			
	30.0	25							
	Boring Terminated at 30 Feet			X	1-1-1 N=2	8			
		30							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
Mud Rotary

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While Drilling*

Terracon
314 Beacon Drive
Winterville, North Carolina

Boring Started: 5/28/2014 | Boring Completed: 5/28/2014

Drill Rig: 45D-05 | Driller: Carolina Drilling, Inc.

Project No.: 72145022 | Exhibit: A-7

APPENDIX B

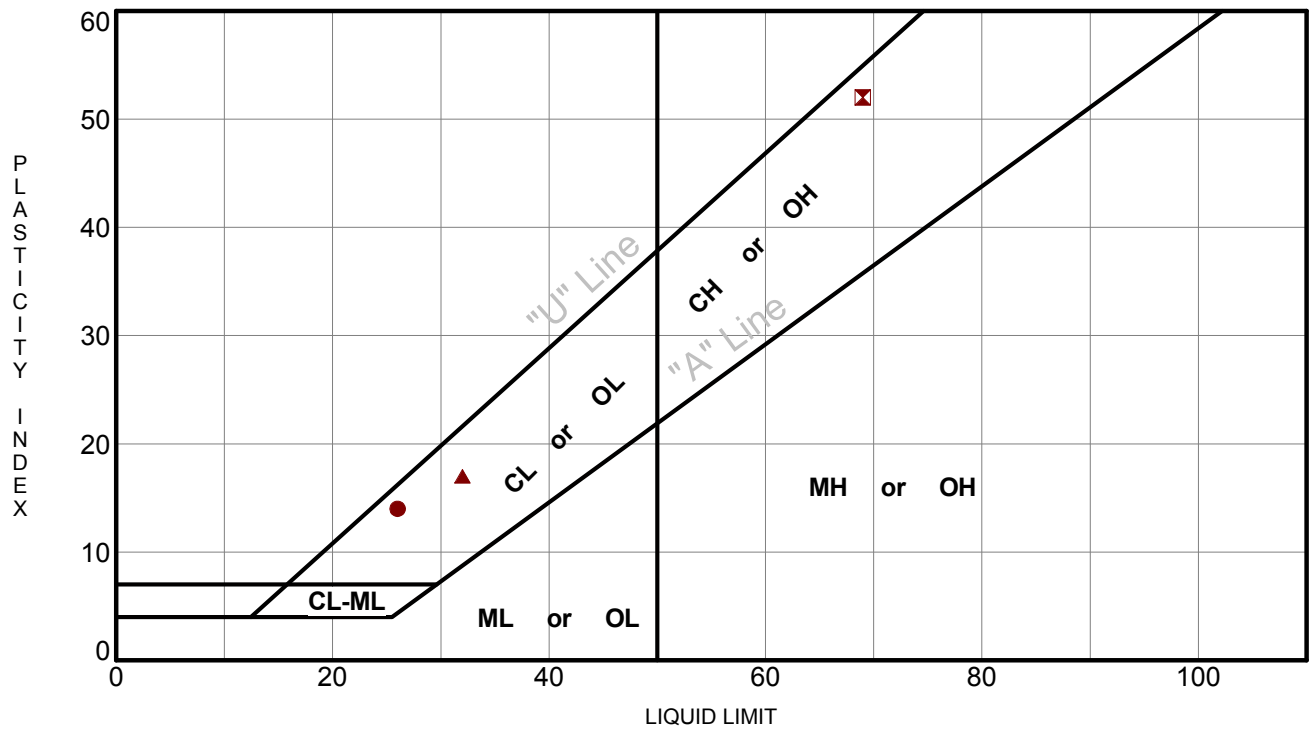
LABORATORY TESTING

Laboratory Testing

Descriptive classifications of the soils indicated on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System. Also shown are estimated Unified Soil Classification Symbols. A brief description of this classification system is attached to this report. Soils laboratory testing was performed under the direction of a geotechnical engineer and included visual classification, moisture content, grain size analysis and Atterberg limits, as appropriate. The results of the laboratory testing are shown on the borings logs and in Appendix B.

ATTERBERG LIMITS RESULTS

ASTM D4318



	Boring ID	Depth (ft)	LL	PL	PI	Fines	USCS	Description
●	B-1	6.0 - 7.5	26	12	14	70.8	CL	GRAY LEAN CLAY WITH SAND
⊠	B-2	13.5 - 15.0	69	17	52	98.0	CH	DARK GRAY FAT CLAY
▲	B-3	3.5 - 5.0	32	15	17	64.1	CL	DARK BROWN & LIGHT GRAY SANDY LEAN CLAY

PROJECT: Proposed GUC Greenville 230kV South Substation

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

Terracon

314 Beacon Drive
Winterville, North Carolina

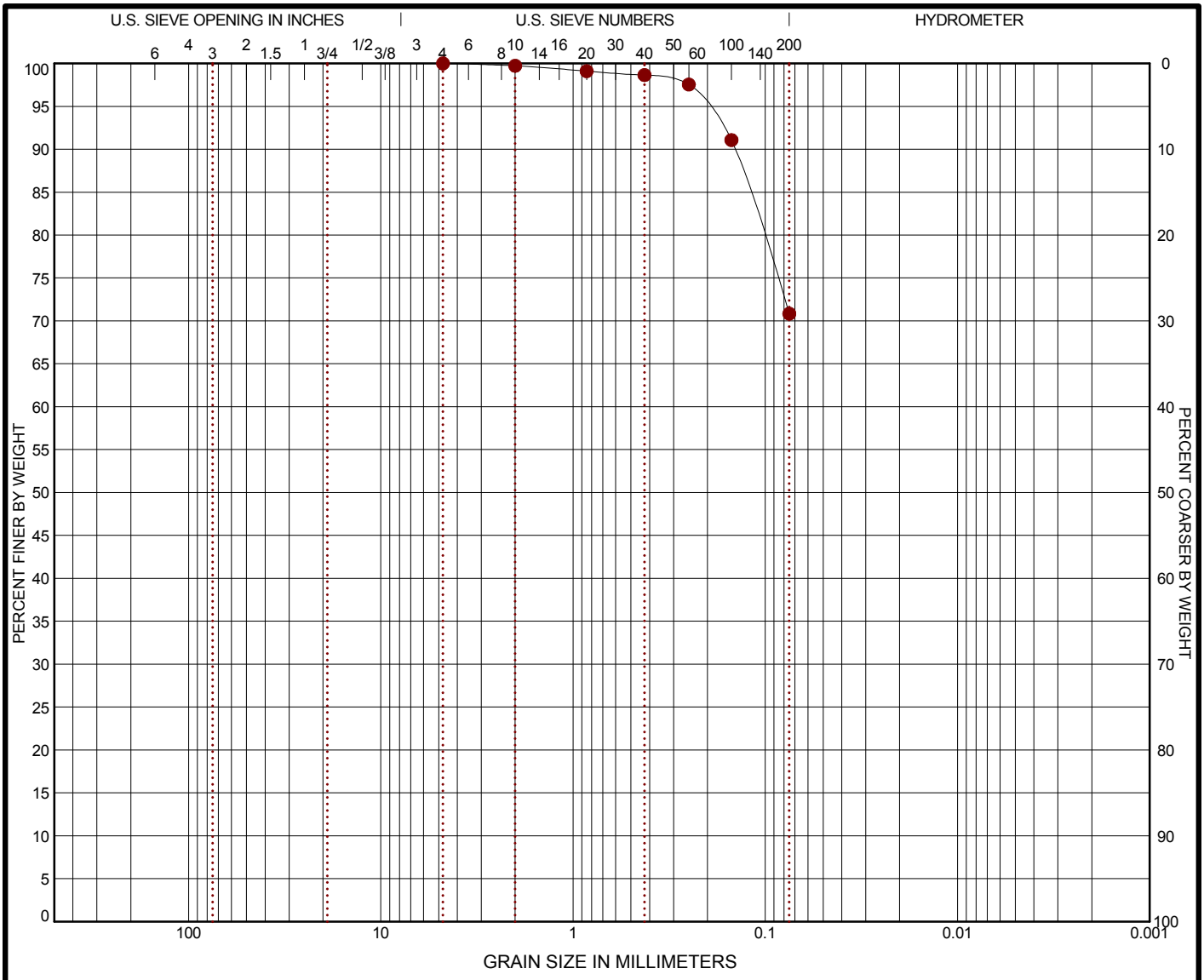
PROJECT NUMBER: 72145022

CLIENT: Ark Consulting Group, PLLC Greenville, NC

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	**B-1**	**6 - 7.5**	**0.0**	**0.0**	**29.2**		**70.8**		**CL**

	GRAIN SIZE
●	
D_{60}	
D_{30}	
D_{10}	
	COEFFICIENTS
C_C	
C_U	

SIEVE (size)	PERCENT FINER
●	
1 1/2"	
1"	
3/4"	
1/2"	
3/8"	
#4	100.0
#10	99.72
#20	99.1
#40	98.64
#60	97.55
#100	91.07
#200	70.84

SOIL DESCRIPTION

● GRAY LEAN CLAY WITH SAND

REMARKS

●

PROJECT: Proposed GUC Greenville 230kV South Substation

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

Terracon

314 Beacon Drive
Winterville, North Carolina

PROJECT NUMBER: 72145022

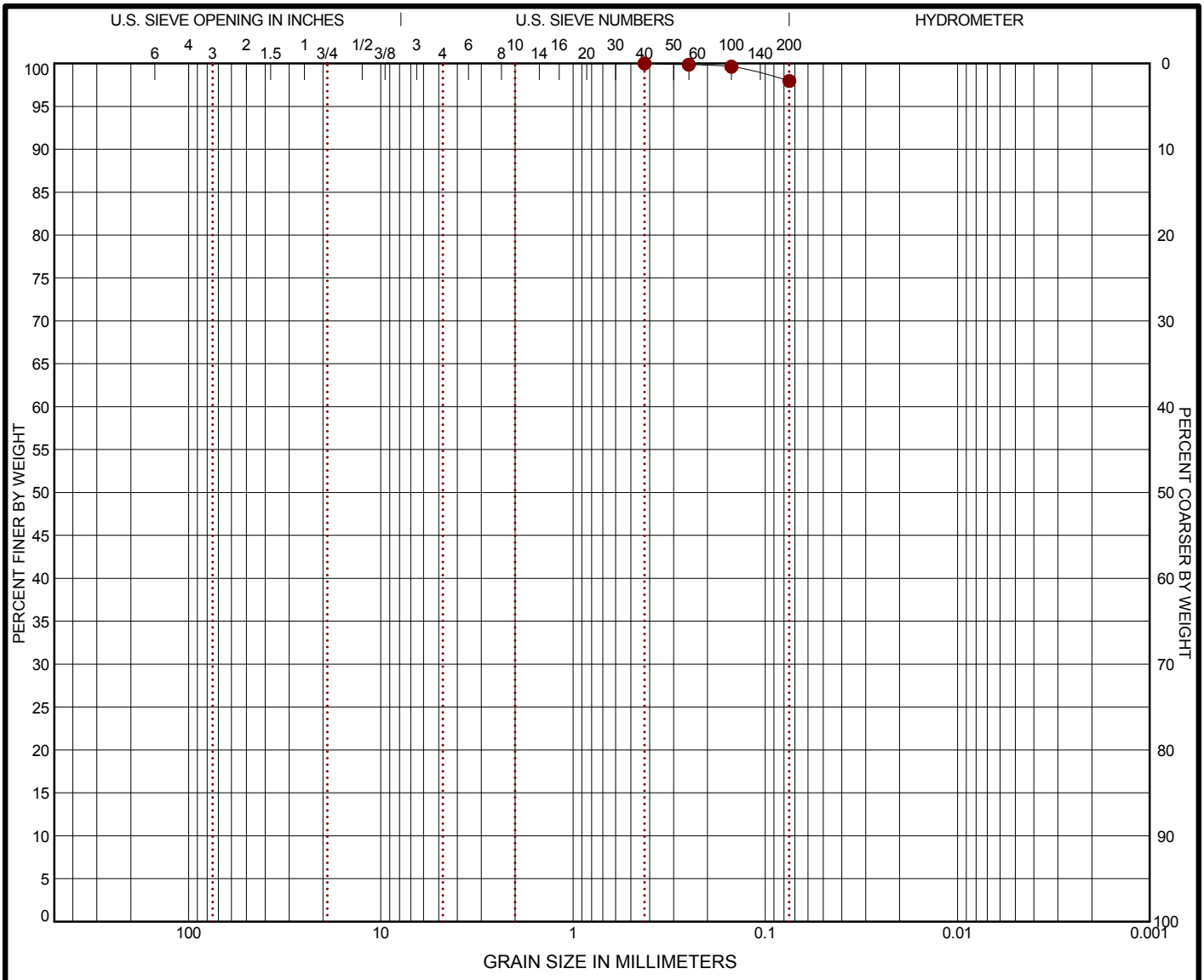
CLIENT: Ark Consulting Group, PLLC Greenville, NC

EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 72145022 PROPOSED GUC GREENVILLE 230KV SOUTH SUBSTATION; GREENVILLE, NC.GPJ TERRACON2012.GDT 6/18/14

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	**B-2**	**13.5 - 15**	**0.0**	**0.0**	**2.0**		**98.0**		**CH**

	GRAIN SIZE
✕	●
D_{60}	
D_{30}	
D_{10}	
✕	COEFFICIENTS
C_C	
C_U	

SIEVE (size)	PERCENT FINER ●		
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4			
#10			
#20			
#40	**100.0**		
#60	**99.85**		
#100	**99.62**		
#200	**97.96**		

SOIL DESCRIPTION
● DARK GRAY FAT CLAY

REMARKS
●

PROJECT: Proposed GUC Greenville 230kV South Substation

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

Terracon
314 Beacon Drive
Winterville, North Carolina

PROJECT NUMBER: 72145022

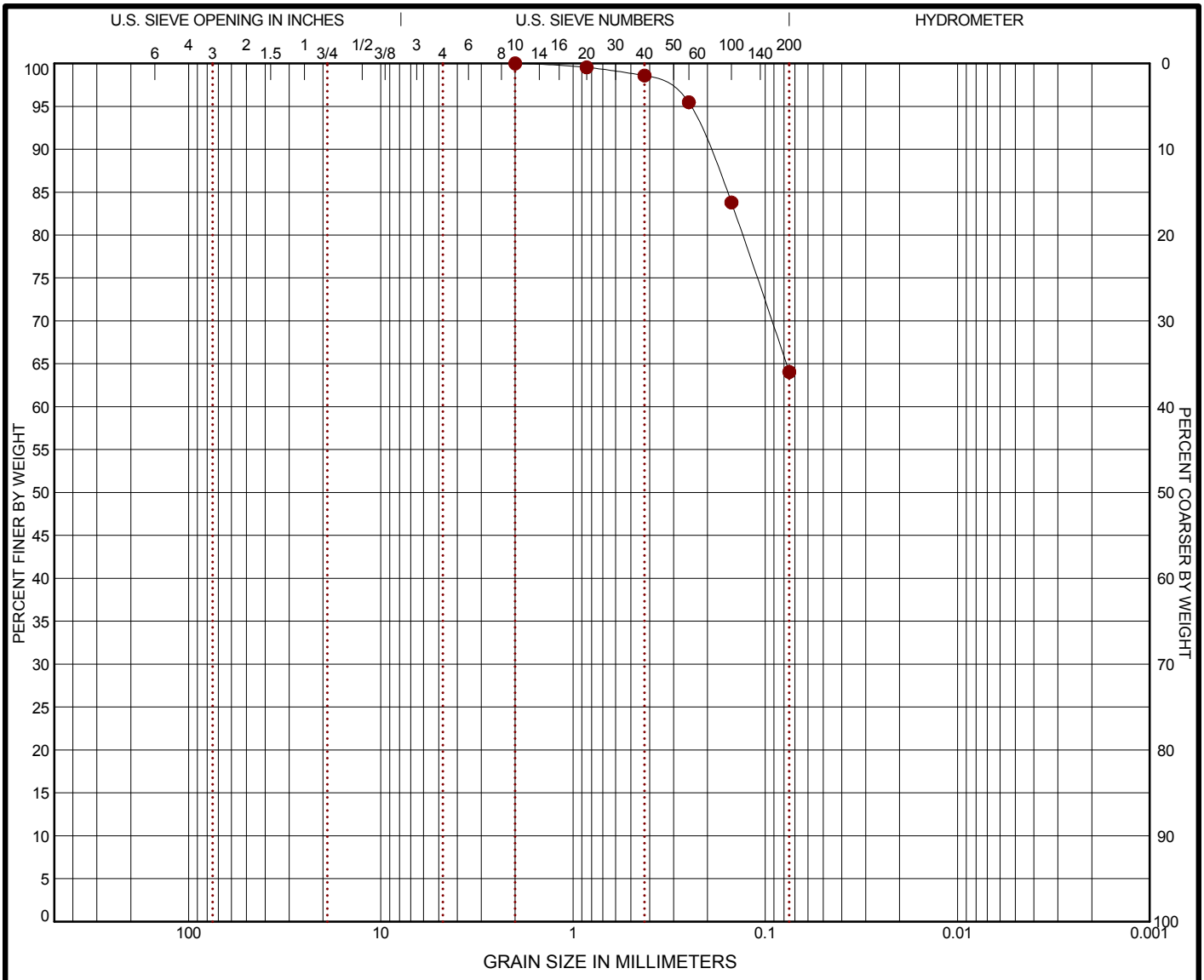
CLIENT: Ark Consulting Group, PLLC Greenville, NC

EXHIBIT: B-4

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 72145022 PROPOSED GUC GREENVILLE 230KV SOUTH SUBSTATION; GREENVILLE, NC.GPJ TERRACON2012.GDT 6/18/14

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
●	**B-3**	**3.5 - 5**	**0.0**	**0.0**	**35.9**		**64.1**		**CL**

	GRAIN SIZE
●	
D_{60}	
D_{30}	
D_{10}	
	COEFFICIENTS
C_C	
C_U	

SIEVE (size)	PERCENT FINER ●
1 1/2"	
1"	
3/4"	
1/2"	
3/8"	
#4	
#10	100.0
#20	99.54
#40	98.58
#60	95.48
#100	83.8
#200	64.05

SOIL DESCRIPTION

● DARK BROWN & LIGHT GRAY SANDY LEAN CLAY

REMARKS

●

PROJECT: Proposed GUC Greenville 230kV South Substation

SITE: Mills Rd and Hudsons Crossroads Rd Greenville, NC

Terracon

314 Beacon Drive
Winterville, North Carolina

PROJECT NUMBER: 72145022

CLIENT: Ark Consulting Group, PLLC Greenville, NC

EXHIBIT: B-5

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 72145022 PROPOSED GUC GREENVILLE 230KV SOUTH SUBSTATION; GREENVILLE, NC.GPJ TERRACON2012.GDT 6/18/14

APPENDIX C
SUPPORTING DOCUMENTS

UNIFIED SOIL CLASSIFICATION SYSTEM

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

[A] Based on the material passing the 3-inch (75-mm) sieve

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

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

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

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

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

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

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

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

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

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

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

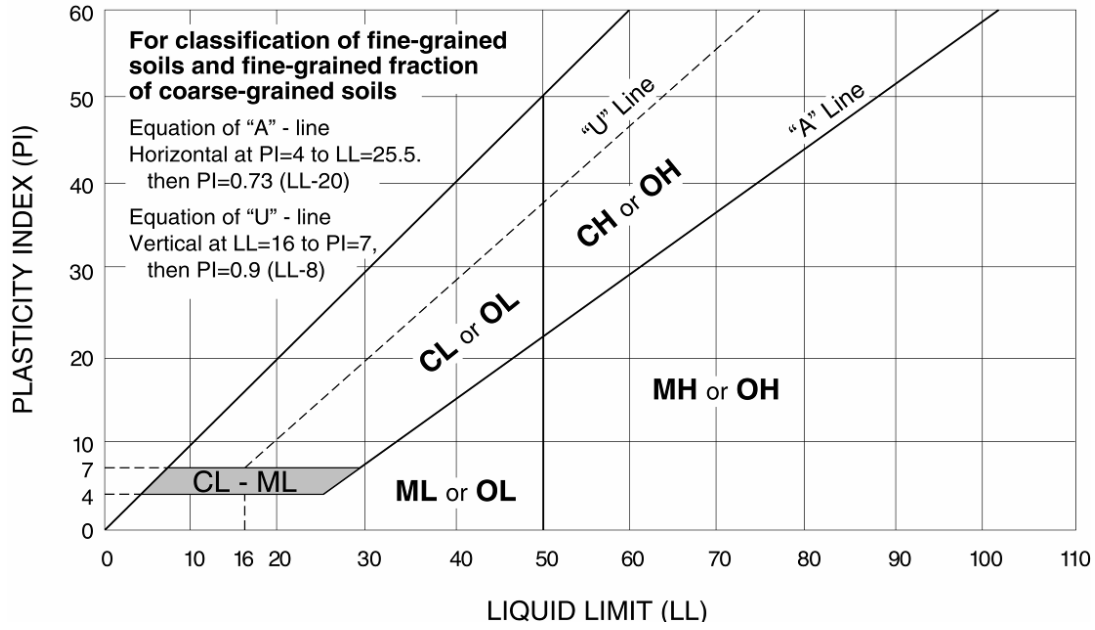
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



UNIFIED SOIL CLASSIFICATION SYSTEM

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

[A] Based on the material passing the 3-inch (75-mm) sieve

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

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

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

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

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

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

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

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

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

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

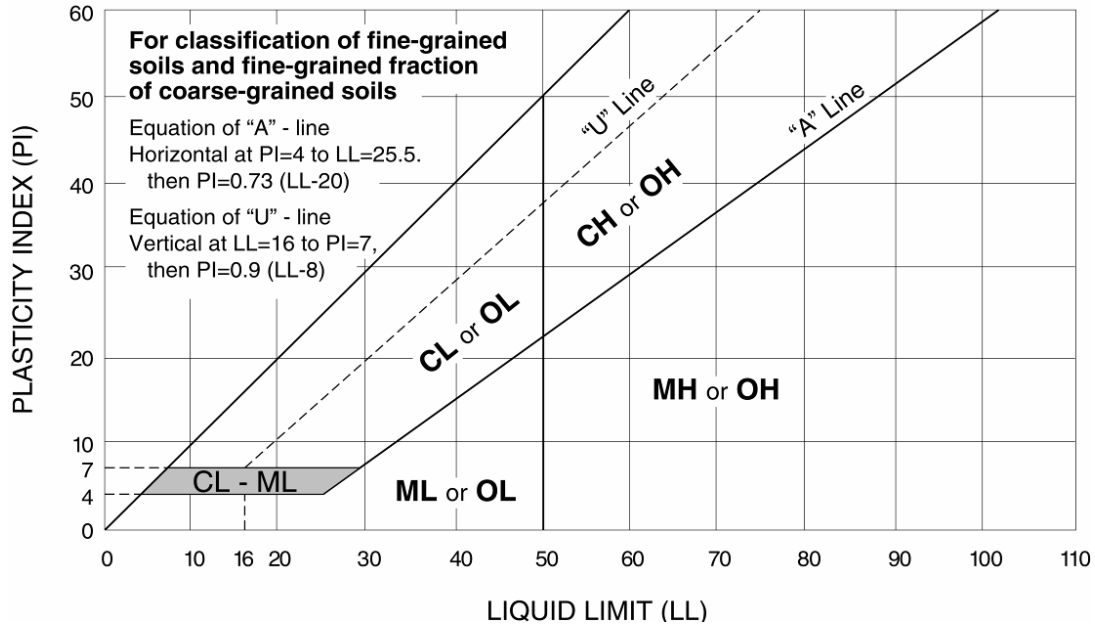
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



FRED D. SMITH SOIL CONSULTING, INC.

May 7, 2014

Mr. Carl Bonner
Terracon Consulting Engineers and Scientists
314 Beacon Dr
Winterville, NC 28590

Subject: Report of a Soil Evaluation for Stormwater Treatment
Greenville Substation
Mills Road
Greenville, NC

Dear Mr. Bonner,

This letter concerns the soil evaluation I performed at the above mentioned site. You authorized me to perform a soil evaluation of the surface soils on the site to determine the depth to the 'seasonal high water table' and perform a permeability test for stormwater design purposes.

You provided me with a site plan showing the locations of geotechnical and stormwater borings at the site. I performed the stormwater borings with a hand auger to describe the soils.

My hand auger boring was advanced to about 50 inches below existing grade to observe and describe physical properties such as texture, color, structure, consistency, depth to seasonal or perched groundwater, parent material, and restrictive horizons. The soils are described into the USDA soil classification system. My soil description is attached in Table 1.

The soils in the study area are formed from Coastal Plain sediments. The soils have black and very dark gray loam or very fine sandy loam topsoil over clay subsoils that have gray and dark gray matrix colors. A few, fine brownish yellow mottles were present and increased with depth. Groundwater was encountered at about 40 inches beneath the surface.

Seasonal High Water Table (SHWT)

The SHWT has become more frequently used as an indicator of the highest level of water table fluctuations due to agricultural considerations, regulations for septic system designs and, more recently, stormwater design. The SHWT is routinely estimated by Soil Scientists from soil morphology (soil forming factors) and landscape position. Soil colors are evaluated because gray colors are associated with saturated and chemically reducing soil environments- the presence or absence of iron. Red, reddish yellow, brown, and brownish yellow colors are associated with aerobic and chemically oxidizing conditions.

During weathering of soil minerals, over a period of time, soluble constituents are removed from the soil profile and more stable compounds will precipitate. Iron is released from minerals and coats soil particles with thin oxide coatings that give soils their red to yellow colors. The natural color of soil particles is gray until they are coated with iron.

Soils also contain microorganisms that generate energy from the oxidation of soil organic matter. When the soil becomes saturated from flooding or slowly percolating water, oxygen is removed from the soil layer and anaerobic conditions prevail. Under anaerobic conditions, other types of soil microbes can derive energy the chemical reduction of oxidized iron and change its state from ferric to ferrous iron (loss

of an electron). The requirements for this chemical-microbiological process are the absence of oxygen for several weeks, a temperature of at least 41 degrees (F), and the presence of organic matter (roots, etc).

During periods of alternative wetting and drying cycles, or SHWT cycles, ferrous iron may move short distances and precipitate during the drying (reoxidation) process. These mottling patterns are called redoximorphic colors.

Soil Scientists use the Munsell Color System to evaluate the degree of color changes visible in the soil. Low chroma colors are considered to be gray or black in the Munsell System (chroma less than 2). We normally consider that once a soil layer has about 5% gray colors and redoximorphic patterns (red-yellow colored mottles), then that soil is saturated at least 21 days and qualifies as a SHWT.

Some SHWT's are actually 'perched'. A perched water table forms above an impermeable layer of soil or rock or saprolite that separates it from the actual groundwater table below. This happens in some piedmont soils and some upper coastal plain soils in NC. Perched water tables are identified by a layer of soil that does not contain redoximorphic conditions between the main water table and the layer in question.

Conclusions

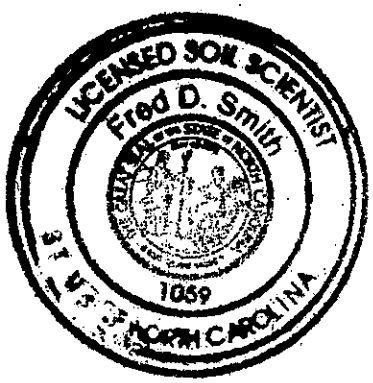
The gray colors show a seasonal high water table at the location is at the surface.

The soil permeability was not measured at the site because of the SHWT at the surface and because of the expansive clay with massive structure. The expansive clays and structureless soil would likely have a permeability of less than 0.01 inches per hour, in my opinion.

I appreciate the opportunity to work with you on this project. Please contact me if you have questions or need additional information.

Cordially,

Fred D. Smith



Office/Mobile (252) 908-4369
Post Office Box 1175 – Nashville, North Carolina 27856

Table 1
Soil Descriptions
Mills Road Substation
Greenville, NC

SW 1, 2 and 3*

Horizon/Depth (inches)	Texture	Color and description
A / 0 - 10	Loamy sand	Very dark gray (10R 3/1) and black (10YR 2/1) weak crumb structure; friable.
B1t / 10-16	Silty clay loam	Gray (10YR 5/1 and 3/1) with few, fine brownish yellow mottles (10YR 6/6); coarse, weak subangular blocky; firm, sticky, plastic.
B2t / 16-40	Silty clay	Gray (10YR 5/1 and 3/1) with few, fine brownish yellow mottles (10YR 6/6); coarse, weak subangular blocky that becomes massive below 28 inches; very firm, very sticky, very plastic.
BC / 40-50+	Sandy Clay	Gray (10YR 5/1 and 3/1) with common, medium brownish yellow mottles (10YR 6/6); massive; very firm, very sticky, very plastic. Water in boring.

* All three borings were very similar except for minor differences in thickness of A and B horizons.

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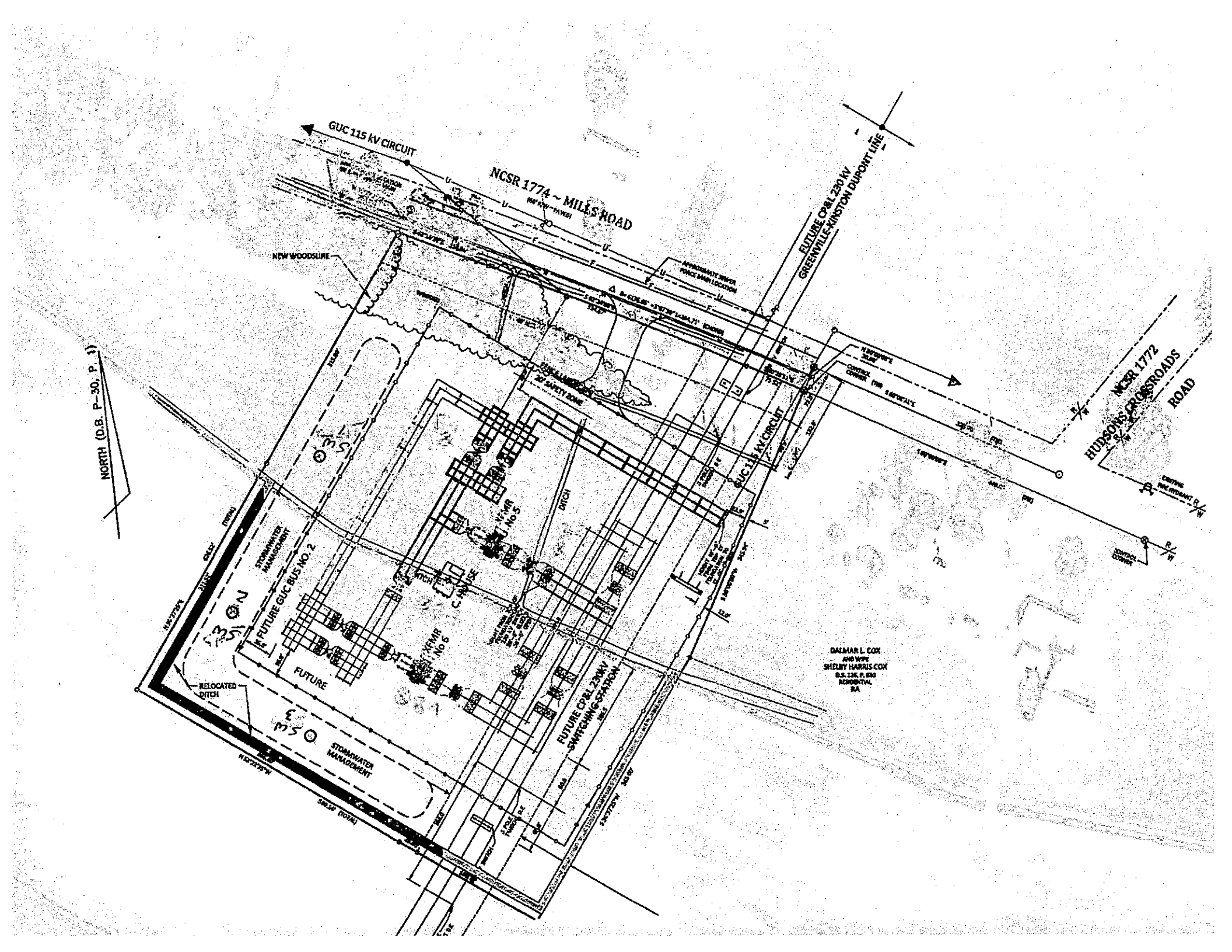
Post Office Box 1175 – Nashville, North Carolina 27856


GUC 115 kV CIRCUIT
NCSR 1774 ~ MILLS ROAD
FUTURE CP&L 230 kV GREENVILLE-KINSTON DUPONT LINE
NEW WOODSLINE
APPROXIMATE SEWER FORCE MAIN LOCATION
NORTH (D.B. P-30, P. 1)
NCSR 1772 HUDSONS CROSSROADS ROAD
EXISTING PAVEMENT
STORMWATER MANAGEMENT
FUTURE GUC BUS NO. 2
XFMR No 5
XFMR No 6
DITCH
115 kV CIRCUIT
FUTURE
RELOCATED DITCH
STORMWATER MANAGEMENT
FUTURE CP&L 230kV SWITCHING STATION
DALMAR L. COX
AND WIFE
SHELBY HARRIS COX
D.B. 126, P. 650
RESIDENTIAL
RA

D

Forms

CHANGE ORDER
NO._____

OWNER: _____
CONTRACTOR: _____
PROJECT NAME: _____
PROJECT NO.: _____
DATE: _____

Description of Work Performed:

Reason for Change:

Changes Authorized By:

Owner:	Date:
Contractor:	Date:
Booth & Associates, Inc.:	Date:

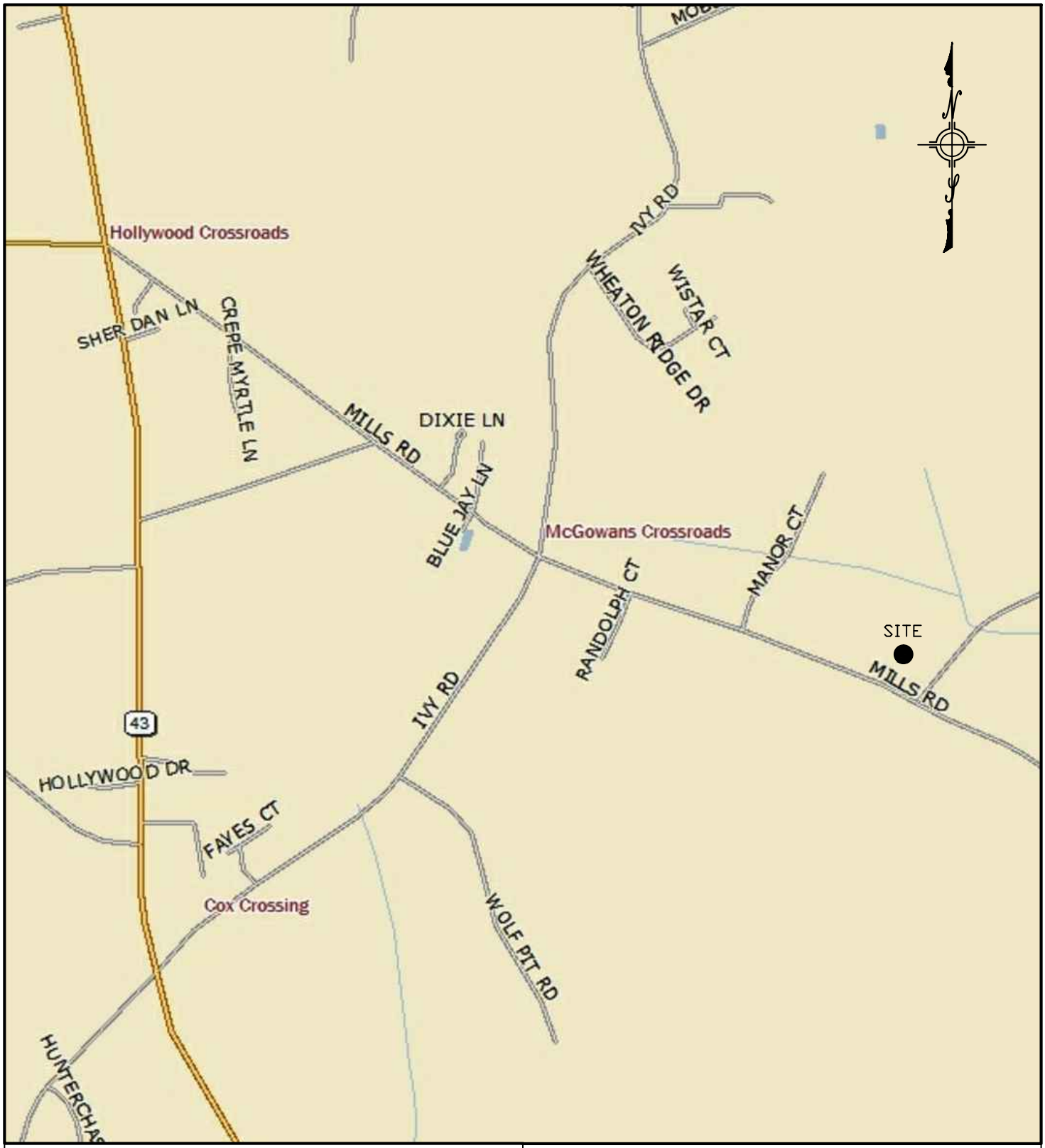
Itemized Cost for Above Order:

UNIT COSTS				
Description	**Quantity**	**Unit**	**Unit Cost**	**Extended Cost**
				$0.00
				$0.00
TOTAL UNIT COSTS:				**$0.00**
LABOR COSTS				
Classification	**Name**	**Base Rate**	**Total Hours worked Straight/Overtime**	**Extended Cost**
				$0.00
				$0.00
TOTAL LABOR COSTS:				**$0.00**
MATERIAL COSTS				
Description				**Material Cost**
TOTAL MATERIAL COSTS				**$0.00**
EQUIPMENT COSTS				
Unit No.	**Description**	**Base Rate**	**Total Hours**	**Extended Cost**
				$0.00
				$0.00
TOTAL EQUIPMENT COSTS:				**$0.00**
TOTAL COST:				**$0.00**

Booth & Associates CONSULTING ENGINEERS

E

Vicinity Map



SITE ADDRESS:
2670 MILLS ROAD, GREENVILLE, NC

GREENVILLE UTILITIES
GREENVILLE, NORTH CAROLINA

POD No. 3 230 TO 115kV
VICINITY MAP

Booth & Associates, LLC
5811 Glenwood Avenue | Raleigh, NC 27612 CONSULTING ENGINEERS NC F-0221

DWN. AAI	DATE: 12/22/15		DWG. NO.
CKD. BDE	APPD. RSY		
SCALE: 1" = 1000'	FILE: 14020VM		VM-1
JOB NO. 147796	DATE	REVISION	
© 12/15			