GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

SPECIFICATIONS AND BID DOCUMENTS FOR THE GREENVILLE 230 kV SOUTH SUBSTATION SITE WORK

ISSUED FOR BIDS

Ark Consulting Group, PLLC
Civil Engineers & Planners
3280 Charles Boulevard, Suite B
Greenville, North Carolina 27858
Firm License No. P-1199

May 2016

GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

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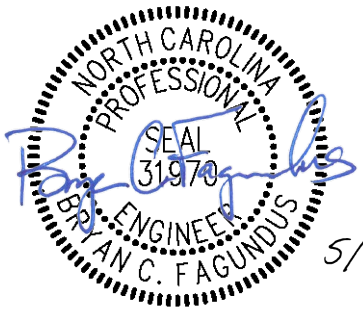


5/3/16

NOTICE TO PROSPECTIVE BIDDERS

Sealed Proposals for the furnishing and delivery of all materials and equipment (except materials and equipment specified to be furnished by the Owner) complete and conforming to the bid documents for the Greenville 230 kV South Substation, as set forth in the Bid Schedules, will be received by Greenville Utilities Commission of Greenville, North Carolina (hereinafter referred to as the Owner) at the offices of the Buyer II, Greenville Utilities commission, 401 S. Greene Street, Greenville, North Carolina 27834, on or before **2:00 PM, local time, Wednesday, May 25, 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. Bids submitted in a fax or e-mail in response to this Invitation for Bids will not be acceptable.

Instructions for submitting bids and complete specifications will be available in the Office of the Buyer II, Greenville Utilities Commission, 401 S. Greene Street, Greenville, North Carolina during regular office hours, which are 8:30 AM – 5:00 PM Monday through Friday. Greenville Utilities Commission reserves the right to reject any or all bids.

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

Bids must be in sealed envelopes clearly marked on the outside with the name of the bid and the bid opening date and time. Bid shall be addressed to BUYER II, GREENVILLE UTILITIES COMMISSION, 401 S. GREENE STREET, GREENVILLE, NORTH CAROLINA 27834.

Bids will be opened promptly and read at the hour and on the date set forth in the advertisement in the Office of the Buyer II, Greenville Utilities Main Office, 401 S. Greene Street, Greenville, North Carolina 27834. Bidders or their authorized agents are invited to be present.

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. Questions shall be received by Owner by 10:00 am on Wednesday, May 18, 2016 and shall be addressed to Mr. Cleve Haddock, GUC Procurement Coordinator, via email at haddocgc@guc.com.

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 GREENVILLE 230 kV SOUTH SUBSTATION
SITE WORK
NOT TO BE OPENED UNTIL
2:00 PM, Wednesday, May 25, 2016"

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

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, delivery 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
GREENVILLE, NORTH CAROLINA

By: Anthony Cannon Date: May 3, 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 Cannon
Consulting Engineer	Ark Consulting Group, PLLC
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
Purchase Order	The agreement covering the furnishing of equipment and/or apparatus and the performance of the work. The Purchase Order shall include the "Instructions to Bidders", "General Conditions", "Form of Proposal", "Plans", "Technical Specifications", and Acknowledgments
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
Substantial Completion	The time in calendar days to complete all site work required for the placement and verified compaction of CABC to finished grade elevations. Specifically included is all earthwork, water service installation, permanent stabilization of all disturbed areas and removal of erosion control measures.

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 Bidder Qualification

1.1 Bids will be accepted only from Bidders deemed by the Owner or the Engineer to be qualified to provide the materials, equipment, and services described by these Specifications. The experience of Bidders in providing the same or similar materials, equipment, and services will be a major factor in determining qualification. The Bidder shall include information to establish qualifications.

1.2 Prospective Bidders who wish to submit a bid, but are not presently qualified, may receive consideration by submitting a completed Bidder's Qualification Form, which requires product line and user list, to the Engineer at least ten (10) days prior to the specified bid opening date and time. The Bidder's Qualification Form may be obtained from the Engineer.

2.0 Proposals

2.1 To warrant consideration, Proposals must comply with these instructions. Strict adherence to these specifications and drawings is requested to facilitate review and consideration of the proposal.

2.2 Bids not received on Ark Consulting Group, PLLC *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.

2.3 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.

2.4 The Bidder shall furnish certain information, as required by the Bid Documents regarding the equipment on which he is bidding. Two (2) copies of the information, together with the manufacturer's literature setting forth the guarantees and describing the equipment on which he is bidding shall be included as part of the Proposal. If one manufacturer is bidding through two or more agents or representatives, descriptive literature, guarantees, etc., may be submitted in duplicate in one sealed envelope, which will be considered and treated as though it contained a sealed bid. This envelope shall contain a list of the names of Bidders to whom the information applies. Each sealed Bid Proposal without this information shall state the name of the manufacturer who is furnishing the information. Additional sets of the Specifications may be obtained upon a payment of Fifty Dollars ($50) non-refundable deposit by approved Bidders.

2.5 Bids may be modified by the Bidder's removal of his original and the submittal of a completely revised bid package in full compliance with the Bid Documents if received prior to the time of opening bids and if included in the public reading of such bids. No oral or telephonic Proposals will be considered.

2.6 Proposals shall include a Form of Exceptions utilizing forms provided which shall itemize each and every exception from the Bid Documents. 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 Proposal*. 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.

2.7 Should the Bidder find discrepancies in the documents or fail to understand their meaning, he shall immediately notify the Engineer, who will send written instructions to all Bidders. Neither the Owner nor the Engineer will be responsible for any oral instructions.

2.8 The Bidder shall be the manufacturer of the equipment, or the Bidder shall submit with the *Form of Proposal* a notarized statement that the Bidder is authorized by the manufacturer to tender the Proposal as submitted and that the manufacturer will guarantee the suitability and adequacy of the equipment proposed, and will be bound by the Specifications, as though the manufacturer had submitted the Proposal.

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

2.10 No Bid Proposal may be withdrawn after the scheduled closing time for the receipt of bids for a period of sixty (60) days pending the purchase order by the successful Bidder. Should the successful Bidder default and not accept a purchase order, then the purchase order may be offered to the next lowest responsible, responsive Bidder whose Proposal is evaluated as acceptable

2.11 Prior to 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.

2.12 The Purchase Order, when accepted, 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 an officer, agent, or employee of the Owner or by any other person.

2.13 Firm quotations should be based upon placement of an order within sixty (60) days from bid date.

2.14 The Owner reserves the right to accept any schedule, combination of schedules, or any portion of a schedule.

3.0 Bid Security

3.1 Each Proposal shall be accompanied by a cash deposit, cashier's check, or certified check drawn on a bank or trust company insured by the Federal Deposit Insurance Corporation or Savings Association Insurance Fund, or a Bid Bond in an amount not less than five percent (5%) of the Proposal. The Owner will retain said deposit as liquidated damages in the event of failure of the Successful Bidder to execute the Purchase Order 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 accept a purchase order in accordance with the Bid Bond, and that upon failure to forthwith make payment, the Surety shall pay to the Obligee an amount equal to double the amount of said Bond.

3.3 Only one (1) Bid Bond is required, the amount of which shall be based on the total amount of the bid. The value for the Bid Bond shall be based on the Bid Schedule of maximum total amount.

4.0 Performance Bond/Payment Bond

A Performance Bond/Payment Bond in the amount of 100% of the construction contract is required for this project.

5.0 Bulletins and Addenda

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

6.0 Purchase Order

6.1 The issue of a purchase order will be made to the lowest responsible, responsive Bidder as soon as practical, provided that in the selection of materials and equipment a purchase order may be awarded to a responsible Bidder other than the lowest in the interest of standardization, or ultimate economy if the advantage of such standardization or ultimate economy is clearly evident. The Owner reserves the right to reject any and all bids.

6.2 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. The Bidder must correct any such irregularities or errors so waived on the Proposal prior to its acceptance.

6.3 In estimating the lowest cost to the Owner as one of the factors in deciding the Award of the purchase order, the Owner will consider, in addition to the prices quoted in the Proposal, the following:

a. Equipment delivery (days),
b. Adherence to the Plans and *Technical Specifications*,
c. Evaluation of equipment suitability to the system as noted and submitted by the Bidder,
d. The Bidder's intended method of shipment of the materials and equipment, and
e. Firm prices.

7.0 Payment

7.1 Unless otherwise agreed between the Owner and Contractor, the Contractor shall submit his requests for payment not later than the twenty-fifth day of each month. Requests shall be based on work performed during the period ending with the date of the request.

7.2 There shall be a ten-percent (10%) retainage on all progress payment requests until substantial completion. Upon substantial completion, the Owner will continue to hold full amount of retainage until the Contractor achieves final completion.

7.3 Each request for payment shall be accompanied by:

7.3.1 Written consent of the Contractor's Surety.

7.3.2 Such consent shall state that Surety agrees to payment of the sum requested, that the value of the work stated in the Contractor's request is a true statement, and that the sums requested for stored materials (if any) are correct.

7.3.3 Provide Certified Sales Tax Report.

7.3.4 Lien waivers.

7.4 Pay requests shall be submitted in triplicate to the Engineer for review and approval. The address for submittal of all invoices is: Ark Consulting Group, PLLC, 3280 Charles Boulevard, Suite B, Greenville, North Carolina 27858; Attention: Bryan C. Fagundus, PE.

7.5 At the completion of the Project prior to receiving final payment, the Contractor shall furnish the Owner, through the Engineer, properly signed and notarized waivers of lien from all subcontractors employed and material suppliers furnishing materials for the Project. Such waivers shall be submitted before final payment will be processed to the Owner by the Engineer.

7.5.1 Administrative actions and submittals that shall proceed or coincide with this application include:

a) Notarized final waiver of lien.
b) Occupancy permits and similar approvals.
c) Warranties (guarantees) and maintenance agreements.
d) Final cleaning.
e) Consent of Surety.

f) Completion of Project closeout requirements.
g) Completion of items specified for completion after Substantial Completion.
h) Assurance that unsettled claims will be settled prior to payment.
i) Assurance that Work not complete and accepted will be completed without delay.
j) Transmittal of required Project construction records to Owner.
k) Proof that taxes, fees and similar obligations have been paid.
l) Removal of temporary facilities and services.
m) Removal of surplus materials, rubbish and similar elements.

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 things necessary to do a complete job, which may include manufactured items and field service assistance. In case of discrepancy or disagreement in the Purchase Order, the order of precedence shall be: Purchase Order, Specifications, Drawings.

2.0 Clarifications and Detail 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 Bidding Documents, and shall become a part thereof.

3.0 Copies of Drawings and Specifications

The Engineer will furnish free of charge to the Bidder one (1) copy of the Drawings and Specifications. Additional sets of these Specifications may be obtained upon request and a non-refundable deposit of Fifty Dollars ($50.00) by approved Bidders.

4.0 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 these Bid Documents without permission is prohibited. All copies of Drawings and Specifications other than final copies shall be returned to the Engineer upon request after completion of the work.

5.0 Royalties, Licenses, and Patents

It is the intention of the Bidding Documents that the work covered herein will not constitute in any way an infringement on patents. The Bidder shall protect and save harmless the Owner against suit on account of alleged or actual infringement. The Bidder 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.

6.0 Uncorrected Faulty Work

The Bidder 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 Bidder for the same by a deduction in the Purchase Order prices arrived at by a fair estimate of the probable cost of correction, approved by the Engineer.

7.0 Liquidated Damages

The Bidder shall commence work upon issuance of a Purchase Order from the Owner, and shall achieve Substantial Completion as per the Delivery Schedule in the *Form of Proposal*. For each day in excess of the proposed dates, the Bidder shall make payable to the Owner the sum of five hundred dollars ($500.00) as liquidated damages (and not as a penalty), reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Bidder to complete delivery within the time specified, such time being in the essence of this Purchase Order and material consideration thereof.

8.0 Delays and Extension of Time

8.1 The time to be allowed for final completion is stated in the *Form of Proposal*. The Bidder, upon notice of award of the Purchase Order, shall prepare a schedule based on the allowed time and submit such schedule to the Engineer for approval.

8.2 If Bidder is delayed at any time in the progress of the work by any act of negligence by the Owner or the Engineer, by any separate Bidder 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.

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

9.0 Assignments

The Bidder shall not assign any portion of this Purchase Order nor subcontract in its entirety except as fully explained in the *Form of Proposal* and accepted by the Owner. No funds or sums of money due or to become due to the Bidder under this Purchase Order may be assigned.

10.0 Guarantee

The Bidder shall guarantee his materials and workmanship against defect due to faulty materials, faulty workmanship, or negligence for a period of one (1) full year from the date of final completion. He shall make good such defective materials or workmanship and any damages resulting therefrom without cost to the Owner.

11.0 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 Purchase Order. The compensation for such changes shall be agreed upon in writing between the Bidder and the Owner prior to commencement of work involving the change. No payment shall be made to the Bidder for correcting work not in compliance with Specifications.

12.0 Insurance

During the term of the Contract, the Bidder at its sole cost and expense shall provide commercial insurance of such type and with such terms and limits as may be reasonably associated with the Contract. As a minimum, the Bidder shall provide and maintain the following coverage and limits:

12.1 Worker's Compensation - The Bidder shall provide and maintain Worker's Compensation Insurance, as required by the laws of North Carolina, as well as employer's liability coverage with minimum limits of $1,000,000.00, covering all of Bidder's employees who are engaged in any work under the Contract. If any work is sublet, the Bidder shall require the subcontractor to provide the same coverage for any of his employees engaged in any work under the Contract.

12.2 Commercial General Liability - General Liability Coverage on a Comprehensive Broad Form on an occurrence basis in the minimum amount of $1,000,000.00 Combined Single Limit. (Defense cost shall be in excess of the limit of the liability.)

12.3 Automobile - Automobile Liability Insurance, to include liability coverage, covering all owned, hired, and non-owned vehicles, used in connection with the Contract. The minimum combined single limit shall be $150,000.00 uninsured/under insured motorist; and $1,000.00 medical payment.

- 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.

12.4 Motor Vehicle Liability Insurance shall be for not less than 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.

12.5 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.

12.6 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 GUC Buyer II.

BUYER II**:**
Greenville Utilities Commission.
401 South Greene Street
Greenville, North Carolina 27835

12.7 Each certificate must not terminate before the contract completion date.

Requirements - Providing and maintaining adequate insurance coverage is a material obligation of the Bidder and is of the essence of this Contract. All such insurance shall meet all laws of the State of North Carolina. Such insurance coverage shall be obtained from companies that are authorized to provide such coverage and that are authorized by the Commissioner of Insurance to do business in North Carolina. The Bidder shall at all times comply with terms of such insurance policies, and all requirements of the insurer under any such insurance policies, except as they may conflict with existing North Carolina laws or this Contract. The limits of coverage under each insurance policy maintained by the Bidder shall not be interpreted as limiting the Bidder's liability and obligations under the Contract.

13.0 Advertising

Bidder agrees not to use the existence of this Contract or the name of the Owner as part of any commercial advertisement.

14.0 Access to Persons and Records

An independent auditor shall have access to persons and records as a result of all Contracts or grants entered into by the Owner in accordance with General Statue 147-64.7 insofar as they relate to transactions with the Owner.

15.0 Equal Employment Opportunity, Minority Business Participation Program

During the performance of this work, the Bidder agrees as follows:

15.1 The Bidder 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 Bidder will take affirmative action to insure 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 Bidder agrees to post in conspicuous places available to employees and applicants for employment notices setting forth the provisions of the nondiscrimination clause.

15.2 The Bidder, in all solicitations or advertisements for employees placed by or on behalf of the Bidder, will 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.

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

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

15.5 The Bidder will include the provisions of this section in every Subcontract or Purchase Order unless exempted by rules, regulations, or orders of the Owner, so that such provisions will be binding upon each Subcontractor.

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

16.0 Indemnification

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.

18.0 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.

19.0 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

20.0 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.

21.0 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.

22.0 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.

23.0 Confidential Information

Except as provided by statute and rule of law, GUC will keep trade secrets which the Bidder does not wish disclosed confidential. 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.

24.0 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.

25.0 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.

26.0 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.

27.0 Administrative Code

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

28.0 Execution

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

29.0 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.**

30.0 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.

31.0 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

32.0 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.

33.0 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.

34.0 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.

35.0 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.

36.0 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.

37.0 Notices

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

Mr. Cleve Haddock
Purchasing, Buyer II
Greenville Utilities Commission
P.O. Box 1847
Greenville, NC 27835-1847

GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

GREENVILLE 230 kV SOUTH SUBSTATION
SITE WORK

FORM OF PROPOSAL

(*Provide* ***one*** *original and* ***one*** *copy****)***

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 Purchasing, Buyer II Office: 252-551-1533 Cell: 252-551-3302	 NAME TITLE STREET ADDRESS CITY/STATE/ZIP PHONE: FAX: E-MAIL: SIGNATURE

TERMS AND CONDITIONS

1. The undersigned (hereinafter called the "Bidder") hereby proposes to sell and deliver to the Owner upon the terms and conditions herein stated, the materials, labor, and equipment (hereinafter called the "Work") specified in the Bid Schedule(s) attached hereto, and by this reference made a part hereof, for the Work for the Owner, and:

    a. These bid documents that include *Notice to Prospective Bidders*, *Instructions to Bidders*, *General Conditions*, and *Technical Specifications* for the site work.

    b. Legal negotiations, with low bidder only, after bids are opened, for budgetary compliance.

2. The prices as quoted herein:

    a. Are lump sum unless otherwise stated.

3. The Bidder further declares that he has examined the site of the work and informed himself fully regarding all conditions pertaining to performing the work; that he has examined the *Technical Specifications* for the work and Bid Documents relative thereto; has read all special provisions furnished prior to the opening of the bids; and that he has satisfied himself relative to the work to be performed.

4. The Bidder proposes and agrees if the following Bid Schedule(s) in this Proposal is accepted, to contract with the Owner, in the form of a purchase order specified, to furnish all necessary labor, materials and equipment, except materials and equipment specified to be furnished by the Owner, complete in accordance with the Bid 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 as filed on Change Order Forms.

5. The work will conform to the *Technical Specifications* attached hereto and made a part hereof.

6. The Owner reserves the right to accept any schedule, combination of schedules, or any portion of a schedule.

7. A *Form of Exceptions* to the *Technical Specifications*, prepared in accordance with the *Instructions to Bidders*, is attached hereto. The Bidder shall document any exceptions with deviation from the bid documents and specifications in the *Form of Proposal*. Otherwise, the complete compliance is assumed.

8. The Bidder 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 Purchase Order in the event that this Proposal is accepted.

9. By the submission of this bid, the Bidder certifies that:

    a. The bid has been arrived at by the Bidder independently and has been submitted without collusion with any other Bidder of materials, supplies, or equipment of the type described in the *Notice to Prospective Bidders* or the *Technical* Specifications, and

    b. The contents of the bid have not been communicated by the Bidder, nor, to its best knowledge and belief, by any of its employees or agents, to any person not an employee or agent of the Bidder or its Surety on any Bond furnished herewith, and will not be communicated to any person prior to the official opening of the bid.

10. The Bidder further agrees that in case of failure on his part to accept said purchase order within ten (10) consecutive calendar days after written notice has been given of the award of the Purchase Order, the Bid Security accompanying this bid, and the monies payable thereon, shall be paid into the funds of the Owner account set aside for this project, as liquidated damages for such failure; otherwise the check or cash accompanying the *Form of Proposal* shall be returned to the Bidder.

If, in submitting this Proposal, the Bidder has made any change in the *Form of Proposal*, the Bidder understands that the Owner may evaluate the effect of such change as they see fit or they may exclude the Proposal from consideration in determining the issue of Purchase Order.

BID SCHEDULES

BID SCHEDULE NO. 1 – Base Bid

LUMP SUM BASE BID PRICE - Includes 3,500 CY of Undercut Excavation w/ Off-site Disposal and Select Borrow Excavation.

1. Site Construction	$_____
2. Soils and Materials Testing Allowance	$ 2,500.00
TOTAL BASE BID	$_____

UNIT PRICES:

1. Undercut Excavation w/ Off-site Disposal and Select Borrow Excavation	$_____ / CY

BID SCHEDULE NO. 1 – Delivery Schedule

The Contractor shall achieve Substantial Completion of the entire Work not later than the number of Calendar Days as indicated from the date of commencement as fixed in a Notice to Proceed issued by the Owner. _____ Calendar Days

The time to achieve Substantial Completion shall be extended for the period of any reasonable delay due exclusively to causes beyond the control and without fault of the Bidder, including acts of God, fire, flood, epidemic, abnormal weather conditions, acts or failures to act of utility owners not under the control of Owner.

Upon completion by GUC of Electrical work, and upon notice to proceed with placement of #57 stone, the Contractor shall have 60 Calendar Days to place #57 stone on the site.

AFFIDAVIT OF BIDDER

The final payment of retained amount due the Bidder on account of the Purchase Order shall not become due until the Bidder has furnished to the Owner through the Engineer an affidavit signed, sworn, and notarized to the effect that all payments for Material, services, or any other reason in connection with this Purchase Order have been satisfied and that no claims or liens exist against the Bidder in connection with this Purchase Order. In the event that the Bidder cannot obtain similar affidavits from Subcontractors to protect the Bidder and the Owner from possible liens or claims against the Subcontractor, the Bidder shall state in his affidavit that no claims or liens exist against any Subcontractor, and if any liens or claims appear afterward, the Bidder shall save the Owner harmless on account thereof.

Bidder: _____

By: _____

Date: _____

FORM OF EXCEPTIONS

Instructions to Bidders, Paragraph 2.6 and Section 7. Purchase Order

BIDDER: _____

OWNER: GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

PROJECT DESCRIPTION: GREENVILLE 230 kV SOUTH SUBSTATION
SITE WORK

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**

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 of Greenville, North Carolina, 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

GREENVILLE 230 kV SOUTH SUBSTATION
SITE WORK

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)

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

GREENVILLE UTILITIES COMMISSION

By: _____
Anthony C. Cannon

Title: General Manager/CEO
(Authorized Signatory)

Date: _____

Attest: _____

Name (Print): Amy Carson Quinn

Title: Executive Secretary

Date: _____

(OFFICIAL SEAL)

COMPANY NAME:

By: _____

Name (Print): _____

Title: _____
(Authorized Signatory)

Date: _____

Attest: _____

Name (Print): _____

Title: Secretary

Date: _____

(OFFICAL SEAL)

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

By: _____
Jeff W. McCauley

Title: Chief Financial Officer

Date: _____

APPROVED AS TO FORM AND LEGAL CONTENT:

By: _____
Phillip R. Dixon

Title: General Counsel

Date: _____

INSERT

ADDENDA / CLARIFICATIONS / BULLETINS

Instructions to Bidders, 5. Bulletins and Addenda

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 _____

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_____

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

SECTION 01010 - PROJECT REQUIREMENTS

RELATED DOCUMENTS:

The general provisions of the Contract, including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

GENERAL DESCRIPTION OF WORK:

The Work to be performed under these Contract Documents consists of

Site Work for the Greenville 230 kV South Substation for Greenville Utilities Commission.

OTHER CONSTRUCTION CONTRACTS:

Work at the site performed by others under separate contracts includes the following:

Electrical Substation Construction

RESPONSIBILITY FOR MATERIALS AND EQUIPMENT:

Items Furnished by CONTRACTOR: CONTRACTOR shall be fully responsible for all materials and equipment which he has furnished, and shall furnish necessary replacements at any time prior to expiration of the Guaranty Period.

OFF SITE STORAGE:

Off-site storage arrangements shall be acceptable to OWNER for all materials and equipment not incorporated into the work but included in Applications for Payment. Such off-site storage arrangements shall be presented in writing, and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible to ENGINEER.

EQUIVALENT MATERIALS AND EQUIPMENT:

Whenever a material or article is specified or described by using the name of a propriety product or the name of a particular manufacturer or vendor without the words "or equal" or "or approved equal" etc., the specified item mentioned shall be provided. Other manufacturers' products will not be accepted.

It is the intent of these specifications to insure that materials and equipment of the highest reliability are supplied. The design of the overall product and selection of materials and equipment included in these specifications have been based upon dimensions, structures, connection wiring, etc. required for the first manufacturer listed in every reference to a quality standard. If material or equipment of another manufacturer (including alternatives specifically referenced) is offered, the cost of any changes in structures, building, piping, wiring, etc., as well as any detailed drawings necessary to show such required changes, shall be borne by the CONTRACTOR with no additional cost to the Owner.

PREPARATION FOR SHIPMENT:

All materials shall be suitably packaged to facilitate handling and protection against damage during transit and storage. Painted surfaces shall be protected against impact, abrasion, discoloration and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of ENGINEER.

Each item, package or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

LAND FOR CONSTRUCTION PURPOSES:

CONTRACTOR will be permitted to use available land belonging to OWNER, on or near the site of the Work, for construction purposes and for the storage of materials and equipment. The location and extent of the areas so used shall be as indicated on the drawings or will be as follows:

CONTRACTOR shall immediately move stored material or equipment if any occasion arises, as determined by OWNER, requiring access to the storage area. Materials or equipment shall not be placed on the property of OWNER until OWNER has agreed to the location to be used for storage.

EASEMENTS AND RIGHTS-OF-WAY:

The easements and rights-of-way for the pipelines will be provided by OWNER. CONTRACTOR shall confine his construction operations within the limits indicated on the drawings, and shall use due care in placing construction tools, equipment, excavated materials and pipeline materials and supplies, so as to cause the least possible damage to property and interference with traffic.

On Private Property: Easements across private property are indicated on the drawings. CONTRACTOR shall set stakes to mark the boundaries of construction easement across private property. The stakes shall be protected and maintained until completion of construction and cleanup.

CONTRACTOR shall not enter for pipe delivery or occupy for any other purpose with men, tools, equipment, construction materials or with materials excavated from the pipe trench, any private property outside the designated construction easement boundaries without written permission from the owner and tenant of the property.

Whenever the easement is occupied by crops which will be damaged by construction operations, CONTRACTOR shall notify the owner and tenant sufficiently in advance so that the crops may be removed before excavation or trenching is started. CONTRACTOR shall be responsible for all damage to crops outside of the easement, and shall make satisfactory settlement for the damage directly with the property owner and tenant involved.

Where the line crosses fields which are leveled for irrigation or terraced, CONTRACTOR shall relevel irrigated fields and replace all terraces to their original or better condition, and to the satisfaction of the property owner and tenant involved.

Work Within Highway and Railroad Rights-of-Way: Permits shall be obtained by OWNER. All Work performed and all operations of CONTRACTOR, his employees or subcontractors, within the limits of railroad and highway rights-of-way, shall be in conformity with the requirements and be under the control (through OWNER) of the railroad or highway authority owning, or having jurisdiction over and control of, the right-of-way in each case.

OPERATION OF EXISTING FACILITIES:

The existing water, sanitary sewer and storm drainage utilities must be kept in continuous operation throughout the construction period. No interruption will be permitted which adversely affects the degree of service provided. Provided permission is obtained from OWNER in advance, portions of the existing facilities may be taken out of service for short periods corresponding with periods of minimum service demands.

CONTRACTOR shall provide temporary facilities and make temporary modifications as necessary to keep the existing facilities in operation during the construction period.

NOTICES TO OWNERS AND AUTHORITIES:

CONTRACTOR shall, as provided in General Conditions, notify owners of adjacent property and utilities when prosecution of the Work may affect them.

When it is necessary to temporarily deny access by owners or tenants to their property, or when any utility service connection must be interrupted, CONTRACTOR shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instructions on how to limit their inconvenience.

Utilities and other concerned agencies shall be contacted at least 72 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

CONTRACTOR shall contact N.C. ONE-CALL 72 hours prior to any excavation. Locations of existing utilities by N.C. ONE-CALL are good for only ten (l0) days after the date of location.

LINES AND GRADES:

All Work shall be done to the lines, grades, and elevations shown on the drawings.

Basic horizontal and vertical control points have been or will be established or designated by ENGINEER on the Drawings. These points shall be used as datum for the Work. All additional field survey, layout and measurement Work shall be performed by CONTRACTOR as a part of the Work.

CONTRACTOR shall provide an experienced surveyor, instrument man, competent assistants and such instruments, tools, stakes and other materials required to complete the survey, layout and measurement Work. In addition, CONTRACTOR shall furnish, without charge, competent surveyors from his force and such tools, stakes and other materials as ENGINEER may require in establishing or designating control points, in establishing construction easement boundaries or in checking survey, layout and measurement Work performed by CONTRACTOR.

CONTRACTOR shall keep ENGINEER informed, a reasonable time in advance, of the times and places at which he wishes to do Work, so that any checking deemed necessary by ENGINEER may be done with minimum inconvenience to ENGINEER and minimum delay to CONTRACTOR.

CONTRACTOR shall remove and reconstruct Work which is improperly located.

Construction staking shall be performed by a Registered Land Surveyor at least twenty-four hours in advance of construction.

ALLOWANCES:

The Contract Price includes cash allowances for certain materials, equipment and portions of the Work as follows:

Allowances are shown in the Proposal.

OWNER, in consultation with ENGINEER, shall select from supplies, samples, information or alternatives submitted by CONTRACTOR. Testing agency shall be selected by and work for the OWNER, but be paid by the CONTRACTOR out of the above allowance.

CONTRACTOR shall cause the Work to be done by materialmen, suppliers or Subcontractors and for amounts satisfactory to ENGINEER. The Contract Price will be adjusted by Change Order for any difference between CONTRACTOR's direct cost for the selected alternative and the cash allowance included in such price adjustments. The cost shall be the actual invoice cost including tax and shipping of items covered by the allowance. The CONTRACTOR shall include any costs for labor overhead and profit in other portions of his bid.

CONNECTIONS TO EXISTING FACILITIES:

Unless otherwise specified or indicated, CONTRACTOR shall make all necessary connections to existing facilities including structures, drain lines and utilities such as water, sewer, gas, telephone and electric. In each case, CONTRACTOR shall receive permission from OWNER or the owning utility prior to undertaking connections. CONTRACTOR shall protect facilities against deleterious substances and damage.

Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

UNFAVORABLE CONSTRUCTION CONDITIONS:

During unfavorable weather, wet ground or other unsuitable construction conditions, the CONTRACTOR shall confine his operations to work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by CONTRACTOR to perform the Work in a proper and satisfactory manner.

CUTTING AND PATCHING:

As provided in General Conditions, CONTRACTOR shall perform all cutting and patching required for the Work, and as may be necessary in connection with uncovering Work for inspection or for the correction of defective Work.

CONTRACTOR shall perform all cutting and patching required for the installation of improperly timed Work, to remove samples of installed materials for testing and to provide for alteration of existing facilities or the installation of new Work in existing construction.

Except when the cutting or removal of existing construction is specified or indicated, CONTRACTOR shall not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without ENGINEER's concurrence.

CONTRACTOR shall provide all shoring, bracing, supports and protective devices necessary to safeguard all Work and existing facilities during cutting and patching operations.

Materials shall be cut and removed to the extent indicated on the drawings or as required to complete the Work. Materials shall be removed in a careful manner with no damage to adjacent facilities or materials. Materials which are not salvable shall be removed from the site by CONTRACTOR.

All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to ENGINEER, to obtain a finished installation with the strength, appearance and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

CLEANING UP:

CONTRACTOR shall keep the premises free at all times from accumulations of waste materials and rubbish. CONTRACTOR shall provide adequate trash receptacles about the site, and shall promptly empty the containers when filled.

Construction materials stored on the site shall be kept off the ground, neatly stacked, protected from rain and sun when required by the ENGINEER, and the area around the stored materials shall be kept free of trash, weeds and brush.

Construction materials, such as concrete forms and scaffolding shall be neatly stacked by CONTRACTOR when not in use. CONTRACTOR shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids and cleaning solutions from surfaces to prevent marring or other damage.

Volatile wastes shall be properly stored in covered metal containers and removed daily.

Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams or waterways. All wastes shall be removed from the site and disposed of in a manner complying with local ordinances and antipollution laws.

Adequate cleanup shall be a condition for recommendation of progress payment applications.

APPLICABLE CODES:

References in the Contract Documents to local codes mean the North Carolina State Building Code and any applicable County or municipal codes.

Other standard codes which apply to the Work are designated in the specifications.

REFERENCE STANDARDS:

Reference to the standards of any technical society, organization or association, or to codes of local or state authorities, shall mean the latest standard, code, specification or tentative standard adopted and published at the date of receipt of bids, unless specifically stated otherwise.

ABBREVIATIONS AND SYMBOLS:

Abbreviations used in the Contract Documents are defined as follows:

AAMA Architectural Aluminum Manufacturers Association
AASHTO American Association of State Highway and Transportation Officials
ACI American Concrete Institute
AFBMA Antifriction Bearing Manufacturers Association
AGA American Gas Association
AGMA American Gear Manufacturers Association
AISC American Institute of Steel Construction
AISI American Iron and Steel Institute
AMCA Air Moving and Conditioning Association
ANSI American National Standards Institute
APA American Plywood Association
API American Petroleum Institute
ASCE American Society of Civil Engineers
ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME American Society of Mechanical Engineer
ASSE American Society of Sanitary Engineering
ASTM American Society for Testing and Materials
AWG American Wire Gauge
AWPA American Wood Products Association
AWS American Welding Society

AWWA	American Water Works Association
CGA	Compressed Gas Association, Inc.
CISPI	Cast Iron Soil Pipe Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard
DENR	Department of Environment and Natural Resources
DHI	Door and Hardware Institute
Fed Spec	Federal Specifications
FGMA	Flat Glass Marketing Association
IBBM	Iron Body, Bronze Mounted
IEEE	Institute Electrical and Electronics Engineers
IFI	Industrial Fasteners Institute
IPS	Iron Pipe Size
MIL	Military Specification
NAAMM	National Association of Architectural Metals Manufacturers
NCDOT	North Carolina Department of Transportation
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPT	National Pipe Thread
NSPC	National Standard Plumbing Code
OSHA	Occupational Safety and Health Administration
PCI	Prestressed Concrete Institute
PS	Product Standard
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPI	Society of the Plastics Industry
SSPC	Steel Structures Painting Council
UL	Underwriters' Laboratories
US	U. S. Bureau of Standards
USBR	U. S. Bureau of Reclamation

PRECONSTRUCTION CONFERENCE:

Prior to the commencement of Work at the site, a preconstruction conference will be held at a mutually agreed time and place. The conference shall be attended by:

CONTRACTOR and his superintendent

Principal Subcontractors

Representatives of principal suppliers and manufacturers as appropriate

ENGINEER and his Resident Project Representative

Representatives of OWNER

Governmental representatives as appropriate

Others as requested by CONTRACTOR, OWNER, or ENGINEER

Unless previously submitted to ENGINEER, CONTRACTOR shall bring to the conference a tentative schedule for each of the following:

Progress

Procurement

Values for progress payment purposes

Shop Drawings and other submittals

The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:

CONTRACTOR's tentative construction schedules

Transmittal, review, and distribution of CONTRACTOR's submittals

Processing applications for payment

Maintaining record documents

Critical Work sequencing

Processing of Field Orders, Work Change Directives, and Change Orders

Use of premises, office and storage areas, security, housekeeping, working hours, and OWNER's needs

Major equipment deliveries and priorities

CONTRACTOR'S assignments for safety and first aid

ENGINEER will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

PROGRESS MEETINGS:

CONTRACTORS shall attend regular progress meetings at least monthly and at other times as requested by ENGINEER or required by progress of the Work.

CONTRACTOR, ENGINEER, OWNER, and all subcontractors active on the site shall be represented at each meeting. CONTRACTORS may at their discretion request attendance by representatives of their suppliers, manufacturers and other subcontractors. Representatives at the progress meeting must be authorized to make decisions and to act on behalf of the organization they represent.

ENGINEER shall preside at the meetings and provide for keeping and distribution of the minutes. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling and resolve other problems which may develop.

The CONTRACTOR shall generate documentation to list and/or illustrate work/tasks begun or completed since the previous progress meeting, and work/tasks expected to begin or be completed in the next 30 days following the current progress meeting. Preliminary or draft versions of this documentation should be circulated among critical subcontractors, the ENGINEER, and the OWNER, at least two (2) days prior to the scheduled progress meeting, such that schedule conflicts and other scheduling issues can be discussed during the progress meeting. CONTRACTOR shall provide sufficient copies of the documentation for distribution at the progress meeting.

OTHER MEETINGS AND CONFERENCES:

The OWNER and ENGINEER reserve the right to conduct other site meetings and conferences as necessary to monitor and facilitate the quality of the work and operation of the existing facility. Specific meetings and conferences have been outlined in individual specification sections. Other meetings and/or conferences may include, but not be limited to, pre-installation and pre-startup. These meetings and/or conferences shall be attended by the CONTRACTOR, the ENGINEER, the OWNER, critical subcontractors, regulatory officials (if necessary), and representatives of manufacturers and suppliers as deemed necessary.
END OF SECTION 01010

SECTION 01150 - PAYMENT

RELATED DOCUMENTS:

The general provisions of the Contract, including the General, Special Conditions and Division-1 Specification sections apply to work of this section.

SCOPE:

This section covers methods of payment for items of Work under this Contract.

GENERAL:

The total Bid Price for each part of the Project shall cover all Work required by the Contract Documents. All costs in connection with the proper and successful completion of the Work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction plant, equipment, and tools; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices bid. All Work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of Contractor and all costs in connection therewith shall be included in the prices bid.

ESTIMATED QUANTITIES:

Payment will be made or lump sum prices adjusted according to unit prices bid and as described below.

Base Bid: This item shall include labor, equipment and materials necessary to accomplish all work specified and shown on the plans (Including but not limited to clearing & grubbing, demolition, mucking out existing ditches, excavation of new ditches, earthwork, storm drainage, stone placement, general grading and incidentals). Payment shall be lump sum based upon the price shown in the Proposal.

Soil and Materials Testing Allowance: This item shall include an allowance as indicated in the Bid Form as herein established. Payment shall be for the actual amount invoiced by the Testing Company.

Subsidiary Obligations: All work not specifically set forth as a pay item in the Bid Schedule shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid. Subsidiary obligations include, but are not limited to: temporary drainage provisions, dewatering, removal and off-site disposal of excess or unsuitable materials

and debris, removal and replacement of existing features.

Undercut Excavation With Off Site Disposal and Select Borrow Excavation: This item includes the excavation and off site disposal of materials as directed by the Engineer, as well as the excavation, transportation and compaction of off site select borrow material used in filling undercut areas. No additional compensation will be made for proof-rolling subgrade. Payment for the allotted amount shall be included in the Base Bid. The unit price shown in the Proposal shall be used as an add/deduct for adjustment of costs, based upon the actual number of cubic yards of material used.

END OF SECTION 01150

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

RELATED DOCUMENTS:

The general provisions of the Contract, including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

CONSTRUCTION SCHEDULE:

Before Work is started, CONTRACTOR for Contract of the project shall submit to ENGINEER for review a minimum of five copies of the schedule of the proposed construction operations. OWNER shall cooperate with CONTRACTOR in arrangements for continuity of service and operation of valves and other control facilities. The construction schedule shall indicate the sequence of the Work, the time of starting and completion of each part for the general contractor and all subcontractors, the installation date for each major item of equipment, and the time for making connections to existing piping, structures, or facilities, for water testing of below grade structures prior to backfilling operations, and time for testing and start of each part or piece of equipment.

The construction schedule shall be a comprehensive, fully developed, horizontal Gantt-Chart or bar-chart type schedule, and shall include sufficient detail to communicate and/or illustrate the construction progress for such items/tasks as listed above. At least one copy of the construction schedule shall be submitted on one sheet, large enough to show the entire schedule for the entire construction period.

At least every 90 days the schedule shall be revised as necessary to reflect changes in the progress of the Work. Reviewed and approved construction schedules which indicate one or more tasks more than 30 days behind schedule shall also be revised and submitted to review. These revised schedules shall include a progress report as described in this section.

Failure of the CONTRACTOR to provide acceptable, updated/revised construction schedules and required progress reports will be grounds for the ENGINEER to recommend the OWNER withhold a portion of requested partial payment.

OWNER may require CONTRACTOR to add to his plant, equipment, or construction forces, as well as increase the working hours, if operations fall behind schedule at any time during the construction period.

In preparation of the construction schedule, the CONTRACTOR shall coordinate the schedule with his subcontractors schedules, the schedule of values, submittals schedule, progress reports, schedule of payments, and other required schedules and reports.

The following requirements shall be taken into consideration in preparing the proposed schedule of construction operations:

Shop drawing submittal schedule, review time, and any revision and resubmittal time.

The CONTRACTOR shall allow ample time in the schedule for equipment / utilities testing, record drawing preparation and acceptance prior to final completion.

PROGRESS REPORTS:

A progress report shall be furnished to ENGINEER with each copy of the application for progress payment. If the Work falls behind schedule, CONTRACTOR shall submit additional progress reports at such intervals as ENGINEER may request.

Each progress report shall include sufficient narrative to describe current and anticipated delaying factors, their effect on the construction schedule, and proposed corrective actions. Any Work reported complete, but which is not readily apparent to ENGINEER, must be substantiated with satisfactory evidence.

SURVEY DATA:

All field books, notes, and other data developed by CONTRACTOR in performing surveys required as part of the Work shall be available to ENGINEER for examination throughout the construction period. All such data shall be submitted to ENGINEER with the other documentation required for final acceptance of the Work.

SHOP DRAWINGS, MATERIAL CERTIFICATES AND PRODUCT DATA:

Engineering data covering all equipment and fabricated materials which will become a permanent part of the Work under this contract shall be submitted to ENGINEER for review prior to installation.

Shop drawings are technical drawings and data that have been specially prepared for this project.

Material Certificates are notarized statements by an official of the supplier certifying that the materials meet the specifications and are used in lieu of or in addition to shop drawings and product data.

Product data includes standard printed information on manufactured products that has not been specially-prepared for this project.

These data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement and operation of component materials and devices; the external connections, anchorages and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment.

All submittals, regardless of origin, shall be stamped with the approval of CONTRACTOR and identified with the name and number of the Contract, CONTRACTOR's name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.

CONTRACTOR's stamp of approval is a representation to OWNER and ENGINEER that CONTRACTOR accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that he has reviewed or coordinated each submittal with the requirements of the Work and the Contract Documents.

All deviations from the Contract Documents shall be identified on each submittal and shall be tabulated in CONTRACTOR's letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by CONTRACTOR (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.

CONTRACTOR shall accept full responsibility for the completeness of each submission, and, in the case of a resubmission, shall verify that all exceptions previously noted by ENGINEER have been

taken into account. In the event that more than one resubmission is required because of failure of CONTRACTOR to account for exceptions previously noted, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER for review of the additional resubmissions.

Any need for more than one resubmission, or any other delay in obtaining ENGINEER's review of submittals, will not entitle CONTRACTOR to extension of the Contract Time unless delay of the Work is directly caused by a change in the Work authorized by a Change Order or by failure of ENGINEER to return any submittal within 21 days after its receipt in ENGINEER's office.

ENGINEER's review of drawings and data submitted by CONTRACTOR will cover only general conformity to the drawings and specifications, external connections, and dimensions which affect the layout. ENGINEER's review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, device, or item shown. ENGINEER's review of submittals shall not relieve CONTRACTOR from responsibility for errors, omissions, or deviations, nor responsibility for compliance with the Contract Documents.

Five copies of each drawing and necessary data shall be submitted to ENGINEER. ENGINEER will not accept submittals from anyone but CONTRACTOR. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.,) to indicate the sequence of the resubmittal.

When the drawings and data are returned marked DISAPPROVED or RESUBMIT, the corrections shall be made as noted thereon and as instructed by ENGINEER and five corrected copies resubmitted.

When corrected copies are resubmitted, CONTRACTOR shall in writing direct specific attention to all revisions and shall list separately any revisions made other than those called for by ENGINEER on previous submissions.

When the drawings and data are returned marked APPROVED AS NOTED, APPROVED, or RECORD COPY, no additional copies need be furnished.

LAYOUT DATA:

CONTRACTOR shall keep neat and legible notes of measurements and calculations made by him in connection with the layout of the Work. Copies of such data shall be furnished to the ENGINEER for use in checking CONTRACTOR's layout as provided under Lines and Grades. All such data considered of value to OWNER will be transmitted to OWNER by ENGINEER with other records upon completion of the Work.

RECORD DRAWING:

CONTRACTOR shall keep one record copy of all specifications, drawings, addenda, modifications, and shop drawings at the site in good order and annotated to show all changes made during the construction process. These shall be available to the ENGINEER and shall be delivered to the ENGINEER upon completion of the project. Complete record drawings shall be submitted to the ENGINEER and then approved by the ENGINEER before final payment is approved.

Updated record drawings shall be submitted for all work that is covered up including piping and utility work within 30 days of the installation.

An updated record drawing shall be prepared by the CONTRACTOR and submitted to the ENGINEER as a condition for approval for any pay request which includes pay items for sanitary sewer or water items.

Annotations on the drawings shall include the exact location of each service stub in relation to the next lowest manhole and centerline of street. Lengths, sizes and types of materials for mains and services shall also be shown.

REPORTS:

DAILY REPORTS:

The CONTRACTOR'S Site Superintendent shall prepare and maintain, at the site, daily construction reports recording the following information concerning events at the Project site:

List of subcontractors at Project site.
Approximate count of personnel at Project site.
Time of arrival and departure of testing agency representative.
Equipment at Project site.

Material deliveries.
High and low temperatures and general weather conditions.
Accidents.
Meetings and significant decisions.
Unusual events.
Stoppages, delays, shortages, and losses.
Emergency procedures.
Orders and requests of authorities having jurisdiction.
Change Orders, Field Orders, and/or Work Change Directives received and implemented.
Services connected and disconnected.
Equipment or system tests and startups.
Work/tasks started and/or completed.
Substantial Completions authorized.

These daily reports shall be made available to the Engineer, Owner, or the Resident Project Representative for examination. These reports, as with Record Drawings, shall be kept up-to-date and will be checked as a partial basis for approval of the Pay Request.

MATERIAL LOCATION REPORTS:

The CONTRACTOR'S Site Superintendent shall prepare and submit to the Resident Project Representative prior to review of the monthly pay request, a comprehensive list of materials delivered to and stored at the Project site. The list shall be cumulative, with item numbers corresponding to the Schedule of Values and the Stored Materials as outlined in the Supplementary Conditions, showing materials previously reported plus items recently delivered. Include with the list, items which are stored away from the Project site. Items stored at locations away from the site have to be approved by the Owner, as outlined in Section 01010 - Project Requirements. The CONTRACTOR shall prepare a maintenance schedule and log of maintenance activities for the individual stored materials. This schedule and log should be kept up-to-date for review by the RPR and OWNER.

The Contractor shall also submit to the RPR, a site map of the storage area, indicating the location of the stored materials, for confirmation of storage by the RPR during review of the Pay Request. The site map should be neat, legible, and of sufficient size to illustrate the location of the individual stored materials.

CLARIFICATION/INFORMATION REQUEST REPORTS:

The CONTRACTOR, in requesting clarification, information, and/or deviation, shall prepare and submit to the ENGINEER a Request for Information (RFI). The RFI should include a detailed description of the request, and in the case of a clarification or deviation, any proposed changes requested to complete the Work. Multiple RFI's should be sequentially numbered and dated to logically track the submittals.

END OF SECTION 01300

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

RELATED DOCUMENTS:

The general provisions of the Contract; including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

TESTING LABORATORY SERVICES:

All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to ENGINEER. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

Testing Laboratory Services for Materials Qualification: CONTRACTOR shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for embedment, fill, and backfill materials, and all other tests and engineering data required for ENGINEER's review of materials and equipment proposed to be used in the Work. CONTRACTOR shall pay all costs for services for materials qualifications.

Testing Laboratory Services for Field Quality Control: The testing laboratory for field quality control shall be selected by and work for the OWNER but be paid for by the CONTRACTOR from the testing allowance. A copy of the Testing Laboratory's monthly invoices shall be submitted to the Engineer for review prior to being included in the Contractor's monthly pay request. All charges of testing laboratories for field quality control tests made in the field or laboratory on concrete, asphalt mixtures, moisture-density (Proctor) and relative density tests on embedment, fill, and backfill materials, in-place field density tests on embedments and fills, and other materials and equipment, during and after their incorporation in the Work shall be paid by CONTRACTOR out of the testing allowance as discussed in SECTION 01010. The CONTRACTOR shall be responsible for scheduling of testing agency for field quality control. To verify that equipment, materials, and installations conform to the requirements outlined in the contract documents, the CONTRACTOR shall also schedule such additional testing as deemed necessary by the ENGINEER. Testing due to failed tests and wasted time due to improper scheduling by the CONTRACTOR will be paid for by the CONTRACTOR, not out of the testing allowance. Field sampling and testing will be performed by the testing laboratory personnel, in the general manner indicated in the

specifications, with minimum interference with construction operations. ENGINEER shall determine the exact time and location of field sampling and testing, and may require such additional sampling and testing as necessary to determine that materials and equipment conform with data previously furnished by CONTRACTOR and with the Contract Documents.

Arrangements for delivery of samples and test specimens to the testing laboratory will be made by CONTRACTOR. The testing laboratory shall perform all laboratory tests within a reasonable time consistent with the specified standards and shall furnish a written report of each test.

CONTRACTOR shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the Work when necessary. When sampling or testing activities are performed in the field by testing laboratory personnel, CONTRACTOR shall furnish personnel and facilities to assist in the activities.

OWNER shall not require the CONTRACTOR to retain any testing laboratory against which CONTRACTOR has reasonable objection, and if at any time during the construction process the services become unacceptable to CONTRACTOR, he may request in writing that such services be terminated. The request must be supported with evidence of improper testing. If ENGINEER and OWNER determine that sufficient cause exists, CONTRACTOR may terminate the services and engage a different testing laboratory.

Transmittal of Test Reports: Written reports of tests and engineering data furnished by CONTRACTOR for ENGINEER's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings in Section 01300.

The testing laboratory will furnish four copies of a written report of each test performed by laboratory personnel in the field or laboratory. Three copies of each test report will be transmitted to the ENGINEER and one copy to CONTRACTOR within three days after each test is completed. Testing laboratory will provide Resident Inspector and CONTRACTOR copies of field reports and test results on a daily basis prior to leaving the site. Notify ENGINEER and CONTRACTOR immediately of failing test results.

END OF SECTION 01400

SECTION 01500 - TEMPORARY FACILITIES

RELATED DOCUMENTS:

The general provisions of the Contract, including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

OFFICE AT SITE OF WORK:

During the performance of this Contract, CONTRACTOR for each Contract shall maintain a suitable office at or near the site of the Work which shall be the headquarters of his representative authorized to receive drawings, instructions, or other communication or articles. Any communication given to the said representative or delivered at CONTRACTOR's office at the site of the Work in his absence shall be deemed to have been delivered to CONTRACTOR.

Copies of the drawings, specifications, and other contract documents shall be kept at CONTRACTOR's office at the site of the Work and available for use at all times.

WATER:

All water required for and in connection with the Work to be performed and for any specified tests of piping, equipment, devices, etc., or for any other use as may be required for proper completion of the Work shall be provided by and at the expense of CONTRACTOR. No separate payment for water used or required will be made and all costs in connection therewith shall be included in the Bid.

POWER:

CONTRACTOR shall provide all power for heating, lighting, operation of CONTRACTOR's plant or equipment, or for any other use by CONTRACTOR. Temporary heat and lighting shall be maintained until the work is accepted.

SANITARY FACILITIES:

CONTRACTOR under Contract shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.

Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 men. CONTRACTOR shall enforce the use of such sanitary facilities by all personnel at the site.

MAINTENANCE OF TRAFFIC:

CONTRACTOR shall conduct his work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways and walks, whether public or private, CONTRACTOR shall provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel, and shall give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when CONTRACTOR has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.

In making open cut street crossings, CONTRACTOR shall not block more than one-half of the street at a time. Whenever possible, CONTRACTOR shall widen the shoulder on the opposite side to facilitate traffic flow. Temporary surfacing shall be provided as necessary on shoulders.

Temporary Bridges: CONTRACTOR shall construct substantial bridges at all points where it is necessary to maintain traffic across pipeline construction. Bridges in public streets, roads, and highways shall be acceptable to the authority having jurisdiction thereover. Bridges erected in private roads and driveways shall be adequate for the service to which they will be subjected. Bridges shall be provided with substantial guard rails and with suitably protected approaches. Foot bridges shall be not less than 4 feet wide, provided with handrails and uprights of dressed lumber. Bridges shall be maintained in place as long as the conditions of the Work require their use for safety of the public, except that when necessary for the proper prosecution of the Work in the immediate vicinity of a bridge, the bridge may be relocated or temporarily removed for such period as ENGINEER may permit.

Detours: Where required by the authority having jurisdiction thereover that traffic be maintained over any construction work in a public street, road, or highway, and the traffic cannot be maintained on the alignment of the original roadbed or pavement, CONTRACTOR shall, at his own

expense, construct and maintain a detour around the construction work. Each detour shall include a bridge across the pipe trench and all necessary barricades, guard rails, approaches, lights, signals, signs, and other devices and precautions necessary for protection of the Work and safety of the public.

BARRICADES AND LIGHTS:

All streets, roads, highways, and other public thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersecting public highway or street on each side of the blocked section.

All open trenches and other excavations shall have suitable barricades, signs, and lights to provide adequate protection to the public. Obstructions such as material piles and equipment shall be provided with similar warning signs and lights.

All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and conduct of the Work on or alongside public streets and highways shall cause the minimum obstruction and inconvenience to the traveling public.

All barricades, signs, lights and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within railroad and highway rights-of-way, as required by the authority having jurisdiction thereover.

FENCES:

All existing fences affected by the Work shall be maintained by CONTRACTOR until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

On completion of the Work across any tract of land, CONTRACTOR shall restore all fences to their original or to a better condition and to their original location.

PROTECTION OF PUBLIC AND PRIVATE PROPERTY:

CONTRACTOR shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards and parkings, shall be restored to their original condition. All replacements shall be made with new materials.

CONTRACTOR shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or men to or from the Work or any part or site thereof, whether by him or his Subcontractors. CONTRACTOR shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

TREE AND PLANT PROTECTION:

All trees and other vegetation which must be removed to perform the Work shall be removed and disposed of by CONTRACTOR; however, no trees or cultured plants shall be unnecessarily removed unless their removal is indicated on the drawings. All trees and plants not removed shall be protected against injury from construction operations.

Trees considered by ENGINEER to have any significant effect on construction operations are indicated on the drawings and those which are to be preserved are so indicated.

CONTRACTOR shall take extra measures to protect trees designated to be preserved, such as erecting barricades, trimming to prevent damage from construction equipment, and installing pipe and other Work by means of hand excavation or tunneling methods. Such trees shall not be endangered by stockpiling excavated material or storing equipment against the trunk.

When the injury or removal of trees designated to be preserved cannot be avoided, or when removal and replacement is indicated on the drawings, each tree injured beyond repair or removed shall be replaced with a similar tree of the nearest size possible.
All trimming, repair, and replacement of trees and plants shall be performed by qualified nurserymen or horticulturists.

SECURITY:

CONTRACTOR shall be responsible for protection of the site, and all work, materials, equipment and existing facilities thereon, against vandals and other unauthorized persons.

No claim shall be made against OWNER by reason of any act of an employee or trespasser, and CONTRACTOR shall make good all damage to OWNER's property resulting from his failure to provide security measures as specified.

Security measures shall be at least equal to those usually provided by OWNER to protect his existing facilities during normal operation, but shall also include such additional security fencing, barricades, lighting, watchman services and other measures as required to protect the site.

ACCESS ROADS:

CONTRACTOR under Contract shall establish and maintain temporary access roads to various parts of the site as required to complete the Project. Such roads shall be available for the use of all others performing work or furnishing services in connection with the Project.

PARKING:

CONTRACTOR under Contract shall provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Project as required to avoid any need for parking personal vehicles where they may interfere with public traffic, OWNER's operations or construction activities.

TEMPORARY DRAINAGE PROVISIONS:

CONTRACTOR shall provide for the drainage of stormwater and such water as may be applied or discharged on the site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the site, and adjacent property.

Existing drainage channels and conduits shall be cleaned, enlarged or supplemented as necessary to carry all increased runoff attributable to CONTRACTOR's operations. Dikes shall be constructed as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect OWNER's facilities and the Work, and to direct water to drainage channels or conduits. Ponding shall be provided as necessary to prevent downstream flooding.

END OF SECTION 01500

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

RELATED DOCUMENTS:

The general provisions of the Contract, including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

DESCRIPTION OF REQUIREMENTS:

Provisions of this section apply to the procedural requirements for the actual closeout of the Work, not to administrative matters such as final payment or the change over of insurance. Closeout requirements relate to both substantial and final completion of the Work; they also apply to individual portions of completed work as well as the total Work. Specific requirements contained in other sections have precedence over the general requirements contained in this section.

PROCEDURES AT SUBSTANTIAL COMPLETION:

Prerequisites: Comply with the General Conditions, Special Conditions and complete the following before requesting the ENGINEER's inspection of the work, or a designated portion of the Work, for certification of substantial completion.

Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates and similar required documentation for specific units of work, enabling OWNER's unrestricted occupancy and use.

Submit record drawing documentation, maintenance manuals, tools, spare parts, keys and similar operational items.

Complete final cleaning, and remove temporary facilities.

Inspection Procedures: Upon receipt of CONTRACTOR's request, ENGINEER will proceed with inspection or advise CONTRACTOR of prerequisites not fulfilled. Following initial inspection, ENGINEER will either prepare CERTIFICATE OF SUBSTANTIAL COMPLETION, or advise CONTRACTOR of work which must be performed prior to issuance of the CERTIFICATE OF

SUBSTANTIAL COMPLETION. The ENGINEER will repeat the inspection when requested and assure that the Work has been substantially completed. Results of the completed inspection will form the initial "punch-list" for final acceptance.

PROCEDURES AT FINAL ACCEPTANCE:

Reinspection Procedure: The ENGINEER will reinspect the Work upon receipt of the CONTRACTOR's notice that, except for those items whose completion has been delayed due to circumstances that are acceptable to the ENGINEER, the Work has been completed, including punch-list items from earlier inspections. Upon completion of reinspection, the ENGINEER will either recommend final acceptance and final payment, or will advise the CONTRACTOR of work not completed or obligations not fulfilled as required for final acceptance. If necessary, this procedure will be repeated.

RECORD DOCUMENTATION:

Record Drawings: Maintain at the construction site a complete set of prints of the Contract Drawings and shop drawings for record mark-up purposes throughout the Contract Time. Mark-up these drawings during the course of the work to show both changes and the actual installation, in sufficient detail to form a complete record for the OWNER's purposes. Give particular attention to work which will be concealed and difficult to measure and record at a later date, and work which may require servicing or replacement during the life of the project. Record Drawings shall show all field changes of dimension and detail, station number of all service laterals, wyes, and tees measured from the nearest downstream manhole and the lengths of all service lines.

END OF SECTION 01700

SECTION 02200 - EARTHWORK

PART 1 - GENERAL:

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK:

Extent of earthwork is indicated on drawings.

Preparation of subgrade for curb and gutter and pavements is included as part of this work.

Definition: "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

QUALITY ASSURANCE:

Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction and NCDOT specs.

Testing and Inspection Service: Owner will engage soil testing and inspection service for quality control testing during earthwork operations.

SUBMITTALS:

Test Reports-Excavating: Submit following reports directly to Architect/Engineer from the testing services, with copy to Contractor:

Test reports on soil and embedment.

Field density test reports.

One optimum moisture-maximum density curve for each type of soil encountered.

JOB CONDITIONS:

Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Engineer, then only after acceptable temporary utility services have been provided.

Provide minimum of 48-hour notice to Engineer, and receive written notice to proceed before interrupting any utility.

Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

Use of Explosives: The use of explosives is not permitted.

Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

Operate warning lights as recommended by authorities having jurisdiction.

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 - PRODUCTS

SOIL MATERIALS:

Definitions:

Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification Groups GW, GP, GM, GC, SM, SW and SP.

Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups ML, MH, CL, CH, OL, SC, OH and PT.

Aggregate for Aggregate Base Course: Aggregate meeting the requirements of Section 520, Paragraph (a) of "Standard Specifications for Roads and Strucutres" as issued by NCDOT.

Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.

Select Backfill: Job excavated or borrow material consisting of coarse sands, fine sands, with not more than 15% by weight passing the No. 200 sieve. This does not include clays, silts, organic soils or any materials not acceptable as fill material. Select backfill must receive prior approval from the Engineer before use.

Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter.

PART 3 - EXECUTION

EXCAVATION:

Substation Yard Excavation:

Excavation for the gravel substation yard shall conform to the lines, grades, cross sections, and dimensions indicated on the drawings and shall include the excavation of all unsuitable materials from the subgrade. Subgrade shall conform to proposed line, grade and cross-section. This operation shall include any reshaping and wetting or drying required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

Excavation is Unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.

Undercut Excavation: When excavation has reached required subgrade elevations, provide a proof rolling of the prepared pavement subgrade with a heavy roller or loaded dump truck (+25 tons) in the presence of the Engineer's Representative. The proof rolling shall be covered by the wheels of the proof roller operating at a speed between 2-1/2 and 3-1/2 miles per hour.

Any areas that rut or pump excessively shall be scarified by the contractor allowed to dry. If the areas continue to rut or pump they shall be undercut and backfilled with select material as directed by the Engineer.

After undercut and backfill operations are complete, a final proofrolling of the undercut areas will be performed in the presence of the Engineer's Representative.

Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

Maintain sides and slopes of excavations in safe condition until completion of backfilling.

Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

Dispose of excess soil material and waste materials as herein specified.

Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degee F (1 degee C).

COMPACTION:

General: Control soil compaction during construction providing minimum percentage of density specified for each area classification as indicated below.

Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density at optimum moisture content as determined by ASTM D 698.

Structures, Building Slabs, Steps, Pavements, Gravel Substation Yard: Compact top 12" of subgrade at 98% maximum density. Each layer of backfill or fill material below top 12" shall be compacted to 95% maximum density.

Lawn or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density.

Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 95% maximum density.

Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

BACKFILL AND FILL:

General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

In excavations, use satisfactory excavated or borrow material.

Under grassed areas, use satisfactory excavated or borrow material.

Under walks and pavements, use subbase material, or satisfactory excavated or borrow material, or combination of both.

Backfill excavations as promptly as work permits, but not until completion of the following:

Inspection, testing, approval, and recording locations of underground utilities.
Removal of trash and debris.

Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.

Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

GRADING:

General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

Grade areas as shown on the Drawings to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:

Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10' above or below required subgrade elevations.

Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.05' above or below required subgrade elevation.

Gravel Substation Yard & Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.

Patches in driveways and roadways shall be graded to depth required to match existing pavement or to provide minimum pavement specified.

Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

PAVEMENT SUBBASE COURSE:

General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.

See other Division-2 sections for paving specifications.

Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12" width of shoulder simultaneously with compacting and rolling of each layer of subbase course.

Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross- section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

When a compacted subbase course is shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

FIELD QUALITY CONTROL:

Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.

Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Architect/Engineer.

Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2000 sq. ft. of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlaying building slab or paved area, but in no case less than 3 tests.

Foundation Wall Backfill: Take at least 2 field density tests, at locations and elevations as directed.

If in opinion of Architect/Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

MAINTENANCE:

Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

DISPOSAL OF EXCESS AND WASTE MATERIALS:

Removal from Owner's Property: Remove waste materials, including excess or unacceptable excavated material, trash and debris, and dispose of it off Owner's property.

END OF SECTION 02200

SECTION 02220 - TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

RELATED DOCUMENTS:

The general provisions of the Contract, including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

DESCRIPTION OF WORK:

This section covers excavation and trenching work and shall include the necessary clearing, grubbing, and preparation of the site; removal and disposal of all debris; excavation and trenching as required; the handling, storage, transportation, and disposal of all excavated material; all necessary sheeting, shoring, and protection work; preparation of subgrades; pumping and dewatering as necessary or required; protection of adjacent property; backfilling; pipe embedment; and other appurtenant work.

RELATED WORK SPECIFIED ELSEWHERE:

Storm Sewer System - Section 02736

QUALITY ASSURANCE:

Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

Employ testing laboratory to perform soil testing and Inspection service for quality control testing during earthwork operations. The cost of testing and inspection shall be paid for out of the testing allowance as specified in Division-1.

SUBMITTALS:

Test Reports-Excavating: Submit following reports directly to Engineer from the testing services, with copy to Contractor:

Test reports on soil and embedment.

Field density test reports.

One optimum moisture-maximum density curve for each type of soil encountered.

JOB CONDITIONS:

Classification of Excavated Materials: No classification of excavated materials will be made. Excavation and trenching 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.

Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.

Provide minimum of 48-hour notice to Engineer, and receive written notice to proceed before interrupting any utility.

Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

Use of Explosives: The use of explosives is not permitted.

Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

Operate warning lights as recommended by authorities having jurisdiction.

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 - PRODUCTS

DEFINITIONS:

Satisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GW, GP, GM, GC, SM, SW, and SP.

Unsatisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups ML, MH, CL, CH, SC, OL, OH and PT.

GENERAL MATERIALS:

Clean Sand: Washed or natural sand with less than 10 percent by weight passing the No. 200 sieve.

Filter Cloth: Spun synthetic fiber, 10 oz/sy, burst strength 500 psi, vertical water flow 265 gpm/sf, Trevira 1135, Mirafi or equal.

Granular Fill (Embedment and Stabilization Material): Granular fill or embedment material shall be crushed rock or gravel, shall be free from dust, clay, or trash, and shall be #57 stone as defined in ASTM C 33.

Aggregate Base Course Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand as specified in NC DOT Standard Specifications for Roads and Structures Section 520 Type A.

Fill Material (Backfill): All material deposited in trenches shall be free from rocks or stones larger than 2 inches, brush, stumps, logs, roots, debris, and organic or other objectionable materials, and shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content.

Select Backfill: Job excavation or borrow material consisting of coarse sands and fine sands with not more than 15% by weight passing the No. 200 sieve. This does not include clays, silts, organic soils or any materials not acceptable as fill material. Select backfill must receive prior approval from the ENGINEER before use.

Groundwater Barrier: Barrier material shall meet ASTM D2487 soil classification GC, SC, CL, or ML-CL and shall be compacted to 95 percent of maximum density. Material may be finely divided suitable job excavated material, free from stones, organic matter and debris.

PIPE EMBEDMENT:

Embedment materials both below and above the bottom of the pipe, classes of embedment to be used, and placement and compaction of embedment materials shall conform to the requirements shown on the drawings and to the following supplementary requirements.
Embedment materials shall contain no cinders or other material which may cause pipe corrosion.

Class B Bedding shall be used for all ABS Truss, PVC Truss pipelines and DIP sewer pipelines.

Class B bedding shall include granular embedment from 4" below the pipe to the springline and select backfill embedment at least 12" above the pipe as shown on the attached drawing.

Class C Bedding shall be used for all reinforced and nonreinforced concrete pipelines.

Class C bedding shall include granular fill from 4" below the pipe to 1/6 of the outside diameter of the pipe and backfill embedment to at least 12" above the top of the pipe.

Class D Bedding shall be used for all PVC (SDR 35) gravity sewer pipe.

Class D bedding shall include granular embedment from 4" below the pipe to the top of the pipe and at least 12" of select backfill embedment above that.

Class F Bedding shall be used for all ductile iron pipe and PVC waterlines.

Class F embedment shall include backfill material from the bottom of the pipe (and bell holes) to at least 12" above the pipe.

PART 3 - EXECUTION

GENERAL REQUIREMENTS:

Excavation shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.

Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.

Except where exterior surfaces are specified to be dampproofed, monolithic concrete manholes and other concrete structures, or parts thereof, which do not have footings that extend beyond the outside face of exterior walls, may be placed directly against excavation faces without the use

of outer forms, provided that such faces are stable and also provided that a layer of polyethylene film is placed between the earth and the concrete.

Excavations for manholes and similar structures constructed of masonry units shall have such horizontal dimensions that not less than 6 inches clearance is provided for outside plastering.
Backfilling and construction of fills and embankments during freezing weather shall not be done except by permission of the Engineer. No backfill, fill, or embankment materials shall be installed on frozen surfaces, nor shall frozen materials, snow or ice be placed in any backfill, fill or embankment.

DEWATERING:

Dewatering equipment shall be provided to remove and dispose of all surface and ground water entering excavations, trenches, or other parts of the work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

All excavations for concrete structures or trenches which extend down to or below ground water shall be dewatered by lowering and keeping the ground water level beneath such excavations 12 inches or more below the bottom of the excavation.

Surface water shall be diverted or otherwise prevented from entering excavated areas or trenches to the greatest extent practicable without causing damage to adjacent property.

The Contractor shall be responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipe or conduit shall be left clean and free of sediment.

SHEETING AND SHORING:

Except where banks are cut back on a stable slope, excavation for structures and trenches shall be sheeted, braced, and shored as necessary to prevent caving or sliding.

STABILIZATION:

Subgrades for concrete structures and trench bottoms 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 workmen.

Subgrades for concrete structures or trench bottoms which are otherwise solid, but which

become mucky on top due to construction operations, shall be reinforced with crushed rock or gravel. The stabilizing material shall be spread and compacted to a depth of not more than 4 inches; if the required depth exceeds 4 inches, the material shall be furnished and installed as specified for granular fills. Not more than 1/2 inch depth of mud or muck shall be allowed to remain on stabilized trench bottoms when the pipe bedding material is placed thereon. The finished elevation of stabilizing subgrades shall not be above subgrade elevations indicated on the drawings.

EARTH FILLS AND EMBANKMENTS:

To the maximum extent available, excess suitable material obtained from structure and trench excavations shall be used for construction of fills and embankments. Additional material shall be provided as required or obtained from the borrow pits where indicated on the drawings. After preparation of the fill or embankment site, the subgrade shall be leveled and rolled so that surface materials of the subgrade will be compact and well bonded with the first layer of the fill or embankment.

Fills and embankments shall be constructed in horizontal layers not exceeding 8 inches in uncompacted thickness. Material deposited in piles or windrows by excavating and hauling equipment shall be spread and leveled prior to compaction. Each layer shall be thoroughly compacted to 98 percent of the maximum density at optimum moisture content as determined by ASTM D 698. If the material fails to meet the density specified, compaction methods shall be altered.

Wherever a trench passes through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation 12 inches above the top of the pipe before the trench is excavated.

EXCAVATION FOR STRUCTURES:

Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

In excavation for footings and foundations, take care not to disturb bottom of excavation. Trim bottoms to required lines and grades to leave solid base to receive other work.

ROADWAY EXCAVATION:

Excavation for the roadways shall conform to the lines, grades, cross sections, and dimensions

indicated on the drawings and shall include the excavation of all unsuitable material from the subgrade. The top 12" of subgrade shall be compacted to 98% maximum density. Each layer of backfill or fill material below top 12" shall be compacted to 95% maximum density as determined by ASTM D 698. Subgrade shall conform to proposed line, grade and cross-section. This operation shall include any reshaping and wetting or drying required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

Limiting Trench Widths: Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper pipe installation, jointing, and embedment. However, the limiting trench widths from the bottom of the trench to an elevation one foot above the top of installed pipe, and the minimum permissible sidewall clearances between the installed pipe and each trench wall shall be as follows:

Nominal Pipe Size (inches)	Minimum Trench Width (inches)	Maximum Trench Width (inches)
Less than 18	Pipe O.D. Plus 18	Pipe O.D. Plus 24
18 through 30	Pipe O.D. Plus 24	Pipe O.D. Plus 30
34 through 48	Pipe O.D. Plus 24	Pipe O.D. Plus 36

Stipulated minimum sidewall clearances are not minimum average clearances but are minimum clear distances which will be required.

Cutting trench banks on slopes to reduce earth load to prevent sliding and caving shall be used in areas where the increased trench width will not interfere with surface features or encroach on right-of-way limits. Slopes shall not extend lower than one foot above the top of the pipe.

Unauthorized Trench Widths: Where, for any reason, the width of the lower portion of the trench, as excavated at any point, exceeds the maximum permitted in the foregoing tables, either pipe of adequate strength, special pipe embedment, or arch concrete encasement, as required by loading conditions and with the concurrence of the Engineer, shall be furnished and installed by and at the expense of the Contractor.

Mechanical Excavation: The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, or other existing property, utilities, or structures above or below ground. In all such locations, hand excavating methods shall be used.

Mechanical equipment used for trench excavation shall be of a type, design, and construction, and shall be so operated that the rough trench excavation bottom elevation can be controlled, that uniform trench widths and vertical sidewalls are obtained at least from an elevation one foot above the top of the installed pipe to the bottom of the trench, and that trench alignment is such

that pipe when accurately laid to specified alignment will be centered in the trench with adequate clearance between the pipe and sidewalls of the trench, Undercutting the trench sidewall to obtain clearance will not be permitted.

Cutting Concrete and Asphalt Surface Construction: Cuts in concrete and asphalt pavements shall be no larger than necessary to provide adequate working space for proper installation of pipe and appurtenances. Cutting shall be started with a concrete saw in a manner which will provide a clean groove at least 2 inches deep along each side of the trench and along the perimeter of cuts for structures.

Concrete and asphalt pavement over trenches excavated for pipelines shall be removed so that a shoulder not less than 6 inches in width at any point is left between the cut edge of the pavement and the top edge of the trench. Trench width at the bottom shall not be greater than at the top and no undercutting will be permitted. Pavement cuts shall be made to and between straight or accurately marked curved lines which, unless otherwise required, shall be parallel to the centerline of the trench. Pavement removed for connections to existing lines or structures shall not be of greater extent than necessary for the installation. Where the trench parallels the length of concrete walks and the trench location is all or partially under the walk, the entire walk shall be removed and replaced. Where the trench crosses drives, walks, curbs, or other surface construction, the surface construction shall be removed and replaced between existing joints or between saw cuts as specified for pavement.

Excavation Below Pipe Subgrade: Where required, pipe trenches shall be excavated below the underside of the pipe, to provide for the installation of granular embedment.

Artificial Foundations in Trenches: Whenever unsuitable or unstable soil conditions which cannot be corrected by dewatering are encountered, trenches shall be excavated below grade and the trench bottom shall be brought to grade with suitable stabilization material. The use of stabilization material (stone) shall be approved by the Engineer's Representative prior to installation.

Bell Holes: Bell holes shall provide adequate clearance for tools and methods used in installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

PIPE EMBEDMENT:

Placement and Compaction: Granular embedment material shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It will be permissible to slightly disturb the finished subgrade surface by withdrawal of pipe slings or other lifting tackle.

After each pipe has been graded, aligned, and placed in final position on the bedding material or trench bottom and shoved home, sufficient pipe embedment material shall be deposited and compacted under and around each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and alignment during subsequent pipe jointing and embedment operations.

Embedment material shall be deposited and compacted uniformly and simultaneously on each side of the pipe to prevent lateral displacement.

Hand placed embedment shall be compacted to the top of the pipe in all areas where compacted backfill is specified.

Whenever crushed rock is used as embedment for 36 inch and larger pipe, the portion above the bottom of the pipe shall be vibrated with a mechanical probe type vibrator during placement to ensure that all spaces beneath the pipe are filled.

Ground Water Barrier: Continuity of embedment material shall be interrupted by low permeability ground water barriers to impede passage of water through the embedment. Ground water barriers for sewer lines shall be compacted soil around each manhole. Barriers for all other pipelines shall be compacted soil the full depth of granular material, the full trench width, approximately 4 feet long, and spaced not more than 400 feet apart.

TRENCH BACKFILL:

Compact top 12" of subgrade at 100% maximum density. Each layer of backfill or fill material below top 12" shall be compacted to 95% maximum density, in the following locations:

Where beneath pavements, surfacings, driveways, curbs, gutters, walks or other surface construction or structures.

Where in street, road, or highway shoulders.

Where beneath fills or embankments.

In established lawn areas.

In other areas the backfill shall be compacted to 95 percent or equal to existing.

Where the trench for one pipe passes beneath the trench for another pipe, backfill for the lower trench shall be compacted to the level of the bottom of the upper trench.

Job excavation material may be used for compacted backfill when the job excavated material is

finely divided and free from debris, organic material, cinders or other corrosive material, and stones larger than 3 inches in greatest dimension. Masses of moist, stiff clay shall not be used. Each layer of material shall have the best practicable moisture content for satisfactory compaction. The material in each layer shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content and adequate compaction. Backfill materials shall be placed in uniform layers not exceeding 8 inches in uncompacted thickness. Increased layer thickness may be permitted for noncohesive material if the Contractor demonstrates to the satisfaction of the Engineer that the specified compacted density will be obtained.
The method of compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe.

The top portion of backfill beneath established lawn areas shall be finished with not less than 4 inches of topsoil corresponding to, or better than, that underlying adjoining lawn areas.

STRUCTURE BACKFILL:

The quality and moisture content of materials for backfill around and outside of structures shall conform to the requirements for fill materials. Backfill materials shall be deposited in layers not to exceed 8 inches in uncompacted thickness and compacted to at least 98 percent of maximum density at optimum moisture content as determined by ASTM D 698. Compaction of structure backfill by rolling will be permitted provided the desired compaction is obtained and damage to the structure is prevented. Compaction of structure backfill by inundation with water will not be permitted. No backfill shall be deposited or compacted in water. Particular care shall be taken to compact structure backfill which will be beneath pipes, drives, roads, parking areas, walks, curbs, gutters, or other surface construction or structures. In addition, wherever a trench is to pass through structure backfill, the structure backfill shall be placed and compacted to an elevation not less than 12 inches above the top of pipe elevation before the trench is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.

DRAINAGE MAINTENANCE:

Trenches across roadways, driveways, walks, or other trafficways adjacent to drainage ditches or water courses shall not be backfilled prior to completion of backfilling the trench on the upstream side of the trafficway, to prevent impounding water after the pipe has been laid. Bridges and other temporary structures required to maintain traffic across such unfilled trenches shall be constructed and maintained by the Contractor. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches. All material deposited in roadway ditches or other water courses by the line of trench shall be removed immediately after backfilling is completed and the original section, grades, and contours of ditches or water courses shall be restored. Surface drainage shall not be obstructed longer than necessary.

DISPOSAL OF EXCESS EXCAVATED MATERIALS:

Except as otherwise permitted, all excess excavated materials shall be disposed of away from the site of the work.

Broken concrete and other debris resulting from pavement or sidewalk removal, excavated rock in excess of the amount permitted to be installed in trench backfill, debris encountered in excavation work, and other similar waste materials shall be disposed of away from the site of the work.

For excavation in street rights-of-way, Contractor shall grade work area to within 0.1 foot ± of proposed subgrade. For excavation in easements, excess excavation may be distributed within the easements, to a maximum depth of 6 inches above the original ground surface elevation at and across the trench and sloping uniformly each way.

All wasted material shall be carefully finished with a drag, blade machine, or other suitable tool to a smooth, uniform surface without obstructing drainage at any point. The disposal of waste and excess excavated materials, including hauling, handling, grading, and surfacing shall be a subsidiary obligation of the Contractor and no separate payment will be made therefore.

SETTLEMENT:

The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within the correction period stipulated in the General Conditions.
The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from the Engineer or Owner.

TESTS:

As stipulated in the quality control section, all tests required for preliminary review of materials shall be made by an acceptable independent testing laboratory at the expense of the Contractor. Two initial gradation tests shall be made for each type of embedment, fill, or backfill material and one additional gradation test shall be made for each additional 500 tons of each material. Moisture-density (Proctor) tests and relative density tests on the materials, and all in-place field density tests, shall be paid for out of the testing allowance.

END OF SECTION 02220

SECTION 02736 - STORM SEWER SYSTEM

PART 1 - GENERAL

RELATED DOCUMENTS:

The general provisions of the Contract, including General Supplemental General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

Related Work Specified Elsewhere:

Excavation, Trenching and Erosion Control: See Division-2 sections.

Concrete: See Division-3 sections.

DESCRIPTION OF WORK:

The extent of storm sewer system work is shown on the drawings.

Storm sewer system work includes, but is not limited to, all of the following.

Storm sewer pipe.

Drop inlets, frames and gratings.

Curb inlets, frames and gratings.

Reinforced concrete and brick junction box.

Rip Rap

QUALITY ASSURANCE:

Code and Standards: Comply with requirements of the NC Department of Transportation and with requirements of applicable Division - 2 sections for excavation and backfilling required in connection with storm sewer system work.

SUBMITTALS:

Shop Drawings and Storm Sewer System: Submit shop drawings for the storm sewer system, including details of underground structures, metal accessories, fittings, and connections, and any variations from those details shown on the drawings.

PART 2 - PRODUCTS

CONDUIT MATERIALS:

Reinforced Concrete Pipe (RCP): Concrete Pipe shall be in accordance with ASTM C-76, Class III All pipe shall have tongue-and groove type joint. All pipe shall be stamped by supplier - "R.C.". Joint material shall be RAM-NEK Performed Plastic Gasket, Type I rope form sealing compound conforming to Federal Specifications SS-S-210A.

MASONRY MATERIALS:

Concrete Masonry Units (Manhole Block): ASTM C 139.

Manhole Drop Inlet and Catch Basin Brick: ASTM C 32, Grade MS.

Concrete Brick: ASTM C 55, Grade N1.

Masonry Mortar: ASTM C 270, Type M, approximately 1:1/4:2 Portland cement, lime, sand.

Concrete Block: ASTM C-90, Grade N 1.

For minor amounts of mortar, packaged materials complying with ASTM C 387, Type M, will be acceptable.

Plasticizing Agent - Omicron or equal. Use in accordance with manufacturer's instructions.

METAL ACCESSORIES:

General: All metal accessories for manholes, catch basins and drop inlets shall be gray cast iron, ASTM A 48, Class 30B. Frames, grates and covers shall be factory coated with an asphalt base paint. Install metal accessories as shown on the drawings and as follows:

Manhole frames and covers shall be V-1384 as manufactured by East Jordan Iron Works, or approved equal. Furnish covers with cast-in legend "Storm" or "Sanitary" as applicable on roadway face.

Catch basin frames and grates shall be V-4066-2 (NCDOT Type C) as manufactured by East Jordan Iron Works., or approved equal.

Drop inlet frames and grates shall be V-5660 as manufactured by East Jordan Iron Works, or approved equal.

Manhole steps shall be plastic coated steel bar as manufactured by MA Industries or cast iron as V-1999 manufactured by East Jordan Iron Works, or approved equal.

Rip Rap: Rip rap shall be accomplished in accordance with Section 868 of the N.C. State Highway Specifications for Roads and Structures. Rip rap shall be located and be of the class shown on plans.

Filter Cloth: Filter cloth shall be composed of strong rot proof synthetic fibers formed into a fabric of either the woven or nonwoven type. Either type of fabric shall be free of any treatment or coating which might significantly alter its physical properties after installation.

The filter cloth shall have a puncture strength to withstand a minimum force of 100 lbs., in accordance with ASTM D751. Filter cloth as manufactured by Contech, Carthage Mills, Inc., or approved equal will be acceptable.

Temporary Silt Fence: Temporary silt fence shall be accomplished in accordance with Section 1605 of the N.C. State Highway Specifications for Roads and structures and as shown on the plans.

PART 3 - EXECUTION

INSPECTION:

Contractor must examine the areas and conditions under which storm sewer system work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

INSTALLATION OF CONDUIT (PIPE):

General:

Perform excavation, trenching and backfilling as specified in appropriate Division-2 Sections. Conduct backfill operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed.

Inspect conduit before installation to detect any apparent defects. Mark defective materials with white paint and promptly remove from the site.

Particular care shall be taken to prevent damage to pipe and fitting linings and coatings. Pipe shall be protected during handling against impact shocks and free fall.

Lay conduit beginning at the low point of a system, true to the grades and alignment indicated with unbroken continuity of invert. The line and invert grade of each pipe shall be checked from top line carried on batter boards not over 24' apart or by a laser and target.

Cross above or below other pipe a minimum of 6" unless otherwise directed by the Engineer.

Place bell ends of conduit or the groove end of concrete facing upstream.

Bell holes shall be excavated for each joint to assure bedding supports the barrel of the pipe and to facilitate making a perfect joint. Preparatory to making pipe joints, all surfaces of the portion of the pipe to be jointed or of the factory-made jointing materials shall be clean and dry.

Install gaskets in accordance with manufacturer's recommendations for the use of lubricants, cements, and other special installation requirements.

Cleaning Conduit: Clear the interior of conduit of dirt and other superfluous material as the work progresses.
Place plugs in the ends of uncompleted conduit at the end of the day or whenever work stops.

Flush lines between manholes if required to remove collected debris.

Interior Inspection: Inspect conduit to determine whether line displacement or other damage has occurred.

A light held in a manhole shall show a full circle of light when viewed from the adjoining end of the line.

Make inspections after lines between manholes, or manhole locations, have been installed and approximately two feet of backfill is in place and at completion of the project.

If the inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, take whatever steps are necessary to correct such defects to the satisfaction of the Engineer.

Connection to Existing Structures: Pipe connections to existing structures shall be made in such manner that the finished work will conform as nearly as practicable to the essential applicable requirements specified for new structures, including all necessary concrete work, cutting, and shaping.

UNDERGROUND STRUCTURES:

General: Manholes may be precast manhole sections or constructed with concrete masonry units (manhole block), manhole brick or concrete brick masonry as specified under Part 2 - Products unless otherwise noted.

Drop inlets or curb inlets may be constructed with concrete brick or manhole brick masonry as specified under Part 2 - Products. Construct all drainage structures with a grouted invert to channel flow through structure from inlet pipes to outlet pipe. Where pipes are skewed, the grouted channel shall form a smooth radius. Structures shall not be backfilled until inspected by the Engineer or his representative unless otherwise directed.

Construct all structures in accordance with all authorities having jurisdiction and as hereinafter specified.

Masonry Construction Manholes: At Contractor's option, use either manhole brick, concrete brick or concrete masonry (manhole block) units to construct masonry manholes.

> Mix mortar with only enough water for workability. Re-tempering of mortar will not be permitted. Keep mortar mixing and conveying equipment clean. Do not deposit mortar upon, or permit contact with, the ground.
>
> Lay masonry in mortar so as to form full bed with ends and side joints in one operation, and with full bed and vertical joints, not more than 3/8" wide on the inside. Protect fresh masonry from freezing and from too rapid drying.

Curb Inlet and Drop Inlets: Construct curb inlet or drop inlet to the sizes and shapes as shown on the drawings and as specified for masonry manholes.

Use concrete which will attain a 28-day compressive strength of not less than 3,000 psi.

Set cast iron frames and gratings to the elevations indicated.
Field revisions may be necessary for manholes and catch basins constructed on existing lines, as directed by Engineer.

Concrete Block retaining walls shall be constructed where existing concrete block walls must be removed for sidewalk or curb and gutter construction unless otherwise directed by the Engineer. Constructed shall be where located by Engineer according to detail for masonry manhole structures.

Installation of filter cloth shall be in accordance with the manufacturer's recommendations. Care shall be taken to insure that the cloth develops no rips, holes, deterioration, or damage during installation. During all periods of shipment and storage, the cloth shall be maintained, wrapped in a heavy duty protection covering to protect the fabric from direct sunlight ultraviolet rays, mud, dirt, dust and debris.

END OF SECTION 02736

SECTION 02910 - EROSION AND POLLUTION CONTROL

PART 1 - GENERAL

RELATED DOCUMENTS:

The general provisions of the Contract, including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

DESCRIPTION OF WORK:

The extent of the work required under this section is that required to minimize water, air, and noise pollution and soil erosion and siltation.

Temporary erosion control measures which may be necessary include, but are not limited to, temporary berms, dikes, dams, drainage ditches, silt basins, silt ditches, silt fences, rip rap, perimeter swales, slope drains, structures, vegetation, mulches, mats, netting, gravel or any other methods or devices that are necessary to control or restrict erosion. Temporary erosion control measures may include work outside the right-of-way or construction limits where such work is necessary as a result of construction such as borrow pit operations, haul roads, plant sites, equipment storage sites, and disposal of waste or debris. The Contractor shall be liable for all damages to public or private property caused by silting or slides originating in waste areas furnished by the Contractor.

Related Work Specified Elsewhere:

Fertilizing, Seeding and Mulching: Section 02920

QUALITY ASSURANCE:

Codes and Standards:

North Carolina Sedimentation Pollution Control Act of 1973 and the Rules and Regulations promulgated pursuant to the provisions of said act.

"Standard Specifications for Roads and Structures", North Carolina Department of Transportation (DOT).

In the event of conflict between the regulations listed above and the requirements of these specifications, the more restrictive requirement shall apply.

SANCTIONS:

Failure of the Contractor to fulfill any of the requirements of this section may result in the Owner ordering the stopping of construction operations in accordance with SUBARTICLE 13.8 of the General Conditions until such failure has been corrected. Such suspension of operations will not justify an extension of contract time nor additional compensation.

Failure on the part of the Contractor to perform the necessary measures to control erosion, siltations, and pollution will result in the Engineer notifying the Contractor to take such measures. In the event that the Contractor fails to perform such measures within 24 hours after receipt of such notice, the Owner may suspend the work as provided above, or may proceed to have such measures performed with other forces and equipment, or both. The cost of such work performed by other forces will be deducted from monies due the Contractor on his contract.

PART 2 - PRODUCTS

SILT FENCES:

Posts: Steel posts shall be 5' in height and be of the self-fastener angle steel type.

Posts shall be spaced at 8' max. when silt fence is backed with wire mesh, and 5' when no wire mesh is used or as required by the Engineer.

Woven Wire: Woven wire fencing shall conform to ASTM A116 for Class 3 galvanizing. Fabric shall be a minimum of 32" in width and shall have a minimum of 6 line wires with 12" stay spacing. The top and bottom wires shall be 10 gauge while the intermediate wires shall be 12-1/2 gauge. Wire fabric shall be fastened to posts with not less than #9 wire staples 1-1/2" long.

Fabric: Provide woven synthetic fiber designed specifically for silt fence conforming to NCDOT Standard Specifications for Roads and Structures Section 1056 Type 3 in Table 1056-1. Minimum roll width shall be 36”.

DRAINAGE STONE:

NCDOT Class VI select material meeting the gradation requirements of standard size 57 in Table 1005-1 as described in Section 1005 and 1006.

RIP RAP:

Class B in accordance with NCDOT specifications.

FILTER CLOTH:

For use under rip rap provide geotextile which meets requirements of NCDOT Standard Specifications for Roads and Structures Section 1056 Type 2 in Table 1056-1.

MATTING FOR EROSION CONTROL:

Matting for erosion control shall be jute matting or excelsior matting. Other acceptable material manufactured especially for erosion control may be used when approved by the Engineer in writing before being used. Matting for erosion control shall not be dyed, bleached, or otherwise treated in a manner that will result in toxicity to vegetation.

TEMPORARY SEEDING:

Temporary seeding, when required, shall be performed in accordance with the recommendations contained in "Guide for Sediment Control on Construction Sites in North Carolina", published by the Soil Conservation Service and Section 02920 of these specifications.

PART 3 – EXECUTION

GENERAL:

The Contractor shall take whatever measures are necessary to minimize soil erosion and siltation, and water, air, and noise pollution caused by his operations. The Contractor shall also comply with the applicable regulations of all legally constituted authorities relating to pollution prevention and control. The Contractor shall keep himself fully informed of all such regulations which in any way affect the conduct of the work, and shall at all times observe and comply with all such regulations. In the event of conflict between such regulations and the requirements of the specifications, the more restrictive requirements shall apply.

EROSION AND SILTATION CONTROL:

The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces, or other property.

Prior to suspension of operations on the project or any portion thereof, the Contractor shall take all necessary measures to protect the construction area, including but not limited to borrow sources, soil type base course sources, and waste areas, from erosion during the period of suspension.

Provide diversion ditches and berms as necessary to prevent concentrated flow of water across disturbed areas.

Stockpile excavated material on the opposite side of the utility trenches from the watercourses to the extent that is possible.

In the event that stockpiles are placed on the watercourse side of the trench, provide silt fence or silt berms with stone filter outlets along the entire length of the stockpile that is on the watercourse side of the trench. Upon the completion of backfilling, the measures shall be removed and the site graded to its natural grade or as shown on plans.

Maintain natural buffer zones along all watercourses sufficient to retain all visible siltation within the first 25 percent of the buffer width.

Provide a settling basin with a gravel filter outlet for all water pumped from trenches or dewatering equipment. Pumping of that water directly into any stream, pond, or watercourse is prohibited.

Tamp, fertilize, seed and mulch the disturbed areas as soon as practicable after line is installed and, in all cases, no later than 14 days after completion of the line segment or work at a particular site.

When construction operations are suspended for more than 14 days, provide temporary seeding and mulching of all disturbed areas including those areas in which further construction is necessary.

Erosion control measures installed by the Contractor shall be acceptably maintained by the Contractor.

Silt fences shall be provided where shown on the drawings and/or as necessary to prevent erosion.

Catch basins and Drop Inlets shall be protected from silt by placing rock inlet sediment traps around the openings until vegetative cover is established.

Temporary rock check dams shall be constructed where shown on the drawings.

Seeding for erosion control shall be performed in accordance with Section 02920.
Stream Or Ditch Crossings shall be perform in accordance with details shown on plans. Complete crossing in one working day. Carefully stabilize disturbed slopes by tamping with equipment buckets and mechanical or hand tamping. Distribute topsoil evenly on slopes and tamp.

Where rip rap is required, carefully place at least one foot thick over filter cloth.

Fertilize, seed, and mulch each crossing's slopes as soon as practicable after completing the crossing and in no case more than two weeks after disturbance of the slopes.

WATER AND AIR POLLUTION:

The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent pollution of rivers, streams, and water impoundments. Pollutants such as chemicals, fuels, lubricants, bitumens, raw sewage, and other harmful waste shall not be discharged into or alongside of rivers, streams, or impoundments, or into natural or manmade channels leading thereto.

The Contractor shall comply with all State or local air pollution regulations throughout the life of the project.

DUST CONTROL:

The Contractor shall control dust throughout the life of the project within the project area and at all other areas affected by the construction of the project, including, but not specifically limited to, unpaved secondary roads, haul roads, access roads, disposal sites, borrow and material sources, and production sites. Dust control shall not be considered effective where the amount of dust creates a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property.

NOISE CONTROL:

The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent excessive and unnecessary noise. The Contractor shall choose his methods so as to minimize the disturbance of area residents.
END OF SECTION 02910

SECTION 02920 - FERTILIZING, SEEDING AND MULCHING

PART 1 - GENERAL

RELATED DOCUMENTS:

The general provisions of the Contract, including the General and Special Conditions and Division-1 Specification sections apply to work of this section.

DESCRIPTION OF WORK:

Permanent Seeding: Permanent seeding is required for all areas disturbed by construction, except for areas covered by structures, pavements, etc.

Temporary Seeding: Soil stabilization shall be achieved on any area of a site where land-disturbing activities have temporarily or permanently ceased according to the following schedule:

1. All perimeter dikes, swales, ditches, perimeter slopes and all slopes steeper than 3 horizontal to 1 vertical (3:1) shall be provided temporary or permanent stabilization with ground cover as soon as practicable but in any event within 7 calendar days from the last land-disturbing activity.

2. All other disturbed areas shall be provided temporary or permanent stabilization with ground cover as soon as practicable but in any event within 14 calendar days from the last land-disturbing activity.

3. As deemed necessary by the Engineer.

The following conditions and/or exemptions shall apply in meeting the stabilization requirements above:

1. Extensions of time may be approved by the permitting authority based on weather or other site-specific conditions that make compliance impracticable.
2. All slopes 50' in length or greater shall apply the ground cover within 7 days except when the slope is flatter than 4:1. Slopes less than 50' shall apply ground cover within 14 days except when slopes are steeper than 3:1, the 7 day-requirement applies.
3. Any sloped area flatter than 4:1 shall be exempt from the 7-day ground cover requirement.
4. Slopes 10' or less in length shall be exempt from the 7-day ground cover requirement except when the slope is steeper than 2:1.

5. Although stabilization is usually specified as ground cover, other methods, such as chemical stabilization, may be allowed on a case-by-case basis.
6. For portions of projects within one mile and draining to trout waters and High Quality Waters as classified by the Environmental Management Commission, stabilization with ground cover shall be achieved as soon as practicable but in any event on all areas of the site within 7 calendar days from the last land-disturbing act.
7. For portions of projects located in Outstanding Resource Waters watersheds as classified by the Environmental Management Commission, stabilization with ground cover shall be achieved as soon as practicable but in any event on all areas within 7 calendar days from the last land-disturbing act.
8. Portions of a site that are lower in elevation than adjacent discharge locations and are not expected to discharge during construction may be exempt from the temporary ground cover requirements if identified on the approved E&SC plan or added by the permitting authority.

QUALITY ASSURANCE:

Codes and Standards: In general, follow procedures and guides published by the Soil Conservation Service, United States Department of Agriculture.

PART 2 - PRODUCTS

FERTILIZER:

Provide commercial fertilizer conforming to statutory requirements and all rules and regulations adopted by the North Carolina Board of Agriculture.

LIMESTONE:

Provide agricultural limestone conforming to all statutory requirements and all rules and regulations adopted by the North Carolina Board of Agriculture.

SEED:

Provide seed conforming to all statutory requirements and all rules and regulations adopted by the North Carolina Board of Agriculture.

Provide seed in accordance with requirements shown below. Deliver to site in original containers, labeled to show that the requirements of the N.C. Seed Law are met.

Quality of seed shall conform to the following:

Common Name	Minimum Seed Purity %	Minimum Germination %	Maximum Weed Seed %
Grasses			
Fescue Tall (KY.-31)	98	90	1.00
Common Bermudagrass	99	90	0.1
Centipede	80	90	1.00
Rye	80	90	1.00

Seeding containing prohibited noxious weed seed shall not be accepted. Seed shall be in conformance with state seed law restrictions for restricted noxious weeds.

If seed of the accepted quality cannot be bought, secure prior approval before making changes or exceptions.

MULCH:

Mulch for erosion control shall consist of grain straw or other acceptable material, and shall have been approved by the Engineer before being used. All mulch shall be reasonably free from mature seedbearing stalks, roots, or bulblets of Johnson Grass, Nutgrass, Sandbur, Wild Garlic, Wild Onion, Bermuda Grass, Crotalaria, and Witchweed, and free of excessive amount of restricted noxious weeds as defined by the North Carolina Board of Agriculture at the time of use of the mulch. Also there shall be compliance with all applicable State and Federal domestic plant quarantines. Straw mulch that is matted or lumpy shall be loosened and separated before being used.

Material for holding mulch in place shall be asphalt or other approved binding material applied in accordance with this section.

JUTE MESH:

Use jute mesh on seeded areas where slope is steeper than 2 horizontal to one vertical (2:1 slope). Use woven jute yarn weighing approximately 90 lbs. per 100 sq. yds. and having 3/4" openings.

PART 3 - EXECUTION

GENERAL:

Follow procedures set forth in the publication "Guide for Sediment Control on Construction Sites in North Carolina" by the United States Department of Agriculture, Soil Conservation Service, and as specified herein.

Scarify soil to a depth of three (3) inches and work into a satisfactory seed bed by discing, use of cultipackers, harrows, drags and other approved means.

Preparation outlined above shall not be done when the soil is frozen, wet or otherwise in an unfavorable condition.

Begin and complete seeding operations as outlined below as soon as possible after final grading is completed, but in no event later than 30 days after completion of final grading.

Seeding and mulching operations shall not begin until electrical service has been installed within the project, unless directed by the Engineer.

Distribute lime and fertilizer, uniformly over seed bed and harrow, rake, or otherwise work same into seed bed.

Distribute seed uniformly over seed bed. Cover seed lightly after seeding.

No lime, fertilizer, or seed shall be applied during a strong wind, when soil is wet or otherwise unworkable. Should rain follow seeding before rolling is begun, the bed shall not be rolled.

PERMANENT SEEDING:

Application of Lime, Fertilizer and Seed:

Apply lime at the rate of 2 tons per acre.

Apply fertilizer at a rate and analysis which will provide the following amounts of nutrients:

Nitrogen: 100 pounds per acre
Potash: 200 pounds per acre
Phosphorous: 200 pounds per acre

Apply 600 pounds per acre of 20% superphosphate or equivalent in addition to that listed above or use an analysis which will provide the additional phosphorous.

Provide permanent seeding in accordance with the following schedule:

(January 1 – March 31)
Common Bermuda grass (unhulled) - 20 pounds per acre
Rye (grain) - 25 pounds per acre

(April 1 – July 31)
Common Bermuda grass (hulled) - 15 pounds per acre
Weeping Lovegrass - 5 pounds per acre
Centipede - 8 pounds per acre

(August 1 – December 31)
Common Bermuda grass (unhulled) - 20 pounds per acre
Tall Fescue - 60 pounds per acre
Rye (grain) - 25 pounds per acre

Seed Bed Protection:

Straw Mulch - 2 tons per acre (visual)
Asphalt Tack - 0.03 gallons per square yard

TEMPORARY SEEDING:

Seed in accordance with Soil Conservation Service recommendations with regard to seed type, rate of application, fertilizer, etc.

APPLICATION OF MULCH:

Apply mulch immediately after permanent seeding at a uniform rate sufficient to achieve approximately 80% coverage of ground surface. Care must be taken to prevent the mulch from being applied too thickly and smothering the seedlings. Mulch for temporary seeding should be applied based upon the recommendations of the Soil Conservation Service for the particular type of seed to be used.

Mulch Anchoring:

On ground slopes less than 4%, anchor mulch with a straight blade disk or anchoring tool. Press mulch into soil about three inches. Operate equipment across slopes.

On ground slopes greater than 4%, apply asphalt with suitable applicator at a rate of not less than 150 gallons per ton of mulch.

Peg and twine anchoring may be used on steep slopes. Drive 8" wood stakes every 3 to 4 feet in all directions. Stretch in a crisscross and square in all directions. Secure twine around pegs and drive pegs flush with surface.

REPAIR AND MAINTENANCE:

Maintain the grass on the area for a period of 90 days after the grass growth appears. Reseed bare areas and repair all eroded areas during that period.

Repairs: Inspect all seeded areas and make necessary repairs or reseedings within the planting season, if possible. If stand should be over 60% damaged, reestablish following original lime, fertilizer and seeding recommendations.

All areas which do not exhibit satisfactory ground cover within 45 days of seed application shall be replanted.

END OF SECTION 02920

SECTION 03305 – CONCRETE

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division - 1 Specification Sections apply to work of this section.

DESCRIPTION OF WORK:

Concrete work includes, but is not specifically limited to, concrete piers, pipe encasement, concrete curbs and gutters, concrete drives, walks and other concrete items required in the project.

RELATED ITEMS SPECIFIED ELSEWHERE:

Storm Sewer System: Section 02736

QUALITY ASSURANCE:

Codes and Standards: AC1 301 "Specifications for Structural Concrete for Buildings"; AC1 347 "Recommended Practice for Concrete Formwork", AC1 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete"; comply with applicable provisions except as otherwise indicated.

Workmanship: The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed by the Engineer.

Concrete Testing Service: Employ a testing laboratory acceptable to the Engineer to perform material evaluation tests and to design concrete mixes at Contractor's expense.

Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing. Certificates of compliance must be signed by the materials producer and the Contractor.

PART 2 - PRODUCTS

CONCRETE MATERIALS:

Portland Cement: ASTM C150, Type 1, unless otherwise acceptable to the Engineer.

Aggregates: ASTM C33, except local aggregates of proven durability may be used when acceptable to the Engineer.

Water: Clean, potable.

Design strength: 4000 psi for sidewalks curb and gutter, drives, etc.; 3,000 PSI with 3/8" aggregate for masonry fill; 2500 psi for pipe blocking and encasement.

No admixtures containing calcium chloride may be used. Use Pozzolith by Master Builders, Plastiment or Plasticrete by Silka and Chemstrong A, R, or W by Castle Chemical Company or approved equal. Retarders and accelerators shall be used only as directed by the Engineer.

Air-Entraining Admixture: ASTM C260. Only use admixtures having neutralized vensol resins. Use MB-VR by Master Builders, SIKA AER by Sika Chemical Company, or CASTLE VR by Castle Chemical Company, or approved equal.

Use air-entraining admixture in all concrete, providing not less than 4% nor more than 6% entrained air.

Water-Reducing Admixture: ASTM C494, Type A, D, and E. Only use admixtures which have been tested and accepted in mix designs, unless otherwise acceptable.

Mortar: Mortar used for sewer structures shall conform to ASTM Specification C-144 as to aggregate and strength. Mortar shall be prepared from cement in perfect condition and shall be prepared in box for that purpose. No mortar that has stood beyond 45 minutes shall be used. Proportion by volume for different kinds of work shall be:

Brick Masonry 1 part cement to 2 parts sand
Jointing 1 part cement to 1 part sand

Concrete: Concrete shall be only plant-mixed or transit-mixed concrete conforming to ASTM C-94 for Ready-Mix Concrete.

FORM MATERIALS:

Provide form materials with sufficient stability to withstand pressure of placed concrete without bow or deflection.

Exposed Concrete Surfaces: Acceptable panel-type to provide continuous, straight, smooth, as-cast surfaces. Use largest practical sizes to minimize form joints.

Unexposed Concrete Surfaces: Suitable material to suit project conditions.

CURING COMPOUND:

Liquid membrane forming curing compound shall comply with ASTM C300, Type I Class A, minimum 22% solids.

REINFORCING MATERIALS:

Reinforcing Bars: ASTM A615, Grade 40

Welded Wire Fabric: ASTM A185

JOINT MATERIALS:

Self-Expanding Cork Joint Filler: Provide resilient and non-extruding type premolded cork units complying with ASTM D1752, Type III.

Water - Stop: PVC meeting Corps of Engineers CRD-C572 with center bulb.

PART 3 - EXECUTION

FORMING AND PLACING CONCRETE:

Ready-Mixed Concrete: ASTM C94. Furnish delivery tickets for each load showing amount of each material in the batch, time batched, date, job.

Formwork: Construct so that concrete members and structures are of correct size, shape, alignment, elevation and position, complying with ACI 347. Provide 3/4" chamfer on all exposed corners.

Provide openings in formwork to accommodate work of other trades. Accurately place and securely support items built into forms.

Clean and adjust forms prior to concrete placement. Apply form release agents or wet forms, as required. Retighten forms during and after concrete placement if required to eliminate mortar leaks.

Reinforcement: Position, support and secure reinforcement against displacement. Locate and support with metal chairs, runners, bolsters, spacers and hangers, as required. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Install welded wire fabric in as long lengths as practicable, lapping at least one mesh.

Joints: Provide construction, expansion, weakened-plane (contraction), isolation, and control joints as indicated or required. Locate construction joints so as to not impair the strength and appearance of the structure. Place isolation and control joints in slabs-on-ground to stabilize differential settlement and random cracking.

Provide expansion and weakened-plane (contraction) joints where shown or required. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, either tooled, or with inserts unless otherwise shown. Tool edges of joints where slabs, walks, drives, curbs and gutters, etc. are constructed or replaced.

Place construction joints at the end of pours and at locations where placement operations are stopped for more than 1/2 hour, except where such pours terminate at expansion joints. Construct joints as shown or, if not shown, use standard metal keyway sections.

Provide premolded joint filler for expansion joints abutting curbs, manholes, and other fixed objects. Locate at 20' o.c. for pavement lanes unless otherwise specified.

Concrete Placement: Comply with ACI 304, placing concrete in a continuous operation within planned joints or sections. Do not begin placement until work of other trades affecting concrete is completed.

Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping, so that concrete is worked around reinforcement and other embedded items and into all parts of forms.

Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement and curing.

In cold weather comply with ACI 306.
In hot weather comply with ACI 305.

CONCRETE FINISHES:

Exposed-to-view Surfaces: Provide a smooth rubbed finish for exposed formed concrete surfaces and surfaces that are to be covered with a coating or covering material applied directly to concrete. Remove fins and projects, patch defective areas with cement grout, and rub smooth.

Slab Trowel Finish: Apply trowel finish to interior monolithic slab surfaces that are exposed-to-view or are to be covered with resilient covering, paint or other thinfilm coating. Consolidate concrete surface by finish troweling, free of trowel marks, uniform in texture and appearance.

Curing: Begin initial curing as soon as free water has disappeared from exposed surfaces. Where possible, keep continuously moist for not less than 72 hours. Continue curing by use of moisture-retaining cover or membrane-forming curing compound. Apply curing compound according to manufacturer's instructions and Federal Specification TT-C-00800. Cure formed surfaces by moist curing until forms are removed. Provide protections as required to prevent damage to exposed concrete surfaces.

Drives, Walks, Curbs and gutter Finishing: After striking-off and consolidating, smooth the concrete surface by screeding and floating. Work edges of slabs, gutters, and other formed joints with an edging tool to a ½" radius. After floating and when excess moisture or surface sheen has disappeared, complete surface finishing as follows:

Broom finish by drawing a fine-hair broom perpendicular to line of traffic, as acceptable to the ENGINEER.

END OF SECTION 03305

APPENDIX

GEOTECHNICAL ENGINEERING REPORT

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.

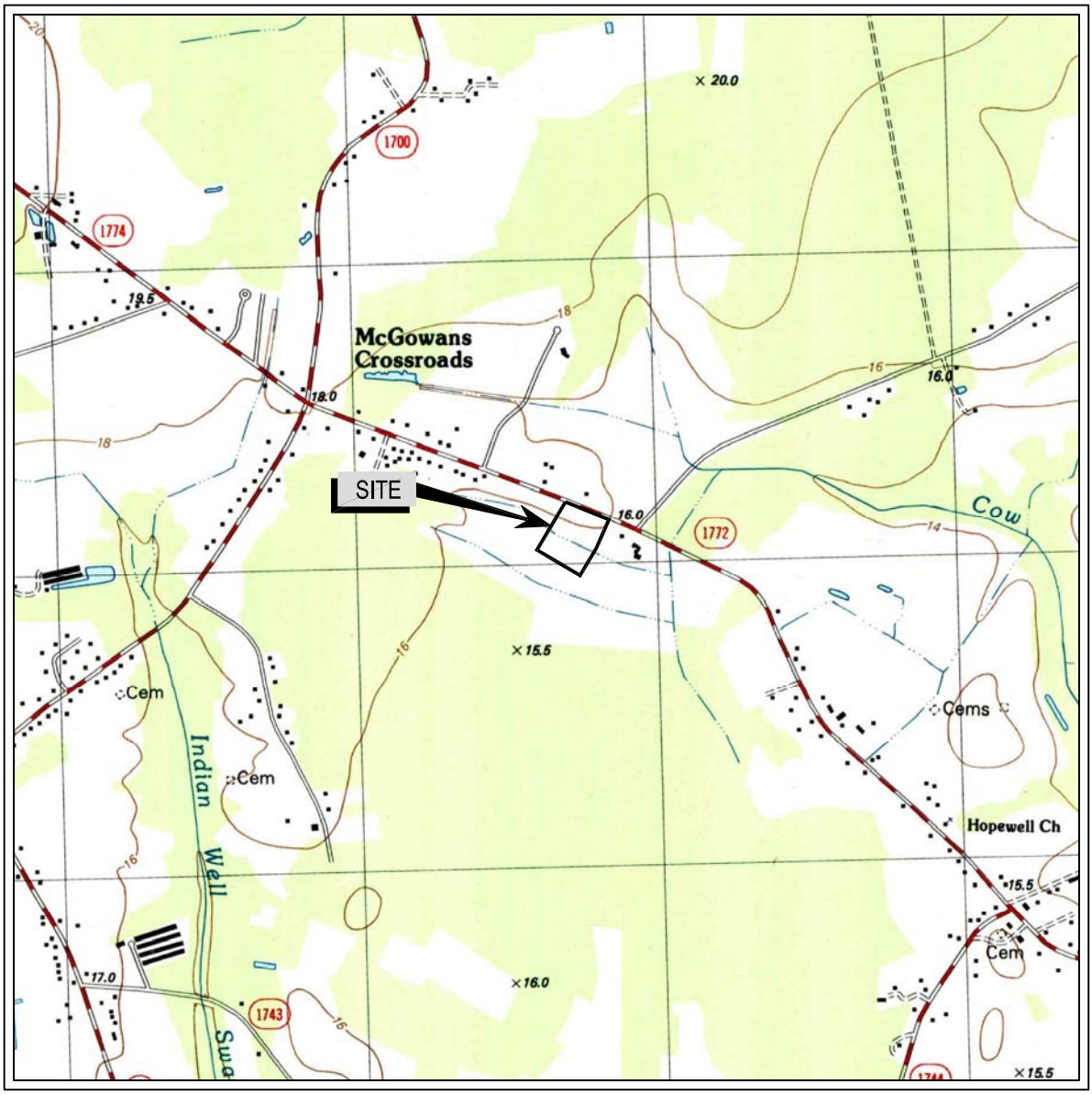
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the 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

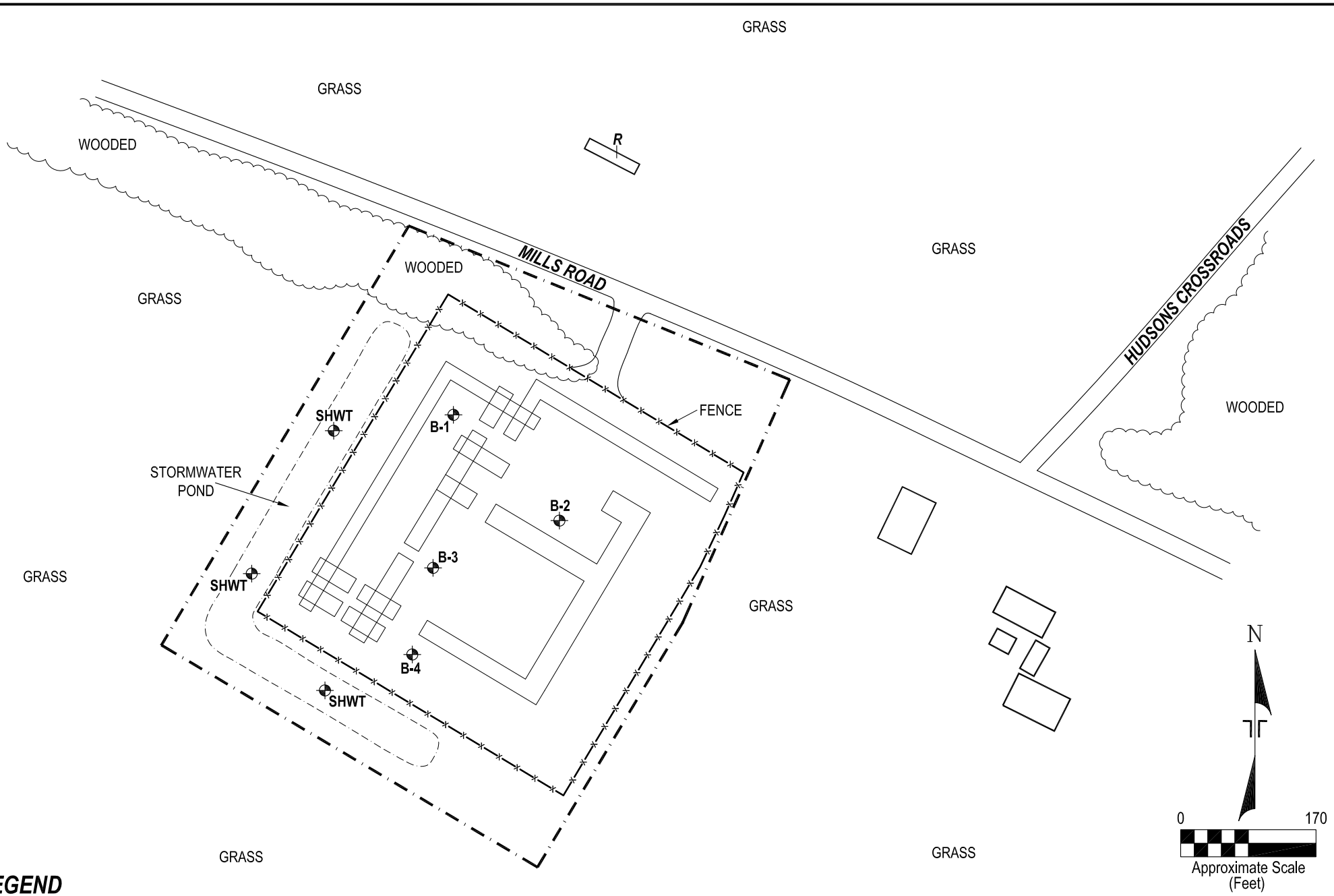
CONTOUR INTERVAL 2 METERS

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 **LEAN CLAY WITH SAND (CL)**, gray, soft	5		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 **FAT CLAY (CH)**, dark gray, very soft	15							
				X	1-1-1 N=2	6	64		
	23.0 **LEAN CLAY (CL)**, dark gray, very soft	20							
				X	1-1-1 N=2	7	55		
	30.0 ***Boring Terminated at 30 Feet***	25							
				X	1-1-1 N=2	8	51		
		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 **POORLY GRADED SAND (SP)**, light tan, loose	5		X	4-3-2 N=5	3			
	8.0 **SILTY SAND (SM)**, dark gray, loose		▽	X	1-2-3 N=5	4			
	13.0 **FAT CLAY (CH)**, dark gray, very soft to soft	10		X	1-1-2 N=3	5	54	69-17-52	98
		15		X	1-1-1 N=2	6			
	23.0 **LEAN CLAY (CL)**, dark gray, very soft	20		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		
		1-2-1 N=3	8	60		
30.0	***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 **POORLY GRADED SAND (SP)**, gray brown, loose	5		X	5-3-3 N=6	3			
	8.0 **CLAYEY SAND (SC)**, gray, medium dense		▽	X	2-2-8 N=10	4			
	13.0 **POORLY GRADED SAND (SP)**, gray, loose	10		X	7-9-6 N=15	5			
	18.0 **LEAN CLAY (CL)**, dark gray, very soft	15		X	1-1-1 N=2	6			
	28.0 **FAT CLAY (CH)**, dark gray, very soft	20		X	1-1-1 N=2	7			
	30.0 ***Boring Terminated at 30 Feet***	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*

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314 Beacon Drive
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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

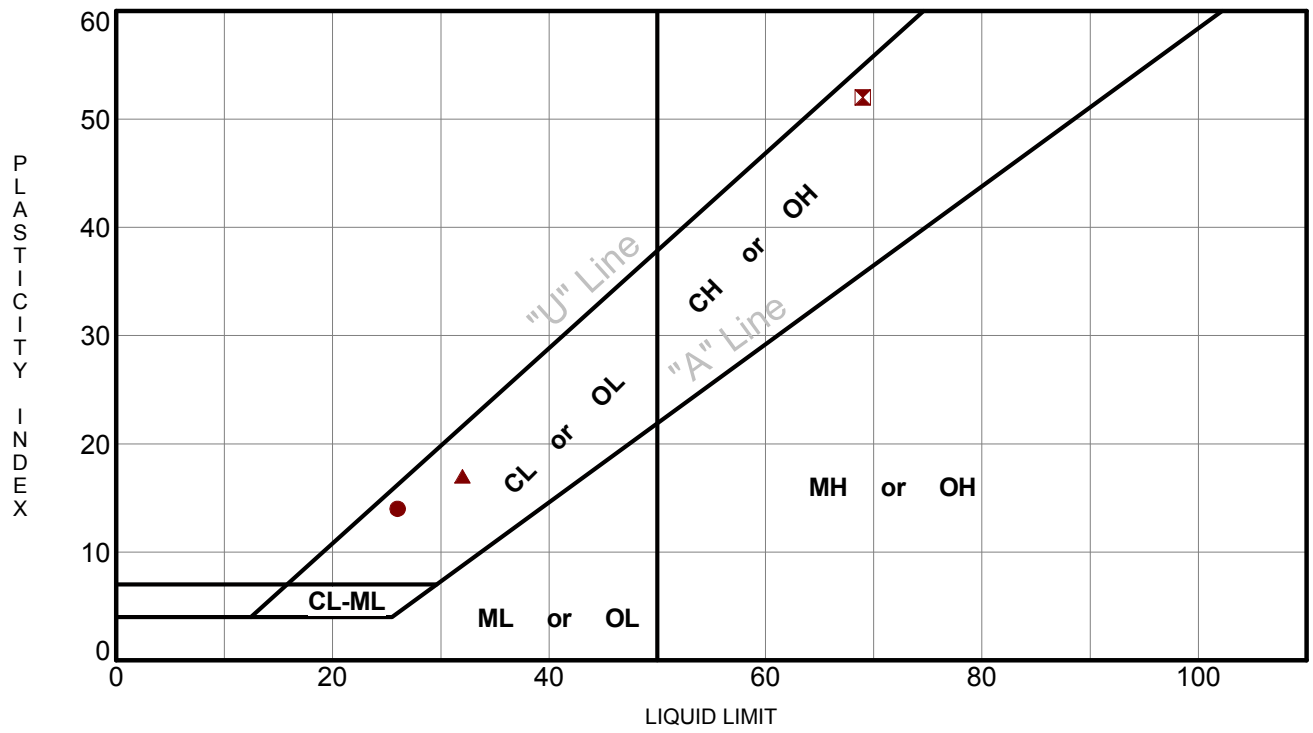
LABORATORY TESTING

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

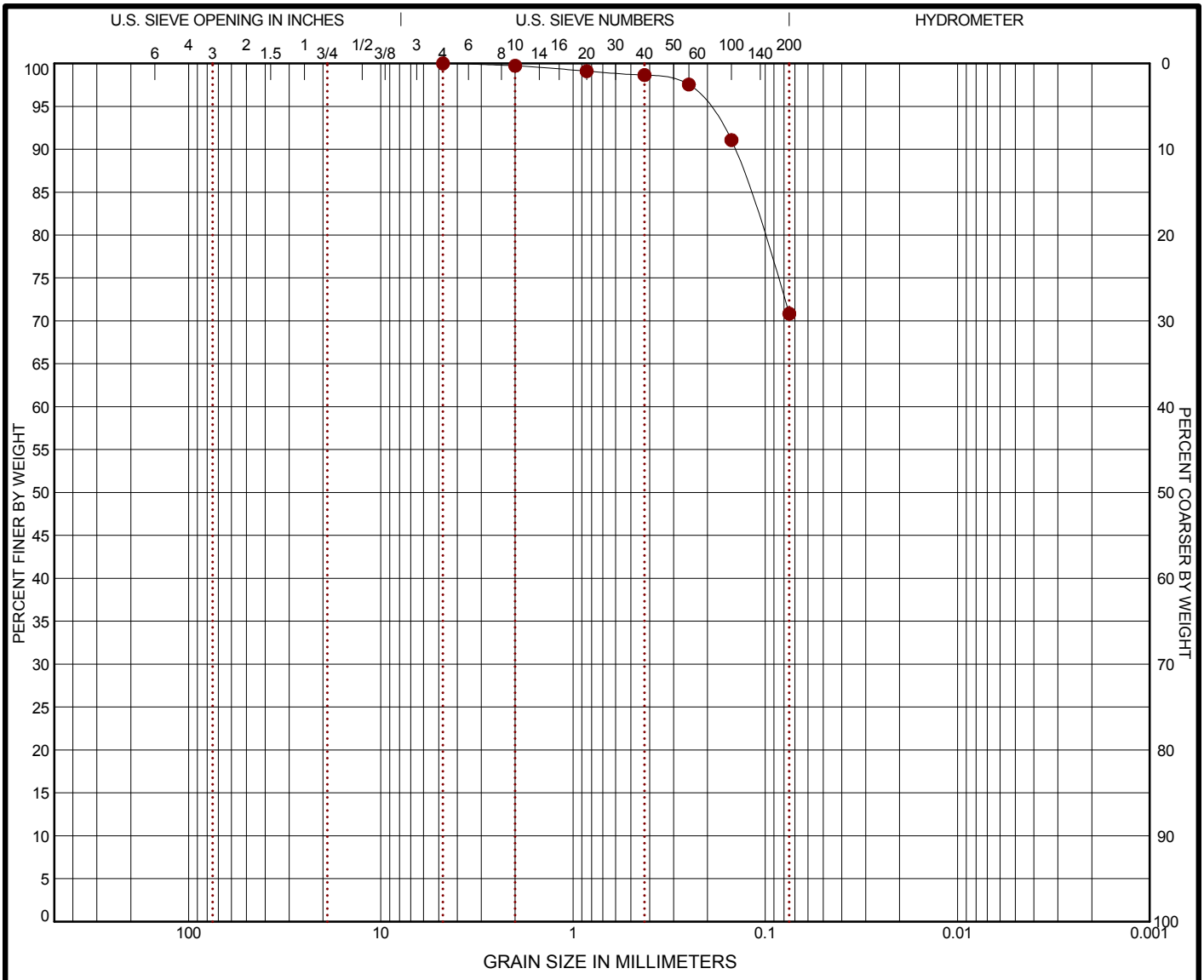
PROJECT NUMBER: 72145022

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

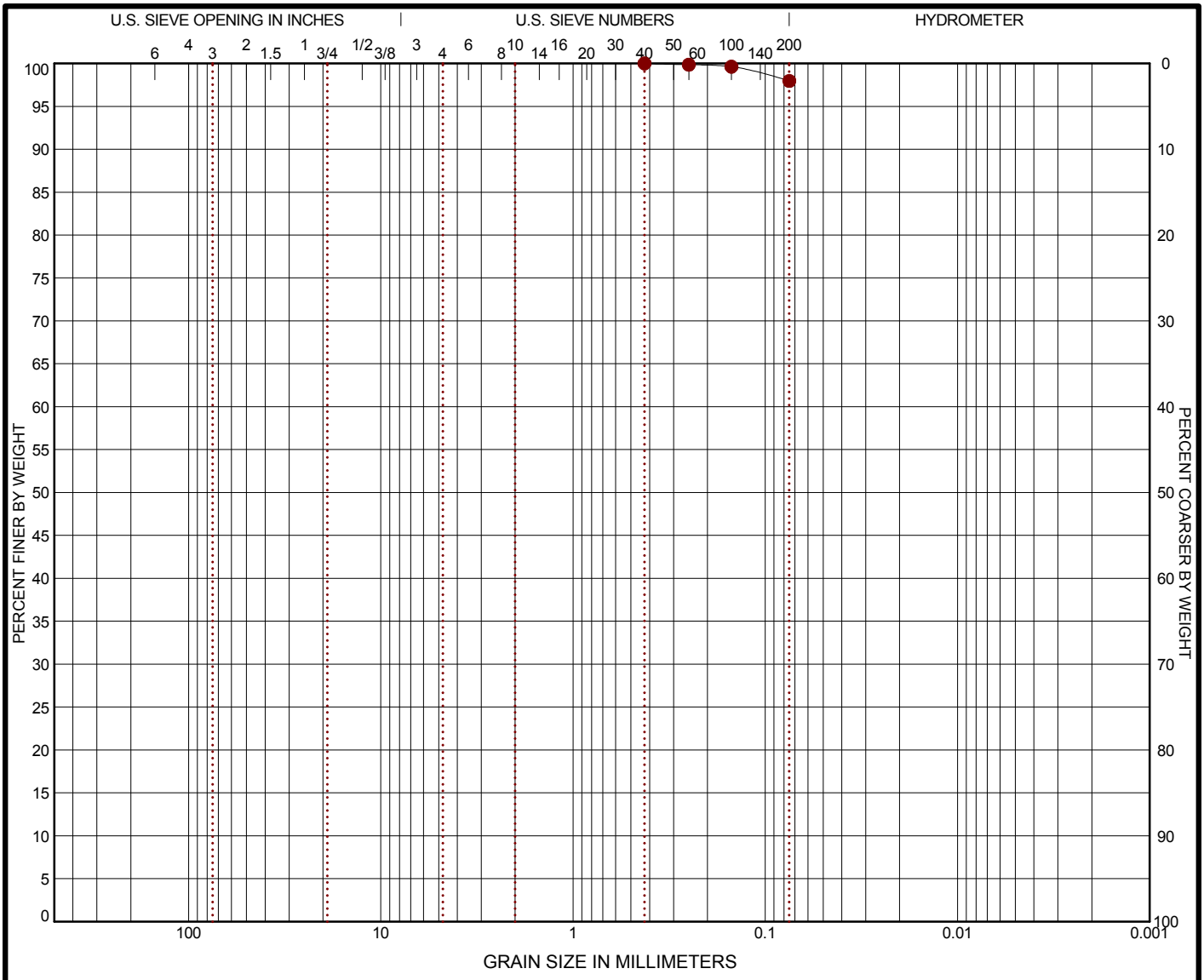
CLIENT: Ark Consulting Group, PLLC Greenville, NC

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

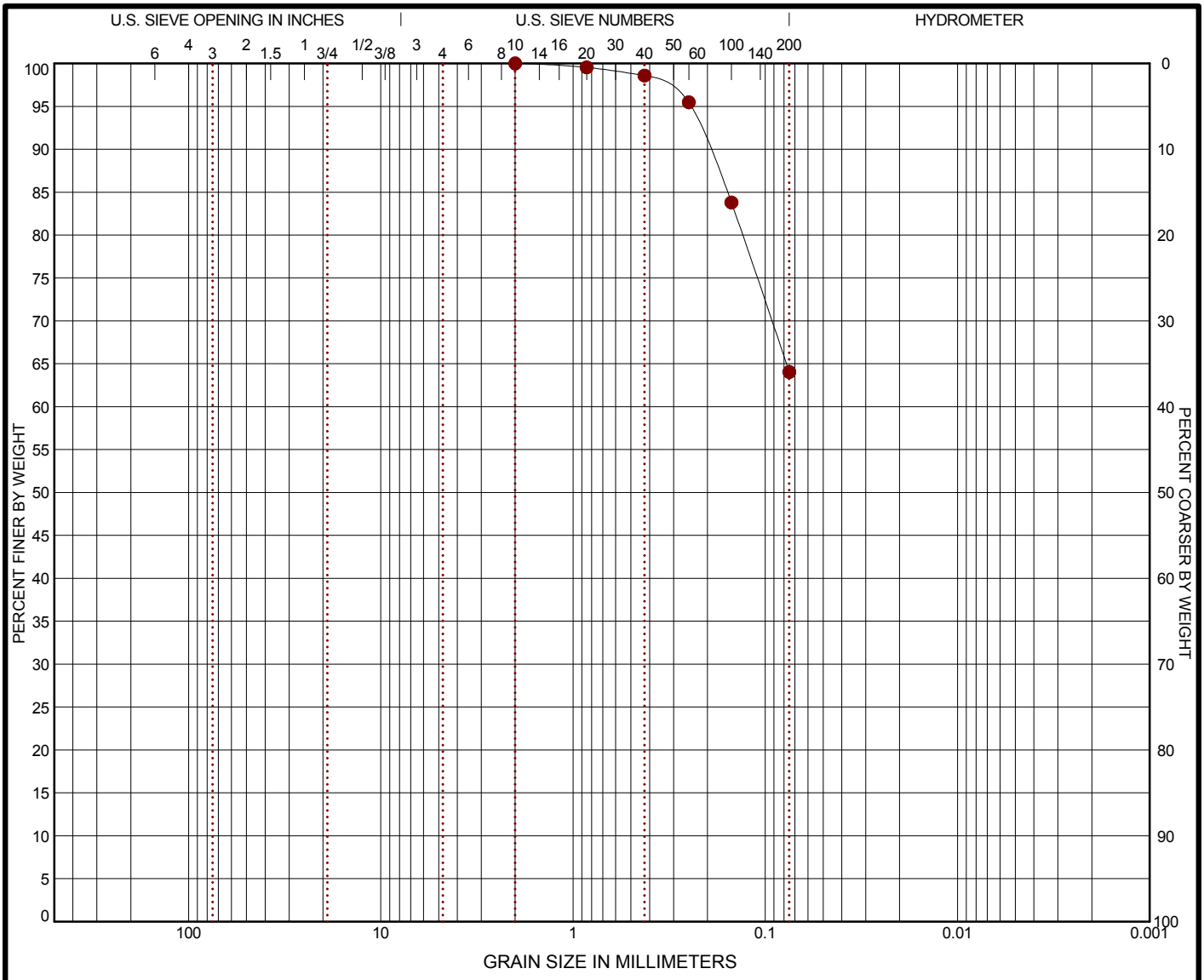
CLIENT: Ark Consulting Group, PLLC Greenville, NC

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.

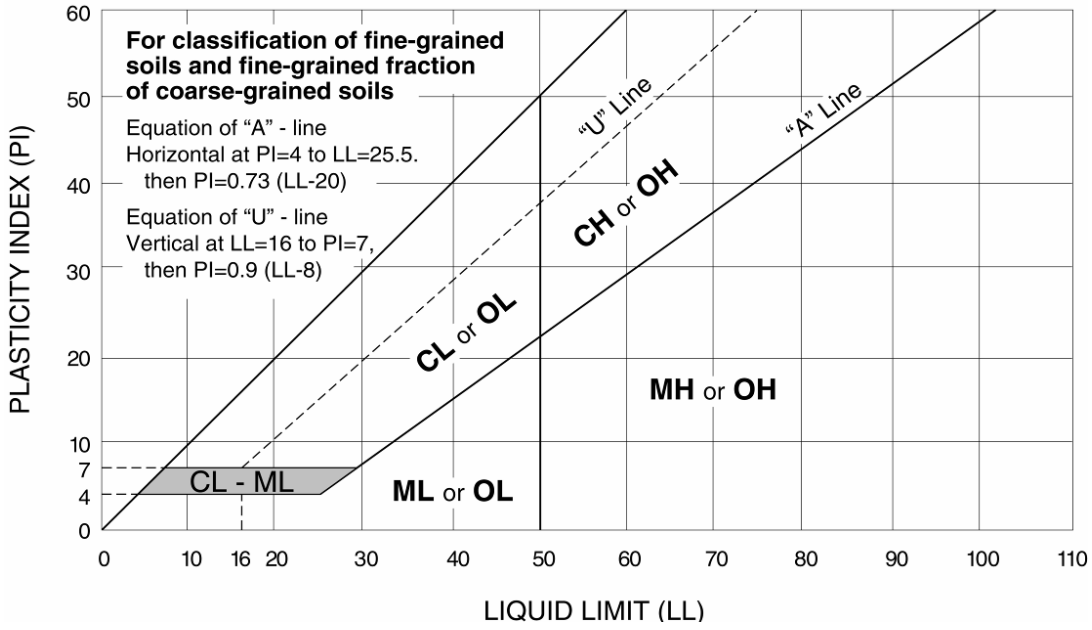
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[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]
		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.

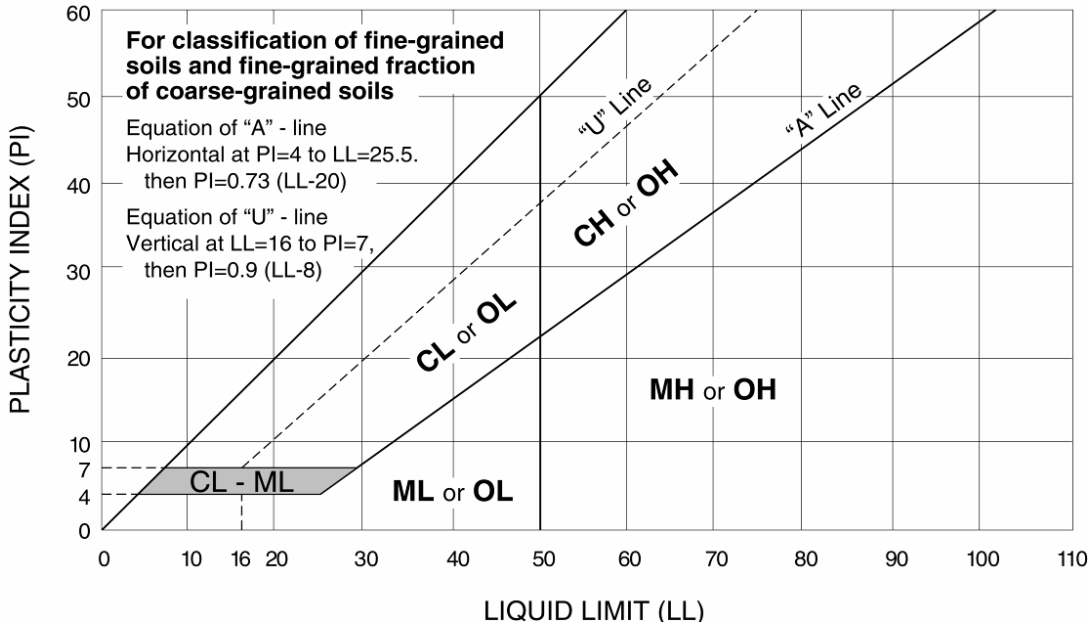
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[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.



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

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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

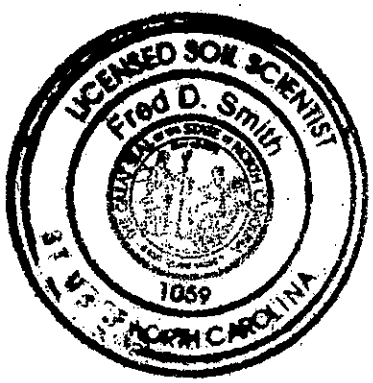

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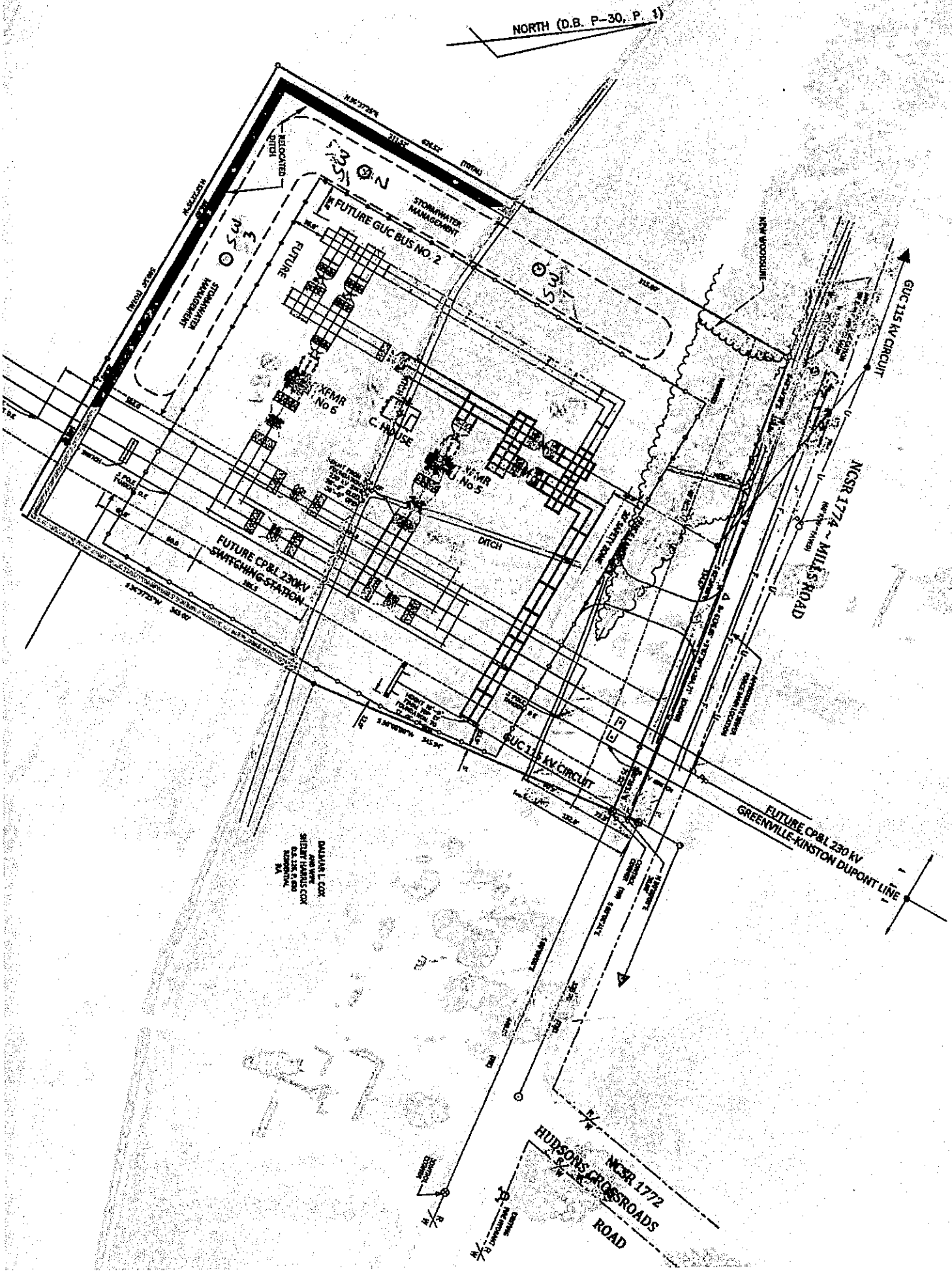
Table 1
Soil Descriptions
Mills Road Substation
Greenville, NC

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.


NORTH (D.B. P-30, P. 1)
FUTURE GUC BUS NO. 2
STORMWATER MANAGEMENT
FUTURE
XFMR No 6
C. HOUSE
XFMR No 5
DITCH
FUTURE CP&L 230KV SWITCHING STATION
GUC 115 KV CIRCUIT
GUC 115 KV CIRCUIT
NCSR 1774 - MILLS ROAD
FUTURE CP&L 230 KV GREENVILLE-KINSTON DUPONT LINE
NCSR 1772
HUDSONS CROSSROADS ROAD