

**GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA**

**SPECIFICATIONS AND BID DOCUMENTS
FOR THE INSTALLATION OF SUGG
PARKWAY FOUNDATIONS**

ISSUED FOR BIDS

**GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA**

**SPECIFICATIONS AND BID DOCUMENTS
FOR THE INSTALLATION OF
SUGG PARKWAY FOUNDATIONS**

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NOTICE TO PROSPECTIVE BIDDERS

Sealed Proposals for the installation of the Sugg Parkway Foundations, complete and conforming to the bid documents, as set forth in the Bid Schedule, will be received by Greenville Utilities Commission, North Carolina (hereinafter referred to as the Owner) at the offices of the Procurement Manager, Greenville Utilities Commission, 401 S. Greene Street, Greenville, NC 27834 on or before **2:00 PM, local time, Wednesday, December 16, 2020**, at which time the Proposals will be opened and read. Any Proposal received subsequent to that time will be promptly returned to the Bidder unopened. All questions concerning this bid must be received by **Tuesday, December 1, 2020**.

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

We are requesting that you also send a scanned copy of your bid or electronic copy via e-mail to my attention at: haddocgc@guc.com

Please note to send the scanned copy of your bid or electronic copy via e-mail on December 17, 2020, by 2:00 pm. Do not send before December 17, 2020.

We must still receive your sealed proposal/bid (paper hardcopy) by 2:00 pm (EDST) on December 16, 2020 per the bid instructions for your sealed proposal/bid to be considered.

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

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

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

**GREENVILLE UTILITIES COMMISSION OF THE
CITY OF GREENVILLE, NORTH CAROLINA**

By: Anthony C. Cannon
General Manager/ CEO

Date: _____

DEFINITIONS

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

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

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

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

INSTRUCTIONS TO BIDDERS

1.0 Proposals

- 1.1 Only those Proposals made in accordance with these instructions will be considered.
- 1.2 Bids not received on the *Form of Proposal* contained herein will be considered unresponsive. The forms shall be filled out complete; any omissions may cause the entire Proposal to be rejected.
- 1.3 Proposals must be made on the *Form of Proposal* provided herein and must not be altered, erased, or interlined in any manner. The Bidder shall fill in the *Form of Proposal* as detailed in the Terms and Conditions. The Bidder may retain one (1) copy, but the original, fully executed, must be inserted in or attached to the Bid Documents. Also, one (1) additional copy of all executed forms and supporting information shall be supplied.
- 1.4 Proposals must be enclosed in a sealed envelope, addressed to the Owner. The outside of the envelope must be marked with the Project name and the Bidder's name, bid opening date and time and the Bidder's license number shall be shown thereon.
- 1.5 Additional copies of these Specifications may be obtained upon request from the Engineer by approved Bidders upon payment of a fifty dollar (\$50.00) non-refundable fee per copy.
- 1.6 Proposals shall include a *Form of Exceptions* utilizing forms provided which shall itemize each and every exception from the Specifications. The *Form of Exceptions* shall state the section, subsection, and paragraph designations from the part of the Specifications to which exception is taken and explain in detail the nature of the exception. A copy of this *Form of Exceptions* is included in the Form of Proposals. Exceptions will not necessarily eliminate a Bidder from consideration, even if bids without exceptions are received from others. The treatment of exceptions will be based entirely on the overall best interests of the Owner.
- 1.7 Modifications to bids must be by removal of the Bidder's original bid and the submittal of a completely revised bid package in full compliance with the Drawings, Specifications, and Bid Documents. This is required prior to the time of opening bids. No oral or telephonic Proposals will be accepted.
- 1.8 Should the Bidder find discrepancies in or omissions from the Drawings or Documents or should he be in doubt as to their meaning, he shall at once notify the Engineer who will send written instructions to all Bidders. Neither the Owner nor the Engineer will be responsible for any oral instructions. If Plans and Specifications are found to disagree after Contract is awarded, the Engineer shall be the judge as to what was intended. The Successful Bidder is hereby made responsible for the furnishing of the necessary labor, tools and equipment reasonably inferred or evidently necessary for the proper execution and completion of the work; for any additional work involved in the correction of apparent errors or inconsistencies, and in executing the true intent and meaning of the Drawings and Specifications as interpreted by the Engineer and all such labor and equipment shall be provided at the Contractor's expense, and under no condition will any such labor and equipment be allowed as an extra.

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

2.0 Payment

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

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

3.0 Bid Security

- 3.1 Each Proposal shall be accompanied by a cashier's check, or certified check drawn on a bank or trust company insured by the Federal Deposit Insurance Corporation, or the Savings Association Insurance Fund, or a Bid Bond in an amount equal to not less than five percent (5%) of the total amount of the Proposal; said deposit to be retained by the Owner as liquidated damages in event of failure of the Successful Bidder to execute the Contract within ten (10) days after the award.
- 3.2 Bid Bond shall be conditioned that the Surety will upon demand forthwith make payment to the Obligee upon said Bond if the Bidder fails to execute the Contract in accordance with the Bid Bond, and upon failure to immediately make payment, the Surety shall pay to the Obligee an amount equal to double the amount of said Bond. Standard Form of Bid Bond is included in these Specifications.
- 3.3 Only one (1) bid Surety is required, the amount of which shall be based on the total amount of all bid schedules.

4.0 Bulletins and Addenda

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

5.0 Award of Contract

- 5.1 The award of the Contract will be made to the lowest acceptable Bidder as soon as practicable. The bid shall be awarded to the Bidder who, in the judgment of the Owner, offers the best value to the Owner. Factors to be considered by the Owner are specified in Paragraph 5.3. The Owner reserves the right to reject any and all bids.
- 5.2 The Owner reserves the right to waive minor irregularities or minor errors in any Proposal if it appears to the Owner that such irregularities or errors were made through inadvertence. Any such irregularities or errors so waived must be corrected on the Proposal prior to its acceptance by the Owner.
- 5.3 In estimating the lowest cost to the Owner as one of the factors in deciding the award of the Contract, the Owner will consider, in addition to the prices quoted in the Proposal, the following:
 1. Completion date,
 2. Adherence to the Plans and Specifications,
 3. Contractor capabilities, crew experience, and past performance,
 4. Conditional quotations (Only firm fixed prices in U.S. dollars),
 5. Any additional factors deemed appropriate by the Owner.
- 5.4 In the event the Bidder proposes any change or deviation from the Engineer's Plans and Specifications, such proposed changes or deviations must be submitted at the time bids are opened on the *Form of Exceptions* included. The Owner reserves the right to reject any proposed changes or deviations. All exceptions must be stated on the *Form of Exceptions*. Failure to provide a *Form of Exceptions* with the Proposal shall imply strict adherence to all details of the Plans and Specifications.
- 5.5 The Contract, when awarded, shall be deemed to include the Specifications for the equipment, and the Bidder shall not claim any modification thereof resulting from any representative or

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

6.0 Performance and Payment Bonds

- 6.1 The Successful Bidder shall be required to furnish separate Performance and Payment Bonds executed on the forms bound herein in amounts at least equal to one hundred percent (100%) of the Contract price as security for the faithful performance of this Contract and as security for the payment of all persons performing labor and furnishing materials and equipment in connection with this Contract.
- 6.2 Performance and Payment Bonds shall be with a Surety company authorized and licensed to do business in the State of North Carolina and shall be for the full Contract sum.

7.0 Examination of Conditions

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

8.0 Subcontractors

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

9.1 Completion

- a. The award of this Contract shall be issued as soon as possible, subsequent to the bid opening, by issuance of written contract to the Contractor from the Owner.
- b. The completion date for the projects' on-site activities shall be 90 days from the issuance of written contract.
- c. Time for completion shall be extended for delays due to bad weather days or other special cases with the written consent of the Owner and/or Engineer.
- d. The Contractor shall include in the Proposal a project construction schedule indicating each major construction activity with duration and the total number of calendar days of construction time he proposes to perform his work based on the above completion date.

10.0 Liquidated Damages

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

11.0 Bids to be Retained

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

12.0 Delivery Location

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

13.0 Form of Proposal

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

14.0 Contractor's Insurance

14.1 General Liability

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

14.2 Automobile Liability

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

14.3 Workers Compensation

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

14.4 Employers Liability

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

14.5 Umbrella Liability

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

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

15.0 Contractor's License

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

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

GENERAL CONDITIONS

1.0 Drawings and Specifications

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

2.0 Clarifications and Detailed Drawings

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

3.0 Change in Drawings and/or Specifications

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

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

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

4.0 Copies of Bid Documents

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

5.0 Working Drawings and Specifications at the Job Site

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

6.0 Ownership of Drawings and Specifications

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

7.0 Materials, Equipment, And Employees

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

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

- 7.2 The Contractor shall not re- use any “removed” materials in the completion of this project unless indicated as a transfer unit on the construction drawings. Materials damaged or lost during construction of the work due to carelessness of the Contractor’s personnel, shall be replaced in kind by the Contractor at no cost to the Owner.
- 7.3 If at any time during the construction and completion of the work covered by these Specifications, the conduct of any workman of the various crafts is adjudged ungentlemanly and a nuisance to the Owner or the Engineer, or if any workman is considered incompetent or detrimental to the work, the Contractor shall order such parties to be immediately removed from the grounds.
- 7.4 Any superintendent or foreman of the Contractor who ignores or refuses to follow written instructions of the Owner or the Engineer or his representative at the site shall be immediately removed and replaced.
- 7.5 The Contractor shall insure that at all times he has sufficient crew compliments, both in terms of numbers and experience of personnel to perform work tasks safely, both for workers and the general public. Any instance noted to the contrary of this requirement may result in the complete shutdown of work on the project.

8.0 Royalties, Licenses, and Patents

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

9.0 Indemnification

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

10.0 Surveys

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

11.0 Uncorrected Faulty Work

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

12.0 Delays and Extension of Time

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

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

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

13.0 Liquidated Damages

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

14.0 Correction of Work Before Final Payment

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

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

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

15.0 Correction of Work AFTER Final Payment

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

16.0 The Owner's Right to Perform Work

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

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

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

17.0 Contractor's Affidavit

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

18.0 Assignments

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

19.0 Guarantee

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

20.0 Engineer's Status

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

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

21.0 Engineer's Decisions

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

22.0 Right-Of-Way

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

23.0 Accidents

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

24.0 Equal Employment Opportunity

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

- 24.1 The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, political affiliation or belief, age, or physical handicap. The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or physical handicap. Such action shall include but not be limited to the following employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices setting forth the provisions of the nondiscrimination clause.
- 24.2 The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or physical handicap.
- 24.3 The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or other understanding, a notice advertising the labor union or workers' representative of the Contractor's commitments under the Equal Employment Opportunity Section of this Contract and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 24.4 In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Owner contracts.
- 24.5 The owner has adopted an Affirmative Action & Minority & Women Business Enterprise Plan (M/WBE) Program. Contractors submitting a proposal are attesting that they also have taken affirmative action to ensure equality of opportunity in all aspects of employment, and to utilize M/WBE supplies of material and/or labor.

25.0 Mediation/Binding Arbitration

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

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

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

26.0 Government Restrictions

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

27.0 Patents and Copyrights

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

28.0 Patent and Copyright Indemnity

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

29.0 Exceptions

All proposals are subject to the terms and conditions outlined herein. All responses will be controlled by such terms and conditions and the submission of other terms and conditions, price catalogs, and other documents as part of a Bidder's response will be waived and have no effect on this Request for Proposal or any other contract that may be awarded resulting from this solicitation. The submission of any other terms and conditions by a Bidder may be grounds for rejection of the Bidder's proposal. The Bidder specifically agrees to the terms and conditions set forth in this set of Terms and Conditions by affixing its name on the signatory page contained herein.

30.0 Confidential Information

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

31.1 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 Procurement Manager, solely as a convenience to the Bidder, GUC may:

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

Include any person or entity designated by Bidder as a joint payee on the Bidder's payment check.

In no event shall such approval and action obligate GUC to anyone other than the Bidder, and the Bidder shall remain responsible for fulfillment of all contract obligations.

32.0 Availability of Funds

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

33.0 Governing Laws

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

34.0 Administrative Code

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

35.0 Execution

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

36.0 Clarifications/Interpretations

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

37.0 Situs

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

38.0 Termination of Agreement

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

39.0 Force Majeure

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

40.0 Integrated Contract

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

41.0 Contract Provisions

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

42.0 E-Verify

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

43.0 Iran Divestment Act Certification

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

44.0 Notices

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

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

SPECIAL CONDITIONS

1.0 Defective Workmanship

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

2.0 Materials

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

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

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

3.0 Defective Materials (Supplied by Contractor)

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

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

4.0 Storage of Materials

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

or roadway, causing said roadway impassable any time.

5.0 Protection to Persons and Property

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

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

- 5.1 The Contractor shall so conduct the substation construction as to cause the least possible obstruction of public highways or streets.
- 5.2 The Contractor shall provide and maintain all such guard lights and other protection for the public as may be required by applicable statutes, ordinances, and regulations or by local conditions.
- 5.3 The Contractor shall do all things necessary or expedient to protect properly any and all parallel, converging, and intersecting lines, joint line poles, highways, railways and any and all property of others from damage, and in the event that any such parallel, converging and intersecting lines, joint line poles, highways, railways or other property are damaged in the course of the construction of the line, the Contractor shall at his own expense immediately restore any or all of such damaged property to as good a state as before such damage occurred.
- 5.4 The Contractor shall enter and exit the right-of-way at those locations specified by Owner or the Engineer.

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

- 5.5 All ditches and access ways disturbed shall be returned to their pre-existing condition at the end of construction.
- 5.6 Any and all excess earth, rock, debris, underbrush, and other useless material shall be removed by the Contractor from the site of the work as rapidly as practicable as the work progresses.
- 5.7 Before beginning work in or around any areas where underground facilities are known to exist, the Contractor shall locate all such facilities including water, sewer, gas, telephone and electrical lines.
- 5.8 Upon violation by the Contractor of any provisions of this section, after written notice of such violation given to the Contractor by the Owner, the Contractor shall immediately correct such violation. Upon failure of the Contractor to do so, the Owner may correct such violation at the Contractor's expense.
- 5.9 The Contractor shall submit to the Owner monthly reports in duplicate of all accidents, giving such data as may be prescribed by the Owner.

6.0 Supervision and Inspection

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

binding upon the Contractor.

- 6.2 The Owner reserves the right to require the removal from the project of any employee of the Contractor if, in the judgment of the Owner, such removal shall be necessary in order to protect the interest of the Owner. The Owner shall have the right to require the Contractor to increase the number of his employees and to increase or change the amount or kind of tools and equipment if at any time the progress of the work shall be unsatisfactory to the Owner; the failure of the Owner to give any such directions shall not relieve the Contractor of his obligations to complete the work within the time and in the manner specified in this Proposal.
- 6.3 The manner of performance of the work, and all equipment used therein, shall be subject to the inspection, tests and approval of the Owner. The Contractor shall have an authorized agent accompany the Owner when final inspection is made and, if requested by the Owner, when any other inspection is made.
- 6.4 In the event that the Owner shall determine that the construction contains or may contain numerous defects, it shall be the duty of the Contractor, if requested by the Owner to have an inspection made by the Engineer for the purpose of determining the exact nature, extent, and location of such defects.

7.0 Temporary Construction

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

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

8.0 Normal Work Week

- 8.1 The Contractor shall provide the Owner quoted prices on a per-hour basis, for various personnel and equipment, assuming a normal work week as being forty (40) hours.
- 8.2 The Contractor shall state in the Proposal his normal work week for the project.
- 8.3 Work on weekends or generally accepted holidays will only be allowed if specific outage arrangements are required or the Contractor falls behind in meeting the project's scheduled completion date.
- 8.4 The Contractor will not be paid for inclement weather days or for travel time to and from the job site, unless expressly requested by the Contractor as a written stipulation to his original Proposal.

9.0 Job-Site Obligations

- 9.1 Except as otherwise provided in the Contract, necessary sanitary conveniences for use by the Contractor's employees and Subcontractors at the Jobsite shall be furnished and maintained by the Contractor in such manner and at such locations as shall be approved by the Company Representative and their use shall be strictly enforced.
- 9.2 The Contractor shall, at all times, keep its work areas in a neat, clean, and safe condition. The Contractor shall be responsible for continuous clean up and removal of its trash, debris, waste materials and scrap and disposal of same off the Jobsite. Upon completion of any portion of the Work, the Contractor shall immediately remove all of its equipment, construction plant, temporary structures and surplus materials not to be used at or near the same location during later stages of the Work. Upon completion of the Work and before final payment is made, the Contractor shall, at its expense, satisfactorily dispose of all plant, buildings, rubbish, unused

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

- 9.3 The Owner reserves the right to authorize its agents or designees to enter the Jobsite as it may elect for the purpose of inspecting the Work, or constructing or installing such collateral work as it may desire, or testing, boring or surveying, or any other purpose.
- 9.4 The Contractor understands and agrees that duly authorized representatives of government agencies having appropriate jurisdiction may enter the Jobsite at any time and from time to time.
- 9.5 If any Work or part thereof shall be covered contrary to the requirements of the Contract or the request of the Owner or Engineer, it must, if required by the Company Representative, be uncovered for observation and inspection and covered again at the Contractor's sole expense.
- 9.6 If any other Work that the Company Representative has not specifically requested to observe and inspect prior to being covered has been covered, the Owner or Engineer may request to see such Work or part thereof and it shall be uncovered by the Contractor. If such Work or part thereof is found to be in accordance with the Contract, the cost of uncovering and covering again shall, by appropriate Change Form, be charged to the Owner. If such Work or part thereof fails to meet the requirements of the Contract, the Contractor shall pay all costs of uncovering, correcting, and covering again and any additional costs resulting there from.
- 9.7 The Contractor shall conduct daily and weekly on-site safety meetings at the beginning of each work period. These meetings should not preclude the Contractor from conducting tailgate safety meetings before each new work period, after break, different work assignments, etc. as determined by OSHA and other applicable safety laws and regulations. In addition, the Contractor shall be required to attend onsite safety meetings with the Owner.
- 9.8 All personnel / visitors / individuals shall have a safety briefing by the Contractor prior to entering the energized substation area.
- 9.9 The Contractor shall facilitate a formal safety program for all individuals entering the site.
- 9.10 The Contractor shall provide the Owner a copy of the Contractor's Safety Manual, outlining policies, procedures, documentation and training. The Owner will provide the Contractor with a copy of the Owner's Safety Manual. The Contractor shall perform the work using the more stringent of the two policies.

CONTRACT AGREEMENT

THIS CONTRACT, made this _____ day _____, 2020, by _____, hereinafter called Bidder, and GREENVILLE UTILITIES COMMISSION (GUC) OF THE CITY OF GREENVILLE, PITT COUNTY, NORTH CAROLINA, a corporation, hereinafter called the Owner.

WITNESSETH

THAT WHEREAS, a Contract for
**GREENVILLE UTILITIES COMMISSION
SUBSTATION WORK FOR
SUGG PARKWAY FOUNDATIONS**

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

AND WHEREAS, it was provided in said award that a formal Contract would be executed by and between Bidder and Owner, evidencing the terms of said award, and that Bidder would commence the work to be performed under this agreement on a date to be specified in a written order of Owner, and would fully complete all work thereunder no later than 90 days from the date of contract.

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

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

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

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

- a) Governing Law - This Contract shall be construed and enforced in accordance with the laws of the State of North Carolina. All parties agree to the jurisdiction of the Courts of North Carolina with respect to any action or dispute arising between the parties.
- b) Further Assurances - The parties hereto agree to execute and deliver any and all papers and documents which may be necessary to carry out the terms of this Contract.
- c) Entire Contract - This Contract (including materials incorporated herein by reference) constitutes the entire agreement between the parties hereto and there are no agreements, representations, or warranties which are not set forth herein. All prior negotiations, agreements, and understandings are superseded hereby. This Contract may not be amended or revised except by a writing signed by all parties hereto. This Contract shall be construed and interpreted without any presumption either for or against the party who caused its preparation.

- d) Binding Effect - This Contract shall be binding upon an inure to the benefit of the heirs, legal representatives, successors and assigns of the respective parties hereto, provided that this Contract and all rights hereunder may not be assigned by any party hereto without the written consent of the other party.
- e) Time of Performance - Time is of the essence with regard to the performance of this Contract.
- f) Survivability - The terms of this Contract shall survive execution and delivery of any deeds or bills of sale called for hereunder.
- g) Headings - The headings in the paragraphs of this Contract are inserted for convenience only and do not constitute a part hereof.

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

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

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

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

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

PROVIDE CURRENT LIABILITY INSURANCE CERTIFICATE(S)

Instructions to Bidders, 14.0 Contractor's Insurance

COVERAGES:

1. Workmen's Compensation Insurance shall include all of the Bidder's employees employed at the site of the project under his Contract. In case any class of employees engaged in hazardous work under this Contract at the site of the project is not protected under the Workmen's Compensation Statute, the Bidder shall provide adequate coverage for the protection of his employees not otherwise protected.
2. Public Liability and Property Damage Insurance shall be in such amounts as to adequately protect the Owner and the Bidder from claims for damages for personal injury, including accidental death, as well as from claims for property damages which may arise from operations under this Contract, whether such operations be by himself or by anyone directly or indirectly employed by him. The amount of such insurance shall be for the following:

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

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

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

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

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

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

It shall be understood that the above-required insurance shall not be canceled or changed until thirty (30) days after written notice of such termination or alteration has been sent by registered mail to the certificate holder.

CERTIFICATE HOLDER:

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

EXPIRATION:

Each certificate must not terminate before the contract completion date.

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

BIDDER:

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

By _____(SEAL)

Title _____

ATTEST:

By: _____

Title: _____

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

By _____
Anthony C. Cannon

Title: General Manager / CEO

ATTEST:

By: _____
Amy Wade

Title: Executive Secretary

APPROVED AS TO FORM AND LEGALITY:

By: _____
Phillip R. Dixon

Title: General Counsel

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

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

By: _____
Phillip R. Dixon

Title: _____
General Counsel

Date: _____

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

By: _____
Jeff W. McCauley

Title: _____
Chief Financial Officer

Date: _____

FORM OF PROPOSAL

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

GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA

**SUBSTATION INSTALLATION CONTRACT FOR
SUGG PARKWAY FOUNDATIONS**

1.2.FORM OF PROPOSAL

1.3. (Provide two (2) copies)

Respectfully submitted this _ _ day of _____, 2020.

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

TERMS AND CONDITIONS

1. The undersigned, hereafter called the Contractor, hereby declares that the only person or persons interested in this Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the Contract to be entered into; that this Proposal is made without connection with any other person, company or parties making a bid or Proposal; and that it is in all respects fair and in good faith without collusion or fraud.
2. The Contractor further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the locations where the work is to be done; that he has examined the Technical Specifications for the work and Contract Documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.
3. The Contractor proposes and agrees, if this Proposal is accepted, to contract with the Owner in the form of Contract specified, to furnish all necessary labor, equipment, and materials, except materials and equipment specified to be furnished by the Owner, required for the installation of the station, complete in accordance with the Plans, Specifications and Contract Documents, to the full and entire satisfaction of the Owner with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and Contract Documents, as filed on Change Order forms. No changes in work shall begin without prior written approval by the Owner or its representative Engineer.
4. The Bid Schedule is subject to the following terms and conditions which, by reference, are made a part of this Proposal.
5. The prices of materials set forth herein do not include any sums which are or may be payable by the Contractor on account of North Carolina Sales Tax upon the sale, purchase, or use of the materials hereunder, the amount thereof shall be added to the purchase price and paid by the Owner after the Contractor has ascertained the actual sales tax to be included in the Contract price.
6. The prices quoted in the Proposal shall be firm unless otherwise clearly noted in the Proposal.
7. The price quoted includes delivery FOB substation site of any equipment and materials and complete installation at substation site. The prices of the equipment and installation set forth herein shall include the cost of delivery at the Contractor's risk to the site.
8. The Contractor shall provide the Owner quoted prices on a per-hour basis, for various personnel and equipment, assuming a normal work week as being forty (40) hours.
9. The Contractor shall state his normal work week for the project:
_____ Five (5), eight (8) hour days (Monday through Friday)
_____ Four (4), ten (10) hour days (Monday through Thursday)
_____ Other, _____
10. Work on weekends or generally accepted holidays will only be allowed if specific outage arrangements are required, or if the Contractor falls behind in meeting the project's scheduled completion date. If the Contractor deems this necessary, he must receive the Owner's written approval five (5) business days prior to beginning the revised work scheme.
11. The time of completion for the project is of the essence.
12. The Contractor shall submit a proposed project construction schedule with the Proposal for review and approval by the Owner and Engineer. The targeted date for completion is May 1, 2021. If this date is not possible, please present an alternate date.
13. The time for delivery and installation shall be extended for the period of any reasonable delay due exclusively to causes beyond the control and without fault of the Contractor, including acts of God, fires, floods, strikes, and delay in transportation

14. The Contractor will not be paid for inclement weather days or for travel time to and from the job site, unless expressly requested by the Contractor as a written stipulation to his original Proposal.
15. The Contractor-furnished materials shall conform to the "Technical Specifications" attached hereto and made a part hereof.
16. Title to the materials furnished by the Contractor shall pass to the Owner upon completion of the installation at the point above specified.
17. This Proposal is made pursuant to the provisions of the Notice and Instructions to Bidders, the Specifications, and the Contractor agrees to the terms and conditions thereof.
18. The Contractor warrants the accuracy of all statements contained in the Bidders Qualifications, if any shall be submitted, and agrees that the Owner shall rely upon such accuracy as a condition of the Contract in the event that this Proposal is accepted.
19. The Contractor warrants that the Contractor-furnished Materials will conform to the performance data and guarantees attached which, by this reference, are made a part of this Proposal. Any exceptions or deviations from the Plans and Specifications must be clearly stated in the Proposal to warrant consideration.
20. The Contractor assumes liability for the proper care, handling, storage, and security of all materials furnished to the Contractor by the Owner for the project.
21. The undersigned further agrees that in case of failure on his part to execute said Contract within ten (10) consecutive calendar days after written notice has been given of the Award of the Contract, bid security accompanying this bid, and the monies payable thereon, shall be paid into the funds of the Owner's account set aside for this project, as liquidated damages for such failure, otherwise, the check, cash, or Bid Bond accompanying the Proposal shall be returned to the undersigned.
22. The Contractor shall maintain during the course of the project and shall provide the Owner/Engineer one (1) complete set of "as-constructed" drawings upon the completion of the project.
23. The Contractor warrants that it possesses Electric Utility Contractor's License for the State of North Carolina. A copy of the license shall be included in this *Form of Proposal*.
24. The Contractor shall submit, in the *Form of Proposal*, the proposed project management staff, i.e., project manager, site superintendent, general foreman, etc. The qualifications / work experience level of the Bidder's proposed work force shall be included as well. The Contractor shall provide evidence of a minimum of 60% of the proposed work force having five (5) years or more tenure with the Bidder's firm. If other personnel are actually assign to the project, similar information will be required prior to construction assignment.
25. The Contractor shall provide a list of recent projects of similar voltage class and complexity, along with the Owner and contact information of the representative who was reported to directly.
26. If the proposed staff along with their qualifications is not provided, the bid may be subject to non-compliance, thus, making it unacceptable.
27. The Contractor shall provide a list of subcontractors (if any) in the proposal and their respective support services which will be used by the Contractor when undertaking this project. All subcontractors will be subject to review and approval by the Owner.
- 28. A mandatory pre-construction meeting will be scheduled at a later time based on the construction schedule at the substation site.**

INSERT

ADDENDA / CLARIFICATIONS / BULLETINS

Instructions to Bidders, 4.0 Bulletins and Addenda

INSERT
Labor, Material and Unit Pricing Proposals

INSERT

PROPOSED CONSTRUCTION SCHEDULE

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

INSERT

CERTIFICATE(S) OF INSURANCE

Instructions to Bidders, 14.0 Contractor's Insurance

INSERT

CONTRACTOR'S LICENSE

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

EQUAL EMPLOYMENT OPPORTUNITY AFFIDAVIT
General Conditions, 24.0 Equal Employment Opportunity

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

Bidder:

By:

Date:

PROPOSED PROJECT MANAGEMENT STAFF

Form of Proposal, Terms and Conditions – Item 24

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

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

REFERENCES

Form of Proposal, Terms and Conditions – Item 25

CONTACT INFORMATION FOR RECENT SIMILAR PROJECTS

Owner Name	Project Description	Contact Name and Phone Number

LIST OF SUBCONTRACTORS
Form of Proposal, Terms and Conditions – Item 27

SUBCONTRACTOR	PROPOSED WORK TO BE PERFORMED

Letter of Compliance to E-Verify for Greenville Utilities Commission

1. I have submitted a bid for contract or desire to enter into a contract with the Greenville Utilities Commission;
2. As part of my duties and responsibilities pursuant to said bid and/or contract, I affirm that I am aware of and in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):
 - a. ____After hiring an employee to work in the United States I verify the work authorization of said employee through E-Verify and retain the record of the verification of work authorization while the employee is employed and for one year thereafter; or
 - b. ____I employ less than fifteen (15) 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 fifteen (15) employees in the State of North Carolina.

Specify subcontractor: _____

_____(Company Name)

By: _____(Typed Name)

_____(Authorized Signatory)

_____(Title)

_____(Date)

**LETTER OF COMPLIANCE TO THE
IRAN DIVESTMENT ACT CERTIFICATION**

Name of Vendor or Bidder: _____

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

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

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

Signature _____ Date _____

Printed Name _____ Title _____

BID BOND

KNOW ALL MEN BY THESE PRESENT, THAT WE _____

_____ as Principal, and _____

as Surety, who is duly licensed to act as Surety in North Carolina, are held and firmly bound unto the Greenville Utilities Commission, Greenville, NC, as Obligee, in the penal sum of _____

_____ DOLLARS (\$ _____) (5% Bid Bond), lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these present.

SIGNED, Sealed and dated this _____ day of _____, 2020.

WHEREAS, the said Principal is herewith submitting a Proposal for

INSTALLATION OF SUGG PARKWAY FOUNDATIONS

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

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

Principal

By _____ (SEAL)

Corporate Surety

By _____ (SEAL)

**GREENVILLE UTILITIES COMMISSION
GREENVILLE, NORTH CAROLINA**

**SUBSTATION SITE WORK CONTRACT
FOR SUGG PARKWAY SUBSTATION**

TECHNICAL SPECIFICATIONS

1.0 General

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

The Contractor shall install the secondary oil containment system as shown on the drawings and adhere to Composolite Secondary Containment System Installation Guidelines.

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

1.1. Concrete

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

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

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

**Source: ACI 318-11, Table 4.3.1

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

1.2. Materials

1.2.1. Cement

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

1.2.2. Cementitious Materials

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

F.

1.2.3. Fine Aggregate

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

1.2.4. Coarse Aggregate

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

1.2.5. Water

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

1.2.6. Admixtures

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

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

1.2.7. Reinforcing Steel

- a. Reinforcing Bars - All reinforcing steel bars shall be of the deformed type conforming to the requirements of the “Standard Specifications for Bars, Deformed, and Plain, Billet-Steel for Concrete Reinforcement”. Steel shall be Type A615 or A996-Grade 60.
- b. Welded Wire Fabric – Welded wire fabric reinforcement used in slabs shall conform to the requirements of ASTM A1064. It shall be continuous, shall have joints lapped at least one full mesh, and shall be supported at proper elevations by standard accessories. Lapping of sheets shall be staggered to avoid continuous lap in either direction.
- c. Accessories – Accessories such as chairs, ties, bolsters, spacers, etc., shall be of suitable type, as approved, adequate to prevent displacement during construction.
- d. Mechanical Splices – Classified Type 2 in accordance with ACI 318-11 and approved by Engineer. Dayton/Richmond “Dowel Bar Splicer” or “Coupler Splice” system, Bar-Lock “Coupler Systems” or Barsplice Products.

1.2.8. Forms

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

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

1.2.9. Finishing Compounds

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

1.3. Submittals

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

1.3.1. Material Reports

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

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

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

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

Appendix XI.

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

1.3.2. Mix Design Reports

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

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

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

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

1.3.3. Mix Class

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

Mix Class Table Coarse					
Usage	28 Day Strength (psi)	Aggregate Size No, 4 Sieve	Slump +/- 1"	Min Cement (lb/cu yd)	Max Water/Cement Ratio
General Usage	4,500	1"	4"	535	0.45
Drilled Piers (dry, uncased, or permanent casing)	4,500	3/4"	5" (1)	560	0.45
Drilled Piers (temporary casing)	4,500	3/4"	7" (1)	560	0.45
Drilled Piers (slurry displacement)	4,500	3/4"	8" (1)	560	0.45
Underwater	5,000	3/4"	8"	658	0.41
Note: A plasticizer or plasticizing retarder shall be included in all general usage and drilled piers concrete mixes. High range water reducer (Type F or G) shall be included in all underwater mixes.					
(1) Slump requirement during placement with any admixtures.					

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

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

1.4. Mix Requirements

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

1.4.1. Total Water Content

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

1.4.2. Slump

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

1.4.3. Total Air Content

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

1.4.4. Admixtures

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

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

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

1.4.5. Strength

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

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

In cases where the strength of the test cylinders for any portion of the work falls below the requirements specified herein, the Owner or Engineer may require the Contractor to secure test specimens of the hardened concrete represented by these cylinders. Specimens shall be secured and tested in accordance with ASTM C42 and shall have a minimum diameter of 3 inches.

Dependent upon the location of the concrete section in question, the Owner or Engineer may approve low frequency ultrasonic testing or other nondestructive techniques as an alternate to cone drilling and testing.

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

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

1.4.6. Initial Set

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

1.5. Storage of Materials

Cement shall be stored in suitable moisture proof enclosures. Reclaimed cement or cement that has become caked or lumpy shall not be used.

Aggregates shall be stored so that segregation and the inclusion of foreign materials are prevented. The bottom 6 inches of aggregate piles that have been in contact with the ground shall not be used.

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

1.6. Batching and Mixing

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

1.6.1. Batching

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

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

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

1.6.2. Mixing

Concrete shall be mixed in a rotating drum as specified in ASTM C94 until all ingredients are uniformly distributed throughout the batch. Mixers shall not be loaded in excess of their rated capacities. Each batch shall be completely discharged before the mixer is recharged.

1.6.3. Ready-Mix Concrete

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

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

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

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

1.7. Placement Temperature

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

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

1.8. Hot Weather Concreting

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

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

1.9. Cold Weather Concreting

Cold weather concreting shall comply with ACI 306R.

1.10. Field Control Testing

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

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

1.10.1. Sampling

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

1.10.2. Slump

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

1.10.3. Air Entrainment

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

1.10.4. Compression Test Cylinders

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

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

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

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

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

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

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

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

1.10.5. Test Reports

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

1.11. Compaction

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

1.12. Protection Against Moisture Loss

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

1.13. Curing

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

the membrane curing compound specified in the article titled "Materials" in this section. Float finished surfaces shall be cured, except those which will receive a separate finish, with either the membrane curing compound specified or with water. Only water curing will be permitted on surfaces that will receive a separate finish or coating.

Water saturation of concrete surfaces shall begin as quickly as possible, but no later than 12 hours in dry weather and 24 hours in damp weather after initial set of the concrete. The rate of water application shall be regulated to provide complete surface coverage with a minimum of runoff. The application of water to formed surfaces may be interrupted for surface rubbing only over the areas being rubbed at the time. The concrete surface shall not be allowed to become dry during such interruption.

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

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

1.14. Protection

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

1.15. Earthwork

1.15.1. Surveying

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

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

1.15.2. Subsurface Conditions

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

1.15.3. Excavations

All excavation will be classified as "common excavation." All excavation, including soft shale, gravel or other material, which can be moved by hand or machine, is defined as common excavation. Owner shall be notified if excavated material is significantly different from that indicated in the soil borings.

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

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

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

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

Excavations shall be maintained in a safe, clean, and sound condition up to the time of placement of concrete. All excavations shall be suitably protected when not attended. Whenever necessary, the Contractor shall re-excavate materials which have accumulated in previously prepared excavations. Any muck or other unsatisfactory bearing material resulting from frost, action or entrance of water into excavations previously prepared to the required bearing shall be removed and replaced with well-compacted stone or gravel, backfill or concrete at the Contractor's expense.

Subgrades for structures shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workers.

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

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

1.15.4. Rock Excavation

The Contractor shall be responsible for the removal and proper disposal of solid rock when encountered in holes for concrete foundations. Solid rock shall be defined as solid, naturally-occurring mineral formations that cannot be effectively removed by conventional trenchers, backhoes, or pressure augers. Loose rock or

limestone in intermittent layers that result in “difficult digging” shall not be defined as solid rock excavations. “Solid rock” shall require the use of air hammers, blasting or other specialized equipment (Note: Blasting must be approved by the Owner or Engineer in accordance with local ordinances). When solid rock, boulders, or detached stones are encountered and cannot be removed by normal power-driven drills or augers, the Owner shall be notified. Rock excavation techniques shall be used to achieve the desired excavated dimensions. Rock excavation shall consist of igneous, metamorphic, and sedimentary stones, each having a volume of 1/2 cubic yard or more, as determined by physical or visual measurements and approved by Owner.

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

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

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

1.15.5. Blasting

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

1.15.6. Sheeting and Shoring

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

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

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

under all circumstances.

2.0 Special Conditions

The contractor is responsible to review and become familiar with the soil boring report by Terracon Consultants, Inc. for the Proposed GUC Sugg Parkway Substation Project No. 72195082 attached in appendices of the project specifications.

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

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

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

3.0 Slabs on Grade and Mat Foundations

3.1. General

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

3.2. Concrete

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

3.3. Subgrade

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

3.4. Formwork

Forms shall be constructed to the shape, form, line, and grade required and shall be maintained sufficiently rigid to prevent deformation under the load imposed by supported inserts or by wet concrete. The top edges of forms shall be finished to a specified elevation, slope, or contour. They shall be brought to a true line and grade so that the top concrete surface can be finished with a screed or template resting on the top edges of the forms.

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

Concrete shall be placed against job-built plywood forms or forms that are lined with plywood or fiberboard, except as otherwise specified. At Owner's discretion, prefabricated forms or metal frames may be permitted only for surfaces that are not normally

exposed to view when construction has been completed. Plywood and fiberboard shall be new when brought to the construction site and shall be properly coated, protected, and maintained throughout its use. All plywood and fiberboard materials that are damaged, cracked, weathered, or otherwise unsuitable, in the Owner's opinion, for producing smooth, uniformly textured formed surfaces will be rejected as form material.

Vertical surfaces of footings extended above grade shall be formed.

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

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

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

3.4.1. Coating

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

3.4.2. Removal

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

3.5. Expansion Joints

Expansion joints and joints between slabs and vertical surfaces shall be installed according to the Drawings. Premolded fibrated asphalt expansion joint material shall be in accordance with ASTM 1751 and shall be one-half inch (1/2") wide and extend from the bottom of the slab to one half inch (1/2") from the top of the slab. The premolded fibrated asphalt expansion joint material shall then be covered by a one-half inch (1/2") wide strip of polyethylene bond breaker tape. The tape shall be installed along the top of the asphalt expansion joint material only and not on the vertical walls of the slabs. The polyethylene bond breaker tape shall then be covered with one-half inch (1/2") wide by one-half inch (1/2") thick by required length of Vulkem #45 polyurethane sealant for horizontal joints and Vulken #921 sealant for vertical joints according to the manufacturer's installation guidelines.

3.6. Construction Joints

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

3.7. Reinforcement

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

All bar supports, ties, spacers, bolsters, inserts, screeds, and other concrete accessories

required shall be provided to maintain reinforcing in its proper position and permit proper placement of concrete.

Responsibility for the design of all bar support systems shall be assumed by the contractor.

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

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

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

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

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

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

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

Mechanical splices are acceptable if approved by the Owner.

3.8. Installation of Anchorage Items

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

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

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

3.9. Placing

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

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

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

All concrete shall be thoroughly vibrated with appropriate vibrating equipment while concrete is being placed. Settling concrete with shovels only will not be accepted.

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

3.10. Bonding and Grouting

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

3.11. Finishes of Concrete Other Than Floors and Slabs

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

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

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

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

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

The initial floating shall be followed with a second floating at the time of initial set. The

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

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

3.12. Clean-Up

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

4.0 Drilled Cylindrical Foundations

4.1. General

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

4.2. Concrete

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

4.3. Excavations

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

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

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

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

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

Holes may be excavated by the drilling and mud slurry technique. Prior to start of construction, Owner's approval shall be submitted for a drilling mud procedure for wet hole excavation when sufficient side wall pressure cannot be obtained by use of water void of additives. Drilling mud shall be Super Mud manufactured by Polymer Drilling

Systems or acceptable equal. Drilling mud shall be mixed in accordance with manufacturer's recommendations and to the proper consistency for maintaining the sides of the hole. With the Owner's approval, attapulgitic clay type drilling mud may be substituted for Super Mud on holes where Super Mud will not provide sufficient side wall pressure to maintain the sides of the hole excavation.

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

4.4. Removal of Water

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

4.5. Temporary Casing

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

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

4.6. Permanent Casing

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

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

4.7. Dimensional Tolerances

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

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

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

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

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

4.8. Pier Installation Record

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

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

4.9. Reinforcement

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

4.10. Concrete Placement General

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

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

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

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

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

Concrete shall be brought to the point of final deposit by methods that prevent the

separation or loss of the ingredients. Concrete shall be deposited in its final position without moving it laterally in the forms for a distance greater than 5 feet.

4.11. Concrete Placement – Dry Hole

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

4.12. Concrete Placement – Wet Hole

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

4.13. Concrete Placement – Tremie Method

Where the inflow of water into a caisson is too rapid to permit placement of concrete in the dry, the Contractor shall place the concrete underwater by the tremie method. In such cases, a special mix of concrete will be required with coarse aggregate (gravel), 3/4 inch maximum size, and a minimum of seven bags of cement per yard. A retarding agent, approved by the Owner and Engineer, may be used. No vibration of the tremie concrete will be required or permitted, but it will be permissible to vibrate the tremie pipe under certain conditions when the flow of concrete becomes sluggish, and it will also be permissible to vibrate the casing, if used, when the caisson is filled with concrete at the time the casing pull is started. The tremie pipe shall have the minimum diameter of 8 inches and shall be equipped with a foot valve or gate at the bottom end, which is watertight and can be positively controlled from the ground surface. If joints are required

in the tremie pipe, they shall be watertight. The entire assembly shall be watertight, and under no circumstances will concrete be permitted to flow through water in the tremie. In placing concrete, the lower end of the tremie shall be placed as close to the bottom as possible and no more than 6 inches to the bottom of the caisson and shall not be raised until a seal has been established between the tremie pipe and the concrete sufficient to prevent entry of water into the tremie. The discharge end of the tremie shall be kept submerged in the concrete a sufficient depth to maintain, at all times, an adequate seal during underwater placement. The placing of concrete by tremie in any caisson shall not be started until a sufficient supply of concrete is at the site to complete placing of concrete in the caisson up to the ground surface. Once started, the underwater placement shall proceed without interruption until the top of the concrete has been brought to the above-mentioned elevation. As soon as the level of concrete has reached the above-mentioned level over the tremie pipe, the Contractor shall remove the water being displaced by the concrete. Concrete may be placed by tremie only when authorized by the Owner or Engineer.

4.14. Consolidation

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

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

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

4.15. Finishes of Concrete Other Than Floors and Slabs

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

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

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

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

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

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

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

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

4.16. Clean-Up

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

4.17. Repairing Defective Concrete

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

5.0 References

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

5.1. American Concrete Institute

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

5.2. ASTM International

1. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
2. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
3. ASTM C33 – Standard Specification for Concrete Aggregates
4. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
5. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
6. ASTM C94 – Standard Specification for Ready Mixed Concrete
7. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete

8. ASTM C150 – Standard Specification for Portland Cement
9. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete
10. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete
11. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
12. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
13. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete
14. ASTM C403 – Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
15. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
16. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
17. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
18. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Type).

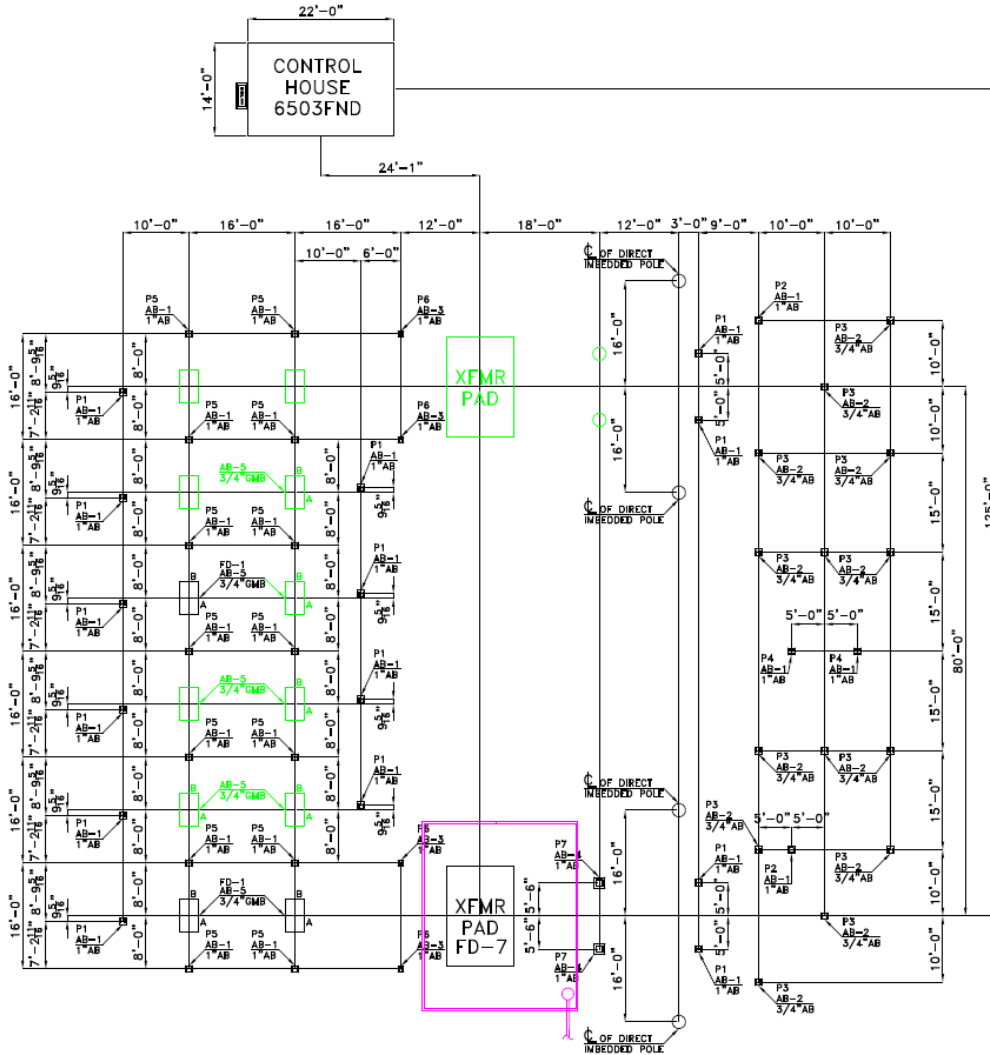
Appendix 1

List of Drawings

1. Foundation Plan
2. Foundation Details
3. Anchor Bolt Details
4. Transformer Foundation Details
5. Oil Containment Foundation
6. Oil Containment Wall Details
7. Control House Foundation

Foundation Plan

REVISIONS	NO.
SUGG PARKWAY SUBSTATION PRELIMINARY DESIGN LP 10/28/20	1.A



CONSTRUCTION NOTE:
 REMOVE OLD WIRE LABELS WITH ORANGE TEXT,
 INSTALL NEW WIRE LABELS WITH GREEN TEXT!

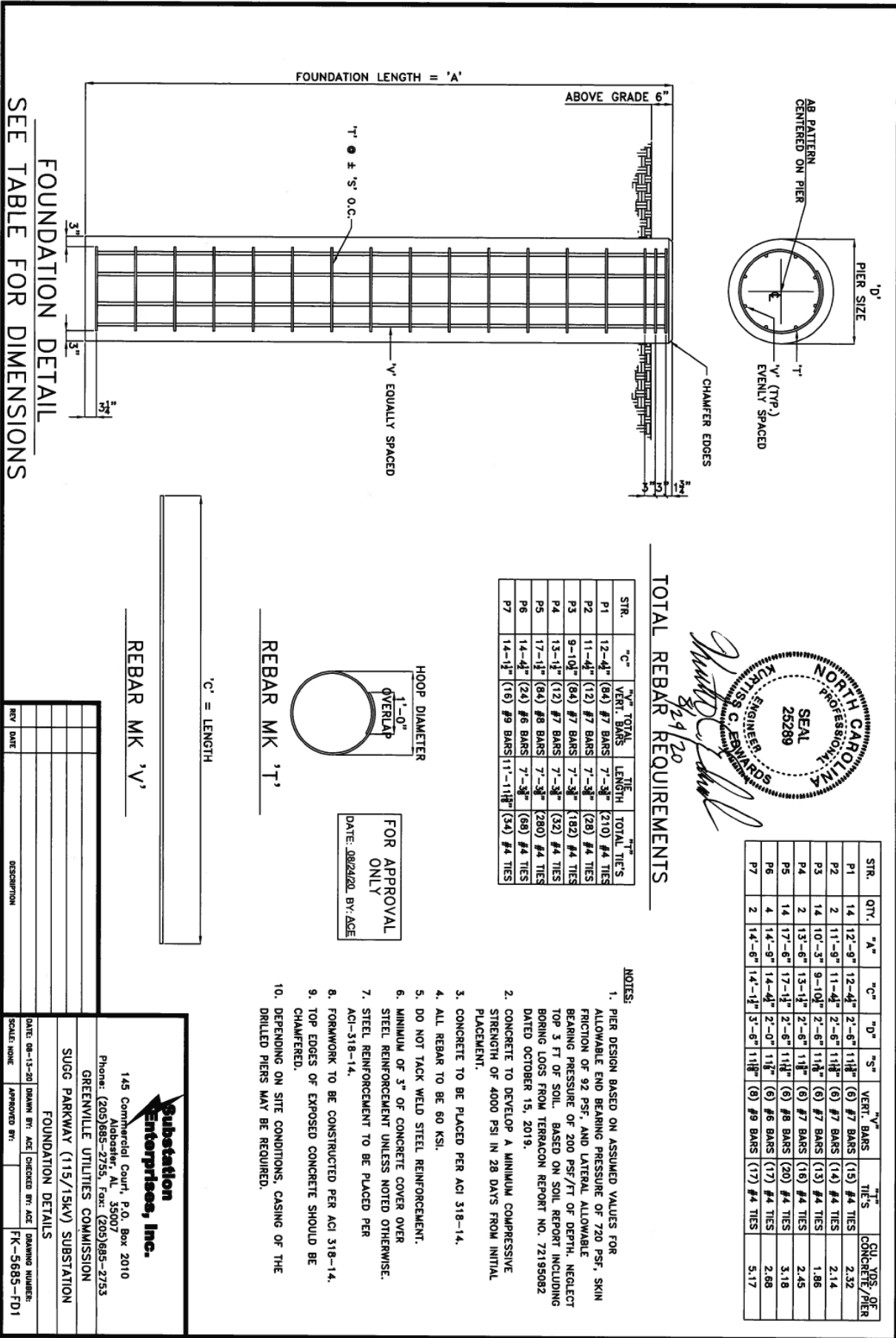
ANCHOR BOLT LAYOUT

- FUTURE FOUNDATIONS
- NEW FOUNDATIONS

PRELIMINARY

DATE	TIME	BY	CHKD
10/28/20	10:00 AM	JL	JL
SUGG PARKWAY SUBSTATION 115.0 TO 115.1 V FOUNDATION PLAN ANCHOR BOLT PLAN			
DATE	TIME	BY	CHKD
10/28/20	10:00 AM	JL	JL

Foundation Detail



TOTAL REBAR REQUIREMENTS

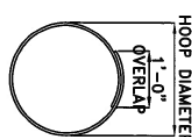
STR.	QTY.	"A"	"C"	"D"	"S"	"V"	"T"	CU YDS. OF CONCRETE / PIER
P1	14	12'-9"	12'-4"	2'-6"	11 1/8"	(6) #7 BARS	(15) #4 TIES	2.32
P2	2	11'-9"	11'-4"	2'-6"	11 1/8"	(6) #7 BARS	(14) #4 TIES	2.14
P3	14	10'-3"	9'-10"	2'-6"	11 1/8"	(6) #7 BARS	(13) #4 TIES	1.86
P4	2	13'-6"	13'-1 1/2"	2'-6"	11 1/8"	(6) #7 BARS	(16) #4 TIES	2.45
P5	14	17'-6"	17'-1 1/2"	2'-6"	11 1/8"	(6) #8 BARS	(20) #4 TIES	3.18
P6	4	14'-9"	14'-4"	2'-0"	11 1/8"	(6) #6 BARS	(17) #4 TIES	2.68
P7	2	14'-6"	14'-1 1/2"	3'-6"	11 1/8"	(6) #9 BARS	(17) #4 TIES	3.17

STR.	"C"	"V"	TOTAL VERT. BARS	TIE LENGTH	TOTAL TIE'S
P1	12'-4"	(84)	#7 BARS	7'-3"	(210) #4 TIES
P2	11'-4"	(12)	#7 BARS	7'-3"	(26) #4 TIES
P3	9'-10"	(84)	#7 BARS	7'-3"	(182) #4 TIES
P4	13'-1 1/2"	(12)	#7 BARS	7'-3"	(32) #4 TIES
P5	17'-1 1/2"	(84)	#8 BARS	7'-3"	(280) #4 TIES
P6	14'-4"	(24)	#6 BARS	7'-3"	(66) #4 TIES
P7	14'-1 1/2"	(16)	#9 BARS	11'-11 1/8"	(34) #4 TIES

NOTES:

- PIER DESIGN BASED ON ASSUMED VALUES FOR ALLOWABLE END BEARING PRESSURE OF 720 PSF, SKIN FRICTION OF 92 PSF, AND LATERAL ALLOWABLE BEARING PRESSURE OF 200 PSF/FT OF DEPTH. NEGLECT TOP 3 FT OF SOIL. BASED ON SOIL REPORT INCLUDING BORING LOGS FROM TERRACON REPORT NO. 72195082 DATED OCTOBER 15, 2019.
- CONCRETE TO DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI IN 28 DAYS FROM INITIAL PLACEMENT.
- CONCRETE TO BE PLACED PER ACI 318-14.
- ALL REBAR TO BE 60 KSI.
- DO NOT TACK WELD STEEL REINFORCEMENT.
- MINIMUM OF 3" OF CONCRETE COVER OVER STEEL REINFORCEMENT UNLESS NOTED OTHERWISE.
- STEEL REINFORCEMENT TO BE PLACED PER ACI-318-14.
- FORMWORK TO BE CONSTRUCTED PER ACI 318-14.
- TOP EDGES OF EXPOSED CONCRETE SHOULD BE CHAMFERED.
- DEPENDING ON SITE CONDITIONS, CASING OF THE DRILLED PIERS MAY BE REQUIRED.

FOR APPROVAL ONLY
DATE: 08/24/20 BY: AGE



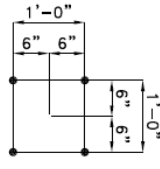
REBAR MK 'T'
REBAR MK 'V'
'C' = LENGTH

SEE TABLE FOR DIMENSIONS

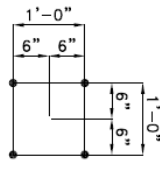
REV	DATE	DESCRIPTION

Substation Enterprises, Inc.
145 Commercial Court, P.O. Box 2010
Albany, AL 35007
Phone: (205)685-2755, Fax: (205)685-2753
GREENVILLE UTILITIES COMMISSION
SUGG PARKWAY (115/15KV) SUBSTATION
FOUNDATION DETAILS
DATE: 08-13-20 DRAWN BY: AGE CHECKED BY: AGE DRAWING NUMBER: FK-5685-FD1
SCALE: NONE APPROVED BY:

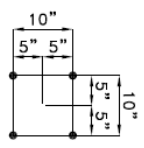
Anchor Bolt Details



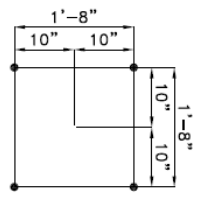
AB-1 ~ (32) PATTERNS REQ'D
(128) 1" ϕ A.B.



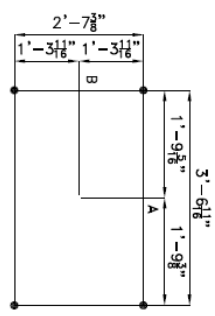
AB-2 ~ (14) PATTERNS REQ'D
(56) 3/4" ϕ A.B.



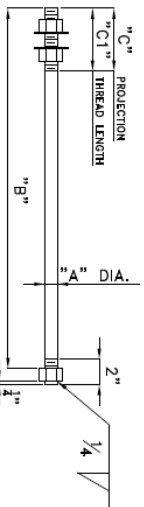
AB-3 ~ (4) PATTERNS REQ'D
(16) 1" ϕ A.B.



AB-4 ~ (2) PATTERNS REQ'D
(8) 1" ϕ A.B. BY OWNER

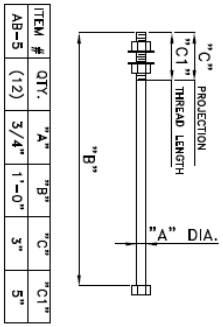


AB-5 ~ (3) PATTERNS REQ'D
(12) 3/4" ϕ G.M.B.

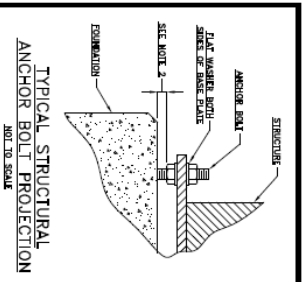


ITEM #	QTY.	"A"	"B"	"C"	"C1"	"L"
AB-1 (128)	1"	2-4 1/2"	4 1/2"	5"	2-6"	2-0"
AB-2 (56)	3/4"	1-1 1/2"	3 1/2"	5"	2-0"	2-6"
AB-3 (16)	1"	2-4 1/2"	4 1/2"	5"	2-6"	2-6"

PLEASE NOTE TOTAL LENGTH OF ANCHOR BOLT IS LONGER THAN "B" DIMENSION, SEE "L"



ITEM #	QTY.	"A"	"B"	"C"	"C1"
AB-5 (12)	3/4"	1'-0"	3"	5"	



Substation Enterprises, Inc.

145 Commercial Court, P.O. Box 2010
Albopster, AL 35007
Phone: (205)685-2755, Fax: (205)685-2753
GREENVILLE UTILITIES COMMISSION
SUGG PARKWAY (115/15KV) SUBSTATION

REV	DATE	DESCRIPTION
1	09/03	RECEIVED BREAKER ANCHOR BOLT PATTERN
2	10/20	

DATE	SCALE	DRAWN BY	CHECKED BY	INCHING NUMBER
08-11-20	NONE	ACE	ACE	FK-5685-AB2

Transformer Foundation Details

REVISIONS SUGG PARKWAY SUBSTATION NEW CONSTRUCTION PRELIMINARY DESIGN PAD DETAILS ARE FROM 04/06/2016 FILED JLP 11-19-2019	NO. 1.A	<p style="text-align: center;">PAD No. 7 TRANSFORMER No. 1 1' GRID</p>
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NO.	DESCRIPTION	DATE	BY	CHK
1	ISSUED FOR PERMIT	11/19/2019	JLP	WJL
2	FOR CONSTRUCTION	04/06/2016	JLP	WJL

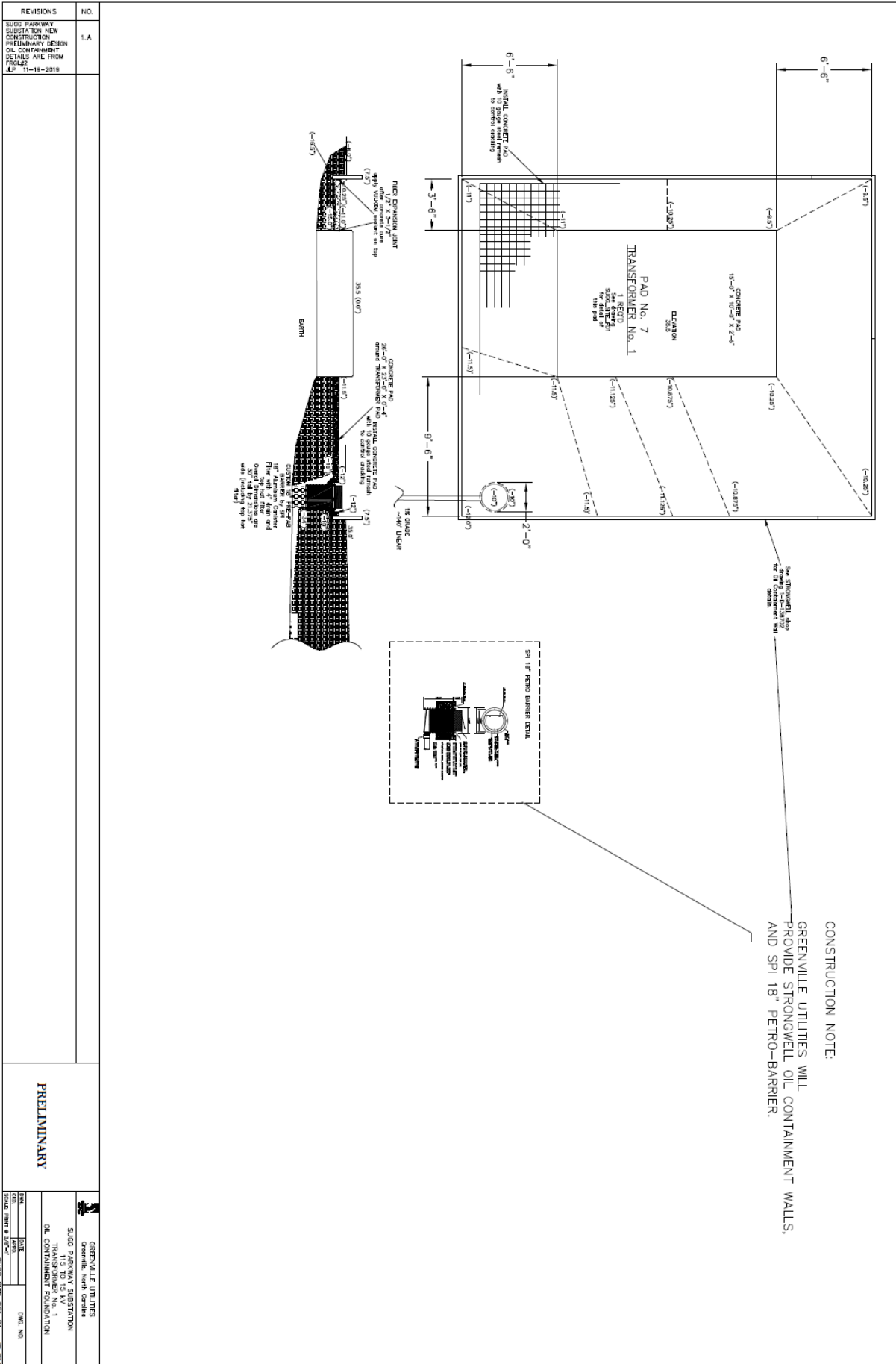
NO.	DESCRIPTION	DATE	BY	CHK
1	ISSUED FOR PERMIT	11/19/2019	JLP	WJL
2	FOR CONSTRUCTION	04/06/2016	JLP	WJL

SCHEDULE FOR TYPICAL PAD DETAIL		SCHEDULE FOR TYPICAL FOUNDATION DETAIL	
NO.	DESCRIPTION	NO.	DESCRIPTION
1	CONCRETE PAD	1	CONCRETE PAD
2	#4 REINFORCEMENT BARS	2	#4 REINFORCEMENT BARS
3	#2/3 COPPER GROUNDING CONDUCTORS	3	#2/3 COPPER GROUNDING CONDUCTORS
4	12 O.C. #4 REINFORCEMENT BARS	4	12 O.C. #4 REINFORCEMENT BARS
5	12 O.C. #3 MESH WALL	5	12 O.C. #3 MESH WALL

SCHEDULE FOR TYPICAL PAD DETAIL		SCHEDULE FOR TYPICAL FOUNDATION DETAIL	
NO.	DESCRIPTION	NO.	DESCRIPTION
1	CONCRETE PAD	1	CONCRETE PAD
2	#4 REINFORCEMENT BARS	2	#4 REINFORCEMENT BARS
3	#2/3 COPPER GROUNDING CONDUCTORS	3	#2/3 COPPER GROUNDING CONDUCTORS
4	12 O.C. #4 REINFORCEMENT BARS	4	12 O.C. #4 REINFORCEMENT BARS
5	12 O.C. #3 MESH WALL	5	12 O.C. #3 MESH WALL

SCHEDULE FOR TYPICAL PAD DETAIL		SCHEDULE FOR TYPICAL FOUNDATION DETAIL	
NO.	DESCRIPTION	NO.	DESCRIPTION
1	CONCRETE PAD	1	CONCRETE PAD
2	#4 REINFORCEMENT BARS	2	#4 REINFORCEMENT BARS
3	#2/3 COPPER GROUNDING CONDUCTORS	3	#2/3 COPPER GROUNDING CONDUCTORS
4	12 O.C. #4 REINFORCEMENT BARS	4	12 O.C. #4 REINFORCEMENT BARS
5	12 O.C. #3 MESH WALL	5	12 O.C. #3 MESH WALL

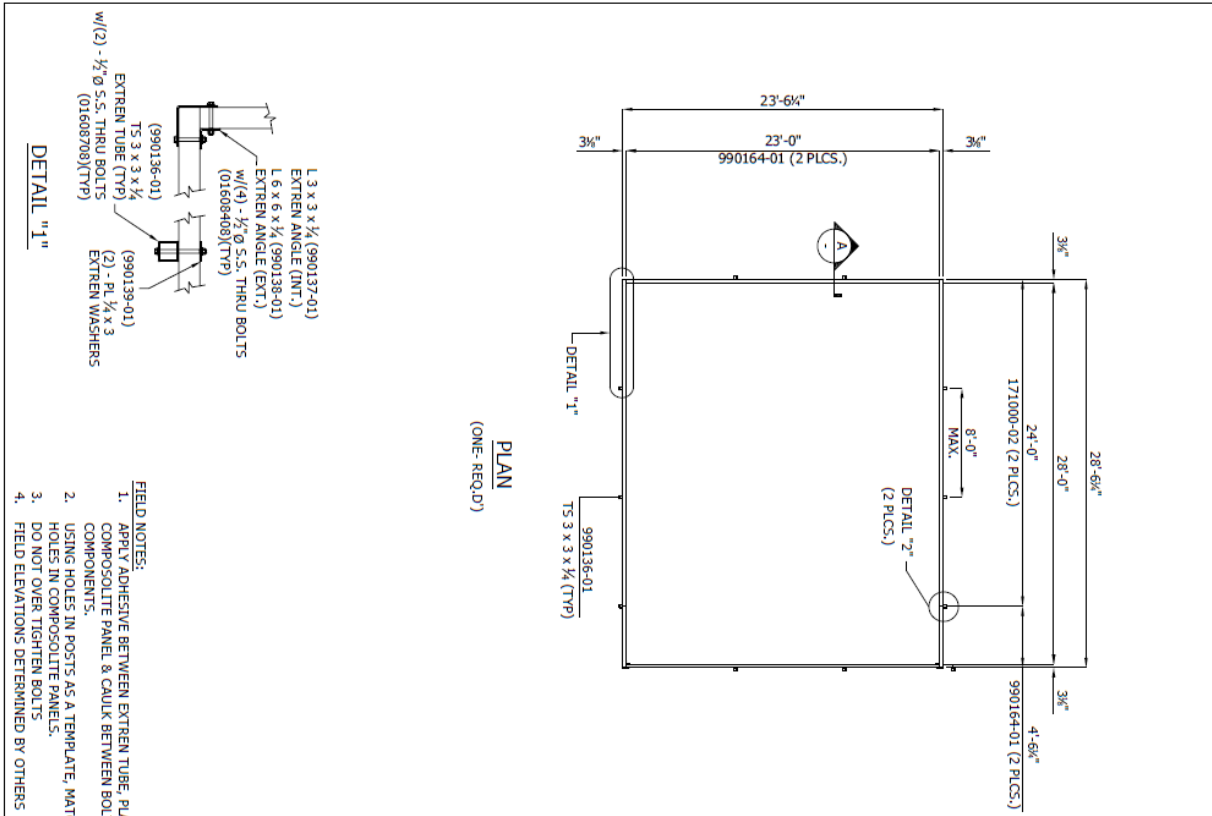
Oil Containment Foundation



REVISIONS	NO.
SUGO PARKWAY SUBSTATION NEW CONSTRUCTION PRELIMINARY DESIGN OIL CONTAINMENT DETAILS ARE FROM FLOOR PLAN 11-19-2019	1.A

PRELIMINARY	
GREENVILLE UTILITIES Greenville, North Carolina	SUGO PARKWAY SUBSTATION 115 TO 125 N.W. TRAILWAY AVENUE, LOT 1 OIL CONTAINMENT FOUNDATION
DATE: 11/19/2019 TIME: 10:52 AM DRAWN BY: [Name] CHECKED BY: [Name]	SHEET NO.: [Number] TOTAL SHEETS: [Total]

Oil Containment Wall Detail



BILL OF MATERIALS

QTY/UNIT	PART #	DESCRIPTION	LENGTH
QTY/UNIT			FT. IN.
8	990159-01	POST KIT	4 0
8	990136-01	TS 3 x 3 x 1/2" (w/ CAP PLUG)	4 0
16	990139-01	PLATE WASHER 1/2" x 3	0 3
16	01608708	1/2" Ø 316 S.S. BOLT	0 7/16
16	10608900	1/2" Ø 316 S.S. HEX NUT	0 7/16
32	11608900	1/2" Ø 316 S.S. FLAT WASHER	0 7/16
4	990180-01	CORNER KIT	1 10/16
4	990139-01	L 5 x 6 x 1/4"	1 10/16
16	01608408	1/2" Ø 316 S.S. BOLT	0 4/16
16	10608900	1/2" Ø 316 S.S. HEX NUT	0 4/16
32	11608900	1/2" Ø 316 S.S. FLAT WASHER	0 4/16
2	990161-01	SPLICE KIT	4 0
2	990136-01	TS 3 x 3 x 1/2" (w/ CAP PLUG)	1 10/16
4	990145-01	PL 1/2" x 8	0 7/16
4	01608708	1/2" Ø 316 S.S. BOLT	0 7/16
8	01608408	1/2" Ø 316 S.S. BOLT	0 4/16
12	10608900	1/2" Ø 316 S.S. HEX NUT	0 4/16
24	11608900	1/2" Ø 316 S.S. FLAT WASHER	0 4/16
6	171053-01	CAP CHANNEL (C 3/42 x 1.3 x .125 (YELLOW))	20 0
WALL PANELS			
2	171000-02	COMPOSITE PANEL 3 x 24	24 0
2	990164-01	COMPOSITE PANEL 3 x 24	23 0
2	990164-01	COMPOSITE PANEL 3 x 24	4 0/16
ACCESSORIES			
1	RZ09060003	1/4" Ø FLTED DRILL BIT	
1	ZW01130405	1/4" Ø DRILL BIT	
1	RZ09060002	ADHESIVE APPLICATOR GUN	
6	RZ09060001	PLUGGER 7/16" x 220 100ML x 100ML TUBES	
120	19004100	1/4" Ø NYLON DRIVE RIVETS	

FIELD NOTES:

- APPLY ADHESIVE BETWEEN EXTREM TUBE, PLATE, ANGLE, THE COMPOSITE PANEL & CAULK BETWEEN BOLT WASHERS & FRP COMPONENTS.
- USING HOLES IN POSTS AS A TEMPLATE, MATCH DRILL 1/8" Ø HOLES IN COMPOSITE PANELS.
- DO NOT OVER TIGHTEN BOLTS
- FIELD ELEVATIONS DETERMINED BY OTHERS

DETAIL "1"

(990136-01) TS 3 x 3 x 1/2" EXTREM TUBE (TYP)
L 6 x 6 x 1/4" (990138-01) EXTREM ANGLE (INT.)
w/ (4) - 1/2" Ø S.S. THRU BOLTS (01608708) (TYP)

(990139-01) (2) - PL 1/2" x 3 EXTREM WASHERS

DETAIL "2"

(990140-01) (01608708) (2) - 1/2" Ø S.S. BOLTS
TS 3 x 3 x 1/2" EXTREM TUBE (TYP)
(4) - 1/2" Ø S.S. BOLTS (01608708)
C/L PANEL SPLICE

DETAIL "A-A"

PL 1/2" x 8 EXTREM

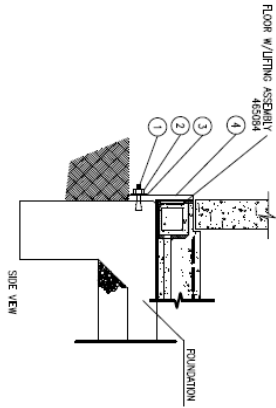
Control House Foundation

NOTES:

1. GENERAL
 - 1.1 All dimensions are specified in inches unless otherwise noted.
 - 1.2 Foundation is designed for 1000 psf bearing. REF: TERRACON S-04 Report 721800Z dated 10/19/78.
 - 1.3 Slab type foundation is not recommended for areas with extreme frost conditions or where high water tables are present. Measure the foundation resulting in structural cracks.
 - 1.4 Rebar spacing must be a minimum foundation depth of 12" or per local frost line on undisturbed soil.
 - 1.5 Locate wedge anchors after shaler is located on slab to correctly align with rebar and anchor plate. Do not install wedge anchor before setting shaler on foundation.
 - 1.6 Rebar spacing must be in accordance with the NEC and Local Codes.
 - 1.7 Reference TERRACON report for site preparation.

2. MATERIAL

- 2.1 Concrete shall have a minimum compressive strength of 3000 psi. Obtain test reports for concrete. All concrete shall be placed and cured in accordance with ACI-318.
- 2.2 Reinforcing bars shall conform to ASTM-A65 grade 60 specifications and be detailed in accordance with ACI-318.
- 2.3 Test cylinders shall be molded and laboratory cured in accordance with ASTM C31. Type cylinders shall be taken for each day's concrete placement. Cylinders shall be stored in accordance with ASTM C31.
3. TOLERANCES
 - 3.1 Tolerances shall be as specified by the customer.



A BUILDING ATTACHMENT FIELD WORK

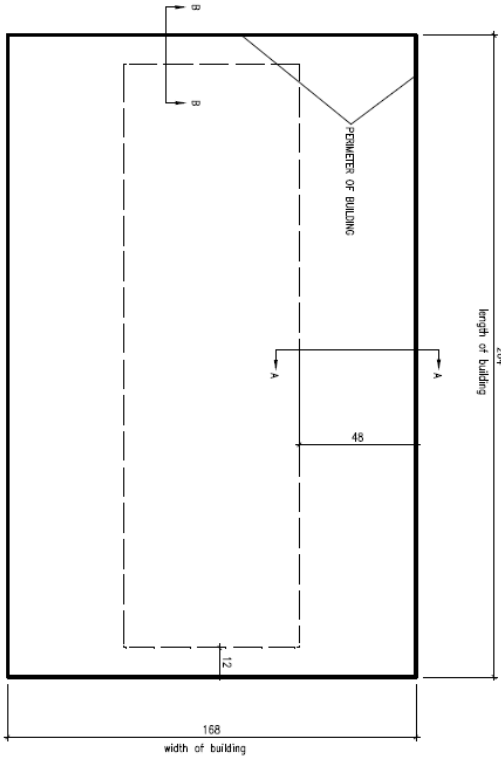
SCALE: 1/2" = 1'-0"

B TIE DOWN PLATE FIELD WORK

SCALE: 3/8" = 1'-0"

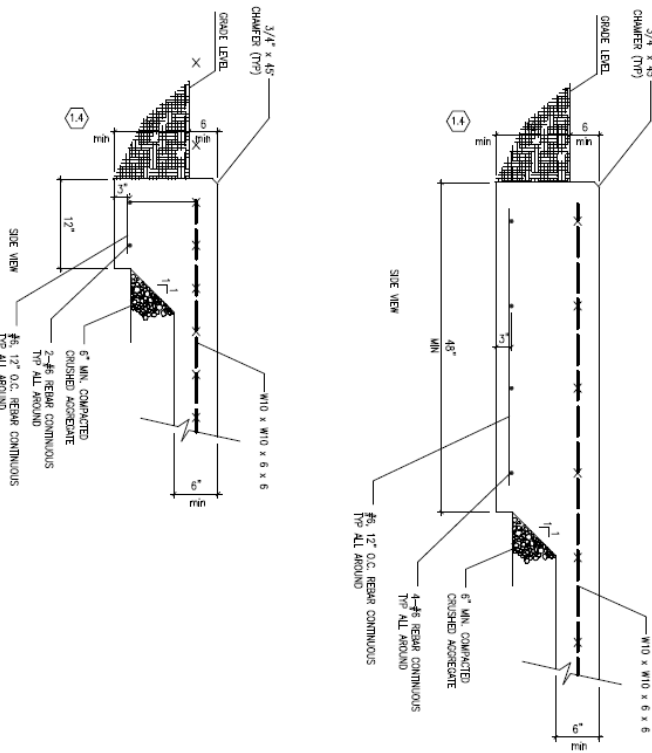
C TIE DOWN PLATE FIELD WORK

SCALE: 3/8" = 1'-0"



FOUNDATION PLAN FIELD WORK

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



NO.	REV.	DATE	DESCRIPTION
1	1	10/02/78	FOUNDATION PLAN
2	1	10/02/78	FOUNDATION PLAN
3	1	10/02/78	FOUNDATION PLAN
4	1	10/02/78	FOUNDATION PLAN
5	1	10/02/78	FOUNDATION PLAN
6	1	10/02/78	FOUNDATION PLAN
7	1	10/02/78	FOUNDATION PLAN
8	1	10/02/78	FOUNDATION PLAN
9	1	10/02/78	FOUNDATION PLAN
10	1	10/02/78	FOUNDATION PLAN

VFP, INC.

CORPORATE OFFICE
 5410 Falls Church Road
 Reston, Virginia 24018-7095
 (540)977-0500 (540)977-5555 fax

MANUFACTURING FACILITY
 5400 South Lakes Blvd
 Dulles, Virginia 24244
 (703)431-4300 (703)431-1756 fax

DATE	BY	DESCRIPTION
10/02/78	W.M.M.	FOUNDATION PLAN
10/02/78	W.M.M.	FOUNDATION PLAN
10/02/78	W.M.M.	FOUNDATION PLAN
10/02/78	W.M.M.	FOUNDATION PLAN
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10/02/78	W.M.M.	FOUNDATION PLAN

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7	1	10/02/78	FOUNDATION PLAN
8	1	10/02/78	FOUNDATION PLAN
9	1	10/02/78	FOUNDATION PLAN
10	1	10/02/78	FOUNDATION PLAN

CHKD. BY	APPR. BY	DATE	REV.

Customer Name: GREENVILLE UTILITIES
 Substation Name: SLICE PARKWAY SUB
 P.O. #: 75939
 VFP Job #: 200494-10665

NO.	REV.	DATE	DESCRIPTION
1	1	10/02/78	FOUNDATION PLAN
2	1	10/02/78	FOUNDATION PLAN
3	1	10/02/78	FOUNDATION PLAN
4	1	10/02/78	FOUNDATION PLAN
5	1	10/02/78	FOUNDATION PLAN
6	1	10/02/78	FOUNDATION PLAN
7	1	10/02/78	FOUNDATION PLAN
8	1	10/02/78	FOUNDATION PLAN
9	1	10/02/78	FOUNDATION PLAN
10	1	10/02/78	FOUNDATION PLAN

Appendix 2



Geotechnical Engineering Report

**Sugg Parkway Substation
Greenville, Pitt County, NC**

October 15, 2019

Terracon Project No. 72195082

Prepared for:

Greenville Utilities Commission

Greenville, NC

Prepared by:

Terracon Consultants, Inc.

Winterville,





October 15, 2019
Greenville Utilities Commission
PO Box 1847
Greenville, NC 27835
Attn: Mr. Ken Wade – Substation and Controls Engineer
P: (252) 551-1570
E: wadekr@guc.com
Re: Geotechnical Engineering Report Sugg
Parkway Substation
Sugg Parkway and Old Creek Road
Greenville, Pitt County, NC
Terracon Project No. 72195082

Dear Mr. Wade:

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

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

Sincerely,

Terracon Consultants, Inc.

Seth A. Bowman
Staff Professional

Geotechnical Services
Reviewed by: Kevin Sohrabnia, PE

Andrew J. Gliniak, PE
Geotechnical Project
Engineer
Registered NC 042183

Terracon Consultants, Inc. 314 Beacon Drive Winterville, NC 28590
P (252) 353 1600 F (252) 353 0002 terracon.com Registered NC F-0869

REPORT TOPICS

INTRODUCTION.....1

Environmental



Facilities



Geotechnical



Materials

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

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

ATTACHMENTS

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

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

Geotechnical Engineering Report

Sugg Parkway Substation ■ Greenville, Pitt County, NC

October 15, 2019 ■ Terracon Project No. 72195082



REPORT SUMMARY

Topic ¹	Overview Statement ²
Project Description	The project includes a new substation with associated above-ground power lines off Sugg parkway and Old Creek Road in Greenville, NC.
Geotechnical Characterization	The borings encountered very loose to medium dense sand underlain by denser sand. Groundwater is anticipated at a depth of 3 to 4 feet below the existing ground surface.
Earthwork	After stripping topsoil, the substation footprint should be densified in place using a medium weight vibratory roller. The purpose of the vibratory rolling is to densify the loose, near surface disturbed soils and potentially improve foundation support.
Substation Mat Foundations	Shallow foundations will be sufficient Allowable bearing pressure = 1,000 psf Expected settlements: < 1-inch total, < 1/2-inch differential
Pole Deep Foundations	The poles to be supported by drilled piers installed with the slurry method of drilling to help prevent blow out. Design parameters for the lateral resistance and end bearing capacity of drilled piers are presented in this report.
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Geotechnical Engineering Report
Sugg Parkway Substation
Sugg Parkway and Old Creek Road
Greenville, Pitt County, NC
Terracon Project No. 72195082
October 15, 2019

INTRODUCTION

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

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

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

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

SITE CONDITIONS

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

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

Responsive ■ Resourceful ■ Reliable

Item	Description
------	-------------

Geology	<p>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.</p> <p>According to USGS Mineral Resources On-Line Spatial Data based on the 1998 digital equivalent of the 1985 Geologic Map of North Carolina updated in 1998, the site is mapped within the Yorktown Formation and Duplin Formation, Undivided (Tertiary)</p>
----------------	---

PROJECT DESCRIPTION

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

Item	Description
Information Provided	Email communication with requested boring locations on August 29, 2019.
Proposed Structures	The project includes a new substation with associated above-ground power lines off Sugg parkway and Old Creek Road in Greenville, NC.
Building Construction	Concrete drilled pier foundations or vibratory driven piles are anticipated for the power lines. Mat foundations for transformers and small equipment pads are assumed.
Maximum Loads	<ul style="list-style-type: none"> ■ Substation: 15 to 100 kips (assumed) ■ Poles: 4,500 ft-kips overturning at the ground surface (assumed)
Grading/Slopes	Up to 2 feet of cut and/or fill placement
Estimated Start of Construction	Early 2021

GEOTECHNICAL CHARACTERIZATION

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

Exploration Results section and the GeoModel can be found in the **Figures** section of this report.

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

Model Layer	Layer Name	General Description
1	Looser Sand	Very loose to loose Clayey Sand (SC) and Silty Clayey Sand (SC-SM)
2	Loose to Medium Dense Sand	Generally Silty Sand (SM) and Poorly Graded Sand (SP)
3	Medium Dense to Dense Sand	Poorly Graded Sand (SP), Clayey Sand (SC), Silty Sand (SM)

Groundwater

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

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

GEOTECHNICAL OVERVIEW

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

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

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

Excavation for the piers utilizing slurry drilling techniques will reduce the potential blow out by counter-balancing the hydrostatic pressure.

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

EARTHWORK

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

Site Preparation

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

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

After the vibratory rolling, pore pressures should be allowed to dissipate for a minimum of 16 hours. After the waiting period, proofrolling should be performed on the exposed subgrade soils in areas to receive fill or at the subgrade elevation with a fully loaded, tandem-axle dump truck (20ton minimum) or similar rubber-tired construction equipment. Proofrolling is recommended as a means of detecting areas of soft or unstable subgrade soils. The proofrolling should be performed during a period of dry weather to avoid degrading an otherwise suitable subgrade. The proofrolling operations should be observed by a representative of the geotechnical engineer. Subgrade soils that exhibit excessive rutting or deflection during proofrolling should be repaired as directed by the field representative. Typical repairs include overexcavation followed by replacement with either properly compacted fill or by a subgrade stabilization fabric in conjunction with a sand fill or crushed stone.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 5 feet of structures, pavements or constructed slopes. General fill is material used to achieve grade outside of these areas. Earthen materials used for structural and general fill should meet the following material property requirements:

Geotechnical Engineering Report

Sugg Parkway Substation ■ Greenville, Pitt County, NC

October 15, 2019 ■ Terracon Project No. 72195082



Soil Type ¹	USCS Classification	Acceptable Parameters (for Structural Fill)
Imported Soil	SC, SM, SP	All location and elevations.
On-Site Soils	SC, SM, SP	On site soils that meet these soil classifications are generally suitable for fill if properly moisture conditioned.

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

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

Fill Compaction Requirements

Structural and general fill should meet the following compaction requirements.

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

1. Fill should be tested for moisture content and compaction during placement. If in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the tests should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. It is not necessary to achieve 95% compaction on the existing ground prior to placing fill or beginning construction. However, the subgrade should be evaluated by a representative of the geotechnical engineer prior to placing fill or beginning construction.

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

Grading and Drainage

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

Earthwork Construction Considerations

Shallow excavations for the proposed structures are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to construction.

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

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

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

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer.

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

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas. One density and water content test should be performed for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions,

including assessing variations and associated design changes.

SUBSTATION MAT FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for the substation mat foundations.

DESCRIPTION	VALUE
Maximum Net allowable bearing pressure	1,000 psf
The required embedment below lowest adjacent finished grade for frost protection and protective embedment ¹	12 inches
Modulus of subgrade reaction	8 pounds per square inch per inch (psi/in)
Estimated approximate total settlement ²	Up to 1 inch
Estimated differential settlement ²	Up to ½ inch
Ultimate coefficient of sliding friction	0.35
Uplift Resistance	Weight of foundation concrete.

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

Construction Considerations

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

DRILLED PIER FOUNDATIONS

Drilled Pier Design Parameters

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

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

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is D**. Subsurface explorations at this site were extended to a maximum depth of 30 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

LIQUEFACTION

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

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Geotechnical Engineering Report

Sugg Parkway Substation ■ Greenville, Pitt County, NC

October 15, 2019 ■ Terracon Project No. 72195082



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

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client.

Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing.

Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

FIGURES

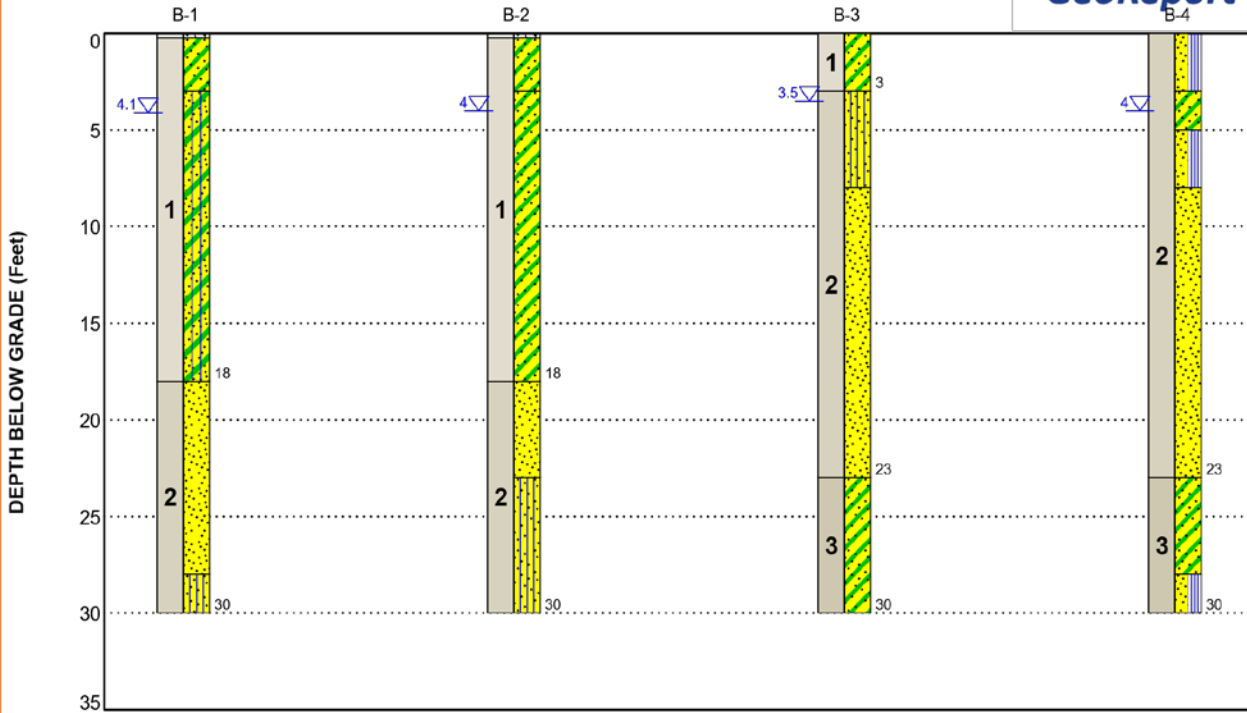
Contents:

GeoModel

Note: All attachments are one page unless noted above.

GEOMODEL

Sugg Parkway Substation ■ Greenville, NC
Terracon Project No. 72195082



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

Model Layer	Layer Name	General Description
1	Looser Sand	Very loose to loose Clayey Sand (SC) and Silty Clayey Sand (SC-SM)
2	Loose to Medium Dense Sand	Generally Silty Sand (SM) and Poorly Graded Sand (SP)
3	Medium Dense to Dense Sand	Poorly Graded Sand (SP), Clayey Sand (SC), Silty Sand (SM)

LEGEND

- Topsoil
- Clayey Sand
- Silty Clayey Sand
- Poorly-graded Sand
- Silty Sand
- Poorly-graded Sand with Silt

First Water Observation

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

NOTES:

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

ATTACHMENTS

Geotechnical Engineering Report

Sugg Parkway Substation ■ Greenville, Pitt County, NC
October 15, 2019 ■ Terracon Project No. 72195082



EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Location
Two	30	New Substation and requested boring locations

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

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

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

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

Geotechnical Engineering Report

Sugg Parkway Substation ■ Greenville, Pitt County, NC
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- ASTM D2216 Standard Test Method of Determination of Water Content of Soil and Rock by Mass
- ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) ■ ASTM D2488 Standard Practice of Description and Identification of Soils (Visual Manual Method) ■ ASTM D422 Standard Test Method for Particle Size Analysis of Soils
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than No. 200 Sieve in Soils by Washing ■ ASTM D4318 Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan

Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

Sugg Parkway Substation ■ Greenville, NC
October 15, 2019 ■ Terracon Project No. 72195082



EXPLORATION PLAN

Sugg Parkway Substation ■ Greenville, NC
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EXPLORATION RESULTS

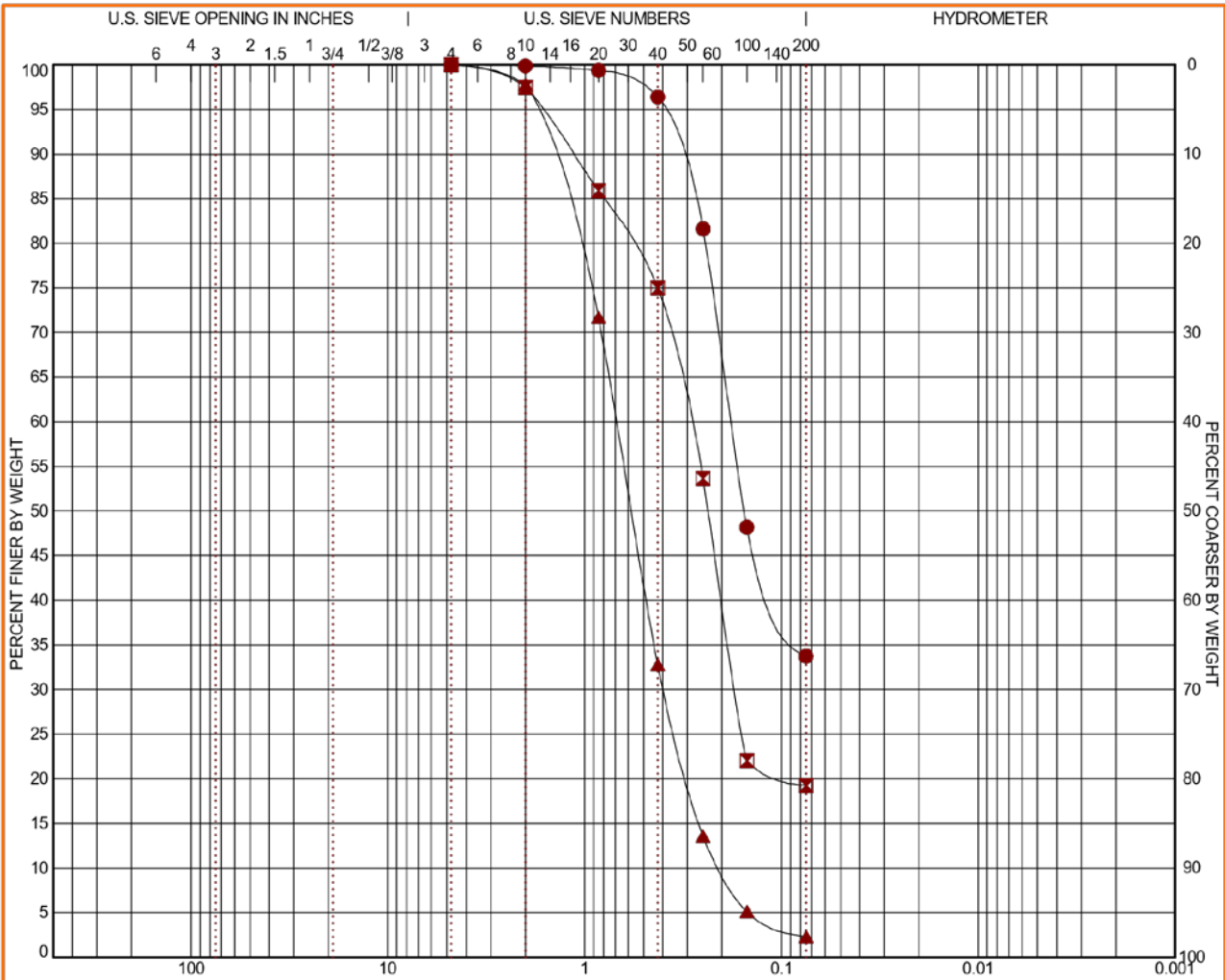
Contents:

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

Note: All attachments are one page unless noted above.

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● B-1	1 - 2.5	0.0	0.0	66.3		33.7		SC
☒ B-1	8.5 - 10	0.0	0.0	80.8		19.2		SC-SM
▲ B-4	8.5 - 10	0.0	0.0	97.7		2.3		SP

GRAIN SIZE			
	●	☒	▲
D ₆₀	0.18	0.293	0.69
D ₃₀		0.171	0.394
D ₁₀			0.202

COEFFICIENTS			
	●	☒	▲
C _c			1.11
C _u			3.42

●		☒		▲	
Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#4	100.0	#4	100.0	#4	100.0
#10	99.87	#10	97.46	#10	97.74
#20	99.36	#20	85.89	#20	71.69
#40	96.4	#40	74.96	#40	32.77
#60	81.62	#60	53.63	#60	13.54
#100	48.18	#100	22.01	#100	5.1
#200	33.73	#200	19.24	#200	2.29

SOIL DESCRIPTION	
●	CLAYEY SAND (SC)
☒	SILTY, CLAYEY SAND (SC-SM)
▲	POORLY GRADED SAND (SP)

REMARKS	
●	
☒	8.5 to 10 feet
▲	

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 72195082 SUGG PARKWAY SUBSTATION; GREENVILLE, NC.GPJ TERRACON_DATATEMPLATE.GDT 10/15/19

PROJECT: Sugg Parkway Substation

SITE: Sugg Parkway and Old Creek Road
Greenville, NC

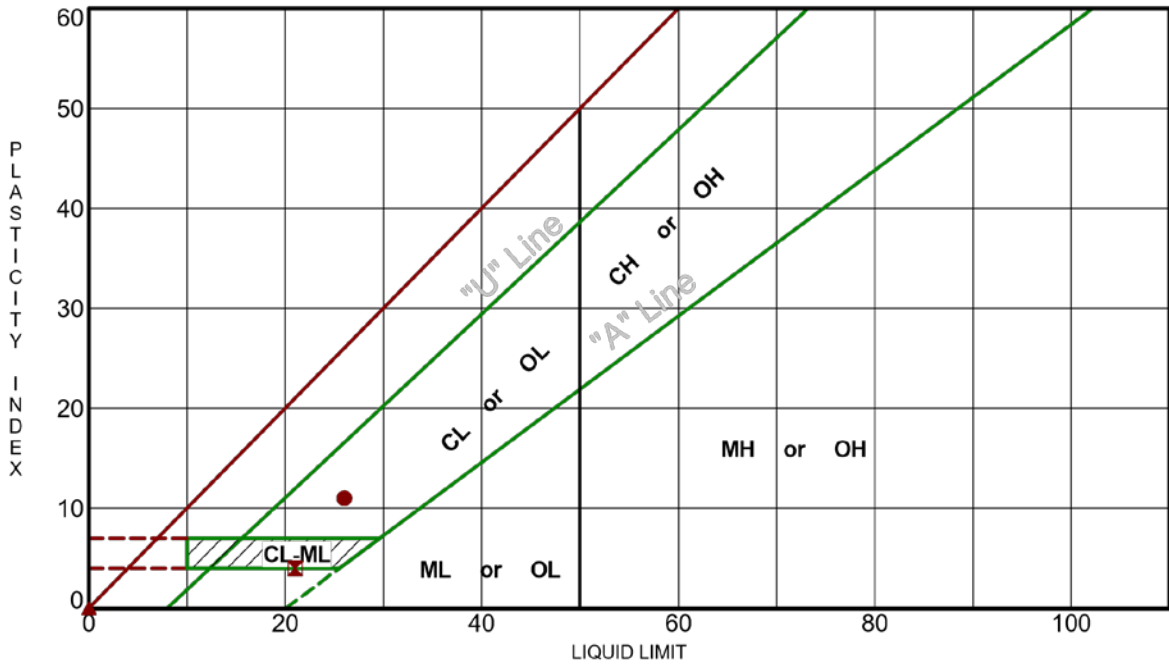


PROJECT NUMBER: 72195082

CLIENT: Greenville Utilities Commission
Greenville, NC

ATTERBERG LIMITS RESULTS

ASTM D4318



LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS 72195082 SUGG PARKWAY SUBSTATION; GREENVILLE, NC.GPJ TERRACON_DATATEMPLATE.GDT 10/15/19

Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
● B-1	1 - 2.5	26	15	11	33.7	SC	CLAYEY SAND
☒ B-1	8.5 - 10	21	17	4	19.2	SC-SM	SILTY, CLAYEY SAND
▲ B-4	8.5 - 10	NP	NP	NP	2.3	SP	POORLY GRADED SAND

PROJECT: Sugg Parkway Substation

SITE: Sugg Parkway and Old Creek Road
Greenville, NC



PROJECT NUMBER: 72195082

CLIENT: Greenville Utilities Commission
Greenville, NC

DESIGN SOIL PARAMETERS FOR DRILLED PIERS

LANDSCAPE

Applicable to the following tables:

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

Boring B-1

Layer (feet)		Soil Type (Clay/Sand)	Effective Unit Weight of Soil (pcf)	Cohesion (psf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	LPile kvalue (pci)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom								
0	4	Sand	112	---	---	---	---	---	---
4	8	Sand	50.6	---	1.76	29	35	260	4,800
8	18	Sand	42.6	---	0.98	28	20	230	1,800
18	23	Sand	57.6	---	1.62	32	75	540	10,000
23	30	Sand	52.6	---	1.24	31	60	520	7,200

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

Geotechnical Engineering Report

Sugg Parkway Substation ■ Greenville, Pitt County, NC

October 15, 2019 ■ Terracon Project No. 72195082

**Boring B-2**

Layer (feet)		Soil Type (Clay/Sand)	Effective Unit Weight of Soil (pcf)	Cohesion (psf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	LPile kvalue (pci)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top -	Bottom								
0	4	Sand	112	---	---	---	---	---	---
4	8	Sand	50.6	---	1.67	29	35	250	4,200
8	18	Sand	43.6	---	1.08	28	20	260	2,400
18	30	Sand	52.6	---	1.22	30	50	470	6,000

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

Boring B-3

Layer (feet)		Soil Type (Clay/Sand)	Effective Unit Weight of Soil (pcf)	Cohesion (psf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	LPile kvalue (pci)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom								
0	3	Sand	112	---	---	---	---	---	---
3	13	Sand	53.6	---	2.80	31	60	340	7,800
13	23	Sand	52.6	---	2.08	30	50	420	6,000
23	28	Sand	57.6	---	1.35	32	75	620	10,000
28	30	Sand	67.6	---	1.47	35	100	890	10,000

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

Geotechnical Engineering Report

Sugg Parkway Substation ■ Greenville, Pitt County, NC

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Boring B-4

Layer (feet)		Soil Type (Clay/Sand)	Effective Unit Weight of Soil (pcf)	Cohesion (psf)	Coefficient of Horizontal Soil Stress (K)	Friction Angle (degrees)	LPile kvalue (pci)	Factored Skin Friction (psf)	Factored End Bearing Pressure (psf)
Top	Bottom								
0	3	Sand	113	---	---	---	---	---	---
3	23	Sand	52.6	---	1.76	31	60	370	6,000
23	28	Sand	57.6	---	0.98	32	75	590	9,600
28	30	Sand	67.6	---	1.62	35	100	510	10,000

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

SUPPORTING INFORMATION

Contents:

General Notes

Unified Soil Classification System





Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Sugg Parkway Substation ■ Greenville, NC

Terracon Project No. 72195082

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

DESCRIPTIVE SOIL CLASSIFICATION

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

LOCATION AND ELEVATION NOTES

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

STRENGTH TERMS				
RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30
RELATIVE PROPORTIONS OF SAND AND GRAVEL			RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight		Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	<15		Trace	<5
With	15-29		With	5-12
Modifier	>30		Modifier	>12
GRAIN SIZE TERMINOLOGY			PLASTICITY DESCRIPTION	
Major Component of Sample	Particle Size		Term	Plasticity Index
Boulders	Over 12 in. (300 mm)		Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)		Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)		Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm)		High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)			

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification			
				Group Symbol	Group Name ^B		
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	Cu \geq 4 and 1 \leq Cc \leq 3 ^E		GW	Well-graded gravel ^F	
			Cu < 4 and/or [Cc<1 or Cc>3.0] ^E		GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH		GM	Silty gravel ^{F, G, H}	
			Fines classify as CL or CH		GC	Clayey gravel ^{F, G, H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	Cu \geq 6 and 1 \leq Cc \leq 3 ^E		SW	Well-graded sand ^I	
			Cu < 6 and/or [Cc<1 or Cc>3.0] ^E		SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH		SM	Silty sand ^{G, H, I}	
			Fines classify as CL or CH		SC	Clayey sand ^{G, H, I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots on or above "A" line ^J		CL	Lean clay ^{K, L, M}	
			PI < 4 or plots below "A" line		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		

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

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

^CGravels 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.

^DSands 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. 2

$$(D_{30})$$

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

$$D_{10} \times D_{60}$$

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

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

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

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

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

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

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

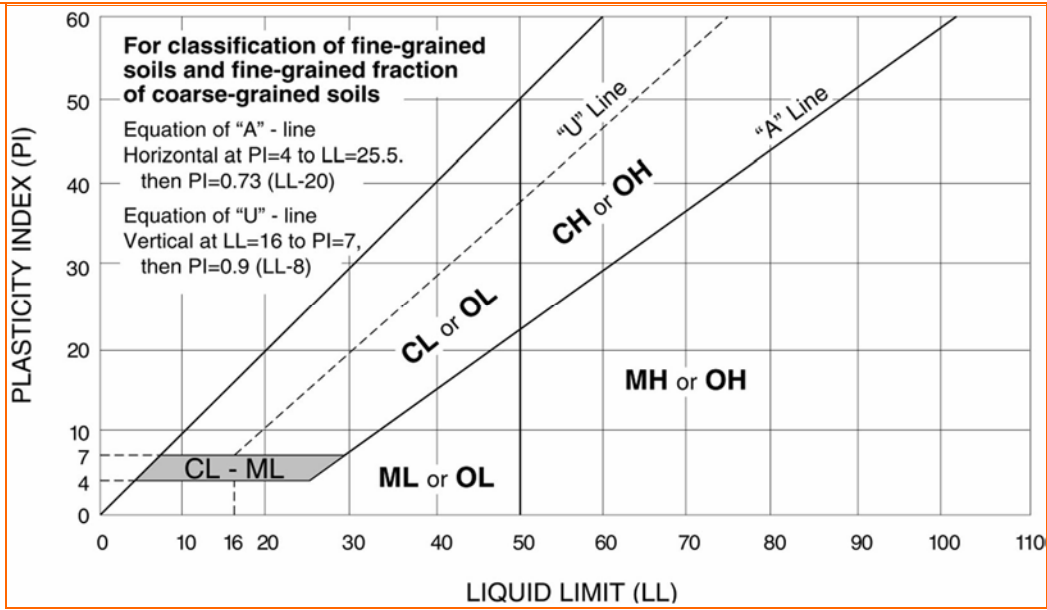
^MIf soil contains \geq 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

^NPI \geq 4 and plots on or above "A" line.

^OPI < 4 or plots below "A" line.

^PPI plots on or above "A" line.

^QPI plots below "A" line.



Responsive ■ Resourceful ■ Reliable

NOTICE:

Greenville Utilities Commission is committed to the health and safety of our customers and employees.

We are taking the spread of COVID-19 very seriously and continue to monitor the latest Local, State, and Federal guidance.

We are presently closed to the public.

We are receiving FedEx, UPS, US Mail.

There will not be a face to face opening.