FAYETTEVILLE PUBLIC WORKS COMMISSION OF FAYETTEVILLE, NORTH CAROLINA

SPECIFICATIONS AND BID DOCUMENTS FOR THE INSTALLATION OF BLACK AND DECKER 69 TO 15 x 25 kV SUBSTATION

ISSUED FOR BIDS

FAYETTEVILLE PUBLIC WORKS COMMISSION OF FAYETTEVILLE, NORTH CAROLINA

SPECIFICATIONS AND BID DOCUMENTS FOR THE INSTALLATION OF BLACK AND DECKER 69 TO 15 x 25 kV SUBSTATION

ISSUED FOR BIDS

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

FAYETTEVILLE PUBLIC WORKS COMMISSION
FAYETTEVILLE, NORTH CAROLINA

SPECIFICATIONS AND BID DOCUMENTS FOR THE INSTALLATION OF BLACK AND DECKER 69 TO 15 x 25 kV SUBSTATION

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REQUEST FOR PROPOSAL

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NOTICE TO PROSPECTIVE BIDDERS

Pursuant to NCGS 143-129, sealed proposals will be received by the FaPublic Works Commission ('PWC"). Bids will be publicly opened outside of the PWC Operation Complex near the visitor entrance at **3:00 p.m., Local Time, Thursday, October 28, 2021**, at which time the bids will be they will be read for the furnishing and delivery of all labor and materials and equipment (except materials and equipment specified to be furnished by the PWC) complete and conforming to the Specifications for the installation of the BLACK AND DECKER 69 TO 15 x 25 kV Substation, all as set forth in the Contract Documents. Any Proposal received subsequent to that time will be promptly returned to the Bidder unopened.

The Technical Specifications and Bid Documents may be obtained from PWC Purchasing Department, at https://www.faypwc.com/purchasing or in the Fayetteville Public Works Commission's Procurement Department, 1st floor, PWC Administration Building, 955 Old Wilmington Road, Fayetteville, NC between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday.

Each Proposal shall be accompanied by cash, cashier's check, or certified check drawn on a bank insured by the Federal Deposit Insurance Corporation or Savings Association Insurance Fund. Checks shall be made payable to the Public Works Commission of the City of Fayetteville, North Carolina, in an amount not less than five percent (5%) of the total bid as a guarantee that a Contract, if awarded, will be entered into. In lieu thereof, a Bid Bond which conforms to the provisions of G.S. 143-129 as amended by Chapter 1104 of the Public Laws of 1951, may be submitted by the Bidder.

Proposals must be completed with indelible ink. No alterations or interlineations will be permitted unless made before submission and initialed and dated. Prior to the submission of the Proposal, the Bidder shall make and shall be deemed to have made a careful examination of the bid documents on file with the Owner and with the Engineer and of all other matters that may affect the cost and the time of the work.

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

Bidders are to mail or deliver their Proposals as follows: Public Works Commission; Attn: Trent Ensley, Procurement Manager; 955 Old Wilmington Road; Fayetteville, NC 28301.

"PROPOSAL FOR THE INSTALLATION OF BLACK AND DECKER 69 TO 15 X 25 KV SUBSTATION, NOT TO BE OPENED UNTIL 3:00 P.M., LOCAL TIME, THURSDAY, OCTOBER 28, 2021".

Notice is hereby given of a pre-bid meeting with the Owner and the Engineer for general discussion, project familiarization, and a site visit to be held at the offices of the Fayetteville Public Works Commission in the Conference Room #107, 1st Floor, Operations Center, 955 Old Wilmington Road; Fayetteville, NC 28301, beginning at 10:00 A.M., local time, Thursday , October 14, 2021. Following a brief meeting, prospective bidders will be given a visit to the substation site.

Regardless of the bidder's chosen means of delivery, a bidder assumes responsibility for delivery to the advertised location by the advertised deadline. If the delivery service cannot deliver the bid to the proper location by the deadline, the bid must be rejected as untimely, and shall be returned unopened to the sender.

The right is reserved to reject any or all bids and to waive all formalities concerning bid, or award bid to the lowest responsible Bidder or Bidders taking into consideration quality, performance, and the time specified in the Proposals for the performance of the Contract.

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 and 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 ninety (90) days from the date of opening

thereof; (3) accept the bid, that, in its opinion, represents the best interests of PWC, regardless of whether such bid is the lowest price; and (4) award Contracts to Bidder(s) for any Schedule(s) individually or collectively from the Bid Schedules.

FAYETTEVILLE PUBLIC WORKS
COMMISSION OF FAYETTEVILLE,
NORTH CAROLINA

By: Trent Ensley Date: September 24, 2021
Purchasing Manager

1.0 Proposals

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

1.2 Proposals must be made on the Contractor's Proposal provided herein and must not be altered, erased, or interlined in any manner. The Contractor shall fill in the Contractor's Proposal as detailed in the instructions. The Bidder may retain one (1) copy, of the completed Contractor's Proposal, but the original, fully executed, must be inserted or be attached to the Specification Documents. In addition, one (1) additional copy of all executed forms and supporting information shall be submitted with the original.

1.3 Proposals must be enclosed in a sealed envelope, addressed to the attention of **Shelby Lesane, PWC – City of Fayetteville, Procurement Advisor.** The outside of the envelope must be marked as required in the "Notice to Prospective Bidders" and the Bidder's name, bid opening date and time and the Bidder's license number shall be shown thereon. All Proposals must be made on the blank forms provided in the Contractor's Proposal.

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

1.5 Proposals shall itemize each and every exemption from the Specification using the Form of Exceptions provided 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 Contractor's Proposal section. 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.

1.6 Invoice shall list the appropriate state sales tax as a separate item.

1.7 The prices as quoted herein:

a. Are firm unless otherwise stated.
b. Do include the cost of delivery to the site at the Bidder's Risk.

1.8 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 Plans, Specifications, and Bid Documents. This is required prior to the time of opening bids. No oral or telephonic Proposals will be accepted.

1.9 The Materialman further declares that he has examined the site of the work and informed himself fully regarding all conditions pertaining to the locations where the work is to be done, examined the Technical Specifications for the work and the Contract Documents relative thereto, read all special provisions furnished prior to the opening of the bids, and satisfied himself relative to the work to be performed.

1.10 The materials will conform to the Technical Specifications sections attached hereto and made a part hereof.

1.11 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 Trent Ensley with Public Works Commission 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 Owner 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 Owner 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.

1.12 After opening, bids may only be withdrawn in accordance with N.C.G.S. 143-129.1.

2.0 Payment

2.1 Payment by the Owner to the Successful Bidder shall be made periodically based on the actual percentage of completion, and upon demonstration that any equipment or materials furnished meet the Specifications.

2.2 In accordance with N.C.G.S. 143-134.1, the Commission will retain five percent (5%) of the amount of each monthly periodic payment. The Commission, after fifty percent (50%) of the work has been completed, will consider waiving further retainage on the project upon the following conditions: (1) written consent of surety is received; (2) satisfactory progress is being made on the Project; and (3) prior to fifty percent (50%) completion, any nonconforming work identified in writing by the Engineer has been corrected by the Contractor and accepted by the Engineer. If retainage is discontinued or reduced, the Commission reserves the right to reinstate retainage up to the five percent (5%) level if the Contractor performs unsatisfactorily. Furthermore, the Commission reserves the right to continue to retain payment, even in the event the Contractor's work is satisfactory, in order to ensure a total of two and one-half percent (2.5%) retainage over the life of the project. The Commission reserves the right to withhold additional payments for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the Commission or reasonable evidence that a third-party claim will be filed.

2.3 The address for submittal of all invoices is Public Works Commission of the City of Fayetteville, 955 Old Wilmington Road, Fayetteville, North Carolina 28301, Attention: Joel Valley.

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 (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 on the Contractor's Proposal.

5.0 Award of Contract

5.1 The award of the Contract will be made to the lowest responsive, responsible Bidder as soon as practicable taking into consideration a number of factors relating to quality performance, and time. Factors to be considered by the Owner include those 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. In all cases concerning cost, unit price shall be the governing factor if a discrepancy exists between the extension of unit cost, times quantity.

5.3 In determining the lowest responsive, responsible bidder while taking into consideration quality, performance, and time specified in a proposal for the performance of the Contract, PWC will consider the following:

5.4
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.

5.5 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.

5.6 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.

6.3 In all Performance and Payment Bonds, there shall be a provision that no suit, action, or proceeding by reason of default shall be brought on this Bond after a period of 24 months. The face value of the Bond shall be one hundred percent (100%) of the contract price for a period 24 months following final acceptance of the project.

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 and all other Contract Documents on file with the Commission and with the Engineer, and all other matters that may affect the cost and the time of completion of the work.

8.0 Time for Completion

The time of completion of the project shall be as specified in the Form of Proposal.

9.0 Bids to be Retained

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of ninety (90) days pending the execution of a Contract by the Successful Bidder. Should the Successful Bidder default and not execute a contract, then the Contract may be offered to the next lowest responsible Bidder whose Proposal is evaluated as acceptable.

10.0 Materialman's Proposal Form

Those bids not received on Fayetteville PWC Proposal Form contained herein, or an exact copy thereof, will be considered unresponsive. The forms shall be filled out completely. Any omissions may cause the entire Proposal to be rejected.

11.0 Questions

Questions regarding this bid must be submitted in writing to the attention of Trent Ensley, Procurement Manager, by fax to (910) 483-1429, or by email to shelby.lesane@faypwc.com no later than **3:00 pm, October 20, 2021**.

Bidders are **prohibited** by contacting any PWC official, employee, or agent other than as listed above. Failure to comply with this provision will result in disqualification of the bidder.

12.0 Contractor's Insurance

12.1 The Contractor shall take out and maintain during the life of this Contract, Worker's Compensation, General Liability, Property Damage and Motor Vehicle Liability Insurance.

This contract will terminate if any of the aforementioned insurance coverage's are cancelled or expired.

12.2 Worker's Compensation Insurance shall include all of the Contractor's employees employed at the site of the Project under the 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 applicable Worker's Compensation statute, the Contractor shall provide adequate coverage for the protection of his employees not otherwise protected.

12.3 General Liability and Property Damage Insurance shall be in such amounts as to adequately protect the Owner and the Contractor 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 not be less than the following:

General Liability Insurance for bodily injury or death $2,000,000 per occurrence, and $5,000,000 for each aggregate.

Property Damage Insurance $3,000,000 for each aggregate and $5,000,000 aggregate for accidents during the policy period.

GL Policy shall include product and completed operations coverage.

12.4 Motor Vehicle Liability Insurance shall be for not less than the following amounts:

Bodily injury or death $1,000,000 per occurrence and $2,000,000 for each aggregate.

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

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

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

12.7 The Contractor shall secure, at his expense, and shall maintain during the life of the Contract, co-insurance for the Public Works Commission of the City of Fayetteville, and the Design Engineer name and included as additional insured. The amounts shall be the same as previously specified.

13.0 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. The Contractor must possess a Public Utilities Electrical Contractors License. A current copy of the Contractor's State of North Carolina Board for General Contractor's license must be submitted with this Proposal and included in the Proposal section. Additionally, a valid license must be maintained during the course of the work. Each bidder shall indicate its North Carolina's license number on the bid envelope.

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.

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. In case of discrepancy or disagreement in the Contract Documents, the order of precedence shall be: Contract, Technical Specifications, Large Scale Detail Drawings, and Small Scale 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 Plans and/or Specifications

The Owner, or the Engineer on behalf of the Owner, may make changes to Plans 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 Drawings and Specifications

The Engineer will furnish free of charge to each Bidder one (1) copy of Plans and Specifications. Additional sets of these Specifications 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.

6.0 Ownership of Drawings and Specifications

All Drawings and Specifications are instruments of service and remain the property of the Owner. 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 and shall install, maintain, and remove all equipment of the construction, other utensils or items and be responsible for the safe, proper, and lawful construction, maintenance, and use of same,

and 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, Paragraphs 2.1 and 2.2. **All other necessary materials are to be furnished by the Contractor as outlined in** the Technical Specifications, Paragraph 2.3.

7.2 The Contractor shall not use any "removed" materials in the completion of the Project unless indicated as a transfer unit. 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 the Contract Documents, 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 Engineer or his representative at the site shall be immediately removed and replaced.

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

8.0 Royalties, Licenses, and Patents

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

9.0 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.

10.0 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.

11.0 Delays and Extension of Time

11.1 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. All construction must be completed in accordance with Section 8.0, Instructions to Bidders.

11.2 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.

11.3 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.

12.0 Correction of Work Before Final Payment

12.1 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.

12.2 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.

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

13.0 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. Contractor 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.

14.0 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 Contractor's Proposal Form.

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.

15.0 Liquidated Damages

Time is of the essence with respect to performance of each of the Parties' obligations under the Agreement. In the event Contractor fails to achieve. Completion of Project by the Completion Date, Contractor shall pay to PWC as liquidated damages the sum of Five Hundred dollars ($500) per day for each and every day that such delivery is delayed beyond the specified times, as liquidated damages and not as a penalty. PWC shall have the right to deduct such amounts, if applicable, from such moneys which may be then due, or which may become due and payable to Contractor..

16.0 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 (the Contractor's) knowledge and if any appear afterwards, the Contractor shall save the Owner harmless on account thereof.

17.0 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.

18.0 Engineer's Status

The Engineer has authority to stop the work whenever such stoppage may be necessary to insure 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.

19.0 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.

20.0 Right-Of-Way

The Owner will obtain all easements and/or right-of-way required for the project. The Owner shall be responsible for clearing all trees and brush as per Plans and Specifications.

21.0 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.

22.0 Equal Employment Opportunity

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

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

22.2 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.

22.3 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.

22.4 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.

Bidder: _____

By: _____

Date: _____

26.0 **The Materialman** shall complete the attached Form of Exception which clearly states any deviance to Specifications proposed by the Bidder. Failure to state any deviance in the Materialman's Proposal from the Specifications assumes complete and total compliance with the requirements of the Specifications.

27.0 **Covid-19**

As North Carolina and the nation continues to deal with the COVID- 19 pandemic, we must all take necessary steps to ensure the health and safety of employees, coworkers, family, friends, associates and people that we come in contact with on a daily basis. PWC has implemented measures including requiring its employees to conduct temperature and wellness checks, wear a face covering or mask, whenever possible, maintain proper social distancing (minimum or 6 feet) and take other actions such as washing their hands, using approved sanitizer and wiping down surfaces, especially commonly shared equipment or tools. This applies to employees working in PWC facilities, in public, or at field sites. Firms who are under contract with PWC or working under contract, are expected to comply with all OSHA/EPA guidelines, CDC recommendations including any applicable North Carolina Executive Orders regarding the performance of work under COVID 19 conditions. Examples of such guidance can be found at the following:

OSHA COVID-19 Overview

https://www.osha.gov/SLTC/covid-19/

OSHA COVID-19 – Control and Prevention / Construction Work

https://www.osha.gov/SLTC/covid-

19/construction.html#:~:text=Keep%20in%2Dperson%20meetings%20(including,Fill%20hand%20sanitizer%20dispensers%20regularly.

https://www.osha.gov/Publications/OSHA4000.pdf

North Carolina COVID-19 Executive Orders

https://www.nc.gov/covid-19/covid-19-executive-orders

Center for Disease Control

https://www.cdc.gov/coronavirus/2019-ncov/index.html

Implementing Safety Practices for Critical Infrastructure Workers

https://www.cdc.gov/coronavirus/2019-ncov/community/critical-workers/implementing-safety-practices.html

Essential Staff- Do's & Dont's

https://www.cdc.gov/coronavirus/2019-ncov/downloads/Essential-Critical-Workers_Dos-and-Donts.pdf

NC Licensing Board for General Contractors

https://www.nclbgc.org/2020/07/02/board-buzz-summer/

NC Association of General Contractors

https://www.cagc.org/CAGC/SafetyHR/CAGC/Safety/SafelyHomeInitiative.aspx?hkey=e3439388-0c36-4755-91bd-4c8fc6d22a41

NC Department of Health and Human Services

https://covid19.ncdhhs.gov/

Cumberland County Health Department

https://www.co.cumberland.nc.us/departments/public-health-group/public-health

Department of Homeland Security

https://www.ready.gov/pandemic

Cape Fear Valley- What to do if you have COVID symptoms

https://www.youtube.com/watch?time_continue=1&v=tD0D7Apa_vw&feature=emb_logo

FAYPWC COVID Response

https://www.faypwc.com/covid-19-update/

Small Business Administration

https://www.sba.gov/page/coronavirus-covid-19-small-business-guidance-loan-resources

As an additional step to ensure the health and safety of contractor employees and PWC employees, should a contractor's employee test positive for COVID 19 the contractor must immediately inform the PWC project manager/supervisor or their primary point of contact at PWC and the employee should not be performing work at PWC facilities or field sites until medically cleared. This is necessary so PWC can inform its employees, conduct its method of contact tracing for our employees and take any measures necessary such as quarantining PWC employees who may have been in contact with the individual who tested positive.

These actions are necessary to ensure the health and safety of all and to ensure that contract performance can be achieved under the conditions of this pandemic.

Contractor must provide a plan with their proposal that describes their plan for working under COVID-19 conditions. The plan should address the Contractor's approach to protect their employees, PWC employees, along with any other Contractor's working on PWC's locations. This may include the Contractor's approach towards employee use of PPE, such as face masks, sanitizing commonly shared tools or equipment, practicing social distancing as work conditions permit, and working within close proximity of others. The plan may also address any other actions that the Contractor will be taking, such as conducting daily temperature checks, conducting symptom checks and trackers, and any other actions the Contractor deems appropriate to protect the health and safety of their employees, PWC employees, and any other Contractor's working on PWC's locations.

28.0 Small Disadvantaged Business Enterprise Program NCDOT Disadvantaged Business Enterprise (DBE) and Historically NC DOA Underutilized Business (HUB) firms with current certifications are acceptable for listing in the Bidder's submittal of SDBE participation. Firms that are certified through NCDOT are listed at the "Vendor Directory," which can be accessed through at https://www.ebs.nc.gov/VendorDirectory. Firms that are certified through NC DOA are listed at the "HUB Vendor Search," which can be accessed through at https://ncadmin.nc.gov/businesses/hub.

Bidder shall submit with the Bid the SDBE documentation requested in these specifications. It is strongly recommended that the Bidder attend the Pre-Bid Conference, as important information will be reviewed. Questions regarding SDBE requirements shall be directed to Lexi Hasapis, Local Vendor Procurement Analyst, at (910) 580-6900 / lexi.hasapis@faypwc.com.

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 one (1) year 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

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.

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 the recoverable from the Contractor.

4.0 Storage of Materials

The breakers and manholes for this construction are currently at the Owner's Warehouse. The Contractor will be responsible for transporting, unloading and storage at the project site. All driveways and public roadways must be kept clear. No parking, storage or staging of materials shall be performed in a driveway or roadway, causing said roadway, impassable any time. Parking, storage and staging of materials shall be performed only in approved lay down areas.

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 (N.C.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 foreman 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 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 state in the Proposal his normal work week for the project.

8.2 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 and specifically agreed to in writing by PWC.

9.0 Job-Site Obligations

9.1 Except as otherwise provided in the Contract, necessary sanitary conveniences for use by Contractor's employees and Subcontractors at the Jobsite shall be furnished and maintained by 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 Contractor shall, at all times, keep its work areas in a neat, clean, and safe condition. 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, 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, 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 Owner's warehouse or designated laydown area(s), at Owner's option of any salvageable materials for which Owner has reimbursed Contractor or that has

been supplied by Owner for incorporation into the Work but not used; and Contractor shall leave the premises in a neat, clean and safe condition acceptable to the Company Representative. In the event of Contractor's failure to comply with the foregoing, the same may be accomplished by Owner at Contractor's expense.

9.3 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 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 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 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 Owner. If such Work or part thereof fails to meet the requirements of the Contract, 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.

9.8 All Contractor personnel and any subcontractor personnel 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.

DEFINITIONS

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

Commission or Owner or PWC	Fayetteville Public Works Commission
General Manager	Elaina Ball, or her designee.
Manager of Substations and Support Services	Joel Valley, or his designee.
Purchasing Manager	Trent Ensley, or his designee.
Engineer	Booth & Associates, LLC
Observer	An authorized representative of the Commission assigned to make any or all necessary observations of work performed and equipment and/or apparatus furnished by the Contractor.
Materialman, Bidder or Contractor	Any individual, firm, or corporation submitting a Proposal for the work contemplated, acting directly or through a duly-authorized representative.
Contractor **Materialman or** **Successful Bidder**	The Bidder that receives the Notice of Award and is the party the second part of the Contract with PWC for the Project, acting directly through a duly authorized representative.
Subcontractor	An individual, firm, or corporation who contracts with the Contractor to perform part of or all of the latter's Contract.
Surety	The body, corporate or individual, approved by the Commission which is bound with and for the Contractor, 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	The approved prepared form on which the Bidder is to submit or has submitted his Proposal for the work contemplated.
Bid Deposit	To all bids there shall be attached cash, cashier's check, or certified check of the Bidder upon a bank authorized to do business in North Carolina, or in lieu thereof, a Bid Bond.
Plans	All Drawings or reproductions of Drawings pertaining to the constructions 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 material to be furnished under the Contract.

Contract or Agreement	The construction agreement covering the furnishing of equipment and/or apparatus and the performance of the work. The Contract shall include all of the Contract Document.
Performance Bond	The approved form of security to be approved by the Commission furnished by the Contractor and his Surety as a guarantee of good faith on the part of the Contractor to execute the work in accordance with the terms of the Specifications and Contract.
Payment Bond	The approved form of security to be approved by the Commission furnished by the Contractor and his Surety as a guarantee for payment of all Subcontractors on the part of the Contractor in execution 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 thing being purchased by the Commission.
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.

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. Additional capitalized terms have the meaning as specified in the Agreement between PWC and Contractor.

FAYETTEVILE PUBLIC WORKS COMMISSION
OF
FAYETTEVILLE, NORTH CAROLINA

CONTRACT AGREEMENT FOR THE INSTALLATION OF THE BLACK AND DECKER 69 TO 15 X 25 KV SUBSTATION

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

_____

(Signature of Finance Officer)

State of North Carolina
Cumberland County

CONSTRUCTION AGREEMENT

THIS CONSTRUCTION AGREEMENT ("Agreement") is made by and between the City of Fayetteville (the "City"), by and through the Fayetteville Public Works Commission ("FPWC"), a North Carolina public authority, and _____ ("Contractor"), a _____ (*specify type of legal entity, state of formation, and if not formed in NC, confirm NC registration to do business*) (each of each of PWC and Contractor is a "Party" and both are collectively the "Parties") as of the date of execution last written below (the "Effective Date"). The Parties agree as follows:

1. The Construction Project. Contractor shall furnish and bear solely the entire cost of all labor and materials necessary for the construction and/or renovation of the Project (defined hereinbelow) as specified in the Contract Documents (defined hereinbelow) and complete all Work on the Project in a workmanlike manner in strict accordance with the Contract Documents, schedule delivery of the new materials, furnish and bear solely the entire cost of all supervision, contract administration, equipment, tools, and other means necessary to complete the Project, perform every obligation imposed by the Contract Documents, and be solely responsible for the clean-up and disposal of all materials and debris relating to or arising from the construction and renovation, subject to any exceptions that are specifically set forth in the Contract Documents. Contractor is solely responsible for all construction means, methods, techniques, sequences, procedures, safety precautions or programs, supervising, coordinating, and performing all the Work necessary to complete the Project; provided, however, PWC shall have the right, without incurring any liability to the Contractor, to suspend Contractor's performance when a PWC employee, in his or her opinion, observes a safety violation involving a threat to life or imminent danger of bodily injury, and the suspension shall remain in effect until Contractor remedies the safety violation.

2. Terms. Capitalized terms used in this Agreement have the meaning specified below:

"Business Day" means each calendar day that is not a Saturday, Sunday, holiday observed by the federal government for its employees, or holiday observed by the State of North Carolina for its employees.

"Completion of the Project" means: (i) the Project is completed in accordance with this Agreement, except for punch list items; (ii) PWC has received any required temporary or final certificate of occupancy from the governmental agency with jurisdiction over the Project; and (iii) the registered architects or engineers (the "Designer(s)") who designed portions or components of the Project have issued certificates of Completion of the Project as to those portions or components.

"Contract Documents" means the following documents that were either made available to Contractor by PWC during the bid solicitation process (including Drawings) or executed by the Parties or both, which are all incorporated by reference herein:

a. This Agreement
b. Invitation to Bid
c. Instructions to Bidders

d. Bid Proposal Checklist
e. Bid Proposal Form
f. Bid Proposal Supplemental – Contractor Qualification Form
g. SDBE Instructions
h. SDBE Forms
i. Performance and Delivery
j. Bid Form submitted by Contractor and accepted by PWC
k. Notice of Award
l. Acceptance of Award
m. Construction Contract
n. Performance Bond
o. Payment Bond
p. Certificates of Insurance
q. Power of Attorney
r. Definitions and Terminology
s. General Conditions
t. Special Conditions
u. Measurement and Payment
v. Submittals
w. CPM Construction Schedule
x. Special Provisions – Performance and Delivery
y. Quality Control
z. Project Closeout
aa. Appendices
bb. Technical Specifications
cc. Drawings

The following documents may be delivered or issued on or after the Effective Date of the Agreement and may not be attached to this Agreement, but are considered Contract Documents when executed by the Parties:

m. Notice to Proceed and Acceptance of Notice
n. Work Change Directive(s)
o. Change Order(s)
p. Field Order(s)

There are no Contract Documents other than those identified in this Agreement. The Contract Documents may only be amended, modified, or supplemented as provided in this Agreement in a writing signed by the Parties.

"Fault" means a breach of contract by Contractor, negligent, reckless, or intentional act(s) or omission(s) constituting a tort under applicable statutes or common law by one or more Responsible Persons, or violation(s) of applicable statute(s) or regulation(s) by a Responsible Person.

"Project" means _____ _____ (insert general description), as more specifically set forth in the Contract Documents.

It is further mutually agreed that, if, at any time after the execution of this agreement and the Surety Bond hereto attached for its faithful performance and payment, Commission shall deem the Surety or Sureties upon such Bond to be unsatisfactory, or if for any reason, such Bond ceases to be adequate to cover the performance and/or payment of the work, Contractor shall, at its expense, within five (5) days after the receipt of notice from Commission so to do, furnish an

additional Bond or Bonds in such form "Responsible Person" means the Contractor and each of its employees, agents, representatives, subcontractors, or other persons and entities for which Contractor may be liable or responsible as a result of any statutory, tort, or contractual duty.

The terms used in this Agreement shall have the meaning as stated herein and in the Definitions and Terminology. In the event of a conflict between the terms of this Agreement and any other component(s) of the Contract Documents, the terms of this Agreement shall govern.

3. Contract Price. PWC shall pay Contractor for completion of the Project in accordance with the Contract Documents the amount identified in the accepted Bid Form of Contractor, being in the total amount of $_____ (the "Price"). Contractor understands and acknowledges that the Price is derived from a specific appropriation of funds provided for the Project. Contractor agrees and acknowledges the Price is equal to the aggregate cost of all Work to be done on the Project, including all labor, materials, equipment, apparatus, and supplies, set in accordance with the amount specified on the Bid Form submitted by Contractor and accepted by PWC.

4. Contract Times. The Parties shall perform their obligations under this Agreement in compliance with all scheduling deadlines set forth in the Contract Documents. The Contractor shall commence the Work to be performed under this Agreement on a date to be specified in accordance with the Notice to Proceed issued by PWC. Contractor shall achieve Completion of the Project no later than _____, plus any extensions thereof allowed in accordance with the General Conditions (the "Completion Date").

5. Payment. PWC shall pay Contractor in installment payments plus a final payment, as set forth in the Contract Documents. For each applicable installment payment, Contractor shall submit an application for payment in accordance with the Contract Documents. Applications for payment will be processed by PWC as provided in the Contract Documents. Such installment payments shall reflect the actual cost of the Work, not to exceed in total the Price, and the allocable portion of the total Price for said installment. PWC shall make payment to the Contractor, less any applicable retainage set forth in the Contract Documents; provided, however, that PWC may withhold all or a portion of a payment on account of (1) incomplete work, (2) defective or nonconforming work, (3) claims filed or a reasonable basis to believe that such claims will be filed imminently, (4) failure of the Contractor to make payments properly for labor, services, materials, equipment or subcontracts, (5) damages caused to PWC or another party by one or more Responsible Persons, or (6) failure to comply with the terms and conditions of this Agreement. In the final payment, PWC shall pay the balance of the Price, including all retained amounts, less any Liquidated Damages and other applicable damage and claim amounts, to Contractor within forty-five (45) days of Completion of the Project; provided, however, that PWC may withhold a reasonable sum from the final payment to ensure correction of any final items or condition on the Project.

6. Contractor's Representations and Warranties. In order to induce PWC to enter into this Agreement, Contractor makes the following representations and warranties to PWC:

a. Contractor is duly licensed in the State of North Carolina to complete all Work necessary for the Project, is duly organized, validly existing and in good standing and has all requisite powers, rights, and authority to execute, enter into, and perform this Agreement in accordance with the terms and conditions of this Agreement, and this Agreement constitutes a legal, valid, and binding obligation of Contractor enforceable against it in accordance with its terms.

b. Contractor has read the Contract Documents, and acknowledges and understands all data, materials, specifications, and requirements identified in the Contract Documents.

c. Contractor has visited the site for the Project, conducted a thorough, visual examination of the site and adjacent areas, and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, and performance in completing the Project.

d. Contractor is familiar with and is satisfied as to all laws and regulations that may affect cost, progress, and performance to complete the Project.

e. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the site and all drawings of physical conditions relating to existing surface or subsurface structures at the site that have been identified in the Detail Specifications and any accompanying reports and drawings, and (2) reports and drawings relating to hazardous environmental conditions, if any, at or adjacent to the site that have been identified in the Contract Documents and any accompanying reports and drawings.

f. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, if any, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

g. Based on the information and observations referred to in subsection e. of this Section, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price commencing on the commencement date and in accordance with the other terms and conditions of the Contract.

h. Contractor is aware of the general nature of work to be performed by PWC and others at the Site that relates to the Work as indicated in the Contract Documents.

i. Contractor has given PWC's Designer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by the Designer is acceptable to Contractor.

j. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

k. Contractor's entry into this Agreement constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

l. Contractor has no business or personal relationship with any PWC Commissioner, officer, director, manager, or supervisor, and Contractor covenants to

disclose immediately to PWC any such relationship that develops during the performance of Work on the Project.

7. Contractor's Payment Obligations. Contractor shall pay all of its obligations arising out of or in connection with the Project in a timely manner to all persons supplying materials in the prosecution of the Work and to all laborers and others employed thereon.

8. Performance and Payment Bonds. Contractor shall obtain and deliver to PWC a performance bond in the amount of one hundred percent (100%) of the construction contract amount, conditioned upon the faithful performance of the Project Work in accordance with the Contract Documents, which bond shall be solely for the protection of PWC. Contractor shall obtain and deliver to PWC a payment bond in the amount of one hundred percent (100%) of the Price, conditioned upon the prompt payment for all labor or materials for which the Contractor or one or more of its subcontractors is liable, which payment bond shall be solely for the protection of the persons furnishing materials or performing labor for which the Contractor is liable. The performance bond and the payment bond shall be executed by one or more surety companies legally authorized to do business in the State of North Carolina, shall become effective upon the awarding of the construction contract by PWC to Contractor, and shall at all times comply with the requirements set forth in Article 3 of North Carolina General Statutes Chapter 44A. In the event PWC deems the surety or sureties upon any bond necessary for this Agreement and the completion of the Project, or if for any reason, such bond ceases to be adequate to cover the performance and/or payment of the Work, Contractor shall, at its expense, within five (5) days after the receipt of notice from PWC, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to PWC. In such event no further payment to Contractor shall be deemed to be due under this Agreement until new or additional security for the performance and payment of the Project shall be furnished in manner and form satisfactory to PWC. Contractor understands and acknowledges that PWC, as a public authority, and the City, as a municipal corporation, are not subject to the provisions of Articles 1 and 2 of Chapter 44A of the General Statutes, in accordance with G.S. 44A-34 and applicable law.

9. Contractor's Damage Repair Obligations. Contractor shall be responsible for all damages to the property of the City and of PWC that may result from the normal procedure of a Responsible Person's actions in the prosecution of the Work or that may be caused by or result from the negligence of a Responsible Person during the progress of or connected with the prosecution of the Work, whether within the limits of the Work or elsewhere. Contractor shall promptly restore all such property so damaged to a condition as good as it was immediately prior to Contractor initiating the Work on the Project.

10. Defective Work. The Project shall be subject to observation and approval by PWC, Designer, and representatives of governmental agencies with jurisdiction over the Project. PWC and Designer shall be entitled to enter at all reasonable times the premises subject to construction or renovation to inspect the Work performed by or on behalf of Contractor, provided that such entry and inspection does not materially interfere with the progress of construction. Contractor shall correct promptly, at no cost to PWC, all Work reasonably rejected by PWC or by its representatives. Should Contractor fail to correct rejected Work, PWC may, acting in its sole discretion, correct such Work, and the Contractor shall pay PWC's actual costs of correction.

11. As-Built Drawings. Contractor shall maintain during the progress of the Project as-built drawings indicating the current status of the Project as actually performed. Upon Completion of the Project, Contractor shall prepare a final version of such as-built drawings and submit them to PWC for approval.

12. Assignment. This Agreement shall be binding upon and inure to the benefit of the Parties, their legal representatives, successors, and assigns. Contractor may not assign, transfer,

convey, or encumber, whether voluntarily or by operation of law, this Agreement or any obligations, rights under, or interests in this Agreement to a third party without the prior written consent of PWC; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

13. Indemnity. Contractor shall indemnify, defend, and hold harmless PWC and its Commissioners, officers, employees, agents, and representatives and the City and its elected officials, managers, employees, agents, and representatives (collectively "Indemnitees") from and against all claims, actions, liabilities, damages, losses, costs, and expenses (including, without limitation, injury to or death of any persons and damage to property, economic and consequential damages and attorneys' fees) asserted by one or more third parties against one or more of the Indemnitees if the Fault of one or more Responsible Persons is a proximate cause of the loss, damage, or expense indemnified. Contractor's obligation to indemnify, defend, and hold harmless the Indemnitees shall survive the termination of this Agreement.

14. Insurance. Contractor shall maintain during the completion of the Project and for at least three (3) years thereafter the insurance coverage set forth in the Contract Documents, which insurance shall be placed with insurance companies authorized to do business in the State of North Carolina and rated A minus VII or better by the current edition of Best's Key Rating Guide or otherwise approved in writing by PWC. Prior to initiating any work on the Project, Contractor shall deliver certificates of insurance confirming each such coverage required by the Contract Documents, and Contractor shall direct its insurers to provide to PWC annually certificates confirming each such coverage during the coverage period. PWC shall be named as an additional insured in the comprehensive automobile and commercial liability insurance policies. Commercial general liability coverage shall be written on an "occurrence" basis. Contractor shall not reduce or allow the required insurance coverages to lapse without PWC's prior written approval. All policies for insurance must be endorsed to contain a provision giving PWC a thirty (30) calendar day prior written notice by certified mail of any cancellation of that policy or material reduction in coverage. Should a notice of cancellation be issued for non-payment of premiums or any part thereof, or should Contractor fail to provide and maintain certificates as set forth herein, PWC shall have the right, but shall not the obligation, to pay such premium to the insurance company or to obtain such coverage and to deduct such payment from any sums that may be due or become due to Contractor, or to seek reimbursement for said payments from Contractor. Any such sums paid by PWC shall be due and payable immediately by Contractor upon notice from PWC. The insurance provisions of this Agreement shall not be construed as a limitation on Contractor's responsibilities and liabilities pursuant to the terms and conditions of this Agreement. Contractor's obligation to maintain insurance for three (3) years after completion of the Project shall survive the termination of this Agreement.

15. Waiver. No failure on the part of any party to exercise, and no delay in exercising, any right, power, or privilege hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right hereunder preclude any other or further cumulative and not exclusive of any remedies provided by law.

16. Law. THIS AGREEMENT SHALL BE GOVERNED BY AND INTERPRETED AND ENFORCED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NORTH CAROLINA WITHOUT GIVING EFFECT TO THE CHOICE OF LAW PROVISIONS THEREOF. Contractor shall at all times comply with all applicable Federal, state, and local laws and building codes in the performance of its obligations under the Contract Documents.

17. Dispute Resolution. In the event of any dispute, controversy, or claim of any kind or nature arising under or in connection with this Agreement (a "Dispute") and involving any two or more of PWC, Designer, Contractor or any tier subcontractor of Contractor, the party initiating the Dispute shall serve written notice of a Dispute on the other party(ies) to the dispute, and those parties shall endeavor to settle the dispute first through direct, informal discussions between the parties' selected representatives. Any such representative(s) shall have binding authority to settle the Dispute. In the event the parties do not settle the Dispute within ten (10) days from the date of written notice of the Dispute, any party to the Dispute may, by written notice to the other party(ies), engage a mediator certified under the laws of the State of North Carolina to mediate the Dispute within thirty (30) days of such notice. The parties to the Dispute shall attend mediation in good faith. In the event mediation is unsuccessful, any party to the dispute may initiate arbitration proceedings. Any controversy or claim arising out of or relating to the Contract Documents, or the breach thereof, shall be settled by binding arbitration administered by the American Arbitration Association under its Construction Industry Arbitration Rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. All of the foregoing dispute resolution procedures shall be held in Cumberland County, North Carolina. The costs of the mediator and arbitrator in a dispute resolution process shall be divided equally among the parties to the process; provided, however, PWC shall bear at least one-third of the cost if PWC is a party to the dispute resolution and the remainder of the cost shall be divided equally among the other parties participating in the dispute resolution. PWC shall in its contractual arrangements with Designer and Contractor shall in its contracts with subcontractors and they in their contracts with lower-tier subcontractors authorize and direct such parties to participate in the dispute resolution procedures set forth in this Section. Unless otherwise directed in writing by PWC, Contractor shall continue the Project and maintain compliance with the scheduling deadlines set forth in the Contract Documents during any dispute resolution proceedings. If Contractor continues to perform, PWC shall make payments due for the continued performance in accordance with this Agreement. The provisions of this Section shall not modify any applicable statutes of limitation or repose.

18. Execution; Entire Agreement; Modification; Severability. This Agreement may be executed in counterparts with the same effect as if the signatures to each counterpart were upon a single instrument, and all such counterparts together shall be deemed an original of this Agreement. For purposes of this Agreement, a facsimile copy or scanned copy or photocopy of a party's signature shall be sufficient to bind such party. This Agreement shall be subject to execution by electronic means in accordance with Article 40 of Chapter 66 of the North Carolina General Statutes. The Contract Documents shall be conclusively considered to contain and express all the terms and conditions agreed upon by the Parties, notwithstanding any prior or contemporaneous written communication, promise, understanding or agreement. No oral communication, promise, understanding, or agreement before, contemporaneous with or after the execution of this Agreement shall affect or modify any of the terms and conditions and obligations of the Contract Documents. The Contract Documents shall be amended, modified or supplemented only by a subsequent writing signed by both Parties. Should any provision of this Agreement or any of the Contract Documents at any time be in conflict with any law, statute, rule, regulation, order or ruling and thus be unenforceable, or be unenforceable for any other reason, then the remaining provisions of this Agreement shall remain in full force and effect and the court or arbitrator shall give the offending provision the fullest meaning and effect permitted by law. The titles of the Sections throughout this Agreement are for convenience only and the words contained therein shall in no way be held to explain, modify, amplify or aid in the interpretation, construction or meaning of the provisions of this instrument.

19. Notices. Any notice which either Party is required or desires to give the other hereunder shall be deemed sufficiently given if, in writing, it is delivered personally, or sent by certified U.S. mail, return-receipt requested, postage prepaid, to the addresses listed herein below, or such other address as either Party shall give to the other Party by written notice in

accordance herewith. Any notice given herein by personal delivery shall be deemed delivered when received. Any properly addressed notice given herein by certified mail shall be deemed delivered on third Business Day after the same is deposited in an official United States Post Office, postage prepaid, or if sooner upon the date when the return receipt therefore is signed, or refusal to accept the mailing by the addressee is noted thereon by the postal authorities.

To PWC:
Fayetteville Public Works Commission
Attn: Elaina L. Ball, CEO/General Manager
PO Box 1089
Fayetteville, NC 28302

To Contractor:
[INSERT MAILING ADDRESS]

20. Compliance. Contractor hereby acknowledges that "E-Verify" is the federal E-Verify program operated by the US Department of Homeland Security and other federal agencies which is used to verify the work authorization of newly hired employees pursuant to federal law and in accordance with Article 2, Chapter 64 of the North Carolina General Statutes. Contractor further acknowledges that all employers, as defined by Article 2, Chapter 64 of the North Carolina General Statutes, must use E-Verify and after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with N.C.G.S. §64-26(a). Contractor hereby pledges, attests and warrants through execution of this Agreement that Contractor complies with the requirements of Article 2, Chapter 64 of the North Carolina General Statutes and further pledges, attests and warrants that all subcontractors currently employed by or subsequently hired by Contractor shall comply with all E-Verify requirements. Failure to comply with the above requirements shall be considered a breach of this Agreement. Contractor hereby further acknowledges that the execution and delivery of this Agreement constitutes Contractor's certification to PWC and to the North Carolina State Treasurer that, as of the date of the Effective Date of this Agreement, Contractor is not listed on (a) the Final Divestment List created and maintained by the North Carolina Department of State Treasurer pursuant to the Iran Divestment Act of 2015, Chapter 147, Article 6E of the General Statutes of North Carolina (the "Iran Divestment Act"); or (b) the list of companies that the North Carolina State Treasurer determines to be engaged in a boycott of Israel in accordance with Article 6G of Chapter 147 of the General Statutes of North Carolina. Contractor represents and warrants to Commission that Contractor, and all persons and entities owning (directly or indirectly) an ownership interest in it: (i) are not, and will not become, a person or entity with whom a party is restricted from doing business with under regulations of the Office of Foreign Asset Control ("OFAC") of the Department of the Treasury (including, but not limited to, those named on OFAC's Specially Designated and Blocked Persons list) or under any statute, executive order (including, but not limited to, the September 24, 2001, Executive Order 13224 Blocking Property and Prohibiting Transactions with Persons Who Commit, Threaten to Commit, or Support Terrorism), or other governmental action; and (ii) are not knowingly engaged in, and will not knowingly engage in, any dealings or transactions or be otherwise associated with such persons or entities described in clause (i) above. Contractor also shall at all times during the term of this Agreement comply with Executive Order 11246, including but not limited to the Equal Opportunity Clause requirements set forth in 41 C.F.R. § 60-1.4. Contractor shall abide by the requirements of 41 CFR 60–300.5(a) and 60–741.5(a) prohibiting discrimination against qualified individuals on the basis of protected veteran status or disability and requiring affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans and individuals with disabilities.

IN WITNESS WHEREOF, the Parties have executed this Agreement by their duly authorized representatives.

The City of Fayetteville, by and through the Fayetteville Public Works Commission

By: _____
Elaina L. Ball, CEO/General Manager

Date: _____

[CONTRACTOR FULL LEGAL NAME]

By: _____
_____, _____
(Printed Name) (Title)

Date: _____

This instrument has been preaudited in the manner required by the Local Government Budget and Fiscal Control Act (N.C. Gen. Stat. § 159-1 et seq.).

By: _____
Rhonda Haskins, Chief Financial Officer

Approved as to form:

_____
James P. West, Chief Legal Officer

Date of Execution:	
Name of Principal: (Contractor)	
Name and Address of Surety:	
Name of Contracting Body:	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, NORTH CAROLINA
Amount of Bond:	
Project:	INSTALLATION OF THE BLACK AND DECKER 69 TO 15 X 25 KV SUBSTATION

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

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

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

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

Executed in __5__ counterparts

Witness:

CONTRACTOR:

_____
(Trade or Corporate Name)

_____
(Proprietorship or Partnership)

_____
ATTEST:

By: _____

Title: _____
(Corporate Secretary or
Assistant Secretary, Only

By: _____

Title: _____
(Owner, Partner, or Corporate
President or V-President, Only)

(CORPORATE SEAL)

SURETY COMPANY:

_____

Witness:

By: _____

_____

Title: _____
(Attorney in Fact)

Countersigned:

_____

_____
N.C. Licensed Resident Agent

_____

(SURETY CORPORATE SEAL)

_____
(Name and Address – Surety Agent)

_____

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

PAYMENT BOND

Instructions to Bidders, 6.0 Performance and Payment Bonds

Date of Execution:	
Name of Principal: (Contractor)	
Name and Address of Surety:	
Name of Contracting Body:	FAYETTEVILLE PUBLIC WORKS COMMISSION FAYETTEVILLE, NORTH CAROLINA
Amount of Bond:	
Project:	INSTALLATION OF THE BLACK AND DECKER 69 TO 15 X 25 KV SUBSTATION

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

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

NOW, THEREFORE, if the Principal shall promptly make payment to all persons supplying labor and material in the prosecution of the work provided for in said Contract, and any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

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

Executed in __5__counterparts

Witness:

CONTRACTOR:

_____
(Trade or Corporate Name)

_____
(Proprietorship or Partnership)

_____
ATTEST:

By: _____

Title: _____
(Corporate Secretary or
Assistant Secretary, Only

By: _____

Title: _____
(Owner, Partner, or Corporate
President or V-President, Only)

(CORPORATE SEAL)

SURETY COMPANY:

_____

Witness:

By: _____

_____

Title: _____
(Attorney in Fact)

Countersigned:

_____

_____
N.C. Licensed Resident Agent

_____

(SURETY CORPORATE SEAL)

_____
(Name and Address – Surety Agent)

_____

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

POWER OF ATTORNEY

NOTICE OF AWARD

TO: _____
_____
_____

PROJECT DESCRIPTION: **INSTALLATION OF BLACK AND DECKER 69 TO 15 X 25 KV SUBSTATION**

The OWNER has considered the BID submitted by you for the above described Project in response to its Advertisement for Bids dated _____ and Instructions to Bidders.

You are hereby notified that your BID has been accepted for items in the amount of $_____.

You are required by the Instructions to Bidders to execute the Agreement and furnish the required Performance Bond, Payment Bond, and Certificates of Insurance within ten (10) calendar days from the date of this NOTICE to you.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your BID as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____day of _____, 2021.

OWNER: **PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE**

BY:_____
Trent Ensley
Purchasing Manager

ACCEPTANCE OF AWARD

INSTALLATION OF BLACK AND DECKER 69 TO 15 X 25 KV SUBSTATION

Receipt of the preceding NOTICE OF AWARD is hereby acknowledged this the _____ day of _____, 2021.

CONTRACTOR

By:_____

Title:_____

NOTICE TO PROCEED

TO: _____ **DATE:**_____

PROJECT: INSTALLATION OF BLACK AND DECKER 69 TO 15 X 25 KV SUBSTATION

_____

You are hereby notified to commence work in accordance with the Contract dated _____, 2021, on or before _____, 2021, and you are to complete the WORK within _____ consecutive calendar days thereafter. The date of completion of all work is therefore _____, 2022.

OWNER: **PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE**

BY:_____
Trent Ensley
Purchasing Manager

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED

is hereby acknowledged this the _____day

of _____, 2021.

CONTRACTOR

BY:_____

TITLE:_____

FORM OF PROPSAL

Form of Proposal
Contractor's Proposal
Addenda/ Clarifications/ Bulletins
Labor and Material Proposal
Unit Pricing Proposal
Proposed Constructions Schedule
Certificate (s) of Insurance
Copy of Contractor's License
Form of Exceptions
Equal Opportunity Employment Affidavit
Legal Employment Verification
Proposed Project Management Staff
References
List of Subcontractors
North Carolina Bid Bond SDBE Contract Provisions

FAYETTEVILLE PUBLIC WORKS COMMISSION

INSTALLATION OF THE BLACK AND DECKER 69 TO 15 KV SUBSTATION

FORM OF PROPOSAL

Respectfully submitted this ____ day of _____, 2021.

_____
Name

By: _____
(signature)

_____
Title

Name and Address of Contractor:

_____

_____

_____

Phone Number: _____

Email: _____

CONTRACTOR'S PROPOSAL

TO: Fayetteville Public Works Commission
Fayetteville, North Carolina

(hereinafter called the "Owner")

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.

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.

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 BLACK AND DECKER 69 to 15 kV Substation, 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.

The Bid Schedule is subject to the following terms and conditions which, by reference, are made a part of this Proposal.

1. 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.

2. The prices quoted in the Proposal shall be firm unless otherwise clearly noted in the Proposal.

3. The price quoted includes delivery FOB to the substation site, Fayetteville, North Carolina, of any equipment and materials and complete installation at the 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.

4. 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.

5. The Contractor shall state his normal work week for the project:

   _____

6. The time of project completion is of the essence, and shall be ready for energization and completed by December 18, 2021 in accordance with Section 8.0, Instructions to Bidders.

7. The Contractor shall submit a proposed project construction schedule with the Proposal using *Microsoft® Project*, for review and approval by the Owner and Engineer.

8. 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.

9. 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.

10. The Contractor-furnished materials shall conform to the "Technical Specifications" attached hereto and made a part hereof.

11. Title to the materials furnished by the Contractor shall pass to the Owner upon completion of the installation at the point above specified.

12. 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.

13. 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.

14. 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 or other Contract Documents must be clearly stated in the Proposal to warrant consideration.

15. The Contractor assumes liability for the proper care, handling, storage, and security of all materials furnished to the Contractor by the Owner for the installation of the BLACK AND DECKER 69 to 15 kV Substation.

16. 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.

17. 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.

18. The Contractor warrants that it possesses a PU Electrical Contractor's License No. _____ for the State of North Carolina, and said license expires _____, 20___. A copy of the license shall be included in the Contractor's proposal.

19. 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 assigned to the project, similar information will be required prior to construction assignment.

    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.

If the proposed staff along with their qualifications is not provided, the bid may be subject to non-compliance, thus, making it unacceptable.

20. 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.

INSERT

ADDENDA / CLARIFICATIONS / BULLETINS

Instructions to Bidders, 4.0 Bulletins and Addenda

LABOR AND MATERIAL PROPOSAL

CLIENT: PWC-Fayetteville, NC
PROJECT: Black and Decker Substation Rebuild
PROJECT NO.: 19-9224-8015
CONTRACTOR:
DATE:

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICING		LABOR AND MATERIAL EXTENDED COST
				LABOR	CONTRACTOR-FURNISHED MATERIAL	
3.1	Structures	1	LOT			
3.2	Three-pole Group Operated Airbreak Switches	1	LOT			
3.3	Lightning Arresters	1	LOT			
3.4	Single-Pole Disconnecting Switches	1	LOT			
3.5	Circuit Breakers	1	LOT			
3.7	Instrument Transformers	1	LOT			
3.8	Power and Station Service Transformers	1	LOT			
3.10	Communications & Supervisory Control Panel	1	LOT			
3.11	Conduit & Cable	1	LOT			
3.12	Foundations	1	LOT			
3.13	Site Preparation	1	LOT			
3.14	Fence	1	LOT			
3.15	Station Grounding	1	LOT			
3.16	Building	1	LOT			
3.17	Batteries	1	LOT			
3.18	Oil Containment System	1	LOT			
3.19	Protective Relaying Panel	1	LOT			
3.21	Testing	1	LOT			
3.23	Underground Circuit Plan	1	LOT			
4.0	Removals and Disposals	1	LOT			
	TOTAL LABOR AND MATERIAL COST:			**$ -**	**$ -**	
					TOTAL INSTALLATION:	

UNIT PRICING PROPOSAL

CLIENT: PWC-Fayetteville, NC
PROJECT: Black and Decker Substation Rebuild
PROJECT NO.: 19-9224-8015
CONTRACTOR:
DATE:

MATERIAL COST			
DESCRIPTION	**LABOR**	**MATERIAL**	**TOTAL**
COST PER INSTALLED CUBIC YARD OF CONCRETE			
Augured-Pier Type Foundation			
Pad-Type Foundation			
COST PER INSTALLED POUND OF REBAR			
COST PER LINEAR FOOT OF GROUND WIRE DITCH			
Machine Excavate			
Hand Excavate			
COST PER INSTALLED 10-FOOT GROUND ROD			
COST PER LINEAR FOOT OF GROUND WIRE IN PRE-EXCAVATED DITCH			
COST PER EXOTHERMIC WELD ON GROUND WIRE / ROD			
COST PER LINEAR FOOT OF CONTROL CABLE CONDUIT DITCH (MACHINE EXCAVATE)			
COST PER LINEAR FOOT OF CONTROL CABLE CONDUIT DITCH (HAND EXCAVATE)			
COST PER LINEAR FOOT OF PVC CONDUIT			
1 inch PVC			
2 inch PVC			
4 inch PVC			
6 inch PVC			
COST PER INSTALLED LINEAR FOOT OF CONTROL CABLE IN CONDUIT / CABLE TRENCH			
COST PER INSTALLED LINEAR FOOT OF CONTROL CABLE IN CABLE TRAY (INCLUDING SECURING CABLE TO TRAY)			
CONTROL CABLE TERMINATIONS			
COST PER INSTALLED TON OF COMPACTED CRUSHER RUN STONE			
COST PER INSTALLED TON OF ASTM NO. 57 STONE			
COST PER INSTALLED CUBIC YARD OF MULCH			
COSTS FOR FIELD CORRECTION OF MISFAB AS LISTED BELOW. WORK TO BE APPROVED IN ADVANCE BY OWNER. PRICE TO INCLUDE PAINTING OF PUNCHED OR CLIPPED STEEL SURFACES WITH FALVANOX PAINT			
Clipping angles or flat stock			
Punching or drilling per hole			
Punching or drilling and tapping per hole			
Reaming per hole			
ROCK EXCAVATION - COST PER CUBIC YARD			
FOUNDATIONS			
Augured-Pier Type			
Pad-Type			
Ground Grid / Conduit Ditch			
Oil Containment Basin			

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

EQUIPMENT			
DESCRIPTION	**UNIT** (per day, hour, week)	**COST**	
Pickup Truck			
Backhoe			
Bucket Truck - 46' - 55'			
Bucket Truck - 60' +			
Trencher			
Air Compressor			
Crane Truck - 15 Ton			
All-Terrain Crane - 18 Ton			

OWNER-FURNISHED MATERIAL LIST

CLIENT: PWC-Fayetteville, NC
PROJECT: Black and Decker Substation Rebuild
PROJECT NO.: 19-9224-8015
CONTRACTOR:
DATE:

ITEM	DESCRIPTION	DELIVERY LOCATION	SUPPLIER	ESTIMATED DELIVERY DATE	QTY
1	69 kV Circuit Breaker	Warehouse	HVB	On Hand	1 Ea
2	25 kV Circuit Breaker	Warehouse	Siemens	On Hand	6 Ea
3	Manhole, 6 x 10	Warehouse	---	On Hand	3 Ea
4	Structure and Equipment Package	Site	TBD	12/1/21	1 Lot
5	Control House (with Relay Panels)	Site	TBD	12/1/21	1 Ea
6	Transformer	Site	Niagara Transformer	9/15/21	1 Ea

INSERT

PROPOSED CONSTRUCTION SCHEDULE

Instructions to Bidders, 9.0 Completion
Contractor's Proposal – Item 8

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
Contractor's Proposal – Item 19

FORM OF EXCEPTIONS

Instructions to Bidders, 5.0 Award of Contract

BIDDER:

OWNER: PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE, NORTH CAROLINA

PROJECT DESCRIPTION INSTALLATION OF BLACK AND DECKER 69 TO 15 KV SUBSTATION

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

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

EQUAL OPPORTUNITY EMPLOYMENT AFFIDAVIT

General Conditions, 13.0 Equal Opportunity Employment

The Contractor will include the provisions of the Equal Opportunity Employment section (General Conditions) 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: _____

LEGAL EMPLOYMENT VERIFICATION

Contractor hereby acknowledges that "E-Verify" is the federal E-Verify program operated by the US Department of Homeland Security and other federal agencies which is used to verify the work authorization of newly hired employees pusuant to federal law and in accordance with Article 2, Chapter 64 of the North Carolina General Statutes. Contractor further acknowledges that all employers, as defined by Aticle 2, Chapter 64 of the North Carolina General Statutes, must use E-Verify and after hiring an employee to work in the United States, shall verify the work authorization of the emplyee through E-Verify in accordance with NCGS §64-26(a). Contractor hereby pledges, attests and warrants through execution of this Agreement that Contractor complies with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes and further pledges, attests and warrants that any subcontractors currently employed by or subsequently hired by Contractor shall comply with any and all E-Verify requirements. Failure to comply with the above requirements shall be considered a breach of this Agreement.

Bidder: _____

By: _____

Date: _____

PROPOSED PROJECT MANAGEMENT STAFF

Contractor's Proposal – Item 20

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

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

REFERENCES

Contractor's Proposal – Item 21

CONTACT INFORMATION FOR RECENT SIMILAR PROJECTS

Owner Name	Project Description	Contact Name and Phone Number

LIST OF SUBCONTRACTORS

Contractor's Proposal – Item 2

SUBCONTRACTOR	PROPOSED WORK TO BE PERFORMED

NORTH CAROLINA BID BOND

Instructions to Bidders, 3.0 Bid Security

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 Public Works Commission of the City of Fayetteville, Fayetteville, North Carolina, as Obligee, in the penal sum of _____ _____DOLLARS ($_____) (5% Bid Bond), lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these present.

SIGNED, Sealed and dated this _____ day of _____, 2021.

WHEREAS, the said Principal is herewith submitting Proposal for

THE INSTALLATION OF BLACK AND DECKER 69 TO 15 KV SUBSTATION

and the Principal desires to file this Bid Bond in lieu of making the cash deposit as required by GS 143-129 amended in Chapter 1104 of the Public Laws of 1951;

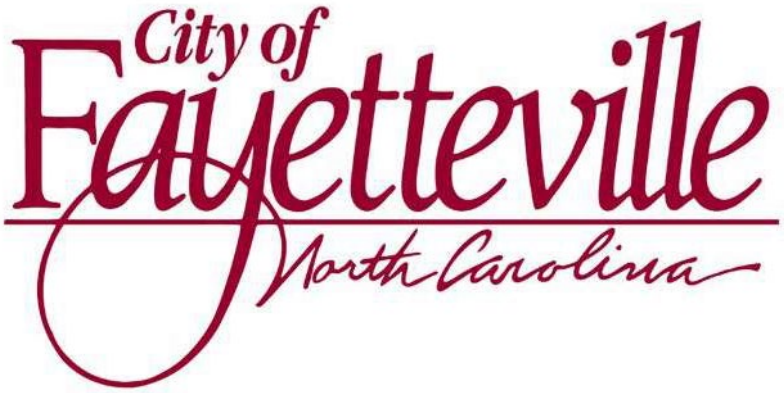
NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such that if the Principal shall be awarded the Contract for which the bid is submitted and shall execute the Contract within ten (10) days after the award of same to the Principal, then this obligation shall be null and void; but if the Principal fails to so execute such Contract as required by GS 143-129, as amended by Chapter 1104 of the Public Laws of 1951, 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 herein. Power of Attorney from the Surety to its Attorney-in-Fact is attached hereto.

_____
Principal

By _____
(SEAL)

_____
Corporate Surety

By _____
(SEAL)



CITY OF FAYETTEVILLE

SMALL DISADVANTAGED BUSINESS ENTERPRISE PROGRAM FOR CONSTRUCTION, PROCUREMENT, AND PROFESSIONAL SERVICES

FAYETTEVILLE CITY COUNCIL
433 HAY STREET
FAYETTEVILLE, NORTH CAROLINA 28301

SMALL DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

TABLE OF CONTENTS

SMALL DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

I. Applicability.

(a) This program shall apply to all construction and repair work involving the expenditure of City funds, regardless of the sources of other funds, in the amounts set forth in G.S. 143-129 and G.S. 143-131; this program shall also apply to the procurement of architectural, engineering and surveying services as outlined in G.S. 143-64.31. This program shall not apply to contracts established by the State or any agency of the State.

(b) If any section, subsection, clause or provision of this chapter, including those groups found to be presumptively socially disadvantaged, is held to be invalid by a court of competent jurisdiction, the remainder of the chapter shall not be affected by such invalidity.

II. Definitions.

As used in this part, the following terms shall have the following meanings:

Affiliation - One firm controls or has the power to control the other, or a third party or parties controls or has the power to control both, or an identity of interests exists between such firms. In determining whether firms are Affiliates, the City shall consider all appropriate factors, including common ownership, common management, and contractual relationships. Affiliates must be considered together in determining whether a firm is a Small Business Enterprise.

Bidder/Participant - Any person, firm, partnership, corporation, limited liability company, association or joint venture seeking to be awarded a public contract or subcontract.

Brokering - Filling orders by purchasing or receiving supplies from a third party supplier rather than out of existing inventory, and providing no Commercially Useful Function other than acting as a conduit between a supplier and a customer.

City - The awarding authority for contracts awarded by the City of Fayetteville and the City of Fayetteville Pubic Works Commission.

City's Marketplace - The geographic and procurement areas in which the City contracts on an annual basis.

Commercially Useful Function - Responsibility for the execution of a distinct element of the work of the contract which is carried out by actually performing, managing, and supervising the work involved, or fulfilling responsibilities as a joint venture.

Contract - A mutually binding legal relationship or any modification thereof obligating the seller to furnish equipment or services and obligating the buyer to pay for them, not including leases or emergency procurements.

Doing Business - Having a physical location from which to engage in for profit activities in the scope(s) of expertise of the firm.

Economically Disadvantaged - An individual whose Personal Net Worth is less than the amount identified in 49 CFR Part 26

Equipment - Materials, supplies, commodities and apparatuses.

Expertise - Demonstrated skills, knowledge, or ability to perform in the field of endeavor in which certification is sought by the firm as defined by normal industry practices, including licensure where required.

Good Faith Efforts - Actions undertaken by a Bidder/Participant to achieve a SDBE goal which, by their scope, intensity, and appropriateness to the objective, can reasonably be expected to fulfill the Program's requirements.

Joint Venture - An association of two or more persons, or any combination of types of business enterprises and persons numbering two or more, proposing to perform a single for profit business enterprise, in which each joint venture partner contributes property, capital, efforts, skill and knowledge, and in which the SDBE is responsible for a distinct, clearly defined portion of the work of the contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture is commensurate with its ownership interest. Joint ventures must have an agreement in writing specifying the terms and conditions of the relationships between the partners and their relationship and responsibility to the contract.

Managers - The City Manager.

Manufacturer - A firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications.

Personal Net Worth - The net value of the assets of an individual after total liabilities are deducted. An individual's Personal Net Worth does not include the individual's ownership interest in an applicant or the individual's equity in his or her primary place of residence. An individual's Personal Net Worth includes only his or her share of assets held jointly with the individual's spouse.

Program - The SDBE Program.

Project Specific Goal - The Goal established for a particular project or contract based upon the availability of SDBEs in the scopes of work of the Contract.

Regular Dealer - A firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a Regular Dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A firm may be a Regular Dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business if the firm both owns and operates distribution equipment for the products. Any supplementing of a Regular Dealer's distribution equipment shall be by a long-term lease agreement and not on an *ad hoc* or contract-by-contract basis. Packagers, manufacture representatives, or other persons who arrange or expedite transactions are not Regular Dealers.

Schedule of Participation - The list of SDBEs that the Bidder/Participant commits will be utilized, their scopes of the work, and dollar value or the percentage of the project they will perform.

Socially Disadvantaged - An individual who has been subjected to racial or ethnic prejudice or cultural bias within American society because of his or her identity as a member of a group and without regard to individual qualities. Social disadvantage must stem from circumstances beyond the individual's control. A Socially Disadvantaged individual must be a citizen or lawfully admitted permanent resident of the United States who is either:

(a) A person whose lifelong cultural and social affiliation is with one of the following groups, which are rebuttably presumed to be Socially Disadvantaged:

(i) Blacks/African - Americans (persons having origins in any of the Black racial groups of Africa);

(ii) Hispanic - Americans (persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race);

(iii) Native - Americans (persons having origins in the original groups of North America);

(iv) Asian - Americans (persons having origins in any of the original groups of the Far East, Southeast Asia, the islands of the Pacific or the Indian Subcontinent);

(v) Women; or

(b) Any socially disadvantaged individual as defined by 15 U.S.C. 637.

Small Disadvantaged Business Enterprise (SDBE) - Means a business, including a sole proprietorship, partnership, corporation, limited liability company, joint venture or any other business or professional entity:

(a) Which is at least 51 percent owned by one or more Socially and Economically Disadvantaged individuals, or in the case of a publicly owned business, at least 51 percent of all classes of the stock of which is owned by one or more Socially and Economically Disadvantaged individuals;

(b) Whose management, policies, major decisions and daily business operations are independently managed and controlled by one or more such Socially and Economically Disadvantaged individuals;

(c) Which is a Small Business Enterprise as defined by 13 CFR Part 121;

(d) Which is Doing Business in the City's Marketplace; and

(e) Which is certified as a SDBE by the City of Fayetteville.

SDBE Program Coordinator - The person designated by the Managers to administer the Program.

III. SDBE Program Administration.

The Coordinator shall administer the SDBE Program, which duties shall include:

(a) Formulating, proposing, and implementing rules and regulations for the further development, implementation, and monitoring of the Program.

(b) Informing SDBEs of City contracting opportunities through outreach activities.

(c) Providing information and assistance to SDBEs relating to City procurement practices and procedures, and bid specifications, requirements, and prerequisites.

(d) Certifying businesses as SDBEs, maintaining certification records, and ensuring that all City departments have current certification listings.

(e) Establishing Project Specific Goals.

(f) Evaluating Bidder/Participant's achievement of Project Specific Goals or Good Faith Efforts to meet Project Specific Goals.

(g) Working with City departments to monitor Contracts to ensure prompt payments to SDBEs, compliance with Project Specific Goals and commitments and the Program's operations and objectives.

(h) Receiving, reviewing, and acting upon complaints and suggestions concerning the Program.

(i) Collecting data to evaluate the Program.

(j) Monitoring the Program and reporting to the Managers, the Mayor and the City Council on the administration and operations of the Program.

IV. Race- and Gender-Neutral Measures to Ensure Equal Opportunities for All Bidders/Participants.

The City shall develop and use measures to facilitate the participation of all firms in City contracting activities. These measures shall include, but are not limited to:

(a) Arranging solicitation times for the presentations of bidding opportunities, which includes quantities, specifications and delivery schedules so as to facilitate the participation of interested firms.

(b) Dividing requests for bids or proposals into work elements to facilitate the participation of small firms.

(c) Providing timely information on specific contracting opportunities, contracting procedures, and bid preparation.

(d) Holding pre-bid conferences, where appropriate, to explain the projects.

(e) Enforcing prompt payment requirements and procedures, including requiring by contract that prime contractors promptly pay subcontractors.

(f) Reviewing bonding and insurance requirements to eliminate unnecessary barriers to contracting with the City.

(g) Maintaining information on all firms bidding on City prime contracts and subcontracts.

V. SDBE Program Eligibility.

(a) Only businesses that meet the criteria of SDBEs may participate in the Program.

(b) The City shall apply the certification criteria and procedures of 49 CFR Part 26 to applicants for participation in the Program.

(c) The City shall certify the eligibility of joint ventures involving SDBEs and non-SDBEs.

(d) In lieu of conducting its own certifications, the Coordinator may accept formal certifications by other entities as meeting the requirements of the Program, if the eligibility standards of such entities are comparable to those of the City. Certification decisions, including decertification and graduation determinations, by those other entities shall be accepted by the City in its discretion.

(e) It is the responsibility of the SDBE to notify the Coordinator of any change in its circumstances affecting its continued eligibility for the Program. Failure to do so may result in the firm's decertification.

(f) A SDBE may be decertified if it submitted inaccurate, false, or incomplete information to the City or failed to comply with requirements of a contract with the City or with the requirements of the Program.

(g) A third party may challenge the eligibility of a certified firm:

(1) The challenge shall be made in writing under oath and shall include all information relied upon by the challenging party.

(2) The Coordinator shall provide an opportunity to the parties for an informal hearing. The parties may appear and provide documentation or other evidence and be represented by counsel.

(3) The Coordinator shall render a written decision within 15 days of the hearing.

(4) If the Coordinator determines that the firm is not eligible, it may appeal the determination to the Manager in writing within 7 days of receipt of the written decision. The challenging party shall have no right of appeal from the Coordinator's determination.

(5) The Manager shall issue a written decision within 15 days of receipt of the appeal. The Manager's determination shall be final.

(h) A firm that has been decertified may not reapply for certification for one year from the effective date of its decertification.

VI. SDBE Goal Setting.

The Coordinator shall establish a Project Specific Goal for appropriate Contracts based on normal industry practice as determined in consultation with the appropriate Department, the availability of SDBEs to perform the functions of the Contracts and the City's utilization of SDBEs to date.

VII. Counting Participation of SDBEs.

(a) The entire amount of that portion of a construction Contract that is performed by the SDBE's own forces shall be counted, including the cost of equipment obtained by the SDBE for the work of the Contract, and equipment purchased or leased by the SDBE (except equipment the SDBE subcontractor or Joint Venture partner purchases or leases from the prime contractor or its Affiliate).

(b) The entire amount of fees or commissions charged by a SDBE for providing a *bona fide* service, such as professional, technical, consultant or managerial services, or for providing bonds or insurance specifically required for the performance of the Contract, shall be counted, provided the fee is reasonable and not excessive as compared with fees customarily charged for similar services.

(c) When a SDBE performs as a participant in a Joint Venture, only the portion of the total dollar value of the Contract equal to the distinct, clearly defined portion of the work of the Joint Venture's Contract that theSDBE performs with its own forces and for which it is separately at risk shall be counted.

(d) Only expenditures to a SDBE that is performing a Commercially Useful Function shall be counted. To determine whether a firm is performing a Commercially Useful Function, the City will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the Contract is commensurate with the work it is actually performing and other relevant factors. To perform a Commercially Useful Function, the SDBE must be responsible, with respect to equipment used on the Contract, for negotiating price, determining quality and quantity, ordering the material, installing (where applicable) and paying for the material itself. A SDBE does not perform a Commercially Useful Function if its role is limited to that of an extra participant in the Contract through which funds are passed in order to obtain the appearance of SDBE participation. If a SDBE subcontracts a greater portion of the work of a Contract than would be expected on the basis of normal industry practice, it is presumed not to perform a Commercially Useful Function. When a SDBE is presumed not to be performing a Commercially Useful Function, the SDBE may present evidence to rebut this presumption.

(e) One hundred percent of the cost of the materials or supplies obtained from a SDBE Manufacturer or Regular Dealer shall be counted. One hundred percent of the fees or transportation charges for the delivery of materials or supplies required on a job site shall be counted only if the payment of such fees is a customary industry

practice and are commensurate with fees customarily charged for similar services. The cost of the materials and supplies shall not be counted.

(f) If a firm is decertified during performance of a Contract, the dollar value of work performed under a Contract with that firm after it has been decertified shall not be counted.

(g) In determining achievement of a Project Specific Goal, the participation of a SDBE shall not be counted until that amount has been paid to the SDBE.

VIII. Procurement of Architectural, Engineering and Surveying Services (G.S. 143-64.31)

(a) The City shall use good faith efforts to notify minority firms of the opportunity to submit qualifications for architectural, engineering, surveying and construction management at risk services.

IX. Informal Construction and Repair Work (G.S. 143-131)

(a) The City shall solicit minority participation for construction and repair projects in the amount of five thousand dollars ($5,000) or more, but less than three hundred thousand dollars ($300,000). The City shall maintain a record of contractors solicited and shall document efforts to recruit minority business participation in these contracts.

X. Formal Construction and Repair Work (G.S. 143-129)

(a) For all solicitations, the Bidder/Participant shall submit a Schedule of Participation detailing all subcontractors from which the Bidder/Participant solicited bids or quotations, and if a Project Specific Goal has been established, its achievement of the Goal or its Good Faith Efforts to do so. The list of SDBEs provided by the City to a Bidder/Participant establishes the minimum universe from which a Bidder/Participant must solicit SDBEs. The Schedule of Participation shall be due at the time set out in the solicitation documents.

(b) Any agreement between a Bidder/Participant and a SDBE in which the Bidder/Participant requires that the SDBE not provide subcontracting quotations to other bidders/proposers is prohibited.

(c) SDBEs shall respond to relevant requests for quotations.

(d) Where the Bidder/Participant cannot achieve the Project Specific Goal, the Coordinator will determine whether the Bidder/Participant has made Good Faith Efforts. At a minimum, the Bidder/Participant must engage in the following Good Faith Efforts that total at least 50 points for the bid or proposal to be responsive.

(1) Contacting SDBEs from the list provided by the City at least ten days before the bid or proposal date and notifying them of the nature and scope of the work to be performed. The Bidder/Participant shall provide interested SDBEs with timely, adequate information about the plans, specifications, and requirements of the Contract to allow SDBEs to respond to the solicitation. The Bidder/Participant must follow up initial solicitations with interested SDBEs. 10 points.

(2) Providing or making the construction plans, specifications, and requirements available for review by SDBEs at least ten days before the bid or proposals are due. 10 points.

(3) Breaking down or combining elements of work into economically feasible units to facilitate minority participation. 15 points.

(4) Working with SDBE, minority, women, trade, community or contractor organizations identified by the City in the bid documents that provide assistance in recruitment of SDBEs. 10 points.

(5) Attending any prebid meetings scheduled by the City. 10 points.

(6) Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors. 20 points.

(7) Negotiating in good faith with interested SDBEs and not rejecting them as unqualified without sound reasons based on their capabilities. Evidence of such negotiation includes the names, addresses, and telephone numbers of SDBEs that were contacted; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and why agreements could not be reached with SDBEs. The Bidder/Participant may not reject SDBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. Any rejection of a SDBE based on price or lack of qualifications must be documented in writing. 15 points.

(8) Providing assistance to an otherwise qualified SDBE in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting SDBEs in obtaining the same unit pricing with the bidder's suppliers in order to help minority SDBEs to establish credit. 25 points.

(9) Negotiating joint venture and partnership arrangements with SDBEs to increase opportunities for SDBE participation. 20 points.

(10) Providing quick pay agreements and policies to enable SDBEs to meet cash-flow demands. 20 points.

(e) In determining whether a Bidder/Participant has made Good Faith Efforts, the performance of other bidders/proposers in meeting the Project Specific Goal may be considered. For example, when the apparent successful Bidder/Participant fails to meet the Project Specific Goal but others meet it, it may be reasonably questioned whether, with additional reasonable efforts, the apparent successful Bidder/Participant could have met the Goal. Similarly, if the apparent successful Bidder/Participant fails to meet the Goal, but meets or exceeds the average SDBE participation obtained by other bidders/proposers, this may be evidence that the apparent successful Bidder/Participant made Good Faith Efforts.

(f) The Coordinator shall timely review the Schedule of Participation prior to award, including the scope of work and the letters of intent from SDBEs. The Coordinator may request clarification in writing of items listed in the Schedule of Participation, provided such clarification shall not include the opportunity to augment listed SDBE participation or Good Faith Efforts.

(g) The Schedule of Participation and supporting documents shall be reviewed by a Bid Selection Committee, composed of the operating departments, Purchasing Department, Coordinator and other representatives as appropriate. If the Bid Selection Committee initially determines the bid to be responsive, it shall recommend award of the Contract to the Managers. If the Bid Selection Committee determines the bid to be non-responsive, it shall confer with the City Attorney prior to recommending the rejection of the bid.

(h) A Bidder/Participant found to be non-responsive may appeal this determination pursuant to the City's bid protest procedures.

XI. Contract Performance Compliance Procedures.

(a) Upon award of a Contract by the City that includes a Project Specific Goal, the Goal becomes a covenant of performance by the Bidder/Participant in favor of the City.

(b) The Bidder/Participant shall provide a listing of all subcontractors to be used in the performance of the Contract, and subcontractor payment information to the City with each request for payment submitted to the City. The Coordinator and the operating department shall monitor subcontractor participation during the course of the Contract and shall have reasonable access to all Contract-related documentation held by the Bidder/Participant. The Bidder/Participant shall submit reports at such times and in such formats as requested by the City.

(c) The Bidder/Participant shall cooperate with the City in studies and surveys related to the Program.

(d) The Bidder/Participant cannot make changes to the Schedule of Participation or substitute subcontractors named in the Schedule of Participation without the prior written approval of the Coordinator. Unauthorized changes or substitutions shall be a violation of this program, and may constitute grounds for rejection of the bid or proposal or cause termination of the executed Contract for breach, the withholding of payment and/or subject the Bidder/Participant to Contract penalties or other sanctions.

(1) All requests for changes or substitutions of the subcontractors named in the Schedule of Participation shall be made to the Coordinator in writing, and shall clearly and fully set forth the basis for the request. A Bidder/Participant shall not substitute a subcontractor or perform the work designated for a subcontractor with its own forces unless and until the Coordinator approves such substitution in writing.

(2) The facts supporting the request must not have been known nor reasonably should have been known by either party prior to the submission of the Schedule of Participation. Bid shopping is prohibited.

(3) Substitutions of the subcontractor shall be permitted only on the following basis:

(i) Unavailability after receipt of reasonable notice to proceed.

(ii) Failure of performance.

(iii) Financial incapacity.

(iv) Refusal by the subcontractor to honor the bid or proposal price.

(v) Mistake of fact or law about the elements of the scope of work of a solicitation where agreement upon a reasonable price cannot be reached.

(vi) Failure of the subcontractor to meet insurance, licensing, or bonding requirements; or

(vii) The subcontractor's withdrawal of its bid or proposal.

(4) Where the Bidder/Participant has established the basis for the substitution to the satisfaction of the Coordinator, the Bidder/Participant shall make Good Faith Efforts to fulfill the Schedule of Participation if the Project Specific Goals will not otherwise be met. The Bidder/Participant may seek the assistance of the SDBE Office in obtaining a new SDBE subcontractor. If the Project Specific Goal cannot be reached and Good Faith Efforts have been made, the Bidder/Participant may substitute with a non-SDBE.

(e) If a Bidder/Participant plans to hire a subcontractor on any scope of work that was not previously disclosed in the Schedule of Participation, the Bidder/Participant shall obtain the approval of the Coordinator to modify the Schedule of Participation and must make Good Faith Efforts to ensure that SDBEs have a fair opportunity to bid on the new scope of work.

(f) The SDBE Compliance Committee, comprised of the Coordinator as the Chair and a representative from the Purchasing Department or any requested representative, shall be responsible for evaluating and reviewing issues and concerns concerning the Program, including whether a Bidder has complied with the GoodFaith Efforts.

(g) If the Bidder/Participant is found to be in noncompliance with the Program or the Contract and fails to correct such noncompliance within ten working days after written notification, the City will withhold 5

percent of the amount of completed work on all monthly payments until the Bidder/Participant has come into compliance.

XII. Protest Procedure.

A Bidder/Participant may protest a decision regarding the implementation of the Program, including the determination that it has not made Good Faith Efforts, by filing a written grievance with supporting evidence with the Coordinator. The Coordinator shall provide a written response within ten working days of receipt of the grievance. The Bidder/Participant may appeal the Coordinator's determination in writing within ten working days ofreceipt to the Purchasing Director. The Director shall refer the grievance to the SDBE Compliance Committee, which shall hold a hearing and issue a written recommendation within ten working days. The Manager, upon receiptof the SDBE Compliance Committee's recommendation, shall make a final determination within ten working days.

XIII. Dispute Resolution.

Not-withstanding the protest procedures outlined above, mediation shall be required for all parties involved in a dispute under this program prior to initiating litigation concerning the dispute. The procedures for mediation shall be those adopted by City Council Resolution #2002-066 which is incorporated herein by reference as if fullyset forth herein.

XIV. Penalties.

(a) Providing false or misleading information to the City in connection with an application for or challenge to certification, recertification or decertification as a SDBE, submission of a bid, responses to requests for qualifications or proposals, Good Faith Efforts documentation, post-award compliance, or other actions in violation of this program may render any bid award or contract void. A contract that is void under this section may continue in effect until an alternative can be arranged when immediate termination would result in harm to the public healthor welfare.

(b) A Bidder/Participant is subject to withholding of payments under the Contract, termination of the Contract for breach, Contract penalties, decertification as a SBDE, or being barred or deemed non-responsive in future City solicitations and Contracts for up to two years, if it is found to have:

(1) Provided false or misleading information in connection with the submission of a bid or proposal or documentation of Good Faith Efforts, post-award compliance, or other Program operations.

(2) Failed in bad faith to fulfill the Project Specific Goal, thereby materially breaching the Contract.

(4) Repeatedly failed to comply in good faith with substantive provisions of this program.

(c) The City reserves the right to pursue all remedies available in law or in equity for violations of this program.

XV. Program Review.

(a) The Managers, the Mayor, and the City Council shall receive an annual report from the Coordinator detailing the City's performance under the Program.

(b) The Managers, the Mayor, and the City Council will review this report, including the City's progress towards eliminating discrimination in its contracting activities and marketplace, and revise the Program as necessary to meet legal and Program requirements.

(c) If the Managers, the Mayor, and the City Council find that the objectives of the Program have been achieved, the City Council shall sunset the Program.

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CITY OF FAYETTEVILLE
AND
PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE
SDBE/HUB COMPLIANCE PROVISIONS

SDBE/HUB CONTRACT PROVISIONS

APPLICATION:
The requirements of the Small Disadvantaged Business Program for participation in the Cityof Fayetteville's construction contracts are hereby made a part of the Contract Documents. Copies of the Program may be obtained from:

Public Works Commission
Procurement Department/Trent Ensley
P.O. Box 1089 Fayetteville, North Carolina 28302
Phone (910) 223-4333 Fax (910) 483-1429 e-mail: trent.ensley@faypwc.com

NCDOT DBE Directory: www.ebs.nc.gov/VendorDirectory
HUB Directory https://ncadmin.nc.gov/businesses/hub

SDBE COMPLIANCE REQUIREMENTS

1. The Bidder shall provide, **with the bid**, the SDBE CONTRACT PROVISIONS (CONSTRUCTION), properly executed which signifies that the Bidder understands and agrees to any incorporated SDBE contract provisions.

2. The Bidder shall provide **with the bid:**

Provide with Bid Form Proposal

Identification of SDBE/HUB Participation Form
AND
Affidavit A – Listing of Good Faith Efforts

OR

Identification of SDBE/HUB Participation Form
AND
Affidavit B – Intent to Self-Perform with Own Workforce

Provided Upon being named apparent low Bidder

Affidavit C – Percentage of SDBE/HUB Participation
OR
Affidavit D – Good Faith Efforts

All written statements, certifications, or intentions made by the Bidder shall become a part of the agreement between the Contractor and the City of Fayetteville for performance of this contract.

SUBCONTRACTOR PAYMENT REQUIREMENTS:

North Carolina General Statutes 143-134.1 (N.C.G.S.) states that the percentage of retainage on payments made by the prime contractor to the subcontractor shall not exceed the percentage of retainage on payments made by the City of Fayetteville to the prime contractor. Failure to comply with this provision shall be considered a breach of the contract, and the contract may be terminated in accordance with the termination provisions of the contract.

The Contractor shall provide an itemized statement of payments to each SDBE subcontractor before final payment is processed.

The Contractor shall provide an itemized statement of payments to each NON-SDBE subcontractor before final payment is processed.

Date: _____

_____
(Name of Company)

_____
(Signature)

Attest: _____ _____
(Above Name Typed or Printed)

_____
(Title)

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

City of Fayetteville

Affidavit A: **Listing of the Good Faith Efforts**

Affidavit of_____

(Name of Bidder)

I have made a good faith effort to comply under the following areas checked:
(A value of 50 points or greater achieves "good faith efforts")

☐ (1) Contacting minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor or available on State or local government maintained lists at least 10 days before the bid or proposal date and notifying them of the nature and scope of the work to be performed. Value = Ten (10) points.

☐ (2) Making the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bid or proposals are due. Value = Ten (10) points.

☐ (3) Breaking down or combining elements of work into economically feasible units to facilitate minority participation. Value = Fifteen (15) points.

☐ (4) Working with minority trade, community, or contractor organizations identified by the Office for Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses. Value = Ten (10) points.

☐ (5) Attending any pre-bid meetings scheduled by the public owner. Value = Ten (10) points.

☐ (6) Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors. Value = Twenty (20) points.

☐ (7) Negotiating in good faith with interested minority businesses and not rejecting them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing. Value = Fifteen (15) points.

☐ (8) Providing assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit. Value = Twenty-five (25) points.

☐ (9) Negotiating joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible. Value = Twenty (20) points.

☐ (10) Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands. Value = Twenty (20) points.

In accordance with GS143-128.2 (d) the undersigned will enter into a formal agreement with the firms listed in the Identification of Small Disadvantaged Business Participation schedule conditional upon execution of a contract with the Owner. Failure to abide by any applicable statutory provision may constitute a breach of the contract. The undersigned hereby certifies that he or she has read the terms of the small disadvantaged business commitment and is authorized to bind the Bidder to the commitment herein set forth.

Date:_____Name of Authorized Officer: _____

SEAL

State of North Carolina, County of _____
Subscribed and sworn to before me this_____day of_____20_____
Notary Public _____
My commission expires _____

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

CITY OF FAYETTEVILLE
AND
PUBLIC WORKS COMMISSION OF THE CITY OF FAYETEVILLE
SDBE/HUB COMPLIANCE PROVISIONS

Affidavit B: **Intent to Perform Contract with Own Workforce:**

Affidavit of _____
(Name of Bidder)

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

_____contract. (Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform **all elements of the work** on this project with his/her own current workforces; and will complete all elements of this project **without** the use of subcontractors, material suppliers, or providers of professional services.

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

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

Date:_____Name of Authorized Officer:_____

Seal

Signature: _____

Title: _____

State of North Carolina, County of _____
Subscribed and sworn to before me this____day of____20 Notary Public _____
My commission expires _____

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

CITY OF FAYETTEVILLE
AND
PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE
SDBE/HUB COMPLIANCE PROVISIONS

Affidavit C: **Percentage of SDBE/HUB Participation**

Affidavit of_____I do certify that on the
(Name of Company)

_____ $ _____
(Project Number) (Dollar Amount of Total Bid)

I will expend a minimum of_____% of the total dollar amount of the contract with small disadvantaged business enterprises. SDBE's will be employed as subcontractors, vendors, or providers of professional services. Such work will be subcontracted to the following firms listed below.

Name, Address and Phone No.	*SDBE HUB Category	Description	Dollar Value	% of Contract

*SDBE categories: Black-African Americans (B), Hispanic-Americans (H), Asian- Americans (A), Native-Americans (I), Women (F), Socially/Economically Disadvantaged (D)
*HUB Statewide Uniform Certification (SWUC)

Pursuant to G.S. 143-128.2(d), the undersigned will enter into a formal agreement with smalldisadvantaged firms for work listed in this schedule conditional upon execution of a contractwith the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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

Date:_____

_____

Name of Authorized Officer:_____

Signature: _____

Title: _____

State of North Carolina, County of ____ Subscribed and sworn to before me this____day of____20

Notary Public_____

My commission expires _____

SEAL

*THIS FORM IS **NOT** TO BE SUBMITTED WITH THE BID PROPOSAL*

CITY OF FAYETTEVILLE
AND
PUBLIC WORKS COMMISSION OF THE CITY OF FAYETEVILLE
SDBE/HUB COMPLIANCE PROVISIONS

Affidavit D: **Good Faith Efforts**

If Owner determines using reasonable discretion that Affidavit C is insufficient, Bidder agrees to provide the following information regarding any good-faith efforts.

Name, Address and Phone No.	*SDBE/HUB Category	Description	Dollar Value

*SDBE categories: Black-African Americans (B), Hispanic-Americans (H), Asian- Americans (A), Native-Americans (I), Women (F), Socially/Economically Disadvantaged (D)
*HUB Statewide Uniform Certification (SWUC)

Bidder may be requested to provide documentation of the Bidder's good-faith efforts. Examples of documentation may include the following:

A. Copies of solicitations for quotes to small disadvantaged business firms. Each solicitation may include a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.
B. Copies of quotes or responses received from each firm responding to the solicitation.
C. A telephone log of follow-up calls to each firm sent a solicitation.
D. For subcontracts where a small disadvantaged business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.
E. Documentation of any contacts or correspondence to small disadvantaged businesses, community or contractor organizations in an attempt to meet the goal.
F. Copy of pre-bid roster.
G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for small disadvantaged businesses.
H. Letter detailing reasons for rejection of a small disadvantaged business due to lack of qualification.
I. Letter documenting proposed assistance offered to small disadvantaged businesses in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

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

Date: _____ Name of Authorized Officer: _____
Signature: _____
Title: _____

SEAL

State of North Carolina, County of _____
Subscribed and sworn to before me this _____day of _____20__
Notary Public _____
My commission expires _____

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

CITY OF FAYETTEVILLE
AND
PUBLIC WORKS COMMISSION OF THE CITY OF FAYETTEVILLE
SDBE/HUB COMPLIANCE PROVISIONS

Identification of Small Disadvantaged Business Participation

I, _____
(Name of Bidder)
do hereby certify that on this project, we will use the following small disadvantaged business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone No.	Description	*SDBE/HUB Category

*SDBE categories: Black-African Americans (B), Hispanic-Americans (H), Asian- Americans (A), Native-Americans (I), Women (F), Socially/Economically Disadvantaged (D)
*HUB Statewide Uniform Certification (SWUC)

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

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FAYETTEVILLE PUBLIC WORKS COMMISSION

Supplemental PWC Requirement: Subcontractor Disclosure Form

NON- SDBE/HUB DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor:
Address & Phone: _____
Project Name: _____
Pay Application #:_____ Period: _____

The following is a list of payments to be made to subcontractors on this project for the above-mentioned period.

Firm Name and Address	Payment Amount	Owner Use Only

Date: _____ Submitted By: _____

Name

_____

Title

_____

Signature

****SUBCONTRACTOR DOCUMENTS:**
SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT

TECHNICAL SPECIFICATIONS

General Conditions
Scope of Work
Substation Construction Assembly Units
Removals and Disposals

PUBLIC WORKS COMMISSION OF THE
CITY OF FAYETTEVILLE, NORTH CAROLINA

INSTALLATION OF THE
BLACK AND DECKER 69 TO 15 KV SUBSTATION

TECHNICAL SPECIFICATIONS

1.0 General Conditions

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

1.2 In such cases where the nature of the work requires clarification by the Engineer, such clarifications 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.

1.3 All construction shall be performed in a workmanlike manner and shall conform to the Drawings and Specifications. The installation shall conform to the latest edition of specifications and publications from the following. The Contractor shall contact the Engineer for clarification / interpretation if there is a discrepancy between codes.

- *National Electrical Code* (NEC) and interim amendments,
- *National Electrical Safety Code* (NESC),
- *National Electrical Manufacturers Association* (NEMA),
- *North Carolina Building Code*,
- *Occupational Safety and Health Administration* (OSHA),
- *North Carolina Department of Labor, Division of Occupational Safety and Health* (OSHNC)
- *American National Standards Institute* (ANSI),
- *American Welding Society* (AWS),
- *American Society for Testing and Materials* (ASTM),
- *American Institute of Steel Construction* (AISC),
- *American Concrete Institute* (ACI),
- *Acoustical Society of America* (ASA),
- *Institute of Electrical and Electronics Engineers* (IEEE),
- *Concrete Reinforcing Steel Institut*e (CRSI) “Manual of Standard Practice,” and
- *Underwriters Laboratories* (UL)

1.4 The Contractor shall install all of the major materials and equipment as listed as furnished by "Owner" or "others" and as required for the installation of the project, and will furnish and install the miscellaneous materials and equipment listed elsewhere in this Specification and shown on the Drawings.

The Contractor shall also be responsible for transporting, off-loading and storage of the major materials and equipment furnished by the Owner or others that are currently stored at the Warehouse. The Contractor shall be responsible for receiving, off-loading and storage of any materials delivered to the site.

The Contractor shall provide a Material Person who is competent, organized and familiar with the material associated with this project. The Material Person will be responsible for arranging delivery, receiving, storing, disbursing and tracking all the material associated with this project. This person shall not be changed without prior approval of the Owner. This Material Person will be responsible for reporting material shortages and misfabrications to the Owner, Engineer, and/or Supplier. The Material Person will work

directly with the Owner, Engineer, and/or Supplier and will be the person on the project who is totally responsible for material.

A materials receipt shall be completed and signed by the Material Person within twenty-four (24) hours acknowledging receipt of the materials and equipment delivered. The Contractor shall distribute the completed material receipts as follows: one (1) copy shall be delivered to the Owner and one (1) copy retained by the Contractor.

The Contractor shall verify the quantity and condition of all materials delivered to him and in case there is any damage to or shortage of materials, he shall report same to the Owner and Engineer in writing, within twenty four (24) hours after delivery. If there is any shortage or damage which is sufficient to cause the materials to be unfit for use in the work, and the shortage or damage has not been reported as specified above, the Contractor will be charged with actual cost of replacement of such shortage or damage.

Damaged or defective materials and equipment, or waste of materials due to faulty handling or negligence during the course of installation or testing on the part of the Contractor shall be replaced, repaired, or charged against the Contractor at their actual cost to the Owner at the point of delivery to the Contractor, to the satisfaction of the Owner.

The Contractor shall furnish and install temporary traffic bollards around the power transformer and power circuit breakers once received and off-loaded onto foundations or in a storage location on-site to reduce the risk of the equipment being struck by a vehicle prior to the oil containment or structures being installed.

The Contractor shall provide temporary structures or heat, at his own expense, during construction for the proper storage of the materials and equipment furnished by the Owner to adequately house or protect them against deterioration or damage for whatever cause. Materials not adequately protected by the Contractor will be so protected by the Owner at the expense of the Contractor.

Upon completion of the work, the Contractor shall return to the Owner, at their storage areas, all materials and equipment furnished by the Owner and not used in the construction. Surplus materials and equipment thus returned shall be neatly stockpiled. The Contractor will be charged for any materials and equipment not used and not returned the amount equal to the cost of the materials and equipment to the Owner at point of delivery to the Contractor. Written receipts shall be made for returned materials, and one (1) copy shall be mailed to the Owner and one (1) copy retained by the Contractor.

1.5 The Contractor shall submit to the Engineer for approval a complete list of the miscellaneous materials and equipment he is required to furnish for the substation installation within thirty (30) days after the award of the Contract. The list of materials and equipment shall include, but not be limited to; concrete mix design, grounding materials, conduit materials, cable trench layout, control cables, electrical panel boards, etc., with specific supplier names, manufacturer names, catalog numbers and catalog data sheets. The Owner reserves the right to strict approval of proposed Contractor-furnished materials to insure system compatibility.

The Owner reserves the right to not allow the Contractor to begin work if the Contractor has not submitted the list of miscellaneous material and equipment. The additional time required to receive approval for the submittals will not extend the completion date of the project or negate the liquidated damages.

1.6 All Contractor-furnished material and equipment shall be new.

1.7 The Contractor shall submit to the Owner and Engineer a complete Bill of Material, after approval has been given for the Contractor-furnished materials, with an individual unit cost for each item. This is needed for the Owner's Continuing Property Records (CPR's) accounting system.

1.8 The Contractor shall submit to the Owner and Engineer for review, three (3) copies of catalog cut sheets, Shop or Setting Drawings and/or manufacturer product data or schedules for each item not on the approved Bill of Material within thirty (30) days after the award of the Contract, so as not to cause delay in the project.

1.9 The Contractor shall be responsible for laying out the work. The Contractor shall, immediately upon entering project site for purpose of beginning work, locate all general reference points and take such action as is necessary to prevent their destruction, lay out his own work, and be responsible for any error resulting from his failure to exercise such precaution. Corner stakes or center line stakes will be provided by the Owner for reference only, and the Contractor shall verify the locations prior to beginning work.

1.10 The Contractor shall provide and maintain the adequate number of temporary toilets recommended for the number of workmen on-site, through the completion of the project. Also, water service for construction, if required, shall be the responsibility of the Contractor.

Temporary power, if necessary, shall be supplied and connected by the Owner to operate tools, machinery, etc., during construction. The Owner will pay the monthly electric bill.

2.0 Scope of Work

The Contractor's work shall include the furnishing of all labor, tools and equipment, and materials, as outlined in Section 3.0, "Substation Construction Assembly Units" and the installation of those materials and the Owner-Furnished materials as indicated necessary to construct the subject station.

The following is a brief structural description of the station, geographic location, and an explanation of the basic Owner/Contractor responsibilities:

The BLACK AND DECKER 69 to 15 kV Substation includes:

a. One (1) 69kV A-frame line terminating structure
b. Six (6) 69 kV, 1200 A, hook-stick disconnect switches
c. Three (3) 48 kV MCOV lightning arresters
d. One (1) 69 kV, 2000 A, power circuit breaker
e. One (1) 69 kV rigid source bus with associated bus supports
f. Two (2) 69 kV, 3-phase, 1200 A, vertical break, manually-operated group switches with supports
g. One (1) 69 to 15 kV power transformer
h. One (1) 25 kV six-bay distribution structure, with associated rigid bus, group-operated switches, disconnect switches, fuse-cuts, instrument transformers, lightning arresters, and power circuit breakers.
i. Two (2) self-supported 69 kV H-Frame structures with corresponding span.
j. One (1) relay control house with associated relay protection panels and battery system
k. Six (6) underground circuit exits including corresponding manholes
l. Associated grounding system, static mast, oil containment system, conduit / cable trench system, and yard stone.

The geographic location of the BLACK AND DECKER 69 to 15 kV Substation is shown on the vicinity map located in the Appendices.

The Contractor's work will be near and/or in the vicinity of energized electrical equipment and is more fully described in the plans, specifications, and Contractor's proposal for work in these locations, the contractor must provide personnel qualified to work near and on energized equipment, bus work and lines. All such work shall be performed to meet at least the safety rules and regulations prescribed by the Owner for its employees including the use of rubber gloves, hot sticks and associated protective equipment. A copy of such rules and regulations may be examined at the office of the Owner. The Owner will perform or have performed any required power line switching.

2.1 Owner Responsibilities

Work that will be performed by the Owner or others and is not included in this Contract for the substation includes the following:

2.1.1 Furnishing the 69 kV to 25 kV power transformer,

2.1.2 Furnishing the one (1) 2000 A 69kV breakers,

2.1.3 Furnishing the six (6) 1200 A 25 kV breakers,

2.1.4 Removing existing breakers (disconnected by Contractor),

2.1.5 Removing existing transformer (disconnected by Contractor),

2.1.6 Furnishing one (1) station service transformer,

2.1.7 Installation of the 69 kV transmission line to the line terminating structure at the substation,

2.1.8 Installation of circuit exit feeder cables,

2.1.9 Installation of fiber optic cable from street to control house,

2.1.10 Installation of backup auxiliary power to transfer switch

2.1.11 Furnish Control House with battery charger and relay panels

2.1.12 Furnish three (3) manholes to be installed by Contractor

2.2 Contractor Responsibilities

2.2.1 Removal of existing structures and equipment foundations and conduit as outlined in Section 4.0 – Removal and Disposal,

2.2.2 Removal of existing trees and shrubs as shown on drawings (if required),

2.2.3 The installation of the Structures and Equipment package found in the appendix,

2.2.4 The installation of the Control House,

2.2.5 Installation of circuit exit conduit and new manholes,

2.2.6 Installation of (2) 69kV H-Frames and interconnected cable.

2.2.7 The furnishing and installation of manhole sump pumps and drains,

2.2.8 The installation of the Owner furnished batteries,

2.2.9 Furnishing and installation of other material and equipment shown in Section 2.3, “Contractor-Furnished Materials,”

2.2.10 Installation of fiber optic patch panels in the breaker cabinets and SCADA panel. Install and connect fiber optic cables from the fiber patch panel housing inside breaker cabinets at the yard to the fiber patch panel on the SCADA switchboard at the control building.

2.3 Contractor-Furnished Materials

The Contractor shall furnish and install all of the miscellaneous material and equipment as required and described in each group of the “Substation Construction Assembly Units” for the complete installation of the project.

The miscellaneous material and equipment to be furnished and installed by the Contractor shall be the following, unless otherwise noted, but are not limited to:

a) Reinforced concrete foundations,
b) Conduit and cable trench system,
c) Lighting,
d) Control wiring system,
e) Oil containment system,

f) Grounding grid
g) Yard stone
h) Sump pumps and drains, and
i) Fencing system.

2.4 Project Change Orders

The Owner, without invalidating the contract, may order changes in the scope of work of the contract, consisting of additions, deletions, or other revisions with the contract amount and completion time, being adjusted accordingly. All such changes in construction shall be authorized by a change order as outlined in Contract Section. No changes in work shall begin without prior written approval by the Owner.

3.0 Substation Construction Assembly Units

3.1 Structures

3.1.1 Structural Steel Installation

The Contractor shall be responsible for off-load, storage, and installation of the structural steel.

The BLACK AND DECKER 69 to 15 kV Substation includes:

a. One (1) 69kV A-frame line terminating structure
b. Two (2) 69 kV GOAB switch supports
c. Three (3) 69 kV single-phase low bus supports
d. One (1) 69 kV three-phase high bus supports
e. One (1) 25 kV six-bay distribution structure
f. Six (6) 25 kV underground riser structures, and
g. One (1) 85-foot direct buried static pole with 10'-0" static mast.
h. Two (2) 55-foot self-supported H-Frames

The structural steel weight is approximately 57,000 pounds.

All steel structures shall be plumb and level. Structural bolts shall not be tightened until all parts are installed in place. After steel is completely installed, bolts shall then be installed to final torque levels. Care shall be exercised to prevent kinking of steel members. Base plates for columns shall be leveled and installed using the double-nut method unless noted.

All structural steel and anchor bolts are hot-dipped galvanized. All steel surfaces or finish damage damaged during the material handling, installation or removal of various equipment shall be thoroughly cleaned, brushed and cold galvanized applied with Galvanox or approval equal.

The Contractor shall take the necessary measures required to prevent any foreign material, such as mud, dirt, concrete splatter, etc., from accumulating on the stored materials. These measures shall include, but shall not be limited to, the use of timbers/pallets to elevate material above grade, covering an area of the initially graded substation yard with several inches of washed stone, the use of a storage trailer, or an enclosed structure.

The structural steel and cast steel shall conform to ASTM Specifications A-36 and A-27 respectively. Wrought iron shall conform to ASTM Specifications A-41 for bolts, rods and bars, A-42 for plates, and A-162 for sheets. Cast iron shall conform to Federal Specifications QQ-I-652. Gauges of sheet iron and steel, as specified, are U.S. Standard for Sheet and Plate. Gauges of nonferrous metals are Brown and Sharpe.

3.1.2 Substation Bus and Leads

The bus and leads installed by the Contractor shall utilize weldment type rigid bus connectors, bolted type terminal lead connectors, and compression type terminal lead connectors which shall be off-loaded at site, stored and installed by the Contractor and include the following: 69 kV and 25 kV rigid bus work, 69 kV leads from the rigid bus work to the disconnect switches, 69 kV leads to the power circuit breaker, 69 kV and 25 kV leads from the power transformer bushings and lightning arresters to both the rigid bus work and GOAB switch, 25 kV leads from rigid bus work to the disconnect switches and power circuit breakers, and 25 kV leads from rigid bus work to the fuse-cut, instrument transformers, and the station service transformer.

The rigid bus and leads shall be installed in sizes and locations as indicated on the Drawings. Aluminum shall conform to Federal Specifications and shall be Alloy 6063T6, anodized. All conductor terminal connections shall be dry brushed, and then wet brushed with a suitable electrical joint compound applied when connections are made to prevent oxidation. Bolted connections shall utilize Anderson Type VS non-gritted compound, and compression connections shall utilize Anderson Type VSG gritted compound. All bus and lead connections shall be electrically sound. All compression tools shall utilize dies approved by the connector manufacturer and shall utilize a minimum sixty (60) ton compression. All bolted electrical connections will utilize stainless steel bolts, washers, and nuts. Connectors shall have all bolts tightened to torque levels specified by the connector manufacturer or the Engineer. New connectors shall be used in all cases of new or relocated connectors. Bi-metallic transition plates, 2-hole or 4-hole, shall be used on all copper to aluminum connections.

The Contractor shall install single conductor of 336.4 kcmil ACSR inside the aluminum bus tubing in excess of twenty feet (20') in length as a dampening device. All aluminum tubing shall have one (1) 1/4–inch diameter weep holes drilled in mid-span of bus supports, end bus fittings and in locations as indicated on the Detail Drawings.

The Contractor shall utilize one of the two (2) accepted methods of welding aluminum bus work: Tungsten Inert Gas (TIG) or Metal Inert Gas (MIG). Flux shall not be used in welding aluminum. Speed of welding shall be such that expansion and contraction is held to a minimum. All fillets shall be by the two-pass method.

Moisture shall not be allowed to contaminate the shielding gas, as this will create porosity in the weld during the initial weld period. All welded connections on aluminum bus or structural elements shall be made by personnel holding a current certification from AWS. Safe welding practice shall always be observed as outlined in "Aluminum Welders Training Manual, First Edition, January 1972" or other County, State or Federal Safety Practices. Welding shall not be attempted during rain, snow, fog, or windy conditions, unless area of welding is protected by an appropriate covering.

All materials to be welded shall be thoroughly cleaned with a mild alkaline, alcohol or acetone solution and commercial degreasers that do not evolve toxic fumes during welding. All welding surfaces must be dried after cleaning before welding to prevent porosity in the welded surface. Oxide films must be removed from the surface of the aluminum by a suitable abrading process and brushing with a clean stainless steel wire brush immediately prior to welding. The filler wire for 6063 alloy bus tubing shall be filler alloy #5356 and shall be kept clean.

Voltage, current and gas flow must be correct to make proper welds and for given situations. MIG welding is done with a direct current, reverse polarity. Shielding gas for MIG welding shall be argon, helium or a mixture of the two gases. The two main types of DC power sources for MIG welding are Constant Current (Dropping Characteristic) Unit and Constant Voltage (Constant Potential) Unit.

Current Settings and Gas Coverage are in Tables 4 to 7 in Welders Training Manual, "The Aluminum Association, First Edition 1972".

Ac current will be used with TIG method of welding. Shielding gas for TIG welding shall be argon. If a water supply is not available, a small water tank and pump will be used to recirculate water from the tank to torch and return. Anti-freeze will be added if conditions warrant and soluble oil is added to water circulating units. The electrode will extend beyond the gas cup slightly further than its diameter for fillet welding. The proper size electrode will be chosen for the proper weld to prevent poor welds. In starting a TIG weld the tungsten electrode shall not touch the aluminum work piece. The filler rod or wire shall always be placed within the inert gas shield and at the leading edges of the weld pool. The proper size rod or wire will always be used.

3.1.3 Animal Guards

The animal guards shall be installed by the Contractor. A list of the animal guards is located in the Bill of Materials. Type BISG guards shall go on all low-side bus insulators, switch insulators, and arresters with the exception of the transformer arresters. Type BCAC guards shall go on low-side breaker bushings, as well as low-side transformer bushings and arresters.

3.2 Three-Pole Group Operated Air Break Switches

The 69 kV, and 25 kV manually operated, three-pole group operated air-break switches to be installed by the Contractor. The Contractor shall be responsible for off-loading, storage, proper assembly, installation, and adjustment of the group-operated air break disconnect switches.

3.3 Lightning Arresters

The station class Type PVN polymer lightning arresters for each substation shall be furnished by the Owner. The Contractor is only responsible for installing the A Frame arrestors, and for installing the #2 AWG ground wire for the feeder exit arresters. The installed #2 AWG ground wire for the feeder exit arresters shall be left coiled up at the foot of the associated structures. The Contractor shall receive and store in the Control House the feeder exit arrestors. The feeder exit arrestors will be installed by Owner.

3.4 Single-Pole Disconnecting Switches

The 69 kV hooksticks, 25 kV hooksticks and 25 kV fused cutout single-pole disconnect switches for each substation shall be installed by the Contractor.

3.5 Circuit Breakers

The 69 kV and 25 kV power circuit breakers for the substation will be furnished by the Owner and stored at the Owner’s warehouse. The Contractor shall be responsible for hauling from the Owner’s warehouse to the project site, off-loading, storage, proper assembly and installation. The Owner will be responsible for the control settings and operation of the breakers.

3.6 Circuit Reclosers – NOT REQUIRED

3.7 Instrument Transformers

The three (3) voltage transformers for the substation will be installed by the Contractor.

3.8 Transformers

Power Transformers

The power transformer will be furnished by the Owner and delivered to the pad at the station. The final assembly, dress-out, oil-filling, and manufacturer testing will be performed by the Owner. The Contractor shall install the electrical connections for the

high-voltage, low-voltage bushings, lightning arresters, control wires, AC and DC power wires, and ground leads for the transformer at the project site.

Station Service Transformer

The Owner will furnish and the Contractor shall install one (1) 25 kVA station service transformer at the substation, all in accordance with the Drawings.

3.9 Voltage Regulators - NOT REQUIRED

3.10 Communications and Supervisory Control Panel

The SCADA cabinet will be furnished and installed by the Owner. Control building for the station will have one (1) SCADA cabinet. All power cables, control cables, fiber optic cables, and fiber patch panels from the yard to the cabinet in the control house shall be furnished, installed, and terminated by the Contractor according to the Cable Schedule.

3.11 Conduit and Cable

3.11.1 Conduit

Non-Metallic Conduit - Non-Encased

The Contractor shall furnish and install rigid non-metallic, polyvinyl chloride (PVC), Schedule 40, conduit for all below ground and above ground conduit runs in the sizes and to the locations as shown on the Drawings, complete with appropriate pull strings.

The Contractor shall begin the conduit installation from the precast concrete cable trench to the appropriate equipment enclosure locations and junction boxes per the Plans and Details. The Contractor shall furnish and install the rigid non-metallic, polyvinyl chloride (PVC) single gang switch / junction boxes for the outdoor lights and outdoor receptacles in locations as shown on the Drawings and Details.

The Contractor shall install all conduits to the junction boxes and/or to the equipment cabinets and install pull-strings in preparation for pulling control cable. The conduit system shall be installed in the straightest path possible and with the minimum amount of bends in any given conduit run. The installation shall avoid sharp radius bends in any one conduit run. The minimum radius bend shall be per the manufacturer's recommendations.

In the event the use of rigid conduit is not as well suited for the installation into the equipment control cabinet, it may be necessary to use non-metallic flexible liquid-tight conduit. The Contractor shall contact the Owner prior to using in cases such as cabinets for the power transformers or power circuit breakers. The Contractor shall be prepared to furnish and install the rigid and/or flexible conduit and be responsible for the required necessary fittings.

The conduit system installation shall be complete with adapters, fittings, elbows, sweeps, flexible liquid-tight fittings, bushings, locknuts, and weatherheads, as required and as shown on the Detail Drawings for a complete installation. Conduits shall be cleaned, installed, and joined using the appropriate PVC cleaner and solvent cement, as recommended by the Manufacturer, at all fittings and joints in the layouts.

The below-ground conduit system for control cable installations shall be buried two feet (2'-0") below final grade, excluding yard stone cover.

The Contractor shall exercise necessary precautions to prevent the accumulation of water, dirt, or concrete in the conduits during execution of the work. Conduits that have been deformed or crushed in any way shall not be installed. Conduits in which water or other foreign materials have been permitted to accumulate shall be cleaned thoroughly or the conduit run replaced where such accumulation cannot be removed by methods approved by the Owner.

Trenches shall be of necessary width for the proper laying of the conduits and the trench banks shall be as nearly vertical as practicable. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of conduit on undisturbed soil at every point along its entire length. Care shall be taken not to excavate below the depth indicated. Unauthorized overdepth shall be backfilled with loose, granular, moist earth, thoroughly tamped. Whenever wet or otherwise unstable soil is encountered that is incapable of properly supporting the conduit (as determined by the Owner) such soil shall be removed to the depth required and the trench backfilled to the proper grade with coarse sand, fine gravel, or other suitable material, as hereinafter specified.

In the event trenching excavations are in excess of five feet (5') in depth, the trench shall include shoring or slope-cutting of vertical walls in accordance with OSHA regulations.

Electrical Metallic Tubing

The Contractor shall furnish and install the electrical metallic tubing (EMT) in sizes shown on the Drawings and Details to be used in the control buildings. The Contractor shall be responsible for the conduit runs from the battery chargers to the cable tray and into the battery room. The EMT conduit installation shall include all required material such as connectors, couplings, nipple fittings, conduit straps, adapters and bushings.

Cable Trench

Synertech Plastibeton Channel System, or approved equal, shall be furnished and installed by the Contractor in accordance with the Plans and Specifications. Channel shall be traffic rated. The channel shall be installed on level and even surfaces set at 2" below final grade level on a surface of crushed stone complete with two (2) four inch (4") drain pipes to keep the trench dry. Channel system installation specifications are on Oldcastle website at http://www.oldcastleprecast.com/plants/Enclosures/brands/Pages/synertech.aspx/products_p_inst.html

All cable trench systems shall be furnished with a minimum of two lifting hooks for each 100' of trench or portion thereof.

Junction Boxes

The junction boxes shall be furnished and installed by the Contractor. The junction boxes for the project shall be rated NEMA 3R weatherproof, and shall include terminal blocks, cartridge fuses, mounting panel, and power connectors, as shown on the Drawings. Junction boxes shall be Hoffman Engineering Company enclosures with inner mounting panel, or equal, at the minimum dimensions, as shown on the Drawings.

Lighting

Exterior yard lighting for each substation shall be furnished and installed by the Contractor as shown on the Drawings and Details. Steel structure mounted lighting shall be standard, two-lamp fixtures. Each exterior structure-mounted light shall be controlled from the ac panel board circuit breaker inside each control building and a weatherproof simple switch where shown on the drawings.

Safety Switches

The Contractor shall furnish and install one (1) safety switch at the substation for the station service transformer as shown on the Drawings and Details. The safety switch shall be rated 200A NEMA 3R, heavy duty, include fuses, and shall be Square D Company Catalog No. H224NRB, or approved equal.

The Contractor will install a meter socket, supply by Owner, between the safety switch and the station service transformer as shown on the Drawings and Details.

3.11.2 Cables

The Contractor shall submit qualifications for the electricians performing the installation and termination of the power and control wiring for the project to the Engineer for approval, upon award of Contract.

All power and control cables shall be clearly and permanently marked at each termination of the jacket in accordance with the cable numbers shown on the "Cable Schedule". Each conductor shall be clearly and permanently marked at each termination. Each cable and each individual conductor shall be labeled using Brady "I.D. Pro Plus" Type wire marking sleeve, or approved equal. Conductor markings shall be in accordance with the Drawings. The markers shall indicate on each end the device identification and device terminal numbers shown on the Drawings to be issued to the Contractor. The wire markers shall indicate the destination of the wire, not the origin. For example, the wire end terminated on Device 50/51 Terminal 2, whose other end is on Device 87T Terminal 2, shall be labeled 87T-2. Wiring shall be done in an orderly manner to permit the addition of Owner's wiring and for troubleshooting wire tracing. The cable jacket shall remain on the cable to a point within one foot (1') of where the first conductor is terminated. At the termination of the jacket, the cable shall be securely sealed using plastic electrical tape. The cables shall be neatly bundled together and secured to the panel/cabinet using plastic cable ty-wraps.

All power and control wiring shall be continuous from terminal point to terminal point; no splices will be permitted. Terminations shall be made using insulated ring tongue compression connectors, AMP PIDG; spade-type terminals shall not be used. All control wiring shall be neatly dressed and tied using plastic cable ty-wraps, in each device. Terminations, wire markers, electrical tape, and ty-wraps shall be furnished by the Contractor. The Contractor is to terminate all power and control wiring unless indicated to be by Others. All control and power cables shall have at least one loop of spare wire in bottom of compartment and / or be long enough to reach any terminal in compartment.

Power Cable

Station service and power cables shall be furnished, installed, and terminated by the Contractor. A list of power cable types, with suggested manufacturers and catalog numbers is included in the Appendices.

Control Cable

Control cables shall be furnished, installed, and terminated by the Contractor. A list of control cable types, with suggested manufacturers and catalog numbers is included in the Appendices.

3.11.3 Pre-terminated Fiber Optic Cable

3.11.3.1 General

Fiber Optic Cable assemblies pre-terminated at the factory will be furnished and installed by the Contractor.

Contractor responsibility is to measure conduit, trench, tray and entry to patch panels for each run, apply additions to length as documented, submit quote request to Anixter and order each cable under separate part number from Anixter/CompuLink and install each cable as directed in prints and schedules.

The Prints and Schedules make some allowance for additional slack in case measurements are short, contractor must understand limitations of those provisions and is still responsible for ordering cable long enough to reach as needed and maintain fiber optic cable requirements for minimum bend radius. The Contractor should

consult and use Prints and Schedules to understand installation requirements and ensure proper length ordered. Wireman must obtain fiber cable pulling specifications well ahead of installation. Wireman must know Minimum Bend Radius (MBR) for the cable both during pull and when cable in place, MBR during pull is LARGER than that when cable is resting in place. Wireman must know Maximum Pull Tension for the cable both during pull and when cable in place, Maximum Pull Tension during pull is LARGER than that when cable is in place. Wireman must be familiar with Radius Guides, Rollers, Pulleys and tension measurement equipment before performing install.

After pulling in Pre-Terminated Cables, Wireman must land pre-terminated cable connectors in these Yard Cabinet (breaker cabinets, transformer cabinet) patch panels and also in Control House SCADA switchboard fiber patch panels per prints. Persons doing this work must be familiar with fiber connectors and their installation

3.11.3.2 Determining Length of Each Cable Run

The Cable and Conduit Schedule indicates which Cable Numbers are Fiber Pre-terminated (FIBER-PT) Assemblies and also indicates the Source and Destination information. This Schedule provides a table to help determine length to order. This table may be copied as needed to provide space to record actual measurements and determine order length. Three additions to the cable length beyond that measured are provided in the table: In-Cabinet Length, Turn Loop Length and Just-In-Case Length.

3.11.3.3 Installation

Wireman must obtain fiber cable pulling specifications well ahead of installation. The Minimum Bend Radius (MBR) is 4.3” for all fiber optic cable during pull, MBR during pull is LARGER than that when cable is resting in place. The Minimum Bend Radius (MBR) is 3” for all fiber optic cable in place. Wireman must know Maximum Pull Tension for the cable both during pull and when cable in place, Maximum Pull Tension during pull is 300 LBF. Wireman must be familiar with Radius Guides, Rollers, Pulleys and tension measurement equipment before performing install.

3.12 Foundations

3.12.1 General

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

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

3.13 Site Preparation

Yard Stone

Once all below-grade construction activity for each phase of the construction as described by this Specification is completed, the Contractor shall proceed with final grading, compaction, clean-up, and the addition and compaction of the yard stone to the substation areas as shown on the drawings. The Contractor shall furnish and install three inches (3") of No. 57 washed stone on top of three inches (3") of compacted No. ABC "crusher-run" stone fill to a total depth of six inches (6") over each substation area as indicated on the Grading and Erosion Control Drawings (GR1 of 2). The Contractor shall use a vibratory roller to compact the layer of the "crusher-run" stone prior to placement of No. 57 stone. The vibratory roller shall also be used to compact the No. 57 stone after final installation. The finished grade contours of the substation site shall be maintained after the crusher run stone has been installed. All areas disturbed by excavation beyond this stone base will also be seeded by the Contractor.

Yard, trench and general backfilling is required to return the disturbed areas to the previous finish grade prior to the construction. This shall constitute grading to the elevations shown on the drawings, allowing an average of 2% of grade with the natural slope of the ground for drainage. The area shall be brought to a smooth compacted plane in such a manner that there will be no pockets or depressions which will hold water, and so that the area will drain naturally. The trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand and gravel, soft shale, or other approved materials, free from large clods of earth or stones, deposited in six-inch (6") layers and thoroughly and carefully tamped until the conduit or cable has a minimum cover of one foot (1'). The remainder of the backfill material shall then be placed in the trench in one-foot (1') layers and tamped. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted, with the surface restored to the required grade and compaction as specified. Open trenches in roadways or other areas subject to traffic shall be backfilled in six-inch (6") layers, and each layer shall be moistened and compacted to a density at least equal to that of the surrounding earth and in such manner as to permit the rolling and compaction of the filled trench with the adjoining earth to provide the required bearing value. Finish grade areas shall be raked clean and free from all trash, wood, forms, and other debris after completion of work, and all spoil piles shall be leveled and excess materials disposed of. If any spoils materials appear to have contamination, contractor is to seek guidance from Owner or Owner's Engineer. Otherwise, dispose of spoils at a NCDENR approved location.

Where backfill is required only clean excavated materials shall be used. If the original excavated materials are soft, spongy, or otherwise unsuitable for backfill, suitable materials shall be brought in and used. Backfill shall be placed in horizontal layers not in excess of twelve inches (12") in thickness, and thoroughly compacted. Backfill shall be compacted to a minimum of ninety-five percent (95%) Modified Proctor Density.

3.14 Fence

Fences and Gates

The existing fence will remain. The Owner will furnish and install all signs to be installed on the fence. The Owner will furnish padlocks for all gates.

The Contractor shall furnish and install any temporary fencing needed to maintain a safe and secure site and to completely isolate any construction activity from any energized device or structure. Fence posts should be coated with epoxy.

The chain-link fence and gates will have grey privacy slats installed throughout. The non-conductive fence shall be Shakespeare SafeFence or approved equal. www.skp-cs.com/products/safefence.

3.15 Station Grounding

The below-grade grounding systems including all Cadweld Connectors shall be furnished and installed by the Contractor. The station ground bus and perimeter fence ground bus is buried two feet six inches (2'-6") below subgrade, excluding final yard stone cover. Trenches shall be of necessary width for the proper laying of ground conductors and the trench banks shall be as nearly vertical as practicable. The perimeter fence ground bus is installed four feet (4') beyond the fence.

The grounding conductors and interconnections shall be installed by the Contractor as indicated on the Drawings. The grounding conductor shall be 2/0 and 4/0 AWG bare copper, 2/0 AWG copper clad steel, and No. 2 AWG tinned copper used in locations as shown on the drawings. The Contractor shall install all ground grid leads for the power circuit breakers, neutral bushings of the power transformers and lightning arrester equipment connections with one continuous ground wire from the grid. All below grade grounding conductor interconnections shall be exothermically welded electrical connection type, as indicated on the Drawings. The connections will be the Erico, Inc. "Cadweld" Type. Cadweld certification is required per the "Certifications" section of this Contract.

All grounding connections that are only present above grade shall be 2/0 AWG 40 percent conductivity copper clad steel. Copper clad shall NOT be installed as part of the below grade grid, or as a pigtail connection to the below grade grid.

The trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand and gravel, soft shale, or other approved materials, free from large clods of earth or stones, deposited in six-inch (6") layers and thoroughly and carefully tamped until the cable has a minimum cover of one foot (1'). The remainder of the backfill material shall then be placed into the trench in one foot (1') layers and tamped. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted, with the surface restored to the required grade and compaction as specified. Open trenches in roadways or other areas subject to traffic shall be backfilled in six-inch (6") layers, and each layer shall be moistened and compacted to a density at least equal to that of the surrounding earth and in such manner as to permit the rolling and compaction of the filled trench with the adjoining earth to provide the required bearing value.

Station Grounding Tests

The Contractor shall perform grounding tests for the ground grid system in accordance with the latest revision of ANSI/IEEE 80 and 81 to certify resistance values shown on the Drawings. Tests shall be performed in the presence of the Owner or the Owner's Engineer and on the form Ground System Test located in the Appendices. The preferred test method to be used is the three-point fall of potential method. The substation grounding system shall also be tested for continuity. The Contractor shall notify the Owner one week in advance of scheduled tests. The continuity and resistance test results shall be recorded and certified by the Owner.

Certifications

The Contractor shall have worker certification for all personnel installing exothermically welded connections. Training and certification is provided free of charge by Erico Electrical Products. Call 1-800-248-WELD or Dan Mays at 919-812-1043 or at his e-mail address, dmays@erico.com.

3.16 Buildings

The Owner shall furnish and install one (1) control building at the substation. The control building is a pre-fabricated concrete building, complete with pre-wired electrical panels, lights, switches, receptacles, cable tray, cable tray risers, and ventilation systems. The Contractor shall be responsible for the proper installation of the outdoor cable tray risers, so that after the cable trench installation along the building, a proper fit between the riser and trench is obtained.

3.17 Batteries

The Contractor shall also be responsible for receiving, off-loading, storage and installing the Owner-furnished battery systems per manufacturer's directions which include the, rack, and batteries. This installation shall be complete to ensure all necessary conduit, conduit straps, adapters, bushings, bolts, anchors, etc. for a completed system.

3.18 Oil Containment System

The oil containment system shall be furnished and installed by the Contractor for the power transformer in accordance with the Specifications and Bill of Materials as found in the Appendices, and the Drawings and Details.

3.19 Protective Relaying Panel

The relay and control switchboards shall be furnished and installed by the Owner in the locations as shown on the Drawings and anchored onto the control room floor. All power, control, and fiber optic cables from the yard to the termination cabinet in the relay control house shall be furnished, installed, and terminated by the Contractor according to the Cable Schedule.

3.20 Fault Interrupters – NOT REQUIRED

3.21 Testing

The Contractor shall perform testing for:

a. Each control cable by means of meggering conductor-to-conductor and each conductor-to-ground prior to termination,

b. The Contractor shall verify each control cable for proper cable and conductor size, type, and labeling per the drawings.

c. Each control cable termination shall be verified per the interconnect drawings for proper conductor lugs, crimping, color codes, lock washers, and tightness.

d. The Contractor shall verify control circuit AC & DC molded-case circuit breakers and fuses of the correct size and type,

e. Installation of station service transformer, station service fused disconnect, and PT power fuses of the correct size and type per the drawings,

f. The Contractor shall verify the 120/240 AC station service systems for each source and transfer capability; branch circuits for proper magnitude and neutral and/or ground terminations at the destination, and

g. 48 VDC system branch circuits for proper magnitude, polarity, and termination at the destination.

The Contractor shall provide the required and acceptable documentation for all testing to the Owner.

3.22 Metalclad Switchgear Enclosure – NOT REQUIRED

3.23 Underground Circuit Plan

The six (6) 25kV Distribution underground circuit exit conduits shall be furnished and installed by the Contractor in the locations shown on the Drawings. The conduits and manholes shall be installed to the depths and locations shown on the Drawings. Permanently glue end caps for each conduit and elbows as well as encase in sand inside the fence and encase in 2000 psi concrete outside the fence. The power cables and terminations will be furnished and installed by Others. The non-metallic conduit shall be furnished and installed in accordance with drawings and specifications as described in Section 3.11. Any disturbances to the soil or asphalt shall be repaired by the Contractor.

4.0 Removals and Disposals

The Contractor's work shall include furnishing of all labor, tools and equipment, and materials as outlined in the following sections for the substation, for the removal and disposal of those materials and equipment. The Contractor shall be responsible for establishing final grade after the removal and disposal of the existing substation. The Contractor shall be responsible for any back-fill needed as well as loading, hauling, and proper disposal of any remaining unneeded spoils.

The Contractor will need to remove and dispose of the existing substation, existing control house and high-side structure. This includes but is not limited to all equipment, devices, cable, conduit, structures, above-grade grounding, and foundations, except as noted below:

The Contractor shall be responsible for removing all cables, control wires, grounds and bolted connections, and the Owner shall be responsible for loading, transporting, and off-loading of the batteries and circuit breakers. The Contractor shall be responsible for disassembling, loading, transporting, and off-loading all relay panels and instrument transformers from the existing substation and relocating the units to the Owner's warehouse for storage. The Contractor shall coordinate this activity with the Owner before transporting to the warehouse. The Contractor shall deliver to the Owner's warehouse all existing steel columns and beams. All existing hardware shall be disposed of by the Contractor.

Existing foundations shall be completely removed. No portion of any foundation shall be abandoned. All power and control wiring shall be completely removed from the conduit system. All existing conduit shall be completely removed. All existing ground taps to equipment and structures shall be removed to a minimum depth of six-inches below sub-grade. The existing below-grade grounding shall be left and shall be bonded to the new ground grid.

The Contractor shall completely remove all existing hand holes at the substation. This work includes re-establishing the final grade with select back-filling and proper compaction.

Backfill shall only be clean excavated material. Backfill shall be placed in horizontal layers not in excess of twelve (12) inches in thickness, and thoroughly compacted. Backfill shall be compacted to a minimum of ninety-five (95) percent Modified Proctor Density.

It will be the Contractor's responsibility to obtain any needed information during the site visit at the mandatory pre-bid meeting.

APPENDICES

1. Booth & Associates, LLC – Drawing List
2. Conduit / Cable Schedules
3. Owner –Furnished Material List
4. Technical Specifications:
   Oil Containment
5. Technical Specifications:
   Foundation
6. Technical Specifications:
   Structures & Equipment
7. Contractor-Furnished Cable Material List
8. Forms:
   a. Contractor's Concrete Test Sample Report
   b. Materials Receipt
   c. Ground System Test
9. Vicinity Map

1 – Booth & Associates, LLC – Drawing List

PUBLIC WORKS COMMISSION
FAYETTEVILLE, NORTH CAROLINA

BLACK AND DECKER 69 TO 15 KV SUBSTATION

LIST OF DRAWINGS

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

STRUCTURES AND EQUIPMENT

Sheet No.	Title
GA1	Plan View
GA2	Section View A-A, B-B
GA3	Section Views C-C, D-D
GA4	Section Views E-E, F-F, G-G, H-H
GA5	Details

GENERAL

Sheet No.	Title
E01	One Line
CE1	Circuit Exit Plan
G1	Grounding Plan
G2	Grounding Details
C1	Conduit & Cable Plan
C2	Trench & Conduit Details
CH1	Control House Plan and Sections
CH2	Control House Details
S1	Site Plan

FOUNDATION AND OIL CONTAINMENT DRAWINGS

Sheet No.	Title
FP1 of 2	Foundation Plan
FP2 of 2	Foundation Plan (69kV H-Frames)
FD1 of 8	Pad 1 Details
FD2 of 8	Section Views A-A, B-B, C-C
FD3 of 8	Pad 2 & 3 Details
FD4 of 8	Pad 4 Control House Details

FOUNDATION AND OIL CONTAINMENT DRAWINGS ***continued***

Sheet No.	Title
FD5 of 8	Pier 1, 2 & 3 Details
FD6 of 8	Pier 4, 5 & 6 Details
FD7 of 8	Typical Pedestal, Transformer, OC Wall & Pad Rebar Details
FD8 of 8	69 kV H-Frame
OC1 of 3	Oil Containment System Plan
OC2 of 3	Oil Containment System Sections
OC3 of 3	Oil Containment System Details

2 – Conduit / Cable Schedules

Black and Decker 69kV to 15kV Substation

Conduit & Cable Schedules

12502C3.xlsx

for the
Public Works Commission of Fayetteville, NC

07/25/2019

Booth & Associates, LLC
CONSULTING ENGINEERS

5811 Glenwood Avenue, Raleigh, NC 27612
NC F-0221

Rev.	Description	Date	By	Appr.
0	ISSUED FOR BIDS		JBS	JBS

DRAWING: 12502C3

LEGEND AND NOTES

CONDUIT INSTALLATION:

NOTE:

1	ALL METALLIC JUNCTION BOXES, RACEWAYS, CABLE TRAYS, PANELS, AND ENCLOSURES SHALL BE BONDED TO THE SUBSTATION GROUND GRID.
2	ALL CONDUIT IS 2" SCHEDULE 40 PVC UNLESS OTHERWISE NOTED ON DRAWING.
3	FUTURE EQUIPMENT. CONDUIT TO BE INSTALLED BUT CAPPED AT LOCATION OF FUTURE EQUIPMENT.
4	FUTURE CONDUIT. SHOWN FADED ON CONDUIT PLAN.
	FOR CONDUIT BEARING FIBER OPTIC CABLES (FOC): 1) HAVE NO LESS THAN 8.0 INCH BEND RADIUS. 2) USE OF "LB" FITTINGS SHALL NOT BE PERMITTED. 3) SLOW BENDS AND COMBINATIONS OF 45 DEGREE BENDS OF MINIMUM 8.0 INCH RADIUS ARE PREFERRED. 4) ENSURE BENDS OTHER THAN 90 DEGREES ALSO ENFORCE MINIMUM BEND RADIUS.

CABLE INSTALLATION:

NOTE:

	ALL AC SERVICE NEUTRALS SHALL BE BONDED TO GROUND AT THE SERVICE PANEL AND AT THE POINT OF TERMINATION.
13	**THESE COPPER OR FIBER JUMPERS SUPPLIED WITH SWITCHBOARDS FROM THE SWITCHBOARD VENDOR.** USE AVAILABLE HORIZONTAL AND VERTICAL CABLE MANAGERS TO ROUTE FIBER AND COPPER JUMPERS. USE VELCRO TO SECURE JUMPERS TO ONE ANOTHER AND ELSEWHERE AS NEEDED. WIRE TIES NOT ALLOWED.
14	ALL **AC BRANCH FEEDERS** SHALL OBSERVE THE FOLLOWING COLOR CODE ACCORDING TO ICEA METHOD E1 CABLE: **X - BLACK Y - RED N - WHITE G - GREEN**
15	ALL **DC BRANCH FEEDERS** SHALL OBSERVE THE FOLLOWING COLOR CODE: **POSITIVE (+) - RED NEGATIVE (-) - BLACK**
16	SECONDARYS FOR CURRENT TRANSFORMERS AND VOLTAGE TRANSFORMERS SHALL HAVE CONDUCTORS COLOR CODED ACCORDING TO ICEA METHOD E1 (i.e. RD, GN, BK, WH) UNLESS OTHERWISE NOTED. **A - RED B - GREEN C - BLACK N - WHITE**
17	TERMINATE GENERAL CONTROL CABLE CONDUCTOR COLORS AT RELAY PANEL TERMINAL BLOCKS IN ORDER OF CONDUCTOR NUMBER (ICEA METHOD E2): **BK, RD, BL, OR, YL, BR, RD/BK, BL/BK, OR/BK, YL/BK, BR/BK, BK/RD**. TERMINATE EQUIPMENT END AS NECESSARY TO MATCH FUNCTION.
18	COIL 30 FEET OF CABLE INSIDE SWBD #4 FOR FUTURE USE. TAPE OFF INDIVIDUAL WIRES IN EACH PAIR. TAPE OFF FOIL AND DRAIN WIRE AT BOTH ENDS.

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LEGEND AND NOTES

19	**CONTROL HOUSE MANUFACTURER TO INSTALL AND TERMINATE THESE CABLES AND JUMPERS. APPLY LABELS TO ENDS OF CABLES AND JUMPERS PER CABLE AND CONDUIT SCHEDULE (12502C3, THIS DOCUMENT).**

FIBER OPTIC CABLE / CONDUIT INSTALLATION:

NOTE:

20	1) OUTSIDE PLANT (OSP) FIBER OPTIC CABLES (FOC) SHALL HAVE **NO LESS THAN 8 (EIGHT) INCH BEND RADIUS** DURING INSTALLATION AND **NO LESS THAN 4 (FOUR) INCH BEND RADIUS IN PLACE AFTER INSTALLATION**. 2) **PULLING TENSION NOT TO EXCEED MAXIMUM** PER MANUFACTURER'S SPECIFICATION. 3) NEED 10 FEET OF CABLE IN EQUIPMENT
21	1) FIBER OPTIC CABLE (FOC) **DUPLEX JUMPERS SHALL HAVE NO LESS THAN 1.5 INCH BEND RADIUS**. 2) **PULLING TENSION NOT TO EXCEED MAXIMUM** PER MANUFACTURER'S SPECIFICATION. 3) USE PANDUIT GUIDES IN SWBD #4 TO PROTECT SLACK. 4) "SM" JUMPERS ARE YELLOW IN COLOR. 5) MAKE AND PLACE CABLE NUMBER LABELS AND "DESTINATION" LABELS ON DUPLEX JUMPERS BEFORE INSTALLATION, SEE PRINTS. 6) USE VELCRO STRAPS (BELDEN PN AX100783 OR EQUIVALENT) TO DRESS DUPLEX JUMPERS IN LOOPS TO TAKE UP SLACK IF NEEDED, RESPECTING BEND RADIUS. WIRE TIES ARE NOT PERMITTED AT ANY TIME.
22	**MEASURING AND INSTALLING PRE-TERMINATED FIBER CABLE**: WIREMAN MUST OBTAIN FIBER CABLE PULLING SPECIFICATIONS WELL AHEAD OF INSTALLATION STEPS. WIREMAN MUST KNOW MINIMUM BEND RADIUS FOR THE CABLE BOTH DURING PULL AND WHEN CABLE IN PLACE, MBR DURING PULL IS LARGER THAN THAT WHEN CABLE IS RESTING IN PLACE. WIREMAN MUST KNOW MAXIMUM PULL TENSION FOR THE CABLE BOTH DURING PULL AND WHEN CABLE IN PLACE, MAXIMUM PULL TENSION DURING PULL IS LARGER THAN THAT WHEN CABLE IS IN PLACE. WIREMAN MUST BE FAMILIAR WITH RADIUS GUIDES, ROLLERS, PULLEYS AND TENSION MEASUREMENT EQUIPMENT BEFORE PERFORMING INSTALL.. **1) WIREMAN TO DETERMINE REQUIRED LENGTH OF FIBER OPTIC CABLES** FROM YARD BREAKERS AND TRANSFORMER TO APPROPRIATE PATCH PANEL MOUNTED IN SWITCHBOARD S4 BEFORE PLACING ORDER FROM DISTRIBUTOR. SEE PRINTS FOR FIBER ROUTING IN SWITCHBOARD AND CABLE & CONDUIT SCHEDULE FOR DIRECTION TO DETERMINE ORDER LENGTH. **2**) **AFTER CONDUIT, TRENCH, WIRE TRAY AND SWITCHBOARDS ARE INSTALLED, MEASURE LENGTH** FOR EACH PRE-TERMINATED FIBER CABLE. MEASURE FROM CONDUIT IN YARD CABINET TO CABLE BRACKET MOUNTED ON EACH PATCH PANEL, SEE CABLE AND CONDUIT SCHEDULE AND SWITCHBOARD PRINTS FOR DETAILS. USE TABLE IN PRINTS TO ADD REQUIRED SLACK.

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LEGEND AND NOTES

22 **CONTINUED**	**3)** ORDER CABLE FROM ANIXTER, MORRISILLE, NC. SEE LABOR SPECIFICATION FOR DETAILS TO ORDER. **3A-** PART NUMBER FOR PRE-TERMINATED CABLE IS: **D18-0710-1**. SPECIFY LENGTH OF CABLE, AS DETERMINED FOR EACH CABLE NUMBER, SPECIFY CABLE NUMBER FOR EACH CABLE FROM THIS DRAWING. **4)** M**AKE AND PLACE CABLE NUMBER LABELS AND "DESTINATION" LABELS** ON BOTH ENDS OF CABLE BEFORE INSTALLATION, SEE CABLE AND CONDUIT SCHEDULE FOR "FROM" AND "TO" DESTINATION TEXT . REPLACE LABELS IF DAMAGED DURING PULL. **5) PULL CABLE OFF SHIPPING BOX USING PULL ROPE WITH SWIVEL ATTACHED TO PULLING EYE FITTING** ON END OF CABLE. -RESPECT MINIMUM BEND RADIUS (INSTALL) AND MAXIMUM PULL TENSION (INSTALL). -DO NOT ALLOW CABLE TO BEND LESS THAN MBR WHILE WAITING FOR NEXT PORTION OF PULL OR AT END POINTS DURING AND AFTER PULL. -PULL BY ROPE OR TAPE ATTACHED TO SWIVEL. -ROUTE CABLES WITH CARE. -MULTIPLE CABLES MAY BE PULLED BUNDLED TOGETHER THRU TRAY AND TRENCH SEPARATING THEM AS NEEDED TO PULL IN CONDUIT. -USE RADIUS GUIDES, ROLLERS OVER EDGES, PULLEYS AND ASSISTANTS AS NEEDED TO FACILITATE INSTALL.
22	**7) IF NECESSARY, COIL CABLE ON ITSELF INSIDE SWITCHBOARD**, RESPECTING MINIMUM BEND RADIUS AND SECURE COIL WITH WIRE TIES. ALLOW COILS TO BE DIFFERENT LENGTHS AS NEEDED. CABLE JACKET MAY NOT BE DEFORMED BY WIRE TIES. **8) TO CONTAIN CABLE SLACK, CABLE MAY LAY IN OVERHEAD TRAY**, IN AN AREA PAST THE SWITCHBOARDS AND LOOPING BACK TO ENTER SWBD #4. IF CABLE MUST BE COILED IN OVERHEAD TRAY, ENSURE COIL OCCURS FAR DOWN LENGTH OF TRAY IN A CLEAR AREA SO OTHER CABLES ARE NOT OBSCURED BY THE COILS. **9) AFTER INSTALLATION, GROUP CABLES** WHICH ENTER SAME PLACE ON THE PATCH PANEL TOGETHER WITH WIRE TIES. CABLE JACKET MAY NOT BE DEFORMED BY WIRE TIES. **10) MINIMUM BEND RADIUS FOR FIBER CABLE DURING INSTALL IS: 8 (EIGHT) INCHES**. **MAXIMUM PULL TENSION FOR FIBER CABLE DURING INSTALL IS: 100 POUNDS.** **MINIMUM BEND RADIUS FOR FIBER CABLE WHEN IN PLACE IS: 4 (FOUR) INCHES.** **MAXIMUM PULL TENSION FOR FIBER CABLE WHEN IN PLACE IS: 90 POUNDS.** OTHER FIBER OPTIC CABLE ON SITE MAY HAVE DIFFERENT SPECIFICATIONS.

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LEGEND AND NOTES

23	CONDUIT BEARING FIBER OPTIC CABLES (FOC): 1) SHALL HAVE NO LESS THAN 8.0 INCH BEND RADIUS. 2) USE OF "LB" FITTINGS SHALL NOT BE PERMITTED. 3) SLOW BENDS AND COMBINATIONS OF 45 DEGREE BENDS OF MINIMUM 8.0 INCH RADIUS ARE PREFERRED. 4) ENSURE BENDS OTHER THAN 90 DEGREES ALSO ENFORCE MINIMUM BEND RADIUS.
24	1) **OUTSIDE PLANT (OSP) FIBER OPTIC CABLE (FOC) FROM BUILDING TO FEEDER BREAKERS AND OTHER YARD DEVICES** TO BE PULLED BY WIREMAN. 2) **FIBER PATCH PANEL AND FIBER SPLICE PANEL (AS NEEDED)** AT THE BREAKER CABINETS AND SCADA SWITCHBOARD TO BE INSTALLED BY CONTRACTOR. 3) **FIBER "JUMPER" CABLES (CABLE NOS. J24 THRU J52 AND J103 THRU J228)** SUPPLIED FROM SWITCHBOARD MANUFACTURER WITH SWITCHBOARD.
25	COAXIAL CABLES (FOR CABLE SEL-C961-025, C961-050) SHALL HAVE NO LESS THAN 6 1/2 INCH BEND RADIUS (13 INCH CIRCLE) DURING INSTALLATION.
ZLC2M	**Corning** 2 fiber Zipcord Jumper, 2.0mm subunit, multimode, **62.5 micron, OM1,** LC duplex to LC duplex connectors. Minimum Bend Radius during install is 2.0 inches, during operation 0.4 inches. Maximum tensile strength during install is 50 lbf. Length 7 feet. No substitutions. PN: **050502K51200tF**
ZLC3M	**Corning** 2 fiber Zipcord Jumper, 2.0mm subunit, multimode, **62.5 micron, OM1,** LC duplex to LC duplex connectors. Minimum Bend Radius during install is 2.0 inches, during operation 0.4 inches. Maximum tensile strength during install is 50 lbf. Length 3 meters. No substitutions. PN: **050502K5120003M**
ZLC3S	**Corning** 2 fiber Zipcord Jumper, 2.0mm subunit, multimode, **9 micron, OS1,** LC duplex to LC duplex connectors. Minimum Bend Radius during install is 2.0 inches, during operation 0.4 inches. Maximum tensile strength during install is 50 lbf. Length 3 meters. No substitutions. PN: **040402G512000003M**
CA605C-xxx	**SEL CAT5E Shielded Patch Cord**, STP, RJ-45 connectors both ends, jacket color Blue. Length is xxx feet as indicated in part number. PN: **CA605CBXxxx. CAT5-04, CAT5-08**
C605A-xxx	**SEL EIA-232**, DB9 connectors both ends. Length is xxx feet as indicated in part number. PN: **C605Axxx. C605A-36, C605A-25**
C961-xxx	**SEL Coaxial cable**, LMR400 cable, TNC connectors both ends. Length is xxx feet as indicated in part number. PN: **C961-xxx. C961-25, C961-50**
C953-xxx	**SEL Coaxial cable**, IRIG, RG58 cable, BNC connectors both ends. Length is xxx feet as indicated in part number. PN: **C953-xxx. C953-6, C953-15, C953-25**

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Conduit Schedule

CONDUIT NO.	CONDUIT SCHEDULE		CONDUIT SIZE/TYPE	REMARKS
	FROM	TO		
C101	MANHOLE #1	TRENCH	2" PVC	
C102	MANHOLE #2	TRENCH	2" PVC	
C103	MANHOLE #3	TRENCH	2" PVC	
C111	CIRCUIT EXIT	MANHOLE #1	6" PVC	
C112	CIRCUIT EXIT	MANHOLE #2	6" PVC	
C113	CIRCUIT EXIT	MANHOLE #1	6" PVC	
C114	CIRCUIT EXIT	MANHOLE #2	6" PVC	
C115	CIRCUIT EXIT	MANHOLE #3	6" PVC	
C116	CIRCUIT EXIT	MANHOLE #3	6" PVC	
C180	FIBER HAND BOX	TRENCH	2" PVC	
C181	FIBER HAND BOX	TRENCH	2" PVC	
C201	69KV LINE BKR 52-T1	TRENCH	2" PVC	
C202	69KV LINE BKR 52-T1	TRENCH	2" PVC	
C203	69KV LINE BKR 52-T1	TRENCH	2" PVC	
C204	69KV LINE BKR 52-T1	TRENCH	2" PVC	
C205	69KV LINE BKR 52-T1	TRENCH	2" PVC	
C211	No.1 TRANSFORMER	TRENCH	2" PVC	
C212	No.1 TRANSFORMER	TRENCH	2" PVC	
C213	No.1 TRANSFORMER	TRENCH	2" PVC	
C214	No.1 TRANSFORMER	TRENCH	2" PVC	
C215	No.1 TRANSFORMER	TRENCH	2" PVC	
C216	No.1 TRANSFORMER	TRENCH	2" PVC	NOTE 23
C217	No.1 TRANSFORMER	TRENCH	2" PVC	
C221	FEEDER BREAKER No. 52-1	TRENCH	2" PVC	
C222	FEEDER BREAKER No. 52-1	TRENCH	2" PVC	
C223	FEEDER BREAKER No. 52-1	TRENCH	2" PVC	NOTE 23
C224	FEEDER BREAKER No. 52-1	TRENCH	2" PVC	
C225	FEEDER BREAKER No. 52-1	TRENCH	2" PVC	
C231	FEEDER BREAKER No. 52-2	TRENCH	2" PVC	
C232	FEEDER BREAKER No. 52-2	TRENCH	2" PVC	
C233	FEEDER BREAKER No. 52-2	TRENCH	2" PVC	NOTE 23
C234	FEEDER BREAKER No. 52-2	TRENCH	2" PVC	
C235	FEEDER BREAKER No. 52-2	TRENCH	2" PVC	
C241	FEEDER BREAKER No. 52-3	TRENCH	2" PVC	
C242	FEEDER BREAKER No. 52-3	TRENCH	2" PVC	
C243	FEEDER BREAKER No. 52-3	TRENCH	2" PVC	NOTE 23
C244	FEEDER BREAKER No. 52-3	TRENCH	2" PVC	
C245	FEEDER BREAKER No. 52-3	TRENCH	2" PVC	
C251	FEEDER BREAKER No. 52-4	TRENCH	2" PVC	
C252	FEEDER BREAKER No. 52-4	TRENCH	2" PVC	
C253	FEEDER BREAKER No. 52-4	TRENCH	2" PVC	NOTE 23
C254	FEEDER BREAKER No. 52-4	TRENCH	2" PVC	
C255	FEEDER BREAKER No. 52-4	TRENCH	2" PVC	
C261	FEEDER BREAKER No. 52-5	TRENCH	2" PVC	
C262	FEEDER BREAKER No. 52-5	TRENCH	2" PVC	
C263	FEEDER BREAKER No. 52-5	TRENCH	2" PVC	NOTE 23

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Conduit Schedule

CONDUIT NO.	CONDUIT SCHEDULE		CONDUIT SIZE/TYPE	REMARKS
	FROM	TO		
C264	FEEDER BREAKER No. 52-5	TRENCH	2" PVC	
C265	FEEDER BREAKER No. 52-5	TRENCH	2" PVC	
C271	FEEDER BREAKER No. 52-6	TRENCH	2" PVC	
C272	FEEDER BREAKER No. 52-6	TRENCH	2" PVC	
C273	FEEDER BREAKER No. 52-6	TRENCH	2" PVC	NOTE 23
C274	FEEDER BREAKER No. 52-6	TRENCH	2" PVC	
C275	FEEDER BREAKER No. 52-6	TRENCH	2" PVC	
C290	15kV BUS NO. 1 VT JUNCTION BOX	VOLTAGE TRANSFORMERS	1" PVC	ABOVE GROUND
C291	15kV BUS NO. 1 VT JUNCTION BOX	TRENCH	2" PVC	
C292	15kV BUS NO. 1 VT JUNCTION BOX	TRENCH	2" PVC	
C293	15kV BUS NO. 1 VT JUNCTION BOX	TRENCH	2" PVC	
C294	15kV BUS NO. 1 VT JUNCTION BOX	TRENCH	2" PVC	
C300	STATION SERVICE TRANSF. No.1	STA. SERVICE METER BODY	2" PVC	ABOVE GROUND
C301	STA. SERVICE METER BODY	STA. SERVICE NO.1 DISCONNECT	2" PVC	ABOVE GROUND
C302	STA. SERVICE No.1 DISCONNECT	TRENCH	2" PVC	
C303				
C304	STATION SERIVCE FEED FROM STREET	TRENCH	2" PVC	
C341	YARD RECEPTACLE No. 1	TRENCH	1" PVC	
C342	YARD RECEPTACLE No. 2	TRENCH	1" PVC	
C343	YARD RECEPTACLE No. 3	TRENCH	1" PVC	
C344	YARD RECEPTACLE No. 4	TRENCH	1" PVC	
C345	SUMP PUMP NO. 1	TRENCH	2" PVC	
C346	SUMP PUMP NO. 1 CONTROL	TRENCH	1" PVC	
C347	SWITCH BOX #15,16	TRENCH	2" PVC	
C347A	SWITCH BOX #15,16	LIGHT #15,16	1" PVC	ABOVE GROUND
C348	SWITCH BOX #1,2	TRENCH	2" PVC	
C350	SWITCH BOX #1,2	LIGHT #1,2	1" PVC	ABOVE GROUND
C351	LIGHT JUNCTION #3,4	TRENCH	2" PVC	
C353	LIGHT JUNCTION #3,4	LIGHT #3,4	1" PVC	ABOVE GROUND
C354	LIGHT JUNCTION #5,6	TRENCH	2" PVC	
C355	LIGHT JUNCTION #5,6	LIGHT #5,6	1" PVC	ABOVE GROUND
C357	SWITCH BOX #7	TRENCH	2" PVC	
C358	SWITCH BOX #7	LIGHT #7	1" PVC	ABOVE GROUND
C359	SWITCH BOX #8,9	TRENCH	2" PVC	
C360	SWITCH BOX #8,9	LIGHT #8,9	1" PVC	ABOVE GROUND
C363	SWITCH BOX #10,11	TRENCH	2" PVC	
C364	SWITCH BOX #10,11	LIGHT #10,11	1" PVC	ABOVE GROUND
C366	SWITCH BOX #12,13	TRENCH	2" PVC	
C367	SWITCH BOX #12,13	LIGHT #12,13	1" PVC	ABOVE GROUND
C368	SWITCH BOX #14	TRENCH	2" PVC	
C369	SWITCH BOX #14	LIGHT #14	1" PVC	ABOVE GROUND

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Conduit Schedule

CONDUIT NO.	CONDUIT SCHEDULE		CONDUIT SIZE/TYPE	REMARKS
	FROM	TO		
C370	240VAC 30A, RECEPTACLE No. 5	TRENCH	2" PVC	
C371	240VAC 50A, RECEPTACLE No. 6	TRENCH	2" PVC	
C375	MOBILE SUBSTATION JUNCTION BOX	TRENCH	2" PVC	
C376	MOBILE SUBSTATION JUNCTION BOX	TRENCH	2" PVC	
C384	FLOOD LIGHT SWITCH BOX #1	TRENCH	2" PVC	
C385	FLOOD LIGHT SWITCH BOX #1	FLOOD LIGHT #1,#2	1" PVC	ABOVE GROUND
C386	FLOOD LIGHT SWITCH BOX #3	TRENCH	2" PVC	
C387	FLOOD LIGHT SWITCH BOX #3	FLOOD LIGHT #3	1" PVC	ABOVE GROUND
C401	SECRUITY CAMERA SYSTEM POLE	TRENCH	2" PVC	
C402	SECRUITY CAMERA SYSTEM POLE	SECRUITY CAMERA SYSTEM POLE	2" PVC	EXISTING
C403	SECRUITY CAMERA SYSTEM POLE	TRENCH	2" PVC	
C404	SECRUITY CAMERA SYSTEM POLE	SECRUITY CAMERA SYSTEM POLE	2" PVC	EXISTING
C405	SECRUITY CARD READER	TRENCH	2" PVC	

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Cable Schedule

CABLE NO.	CONDUIT NO.	FUNCTION	CABLE SCHEDULE		CABLE WIRE NO. & SIZE	REMARKS
			FROM	TO		
221	**C101**	SUMP PUMP #1 AC POWER	SUMP PUMP #1 AC IN (MANHOLE #1)	AC PANEL No. 2	4/C, #10	
222	**C102**	SUMP PUMP #2 AC POWER	SUMP PUMP #2 AC IN (MANHOLE #2)	AC PANEL No. 2	4/C, #10	
223	**C103**	SUMP PUMP #3 AC POWER	SUMP PUMP #3 AC IN (MANHOLE #3)	AC PANEL No. 2	4/C, #10	
232	**C300**	240VAC STA. SERVICE NO. 1	STA. SERVICE TRANSFORMER No. 1	METER BASE No. 1	3-1/C,#4/0	
232A	**C301**	240VAC STA. SERVICE NO. 1	METER BASE No. 1	STA. SERVICE No.1 DISCONNECT	3-1/C,#4/0	
233	**C302**	240VAC STA. SERVICE NO. 1	STA. SERVICE No.1 DISCONNECT	AUTO TRANSFER SWITCH	3-1/C,#4/0	
234A	**C105**	240VAC SUPPLY	OFFSITE STA. SERVICE DISCONNECT	AUTO TRANSFER SWITCH	3-1/C,#4/0	
235	N/A	240VAC SUPPLY DUCT	AUTO TRANSFER SWITCH	240VAC SPLICE IN DUCT	3-1/C,#4/0	NOTE 19
235	N/A	240VAC SUPPLY DUCT	AC PANEL No.1, MAIN	240VAC SPLICE IN DUCT	3-1/C,#4/0	NOTE 19
235	N/A	240VAC SUPPLY DUCT	AC PANEL No.2, MAIN	240VAC SPLICE IN DUCT	3-1/C,#4/0	NOTE 19
241	N/A	120VAC- BUILDING LIGHTS	AC PANEL No. 2	BUILDING LIGHTS	3-1/C, #12	NOTE 19
242	N/A	120VAC- BLDG EMERGENCY LIGHT	AC PANEL No. 2	BUILDING EMERGENCY LIGHTS	3-1/C, #12	NOTE 19
243	N/A	120VAC- BATTERY ROOM LIGHTS	AC PANEL No. 2	BATTERY ROOM LIGHTS	3-1/C, #12	NOTE 19
244	N/A	120VAC- BUILDING RECEPTACLES	AC PANEL No. 2	BUILDING RECEPTACLES No.2	3-1/C, #12	NOTE 19
245	N/A	120VAC- BUILDING RECEPTACLES	AC PANEL No. 2	BUILDING RECEPTACLES No.1	3-1/C, #12	NOTE 19
246	N/A	240VAC- BATTERY ROOM HEATER	AC PANEL No. 1	BATTERY ROOM HVAC	3-1/C, #12	NOTE 19
247	N/A	120VAC- BATTERY ROOM FAN	AC PANEL No. 2	BATTERY ROOM FAN	3-1/C, #12	NOTE 19
248	N/A	240VAC- BUILDING HVAC	AC PANEL No. 1	BUILDING HVAC	3-1/C, #8	NOTE 19
249	N/A	120VAC- SWITCHBOARD No. S1	AC PANEL No. 1	SWBD #1	4/C, #10	NOTE 19
250	N/A	120VAC- SWITCHBOARD No. S2	AC PANEL No. 1	SWBD #2	4/C, #10	NOTE 19
251	N/A	120VAC- BLDG FLOOD LIGHTS	AC PANEL No. 2	BUILDING FLOOD LIGHTS	4/C, #10	NOTE 19
252	N/A	120VAC- BLDG EMERGENCY LIGHT	AC PANEL No. 2	BATTERY ROOM EMERGENCY LTS	3-1/C, #12	NOTE 19
265	**C345**	120VAC- SUMP PUMP AC POWER	AC PANEL No. 1	SUMP PUMP No. 1 AC IN	4/C,#10	NOTE 14
266	**C345**	120VAC- SUMP CONTROLLER AC	AC PANEL No. 1	SUMP PUMP No. 1 CONTROLLER AC IN	4/C,#10	NOTE 14
287	N/A	120VAC- SWITCHBOARD No. S3	AC PANEL No. 1	SWBD #3	4/C, #10	NOTE 14
288	N/A	120VAC- SWITCHBOARD No. S4	AC PANEL No. 1	SWBD #4	4/C, #10	NOTE 19
301	N/A	120VAC- BATTERY CHARGER	AC PANEL No. 1	BATTERY CHARGER No. 1 AC INPUT	4/C, #10	NOTE 19
302	N/A	48VDC SUPPLY	BATTERY CHARGER No. 1 DC OUT	BATTERY BANK No. 1 TERMINALS	2/C, #10	NOTE 19
303	N/A	48VDC SUPPLY	BATTERY BANK No. 1 TERMINALS	DC PANEL No.1	2-1/C, #4/0	NOTE 19
304	N/A	48VDC SUPPLY	DC PANEL No.1	SWBD #1	2/C, #10	NOTE 15
305	N/A	48VDC SUPPLY	DC PANEL No.1	SWBD #2	2/C, #10	NOTE 15
306	N/A	BATTERY CHARGER ALARMS	BATTERY CHARGER	SWBD #4	4/C, #16	NOTE 19, 17
308	N/A	48VDC SUPPLY	DC PANEL No.1	SWBD #3	2/C, #10	NOTE 15
309	N/A	48VDC SUPPLY	DC PANEL No.1	SWBD #4	2/C, #10	NOTE 15
340	TRAY	STATION SERV. TRANSFER ALARM	STA. SERVICE TRANSFER SWITCH	SWBD #4	4/C, #16	NOTE 19
341	TRAY	DOOR ALARMS	DOOR SWITCH JUNCTION BOX	SWBD #4	4/C, #16	NOTE 19
351	**C180**	PWC-F SITE1, UPSTREAM	OUTSIDE FIBER JUNCTION BOX	SWBD #4, PATCH PANEL No. PP1	SM OSP CABLE	NOTE 20,23,24
352	**C180**	PWC-F SITE2, DOWNSTREAM	OUTSIDE FIBER JUNCTION BOX	SWBD #4, PATCH PANEL No. PP1	SM OSP CABLE	NOTE 20,23,24
1100	**C201**	AC POWER SUPPLY	69KV LINE BKR 52-T1	AC PANEL No.1	4/C #10	NOTE 14
1101	**C201**	DC POWER SUPPLY	69KV LINE BKR 52-T1	DC PANEL No.1	2- 1/C #6	NOTE 15
1103	**C202**	CONTROL	69KV LINE BKR 52-T1	TERMINATION CABINET	12/C #10	NOTE 17

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Cable Schedule

CABLE NO.	CONDUIT NO.	FUNCTION	CABLE SCHEDULE		CABLE WIRE NO. & SIZE	REMARKS
			FROM	TO		
1103A	N/A	CONTROL	TERMINATION CABINET	SWBD #1	12/C #10	NOTE 17
1104	**C203**	LINE PRI RELAY CT'S	69KV LINE BKR 52-T1	TERMINATION CABINET	4/C #10	NOTE 16
1104A	N/A	LINE PRI RELAY CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1105	**C203**	CONTROL/ INDICATION	69KV LINE BKR 52-T1	TERMINATION CABINET	12/C #10	NOTE 17
1105A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #1	12/C #10	NOTE 17
1106	**C204**	INDICATION	69KV LINE BKR 52-T1	TERMINATION CABINET	12/C #14	NOTE 17
1106A	N/A	INDICATION	TERMINATION CABINET	SWBD #1	12/C #14	NOTE 17
1107	**C204**	INDICATION	69KV LINE BKR 52-T1	TERMINATION CABINET	12/C #14	NOTE 17
1107A	N/A	INDICATION	TERMINATION CABINET	SWBD #1	12/C #14	NOTE 17
	C205	SPARE	69KV LINE BKR 52-T1	TRENCH		
1120	**C211**	AC POWER SUPPLY	No.1 TRANSFORMER	AC PANEL No.1	3/C, #6	NOTE 14
1121	**C211**	DC POWER SUPPLY	No.1 TRANSFORMER	DC PANEL No.1	4/C #10	NOTE 15
1122	**C212**	L.V. BANK RELAY CT'S	No.1 TRANSFORMER	TERMINATION CABINET	4/C #10	NOTE 16
1122A	N/A	L.V. BANK RELAY CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1123	**C212**	L.V. METERING CT's	No.1 TRANSFORMER	TERMINATION CABINET	4/C #10	NOTE 16
1123A	N/A	L.V. METERING CT's	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1124	**C213**	H.V. BANK RELAY CT'S	No.1 TRANSFORMER	TERMINATION CABINET	4/C #10	NOTE 16
1124A	N/A	H.V. BANK RELAY CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1125	**C213**	X0 RELAY CT	No.1 TRANSFORMER	TERMINATION CABINET	2/C #10	NOTE 16
1125A	N/A	X0 RELAY CT	TERMINATION CABINET	SWBD #1	2/C #10	NOTE 16
1126	**C214**	SPARE	No.1 TRANSFORMER	TERMINATION CABINET	12/C #14	NOTE 17
1126A	N/A	SPARE	TERMINATION CABINET	SWBD #1	12/C #14	NOTE 17
1127	**C214**	LTC VOLTAGE REDUCTION	No.1 TRANSFORMER	TERMINATION CABINET	12/C #10	NOTE 17
1127A	N/A	LTC VOLTAGE REDUCTION	TERMINATION CABINET	SWBD #1	12/C #10	NOTE 17
1128	**C215,C293**	LTC CONTROL POTENTIAL	No.1 TRANSFORMER	15KV BUS No. 1 VT JCT BOX	4/C #10	NOTE 16
1129	**C215**	CONTROL/ INDICATION	No.1 TRANSFORMER	TERMINATION CABINET	12/C, #14	NOTE 17
1129A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #1	12/C, #14	NOTE 17
1130	**C216**	SCADA, ETM2, ATC2	No.1 TRANSFORMER	SWBD #4, PP3, A1-A6	FIBER-PT	NOTE 20,22,23
1131	**C216**	TRIP	No.1 TRANSFORMER	TERMINATION CABINET	12/C, #10	NOTE 17
1131A	N/A	TRIP	TERMINATION CABINET	SWBD #1	12/C, #10	NOTE 17
	C217	SPARE	No.1 TRANSFORMER	TRENCH		
1141	**C221**	AC POWER SUPPLY	FEEDER BREAKER No. 52-F1	AC PANEL No.1	4/C #10	NOTE 14
1142	**C221**	DC POWER SUPPLY	FEEDER BREAKER No. 52-F1	DC PANEL No.1	2- 1/C #6	NOTE 15
1143	**C222**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F1	TERMINATION CABINET	12/C #10	NOTE 17
1143A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #2	12/C #10	NOTE 17
1144	**C222,C291**	RELAY/ METERING POTENTIAL	FEEDER BREAKER No. 52-F1	15KV BUS No. 1 VT JCT BOX	4/C #10	NOTE 16
1145	**C223**	SCADA, PM	FEEDER BREAKER No. 52-F1	SWBD #4, PP3, B1-B6	FIBER-PT	NOTE 20,22,23
1146	**C223**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F1	TERMINATION CABINET	12/C #14	NOTE 17
1146A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #2	12/C #14	NOTE 17
1147	**C224**	DIFFERENTIAL CT'S	FEEDER BREAKER No. 52-F1	TERMINATION CABINET	4/C #10	NOTE 16
1147A	N/A	DIFFERENTIAL CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1148	**C224**	OVERCURRENT CT'S	FEEDER BREAKER No. 52-F1	TERMINATION CABINET	4/C #10	NOTE 16
1148A	N/A	OVERCURRENT CT'S	TERMINATION CABINET	SWBD #2	4/C #10	NOTE 16
	C225	SPARE	FEEDER BREAKER No. 52-F1	TRENCH		
1151	**C231**	AC POWER SUPPLY	FEEDER BREAKER No. 52-F2	AC PANEL No.1	4/C #10	NOTE 14
1152	**C231**	DC POWER SUPPLY	FEEDER BREAKER No. 52-F2	DC PANEL No.1	2- 1/C #6	NOTE 15
1153	**C232**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F2	TERMINATION CABINET	12/C #10	NOTE 17
1153A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #3	12/C #10	NOTE 17
1154	**C232,C291**	RELAY/ METERING POTENTIAL	FEEDER BREAKER No. 52-F2	15KV BUS No. 1 VT JCT BOX	4/C #10	NOTE 16
1155	**C233**	SCADA, PM	FEEDER BREAKER No. 52-F2	SWBD #4, PP3, B7-B12	FIBER-PT	NOTE 20,22,23
1156	**C233**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F2	TERMINATION CABINET	12/C #14	NOTE 17
1156A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #3	12/C #14	NOTE 17
1157	**C234**	DIFFERENTIAL CT'S	FEEDER BREAKER No. 52-F2	TERMINATION CABINET	4/C #10	NOTE 16
1157A	N/A	DIFFERENTIAL CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1158	**C234**	OVERCURRENT CT'S	FEEDER BREAKER No. 52-F2	TERMINATION CABINET	4/C #10	NOTE 16
1158A	N/A	OVERCURRENT CT'S	TERMINATION CABINET	SWBD #3	4/C #10	NOTE 16
	C235	SPARE	FEEDER BREAKER No. 52-F2	TRENCH		
1161	**C241**	AC POWER SUPPLY	FEEDER BREAKER No. 52-F3	AC PANEL No.1	4/C #10	NOTE 14
1162	**C241**	DC POWER SUPPLY	FEEDER BREAKER No. 52-F3	DC PANEL No.1	2- 1/C #6	NOTE 15
1163	**C242**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F3	TERMINATION CABINET	12/C #10	NOTE 17
1163A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #2	12/C #10	NOTE 17

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Cable Schedule

CABLE NO.	CONDUIT NO.	FUNCTION	CABLE SCHEDULE		CABLE WIRE NO. & SIZE	REMARKS
			FROM	TO		
1164	**C242,C291**	RELAY/ METERING POTENTIAL	FEEDER BREAKER No. 52-F3	15KV BUS No. 1 VT JCT BOX	4/C #10	NOTE 16
1165	**C243**	SCADA, PM	FEEDER BREAKER No. 52-F3	SWBD #4, PP3,C1-C6	FIBER-PT	NOTE 20,22,23
1166	**C243**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F3	TERMINATION CABINET	12/C #14	NOTE 17
1166A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #2	12/C #14	NOTE 17
1167	**C244**	DIFFERENTIAL CT'S	FEEDER BREAKER No. 52-F3	TERMINATION CABINET	4/C #10	NOTE 16
1167A	N/A	DIFFERENTIAL CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1168	**C244**	OVERCURRENT CT'S	FEEDER BREAKER No. 52-F3	TERMINATION CABINET	4/C #10	NOTE 16
1168A	N/A	OVERCURRENT CT'S	TERMINATION CABINET	SWBD #2	4/C #10	NOTE 16
	C245	SPARE	FEEDER BREAKER No. 52-F3	TRENCH		
1171	**C251**	AC POWER SUPPLY	FEEDER BREAKER No. 52-F4	AC PANEL No.1	4/C #10	NOTE 14
1172	**C251**	DC POWER SUPPLY	FEEDER BREAKER No. 52-F4	DC PANEL No.1	2- 1/C #6	NOTE 15
1173	**C252**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F4	TERMINATION CABINET	12/C #10	NOTE 17
1173A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #3	12/C #10	NOTE 17
1174	**C252,C292**	RELAY/ METERING POTENTIAL	FEEDER BREAKER No. 52-F4	15KV BUS No. 1 VT JCT BOX	4/C #10	NOTE 16
1175	**C253**	SCADA, PM	FEEDER BREAKER No. 52-F4	SWBD #4, PP3, C7-C12	FIBER-PT	NOTE 20,22,23
1176	**C253**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F4	TERMINATION CABINET	12/C #14	NOTE 17
1176A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #3	12/C #14	NOTE 17
1177	**C254**	DIFFERENTIAL CT'S	FEEDER BREAKER No. 52-F4	TERMINATION CABINET	4/C #10	NOTE 16
1177A	N/A	DIFFERENTIAL CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1178	**C254**	OVERCURRENT CT'S	FEEDER BREAKER No. 52-F4	TERMINATION CABINET	4/C #10	NOTE 16
1178A	N/A	OVERCURRENT CT'S	TERMINATION CABINET	SWBD #3	4/C #10	NOTE 16
	C255	SPARE	FEEDER BREAKER No. 52-F4	TRENCH		
1181	**C261**	AC POWER SUPPLY	FEEDER BREAKER No. 52-F5	AC PANEL No.1	4/C #10	NOTE 14
1182	**C261**	DC POWER SUPPLY	FEEDER BREAKER No. 52-F5	DC PANEL No.1	2- 1/C #6	NOTE 15
1183	**C262**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F5	TERMINATION CABINET	12/C #10	NOTE 17
1183A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #2	12/C #10	NOTE 17
1184	**C262,C292**	RELAY/ METERING POTENTIAL	FEEDER BREAKER No. 52-F5	15KV BUS No. 1 VT JCT BOX	4/C #10	NOTE 16
1185	**C263**	SCADA, PM	FEEDER BREAKER No. 52-F5	SWBD #4, PP3, D1-D6	FIBER-PT	NOTE 20,22,23
1186	**C263**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F5	TERMINATION CABINET	12/C #14	NOTE 17
1186A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #2	12/C #14	NOTE 17
1187	**C264**	DIFFERENTIAL CT'S	FEEDER BREAKER No. 52-F5	TERMINATION CABINET	4/C #10	NOTE 16
1187A	N/A	DIFFERENTIAL CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1188	**C264**	OVERCURRENT CT'S	FEEDER BREAKER No. 52-F5	TERMINATION CABINET	4/C #10	NOTE 16
1188A	N/A	OVERCURRENT CT'S	TERMINATION CABINET	SWBD #2	4/C #10	NOTE 16
	C265	SPARE	FEEDER BREAKER No. 52-F5	TRENCH		
1191	**C271**	AC POWER SUPPLY	FEEDER BREAKER No. 52-F6	AC PANEL No.1	4/C #10	NOTE 14
1192	**C271**	DC POWER SUPPLY	FEEDER BREAKER No. 52-F6	DC PANEL No.1	2- 1/C #6	NOTE 15
1193	**C272**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F6	TERMINATION CABINET	12/C #10	NOTE 17
1193A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #3	12/C #10	NOTE 17
1194	**C272,C292**	RELAY/ METERING POTENTIAL	FEEDER BREAKER No. 52-F6	15KV BUS No. 1 VT JCT BOX	4/C #10	NOTE 16
1195	**C273**	SCADA, PM	FEEDER BREAKER No. 52-F6	SWBD #4, PP3, D7-D12	FIBER-PT	NOTE 20,22,23
1196	**C273**	CONTROL/ INDICATION	FEEDER BREAKER No. 52-F6	TERMINATION CABINET	12/C #14	NOTE 17
1196A	N/A	CONTROL/ INDICATION	TERMINATION CABINET	SWBD #3	12/C #14	NOTE 17
1197	**C274**	DIFFERENTIAL CT'S	FEEDER BREAKER No. 52-F6	TERMINATION CABINET	4/C #10	NOTE 16
1197A	N/A	DIFFERENTIAL CT'S	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1198	**C274**	OVERCURRENT CT'S	FEEDER BREAKER No. 52-F6	TERMINATION CABINET	4/C #10	NOTE 16
1198A	N/A	OVERCURRENT CT'S	TERMINATION CABINET	SWBD #3	4/C #10	NOTE 16
	C275	SPARE	FEEDER BREAKER No. 52-F6	TRENCH		
1210	**C290**	15KV BUS POTENTIAL FROM VT	15KV BUS No. 1 VT JCT BOX	15KV BUS VT- VA, VB, VC, VN	4/C #10	NOTE 16
1211	**C293**	15KV BUS POTENTIAL TO DEVICES	15KV BUS No. 1 VT JCT BOX	TERMINATION CABINET	4/C #10	NOTE 16
1211A	N/A	15KV BUS POTENTIAL TO DEVICES	TERMINATION CABINET	SWBD #1	4/C #10	NOTE 16
1212	**C293**	15KV BUS POTENTIAL TO DEVICES	15KV BUS No. 1 VT JCT BOX	TERMINATION CABINET	4/C #10	NOTE 16
1212A	N/A	15KV BUS POTENTIAL TO DEVICES	TERMINATION CABINET	SWBD #2	4/C #10	NOTE 16
1213	**C293**	15KV BUS POTENTIAL TO DEVICES	15KV BUS No. 1 VT JCT BOX	TERMINATION CABINET	4/C #10	NOTE 16

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CABLE NO.	CONDUIT NO.	FUNCTION	CABLE SCHEDULE		CABLE WIRE NO. & SIZE	REMARKS
			FROM	TO		
1213A	N/A	15KV BUS POTENTIAL TO DEVICES	TERMINATION CABINET	SWBD #3	4/C #10	NOTE 16
1221	**C346**	SUMP PUMP NO. 1 ALARMS (OIL CONTAINMENT)	SUMP PUMP No. 1 ALARMS OUT	TERMINATION CABINET	4/C, #16	
1221A	N/A	SUMP PUMP NO. 1 ALARMS (OIL CONTAINMENT)	TERMINATION CABINET	SWBD #4	4/C, #16	
1261	**C341**	120VAC- YARD RECEPTACLE No.1	AC PANEL No. 2	YARD RECEPTACLE No. 1	4/C,#10	NOTE 14
1262	**C342**	120VAC- YARD RECEPTACLE No.2	AC PANEL No. 2	YARD RECEPTACLE No. 2	4/C,#10	NOTE 14
1263	**C343**	120VAC- YARD RECEPTACLE No.3	AC PANEL No. 2	YARD RECEPTACLE No. 3	4/C,#10	NOTE 14
1264	**C344**	120VAC- YARD RECEPTACLE No.4	AC PANEL No. 2	YARD RECEPTACLE No. 4	4/C,#10	NOTE 14
1267A	**C386**	120VAC- FLOOD LIGHTS #3	AC PANEL No. 1	FLOOD LIGHT SWITCH BOX No. 3	4/C,#10	NOTE 14
1267B	**C386**	120VAC- FLOOD LIGHTS #3	FLOOD LIGHT SWITCH BOX No. 3	FLOOD LIGHT No. 3	4/C,#10	NOTE 14
1267C	**C384**	120VAC- FLOOD LIGHTS #1,2	FLOOD LIGHT SWITCH BOX No. 3	FLOOD LIGHT SWITCH BOX No. 1,2	4/C,#10	NOTE 14
1267D	**C385**	120VAC- FLOOD LIGHTS #1,2	FLOOD LIGHT SWITCH BOX No. 1,2	FLOOD LIGHT No. 1,2	4/C,#10	NOTE 14
1268	**C348**	120VAC- BAY 1- LIGHTS #1,2	AC PANEL No. 1	SWITCH BOX No. 1,2	4/C,#10	NOTE 14
1269	**C350**	120VAC- BAY 1- LIGHTS #1,2	SWITCH BOX No. 1,2	LIGHT No. 1,2	4/C,#10	NOTE 14
1270	**C348, C351**	120VAC- BAY 1- LIGHTS #3,4	SWITCH BOX No. 1,2	SWITCH BOX No. 3,4	4/C,#10	NOTE 14
1271	**C353**	120VAC- BAY 1- LIGHTS #3,4	SWITCH BOX No. 3,4	LIGHT No. 3,4	4/C,#10	NOTE 14
1272	**C351,C354**	120VAC- BAY 1- LIGHTS #5,6	SWITCH BOX No. 3,4	SWITCH BOX No. 5,6	4/C,#10	NOTE 14
1273	**C355**	120VAC- BAY 1- LIGHTS #5,6	SWITCH BOX No. 5,6	LIGHTS No. 5,6	4/C,#10	NOTE 14
1274	**C354,C357**	120VAC- BAY 2- LIGHT #7	SWITCH BOX No. 5,6	SWITCH BOX No. 7	4/C,#10	NOTE 14
1275	**C358**	120VAC- BAY 2- LIGHT #7	SWITCH BOX No. 7	LIGHT No. 7	4/C,#10	NOTE 14
1276	**C359**	120VAC- BAY 1- LIGHT #8-9	AC PANEL No. 1	SWITCH BOX No. 8,9	4/C,#10	NOTE 14
1277	**C360**	120VAC- BAY 1- LIGHT #8-9	SWITCH BOX No. 8,9	LIGHT No. 8,9	4/C,#10	NOTE 14
1278	**C359,C363**	120VAC- BAY 2- LIGHTS #10,11	SWITCH BOX No. 8,9	SWITCH BOX No. 10,11	4/C,#10	NOTE 14
1279	**C364**	120VAC- BAY 2- LIGHTS #10,11	SWITCH BOX No. 10,11	LIGHT No. 10,11	4/C,#10	NOTE 14
1280	**C363,C366**	120VAC- BAY 3- LIGHTS #12,13	SWITCH BOX No. 10,11	SWITCH BOX No. 12,13	4/C,#10	NOTE 14
1281	**C367**	120VAC- BAY 3- LIGHTS #12,13	SWITCH BOX No. 12,13	LIGHTS No. 12,13	4/C,#10	NOTE 14
1282	**C366,C368**	120VAC -BAY 3- LIGHT #14	SWITCH BOX No. 12,13	SWITCH BOX No. 14	4/C,#10	NOTE 14
1283	**C369**	120VAC- BAY 3- LIGHT #14	SWITCH BOX No. 14	LIGHT No. 14	4/C,#10	NOTE 14
1284	**C347, C347A**	120VAC- HIGH SIDE LIGHTS #15,16	AC PANEL No. 1	LIGHTS No. 15,16	4/C,#10	NOTE 14
1285	**C370**	240VAC SUPPLY	AC PANEL No. 2	240VAC 30A, RECEPTACLE No. 5	4/C, #10	NOTE 14
1286	**C371**	240VAC SUPPLY	AC PANEL No. 2	240VAC 50A, RECEPTACLE No. 6	4/C, #8	NOTE 14
1289	**C376**	MOBILE SUB, SCADA	MOBILE SUBSTATION J-BOX	SWBD #4, PP3, A11-A12	FIBER-PT	NOTE 20,22,23
1290	**C375**	MOBILE SUB, CONTROL & ALARM	MOBILE SUBSTATION J-BOX	TERMINATION CABINET	12/C, #10	NOTE 17
1290A	N/A	MOBILE SUB, CONTROL & ALARM	TERMINATION CABINET	SWBD #1	12/C, #10	NOTE 17
1291	**C375**	DC POWER SUPPLY	MOBILE SUBSTATION J-BOX	DC PANEL No.1	4/C #10	NOTE 15
1310	N/A	CNTL/ IND S1 TO S2	SWBD #1	SWBD #2	12/C #14	NOTE 17
1311	N/A	CNTL/ IND S1 TO S3	SWBD #1	SWBD #3	12/C #14	NOTE 17
1312	N/A	CNTL/ IND S1 TO S4	SWBD #1	SWBD #4	12/C #14	NOTE 17
1313	N/A	CNTL/ IND S2 TO S4	SWBD #2	SWBD #4	12/C #14	NOTE 17
1314	N/A	CNTL/ IND S3 TO S4	SWBD #3	SWBD #4	12/C #14	NOTE 17

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CABLE NO.	CONDUIT NO.	FUNCTION	CABLE SCHEDULE		CABLE WIRE NO. & SIZE	REMARKS
			FROM	TO		
J24	N/A	IRIG TO 351S, 2,4,6	SWBD #4-CLK, IRIG T05	SWBD #2- F2-2, TEE	C953-25	NOTE 13
J25	N/A	IRIG TO 351S, 2,4,6	SWBD #2- F2-2, TEE	SWBD #2- F4-2, TEE	C953-6	NOTE 13
J26	N/A	IRIG TO 351S, 2,4,6	SWBD #2- F4-2, TEE	SWBD #2- F6-2, TEE	C953-6	NOTE 13
J27	N/A	IRIG TO 351S, 1,3,5	SWBD #2- F6-2, TEE	SWBD #3- F1-2, TEE	C953-15	NOTE 13
J28	N/A	IRIG TO 351S, 1,3,5	SWBD #3- F1-2, TEE	SWBD #3- F3-2, TEE	C953-6	NOTE 13
J29	N/A	IRIG TO 351S, 1,3,5	SWBD #3- F3-2, TEE	SWBD #3- F5-2	C953-6	NOTE 13
J30	N/A	IRIG TO T1P, T1BU, T1M	SWBD #4-CLK, IRIG T06	SWBD #1- T1-P TEE	C953-25	NOTE 13
J31	N/A	IRIG TO T1P TO T1BU	SWBD #1- T1-P TEE	SWBD #1- T1-BU TEE	C953-6	NOTE 13
J32	N/A	IRIG TO T1BU TO T1M	SWBD #1- T1-BU TEE	SWBD #1- T1-M IRIG IN	C953-6	NOTE 13
J33		CLK ANTENNA IN	SEL ANTENNA	SEL SURGE PROTECTOR	C961-025	NOTE 25
J34	TRAY	CLK ANTENNA IN	SEL SURGE PROTECTOR	SCADA SWBD #4- CLK, ANT	C961-050	NOTE 25
J35	N/A	IRIG TO RTAC	SWBD #4-CLK, IRIG T08	SCADA SWBD #4- RTAC, IRIG-B IN	C953-6	NOTE 13
J36	N/A	IRIG TO ICON1	SWBD #4-CLK, IRIG T07	SCADA SWBD #4- ICON1, IRIG-B	C953-6	NOTE 13
J37	N/A	IRIG TO DPAC	SWBD #4-CLK, IRIG T03	SCADA SWBD #4-DPAC, IRIG-B IN	C953-6	NOTE 13
J38	N/A	IRIG TO GW1	SWBD #4-CLK, IRIG T04	SCADA SWBD #4- GW1, IRIG-B IN	C953-6	NOTE 13
J41	N/A	FIBER JUMPER, PWC-F SITE1, UP	SWBD #4-ICON1, #1-AB	SWBD #4-PP1-A1/A2, SITE1	ZLC3S	NOTE 13
J42	N/A	FIBER JUMPER, PWC-F SITE2, DOWN	SWBD #4-ICON1, #2-AB	SWBD #4-PP1-B1/B2, SITE2	ZLC3S	NOTE 13
J43	N/A	SCADA, ETSW1 TO RTAC	SWBD #4-ETSW1, PORT8	SWBD #4-RTAC, ETH1	CA605C-008	NOTE 13
J44	N/A	SITE COMM, ICON1 TO GW1	SWBD #4-ICON1, #4-5	SWBD #4-GW1, ETH1	CA605C-008	NOTE 13
J45	N/A	SCADA, BATTERY CHARGER NO. 1	BATTERY CHARGER No. 1	SWBD #4, RTAC, PCI2-2	C605A-36	NOTE 13
J47	N/A	SCADA, TRANSFER SWITCH- 485	AUTOMATIC TRANSFER SWITCH	SWBD #4, RTAC, PCI2-4	C605A-50	NOTE 13
J48	N/A	SITE COMM, GW1 TO SWITCH	SWBD #4-ETSW3, PORT7	SWBD #4-GW1, ETH2	CA605C-008	NOTE 13
J49	N/A	NTP TIME, SYSTEM (ETHERNET)	SWBD #4-ETSW2, PORT 7	SWBD #4-CLK, ETH1	CA605C-004	NOTE 13
J50	N/A	SWITCH NETWORK (ETHERNET)	SWBD #4-ETSW1, PORT 7	SWBD #4-ETSW3, PORT 7	CA605C-008	NOTE 13
J51	N/A	SCADA, DPAC (ETHERNET)	SWBD #4-ETSW1, PORT 6	SWBD #4-DPAC-ETH1	CA605C-008	NOTE 13
J52	N/A	SWITCH NETWORK (ETHERNET)	SWBD #4-ETSW1, PORT 5	SWBD #4-ETSW2, PORT 5	CA605C-004	NOTE 13
J103	N/A	SCADA, IO_F1_2	SWBD #4, ETSW1, 19	SWBD #4, PP3, B3B4	ZLC2M	NOTE 13,19
J104	N/A	SCADA, IO_F2_2	SWBD #4, ETSW1, 20	SWBD #4, PP3, B9B10	ZLC2M	NOTE 13,19
J105	N/A	SCADA, IO_F3_2	SWBD #4, ETSW1, 21	SWBD #4, PP3, C3C4	ZLC2M	NOTE 13,19
J106	N/A	SCADA, IO_F4_2	SWBD #4, ETSW1, 22	SWBD #4, PP3, C9C10	ZLC2M	NOTE 13,19
J107	N/A	SCADA, IO_F5_2	SWBD #4, ETSW1, 23	SWBD #4, PP3, D3D4	ZLC2M	NOTE 13,19
J108	N/A	SCADA, IO_F6_2	SWBD #4, ETSW1, 24	SWBD #4, PP3, D9D10	ZLC2M	NOTE 13,19
J123	N/A	SCADA, 2411 BREAKER No. 52F1_2	52F1_2 PATCH PANEL (SPH01P)	IO_F1_2-PORT 1A	ZLC3M	NOTE 13,19
J124	N/A	SCADA, 2411 BREAKER No. 52F2_2	52F2_2 PATCH PANEL (SPH01P)	IO_F2_2-PORT 1A	ZLC3M	NOTE 13,19
J125	N/A	SCADA, 2411 BREAKER No. 52F3_2	52F3_2 PATCH PANEL (SPH01P)	IO_F3_2-PORT 1A	ZLC3M	NOTE 13,19
J126	N/A	SCADA, 2411 BREAKER No. 52F4_2	52F4_2 PATCH PANEL (SPH01P)	IO_F4_2-PORT 1A	ZLC3M	NOTE 13,19
J127	N/A	SCADA, 2411 BREAKER No. 52F5_2	52F5_2 PATCH PANEL (SPH01P)	IO_F5_2-PORT 1A	ZLC3M	NOTE 13,19
J128	N/A	SCADA, 2411 BREAKER No. 52F6_2	52F6_2 PATCH PANEL (SPH01P)	IO_F6_2-PORT 1A	ZLC3M	NOTE 13,19
J201	N/A	SCADA, ETM1_2	SWBD #4, ETSW1, 9	SWBD #4, PP3, A1A2	ZLC2M	NOTE 13,19
J202	N/A	SCADA, LTC1_2	SWBD #4, ETSW1, 10	SWBD #4, PP3, A3A4	ZLC2M	NOTE 13,19
J203	N/A	SCADA, PMF1_2	SWBD #4, ETSW1, 11	SWBD #4, PP3, B1B2	ZLC2M	NOTE 13,19
J204	N/A	SCADA, PMF2_2	SWBD #4, ETSW1, 12	SWBD #4, PP3, B7B8	ZLC2M	NOTE 13,19
J205	N/A	SCADA, PMF3_2	SWBD #4, ETSW1, 13	SWBD #4, PP3, C1C2	ZLC2M	NOTE 13,19
J206	N/A	SCADA, PMF4_2	SWBD #4, ETSW1, 14	SWBD #4, PP3, C7C8	ZLC2M	NOTE 13,19

DRAWING: 12502C3

Cable Schedule

CABLE NO.	CONDUIT NO.	FUNCTION	CABLE SCHEDULE		CABLE WIRE NO. & SIZE	REMARKS
			FROM	TO		
J207	N/A	SCADA, PMF5_2	SWBD #4, ETSW1, 15	SWBD #4, PP3, D1D2	ZLC2M	NOTE 13,19
J208	N/A	SCADA, PMF6_2	SWBD #4, ETSW1, 16	SWBD #4, PP3, D7D8	ZLC2M	NOTE 13,19
J209	N/A	SCADA, MOBILE	SWBD #4, ETSW1, 18	SWBD #4, PP3, A11A12	ZLC2M	NOTE 13,19
J211	N/A	SCADA, T1P	SWBD #4, ETSW2, 6	SWBD #1, T1P, PORT5	CA605C-19	NOTE 13,19
J212	N/A	SCADA, T1BU	SWBD #4, ETSW2, 9	SWBD #1, T1BU, PORT5	CA605C-19	NOTE 13,19
J213	N/A	SCADA, T1PM	SWBD #4, ETSW2, 10	SWBD #1, T1PM, PORT1	CA605C-19	NOTE 13,19
J214	N/A	SCADA, RELAY 52-1_2	SWBD #4, ETSW2, 11	SWBD #2, 351S RELAY PORT5	CA605C-19	NOTE 13,19
J215	N/A	SCADA, RELAY 52-2_2	SWBD #4, ETSW2, 12	SWBD #3, 351S RELAY PORT5	CA605C-19	NOTE 13,19
J216	N/A	SCADA, RELAY 52-3_2	SWBD #4, ETSW2, 13	SWBD #2, 351S RELAY PORT5	CA605C-19	NOTE 13,19
J217	N/A	SCADA, RELAY 52-4_2	SWBD #4, ETSW2, 14	SWBD #3, 351S RELAY PORT5	CA605C-19	NOTE 13,19
J218	N/A	SCADA, RELAY 52-5_2	SWBD #4, ETSW2, 15	SWBD #2, 351S RELAY PORT5	CA605C-19	NOTE 13,19
J219	N/A	SCADA, RELAY 52-6_2	SWBD #4, ETSW2, 16	SWBD #3, 351S RELAY PORT5	CA605C-19	NOTE 13,19
J221	N/A	SCADA, TRANSFORMER T1 ETM	T1 PATCH PANEL (SPH01P)	ETM1_1,SEL-2414, PORT 5A	ZLC3M	NOTE 13,19
J222	N/A	SCADA, TRANSFORMER T1 LTC	T1 PATCH PANEL (SPH01P)	LTC1, PORT 5A	ZLC3M	NOTE 13,19
J223	N/A	SCADA, PM BREAKER No. 52F1_2	52F1_2 PATCH PANEL (SPH01P)	PMF1_2-PORT 5A	ZLC3M	NOTE 13,19
J224	N/A	SCADA, PM BREAKER No. 52F2_2	52F2_2 PATCH PANEL (SPH01P)	PMF2_2-PORT 5A	ZLC3M	NOTE 13,19
J225	N/A	SCADA, PM BREAKER No. 52F3_2	52F3_2 PATCH PANEL (SPH01P)	PMF3_2-PORT 5A	ZLC3M	NOTE 13,19
J226	N/A	SCADA, PM BREAKER No. 52F4_2	52F4_2 PATCH PANEL (SPH01P)	PMF4_2-PORT 5A	ZLC3M	NOTE 13,19
J227	N/A	SCADA, PM BREAKER No. 52F5_2	52F5_2 PATCH PANEL (SPH01P)	PMF5_2-PORT 5A	ZLC3M	NOTE 13,19
J228	N/A	SCADA, PM BREAKER No. 52F6_0	52F6_2 PATCH PANEL (SPH01P)	PMF6_2-PORT 5A	ZLC3M	NOTE 13,17
J229	N/A	SCADA, MOBILE XFRM	PATCH PANEL (SPH01P)	PMF5_2-PORT 5A	ZLC3M	NOTE 13,19
		END OF CABLE SCHEDULE	END OF CABLE SCHEDULE	END OF CABLE SCHEDULE		

DRAWING: 12502C3

FIBER PRE-TERM ORDER

DETERMINING PRE-TERMINATED ASSEMBLY LENGTHS FOR ORDER:

1) SEE PRINTS FOR DETAILED CONNECTIONS. VERIFY "**CABLE NUMBER**" AND "**TO DEVICE**".
2) WRITE IN "**B- MEASURED PATH LENGTH**" AS ACTUALLY MEASURED.
3) CALCULATE "**E- ORDER LENGTH**" AS SHOWN.
4) ORDER ALL CABLES TOGETHER, TO ENSURE BULK CABLE AVAILABLE IN NEEDED QUANTITY.
5) SPECIFY LENGTH NEEDED PER ITEM ORDERED.
6) SPECIFY CABLE NUMBER (CABLE NUMBER IN THIS TABLE) FOR LABELS PER ITEM ORDERED.

Bank No. 1… **FIBER-PT**

CABLE NUMBER (SPECIFY IN ORDER)	TO DEVICE	A - LENGTH IN YARD CABINET	B - MEASURED PATH LENGTH (SEE NOTE BELOW)	C - TURN LOOP LENGTH	D - JUST-IN-CASE LENGTH	E - ORDER LENGTH: ADD A+B+C+D	ORDER PART NUMBER with 4 digit Length, Feet, and 4 digit Cable No. (SPECIFY IN ORDER)
1130	**TRANSFORMER**	**10 FEET**		**2 FEET**	**10 FEET**		
1145	**FEEDER No. 1 52F1**	**10 FEET**		**2 FEET**	**10 FEET**		
1155	**FEEDER No. 2 52F2**	**10 FEET**		**2 FEET**	**10 FEET**		
1165	**FEEDER No. 3 52F3**	**10 FEET**		**2 FEET**	**10 FEET**		
1175	**FEEDER No. 4 52F4**	**10 FEET**		**2 FEET**	**10 FEET**		
1185	**FEEDER No. 5 52F5**	**10 FEET**		**2 FEET**	**10 FEET**		
1195	**FEEDER No. 6 52F6**	**10 FEET**		**2 FEET**	**10 FEET**		
1289	**MOBILE TRANSFOMRER**	**5 FEET**		**2 FEET**	**10 FEET**		

NOTE: **B-MEASURED PATH LENGTH** - MEASURE FROM MOUTH OF CONDUIT INSIDE YARD CABINET THRU CONDUIT, TRENCH, TRAY, DROP INTO SWBD #4 THRU LEFT OR RIGHT CABLE OPENING, TO EDGE OF DESIGNATED PATCH PANEL. TAKE CARE TO ROUND CORNERS USING FIBER MINIMUM BEND RADIUS, NOT WITH SHARP BENDS.

3 – Owner-Furnished Material List

OWNER-FURNISHED MATERIAL LIST

CLIENT: PWC-Fayetteville, NC
PROJECT: Black and Decker Substation
PROJECT NO.: 19-9224-8015
CONTRACTOR:
DATE:

ITEM	DESCRIPTION	DELIVERY LOCATION	SUPPLIER	ESTIMATED DELIVERY DATE	QTY
1	69 kV Circuit Breaker	Warehouse	HVB	On Hand	1 Ea
2	25 kV Circuit Breaker	Warehouse	Siemens	On Hand	6 Ea
3	Manhole	Warehouse	---	On Hand	3 Ea
4	Structure and Equipment Package	Site	TBD	TBD	1 Lot
5	Control House (with Relay Panels)	Site	VFP	TBD	1 Ea
6	Transformer	Site	Pennsylvania Transformer	TBD	1 Ea

4 – Technical Specifications
Oil Containment

PUBLIC WORKS COMMISION
FAYETTEVILLE, NORTH CAROLINA

OIL CONTAINMENT SPECIFICATIONS
FOR
BLACK AND DECKER 69 TO 15 x 25kV SUBSTATION

ISSUED FOR CONSTRUCTION

PUBLIC WORKS COMMISION
FAYETTEVILLE, NORTH CAROLINA

OIL CONTAINMENT SPECIFICATIONS
FOR
BLACK AND DECKER 69 TO 15 x 25kV SUBSTATION

8/2/2021

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

REVISION	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION	09/24/2021

1.0 General

The Oil Containment Specifications, Foundation Specifications, and Drawings are complementary, each to the other. The Black and Decker Substation project includes the placement of the Oil Containment System for the 69 to 15 kV transformer which has been designed to contain accidental spills and/or tank rupture within the area surrounding the power transformer. The installation of this system involves the excavation of a large basin around the transformer foundation. The basin will be permanently formed with reinforced concrete walls and floors.

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

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

2.0 Submittals

Copies of all reports shall be submitted to the Owner and Engineer within fifteen (15) days of contract award and prior to the performance of any work on the subject project. The Engineer will provide approval within ten days (10 days) of receipt of submittals. All submittals shall be provided to the Owner and Engineer as a single packet. A Submittal Log can be found in Appendix A of the Foundation Specifications.

2.1. Material Reports

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

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

2.2. Equipment Reports

Equipment submittals must include the manufacturer, model, accessory equipment, and performance specifications. Equipment cut sheets shall be submitted to the Owner and

Engineer for the following equipment as specified in the "List of Materials for the Oil Containment System":

a) Sump Pump
b) Oil Sensing Device

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

2.3. Coordination Drawings

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

a) Grating
b) Steel Angle

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

3.0 Installation

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

3.1. Excavate for the basin about the 69 to 15 kV transformer foundation over an area of approximately 36 feet x 22 feet to elevations as indicated on the drawings. If unsuitable material is encountered, the contractor shall remove the unsuitable material and backfill with well compacted washed stone or no frost structural fill in six inch (6") lifts, or concrete.

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

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

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

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

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

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

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

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

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

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

4.0 Testing

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

PUBLIC WORKS COMMISION
FAYETTEVILLE, NORTH CAROLINA

BLACK AND DECKER 69 to 15 x 25kV SUBSTATION

LIST OF MATERIALS FOR THE OIL CONTAINMENT SYSTEM

ITEM	DESCRIPTION	QUANTITY
OC1	Welded Steel Bar Grating – Galvanized with 2" x 3/16" load bearing bars at 1-3/16" o.c., McNichols Company Type GW-200, Serrated Surface (See Drawing OC2 for Panel Arrangement) Distributed by: McNichols Company 251 Wille Road #C Des Plaines, IL 60018-1861 Phone: (847) 635-5100 Fax: (847)635-1115 www.mcnichols.com	650 Sq. Ft. ±
OC2	Galvanized Steel Angle L 3" x 3" x ¼" with ½" x 1" slots at 36" o.c. maximum	240 Lin. Ft. ±
OC3	2" x 2" x ¼" Galvanized Steel Clips	As Required
OC4	36" Diameter Reinforced Concrete Pipe (RCP) x 8'-0" long	1
OC5	Aluminum Checker-Plate Cap, ¼" thick, to fit 36" diameter reinforced concrete pipe, with side lip and lifting handles	1
OC6	Grundfos Series Unilift AP Stainless Steel Submersible Sump Pump, Part No. AP12.40.04.1, 1/2 hp, 115 Volt ac, 10' Power Cord, No Float Switch Distributed By: Daparak, Inc. 4915 Waters Edge Drive Suite 180 Raleigh, North Carolina 27606 Phone: (919) 851-4411 Fax: (919) 859-4837 www.daparak.com	1

ITEM	DESCRIPTION	QUANTITY
OC7	Oil Smart Simplex Panel with Alarm, Oil Smart Switch 30 amp motor start relay and mounting hardware #OSSIM-30 Distributed by: See Water, Inc. 121 North Dillon Street San Jacinto, California 92583 Phone: (951)-487-8073 or (888)-733-9283 Fax: (951) 487-0557	1
OC8	PVC Pipe	
	1-1/2” Schedule 80	4 Lin. Ft. ±
	2-1/2" Schedule 80	160 Lin. Ft. ±
	4" Schedule 80	8 Lin. Ft. ±
OC9	Schedule 80 PVC Fittings	
	4" 90° Elbow (1/4 Bend, Sanitary Ell, Hub x Hub)	2
	4” Cap	1
	1-1/2” MPT x S	1
	2-1/2” x 1-1/2” Reducer	1
	2-1/2" 90° Elbow	3
	2-1/2" Union	1
	2-1/2" Couplings	As Required
OC10	2" PVC Conduit with fittings	As Required
OC11	Unistrut Mounting Frame (See Detail No. 3, Drawing OC3)	5 Lin. Ft.
OC12	3/8” x 1 ½” Stainless Steel Hex Head Bolt with nut and washer	As Required
OC13	3/8” x 3” Stainless Steel Anchors – HILTI Kwik Bolt III Distributed by: HILTI, Inc. 5400 South 122nd East Avenue Tulsa, Oklahoma 741461 Phone: (800) 879-8000 www.us.hilti.com	As Required
OC14	Drop-in Anchor for ½” Bolt	As Required

ITEM	DESCRIPTION	QUANTITY
OC15	Galvanized Hardware Cloth with ½" square openings	1 Sq. Ft.
OC16	Stainless Steel Pipe Clamps	
	For 4" pipe	1
	For 2½" pipe	1
OC17	#2 Tinned Copper	As Required
OC18	#2 Copper to #2 Copper Split Bolt Type Connector	As Required
OC19	Bronze Ground Clamp for #2 Copper	As Required
OC20	Bronze Straight Bolt Terminal #2 Copper	As Required
OC21	Clamp – Hubble Cat. No. GC5002	As Required
OC22	Henry Synco-Flex FR Waterstop (Or approved equal)	180 Lin. Ft. ±
OC23	Henry Synco-Flex FR Waterstop (Or approved equal)	
OC24	PVC Pipe Adhesive	As Required
OC25	Electrical Joint Compound	As Required
OC26	Rip Rap - 2” to 6”	1 Cu. Yd.
OC27	Concrete, 4,000 psi	1 Cu. Yd.

5 – Technical Specifications
Foundation

PUBLIC WORKS COMMISION
FAYETTEVILLE, NORTH CAROLINA

FOUNDATION SPECIFICATIONS
FOR
BLACK AND DECKER 69 TO 15 kV SUBSTATION

ISSUED FOR CONSTRUCTION

ISSUED FOR
CONSTRUCTION

August 2, 2021

BOOTH & ASSOCIATES, LLC

PUBLIC WORKS COMMISION
FAYETTEVILLE, NORTH CAROLINA

FOUNDATION SPECIFICATIONS
FOR
BLACK AND DECKER 69 TO 15 kV SUBSTATION

8/2/2021

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

REVISION	DESCRIPTION	DATE
0	ISSUED FOR COSNTRUCTION	08/02/2021

TABLE OF CONTENTS

1.0 General

The Foundation Specifications, Oil Containment Specifications, and Drawings are complementary, each to the other.

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

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

1.1. Special Conditions

The contractor is responsible to review and become familiar with the soil boring report by S&ME, Inc. for the **PWC Antennas, Black & Decker Substation, Hope Mills, North Carolina, Project No. 1305-14-003 (Revised), dated February 11, 2014**, attached in appendices of the project specifications.

1.2. Concrete

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

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

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

**Source: ACI 318-11, Table 4.3.1

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

1.3. Materials

1.3.1. 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.

1.3.2. Cementitious Materials

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

1.3.3. 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.

1.3.4. 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.

1.3.5. 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.

1.3.6. Admixtures

All admixtures are to be supplied by a single approved manufacturer, such as: 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

1.3.7. Reinforcing Steel

a. Reinforcing Bars - All reinforcing steel bars shall be of the deformed type conforming to the requirements of ASTM A615 or A706-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.

1.3.8. 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.

1.3.9. Finishing Compounds

Bonding compound	Epoxy - ASTM C881; Sika Chemical "Sikadur Hi-Mod"; or acceptable equal Latex - ASTM C1059; Dayton Acrylic Bonding Agent J40; 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 kg/m^2 maximum in 72 hours; L&M Chemical "Dress & Seal 30," Sonneborn "Kure-N-Seal 30,"

	or Symons "Cure & Seal 30%."

1.4. Submittals

Three copies of all reports shall be submitted to the Owner and Engineer within fifteen (15) days of contract award and prior to any concreting operations. The Engineer will provide approval within ten days (10 days) of receipt of submittals. All submittals shall be provided to the Owner and Engineer as a single packet. A Submittal Log is provided in Appendix A.

1.4.1. 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.

1.4.2. 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 required average compressive strength or mix proportioning data per ACI 318.

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

1.4.3. 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)	Nominal Maximum Aggregate Size No. 4 Sieve	Slump ± 1"	Min Cement (lb/cu yd)	Max Water/ Cement Ratio
General Usage	4,500	1"	5”	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.

1.5. 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.

1.5.1. 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.

1.5.2. Slump

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

1.5.3. Total Air Content

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

1.5.4. 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.

1.5.5. 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. The Contractor shall assume the costs to remove and replace all defective concrete.
b. The Contractor shall assume the cost of design and construction changes necessary to incorporate the inferior concrete.
c. The Contractor shall provide satisfactory reimbursement or allowance to the Owner for the acceptance of the lower quality concrete.

1.5.6. 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.

1.6. 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.

1.7. 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.

1.7.1. 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.

1.7.2. 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.

1.7.3. 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 90 minutes, or before the drum has revolved 300 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. Longer time periods must be approved by the Engineer. 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 Engineer. 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.

1.8. 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.

1.9. 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.

1.10. Cold Weather Concreting

The conditions of cold weather concreting exist when the air temperature has fallen to, or is expected to fall below, 40°F during the protection period as described in Section 1.10.7 of this specification. Cold weather concreting shall comply with ACI 306R.

1.10.1. Embedments and Surfaces

All surfaces against which concrete is to be placed, including reinforcement, shall be free from snow, ice, and frost. All metallic items embedded in the concrete, including bars, need to be heated if the air temperature is below 10°F. Metallic embedments with a cross-sectional area great than 4 $in.^2$ should be heated above 32°F.

1.10.2. Subgrade Condition

Concrete shall not be placed against frozen base or subgrade. Provisions for heating the subgrade or base shall be the responsibility of the Contractor and should be sufficient to raise and maintain the temperature above 32°F. Contractor shall limit surface temperatures of supporting materials beneath slabs-on-ground and the concrete to a temperature differential of less than 20°F.

1.10.3. Placement and Protection Temperature

The minimum temperature of concrete as placed and to be maintained after placement shall be as specified in Line 1 of the **Cold Weather Concrete Temperatures Table**.

Concrete temperatures for placement shall not be more than 20°F of that given in the **Cold Weather Concrete Temperatures Table**.

Methods for ensuring the placement and protection temperature such as concrete mixture acceleration, insulation, heat systems, enclosures, a combination of these practices, or other methods are the responsibility of the Contractor and shall be in accordance with ACI 306R.

1.10.4. Mixing Temperature

The minimum temperature of concrete at time of mixing shall be as specified in Lines 2, 3, and 4 of the Cold Weather Concrete Temperatures Table.
Concrete temperatures for mixing shall not be more than 15°F of that given in the **Cold Weather Concrete Temperatures Table**.
Methods for ensuring the mixing temperature such as heating mixing water, heating aggregates, or other methods, are the responsibility of the Contractor and shall be in accordance with ACI 306R.

Cold Weather Concrete Temperatures Table

		Section size, minimum dimension			
		< 12 in.	12 to 36 in.	36 to 72 in.	> 72 in.
Line	**Air Temp.**	**Minimum concrete temperature as placed and maintained**			
1	-	55°F	50°F	45°F	40°F
		Minimum concrete temperature as mixed for indicated air temperature*			
2	Above 30°F	60°F	55°F	50°F	45°F
3	0 to 30°F	65°F	60°F	55°F	50°F
4	Below 0°F	70°F	65°F	60°F	55°F
5	-	**Max allowable gradual temperature drop in first 24 hours after end of protection**			
		50°F	40°F	30°F	20°F

*For colder weather, a greater margin in temperature is provided between concrete as mixed and required minimum temperature of fresh concrete in place.
Note 1: For Line 1, maximum placement temperature is minimum temperature in the table plus 20°F.
Note 2: For Lines 2-4, maximum temperature is minimum temperature in the table plus 15°F

*Source: ACI 306R-16 Cold Weather Concreting, Table 5.1-Recommended concrete temperatures.

1.10.5. Temperature Records

Contractor shall be responsible to provide a temperature measuring device at several points within enclosure and recording the temperature no less than twice per 24 hour period. For drilled piers only one measuring device at the edge is required.
The temperature measuring device shall left in place throughout the protection period.
Contractor shall record the maximum and minimum temperature readings in each 24-hour period and provide to the Engineer of Record.

1.10.6. Concrete Curing

Curing of concrete shall be in accordance with section 1.14 of this specification. If water curing is used, terminate use at least 24 hours before any anticipated exposure of the concrete to freezing temperatures.

1.10.7. Concrete Protection Duration

Concrete shall be protected, at a minimum, as described in the **Cold Weather Concrete Temperatures Table** from the effects of freezing-and-thawing cycles for durations as provided in the **Cold Weather Protection Period Table**.
The protection period of concrete shall extend until the concrete has reached a minimum compressive strength of 3,500 psi, if repeated cycles of freezing-and-

thawing are expected prior to the concrete reaching the specified design strength.

1.11. Field Control Testing

The Contractor shall engage an independent professional testing agency and laboratory to provide all necessary equipment and personnel to perform all concrete testing at the Contractor's expense. The testing agency 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 agency 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. If directed to do so by the Owner, any additional field control tests required shall be made.

1.11.1. Sampling

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

1.11.2. 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.

1.11.3. 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%).

1.11.4. 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.

1.11.5. 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.

1.12. Compaction

The contractor shall engage an independent professional Geotechnical engineering firm 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. Compacted sub grade shall be approved for 3,000 lbs per square foot bearing capacity by the Geotechnical engineer.

1.13. 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.

1.14. 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.

1.15. 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 72 hours after it is placed, using insulation material with or without supplementary heat in accordance with ACI 306R.

1.16. Earthwork

1.16.1. 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.

1.16.2. 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.

1.16.3. 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.

1.16.4. Backfill (Other than subgrade)

Material for backfill shall be composed of earth free of wood, grass, roots, broken concrete, large stones, trash, or debris of any kind.

A Standard Proctor Compaction Test shall be performed on the proposed backfill material samples. The samples should be tested to determine the maximum, dry density, optimum moisture content and natural moisture content. These test results are to be used to ensure proper compaction during backfilling procedures.

All fill material shall be placed in lifts not to exceed eight inches (8″) in un-compacted thickness and be free of all organic material. Fill shall not be placed in heavy rain or placed on frozen ground. Frozen material shall not be used as backfill.

Field compaction tests shall be taken by the approved geotechnical engineer from each fill volume measuring 2,000 feet^2 maximum by twelve inches (12″) deep. If

testing results indicate that compaction does not meet specified requirements, fill materials shall be removed, replaced as required, and compacted and retested until acceptable.

All fill areas shall be compacted to at least ninety-five percent (95%) of the Standard Proctor maximum dry density.

1.16.5. 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.

1.16.6. Blasting

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

1.16.7. 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 Slabs on Grade and Mat Foundations

2.1. 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.

2.2. 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%).

2.3. 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 and properly compacted. All slabs on grade and mat foundations shall be placed on a minimum six inch (6") thick layer of compacted washed stone. An independent professional Geotechnical engineering firm shall inspect all subgrades for adequate bearing capacity as specified on the Foundation Drawings.

2.4. 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.

After removal of form ties, the resulting voids in the outer concrete face shall be filled with grout and finish flush with surface of concrete.

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.

2.4.1. Coating

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

2.4.2. Removal

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

2.5. Expansion Joints

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

2.6. 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.

2.7. Reinforcement

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

All bar supports, ties, spacers, bolsters, inserts, screeds, and other concrete accessories required shall be provided to maintain reinforcing in its proper position and permit proper placement of concrete.

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

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

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

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

Steel reinforcing bars shall be placed in the concrete wherever shown on the drawings. Unless otherwise shown on the drawings or directed, measurements made in placing the bars shall be to the center lines of the bars. Before the reinforcing bars are placed, the surfaces of the bars and the surfaces of any metal bar supports shall be cleaned of heavy flaky rust, loose mill scale, dirt, grease, or other foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete. Main reinforcement shall have a minimum clear protective cover to the surface of the concrete as shown on the drawings. Reinforcing bars shall be accurately placed and secured in position so that they will not be displaced during the placing of the concrete, and special care shall be exercised to prevent any disturbance of the reinforcing bars in concrete that already has been place. Rustproof metal chairs, metal hangers, metal spacers, or other satisfactory metal supports may be used for supporting reinforcing bars. No metallic reinforcement supports will be allowed to break the plane at the edge of concrete. 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 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.

All reinforcement shall be shop bent cold. No field bends in reinforcement will be permitted.

2.8. 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.

2.9. 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 shall be deposited in its final position without moving it laterally in the forms for a distance greater than 5 feet.

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. Vibrators shall not be used as a method to move concrete laterally.

Concrete shall be deposited to the required thickness and finished monolithically to a

smooth, level surface by floating and troweling.

2.10. 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.

2.11. 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 and recessed a minimum of 1 inch. 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.

2.12. Clean-Up

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

3.0 Drilled Cylindrical Foundations

3.1. General

This section covers general requirements for the installation of drilled cylindrical foundations and other appurtenant work. All work shall be in accordance with the Plans, Specifications, Plan & Profile Sheets, and Assembly Drawings. Work shall conform to all requirements of ACI 336.1-01 published by the American Concrete Institute, except as modified by these Contract Documents.

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 for surface mounted structures and 3,000 psi for direct embedded structures at twenty-eight (28) days when tested in accordance with ASTM C39. Concrete shall conform to specifications in Mix Class Table. Air content shall be six percent plus or minus one percent (6% ± 1%).

3.3. Excavations

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

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

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

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

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

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

of the hole. With the Owner's approval, attapulgite clay type drilling mud may be substituted for Super Mud on holes where Super Mud will not provide sufficient side wall pressure to maintain the sides of the hole excavation.

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

3.4. 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.

If infiltration of groundwater exceeds a rise of one-quarter inch (1/4") per minute or the total height of water in the bottom of the pier exceeds two inches (2"), the pier shall be considered a wet pier and wet pier concrete placement methods shall be used. Wet pier placement methods shall be approved by the Engineer and Owner, prior to the commencement of work.

3.5. 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.

3.6. 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.

3.7. 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.

3.8. 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)

3.9. Reinforcement

Steel reinforcing bars shall be placed in the concrete wherever shown on the drawings. Unless otherwise shown on the drawings or directed, measurements made in placing the bars shall be to the center lines of the bars. Before the reinforcing bars are placed, the surfaces of the bars and the surfaces of any metal bar supports shall be cleaned of heavy

flaky rust, loose mill scale, dirt, grease, or other foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete. Main reinforcement shall have a minimum clear protective cover to the surface of the concrete as shown on the drawings. Reinforcing bars shall be accurately placed and secured in position so that they will not be displaced during the placing of the concrete, and special care shall be exercised to prevent any disturbance of the reinforcing bars in concrete that already has been place.

All reinforcement shall be shop bent cold. No field bends in reinforcement will be permitted.

3.10. 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 not be allowed to free fall, uncontrolled, more than 5 feet. Concrete shall be deposited in its final position without moving it laterally in the forms for a distance greater than 5 feet.

3.11. 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.

3.12. 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.

3.13. Concrete Placement – Tremie Method

Where the inflow of water into a caisson is too rapid to permit placement of concrete in the dry, the Contractor shall place the concrete underwater by the tremie method. In such cases, a special mix of concrete will be required with coarse aggregate (gravel), ¾ inch maximum size, and a minimum of seven bags of cement per yard. A retarding agent, approved by the Owner and Engineer, may be used. No vibration of the tremie concrete will be required or permitted, but it will be permissible to vibrate the tremie pipe under certain conditions when the flow of concrete becomes sluggish, and it will also be permissible to vibrate the casing, if used, when the caisson is filled with concrete at the time the casing pull is started. The tremie pipe shall have the minimum diameter of 8 inches and shall be equipped with a foot valve or gate at the bottom end, which is watertight and can be positively controlled from the ground surface. If joints are required in the tremic pipe, they shall be watertight. The entire assembly shall be watertight, and under no circumstances will concrete be permitted to flow through water in the tremie. In placing concrete, the lower end of the tremie shall be placed as close to the bottom as

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

3.14. 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.

3.15. 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.

3.16. Clean-Up

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

3.17. Repairing Defective Concrete

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

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

4.0 References

4.1. 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

4.2. ASTM International

1. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
2. ASTM A706 – Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
3. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
4. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
5. ASTM C33 – Standard Specification for Concrete Aggregates
6. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
7. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
8. ASTM C94 – Standard Specification for Ready Mixed Concrete
9. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete
10. ASTM C150 – Standard Specification for Portland Cement
11. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete
12. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete
13. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
14. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
15. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete
16. ASTM C403 – Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance

17. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
18. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
19. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
20. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

4.3. American Welding Society

1. AWS D1.1-Structural Welding Code-Steel

APPENDIX A

SOIL REPORT

GEOTECHNICAL DATA REPORT
PUBLIC WORKS COMMISSION (PWC) ANTENNAS
BLACK & DECKER SUBSTATION
HOPE MILLS, NORTH CAROLINA

S&ME PROJECT NO. 1305-14-003

Prepared For:
Advanced Wireless Solutions, Inc.
P.O. Box 8593
Johnson City, Tennessee

Prepared By:
S&ME, Inc.
3201 Spring Forest Road
Raleigh, North Carolina 27616

February 7, 2014
(Revised February 11, 2014)

February 11, 2014

Advanced Wireless Solutions, Inc.
P.O. Box 8593
Johnson City, Tennessee

Attention: Mr. Rick Moore

Reference: **Geotechnical Data Report**
PWC Antennas
Black & Decker Substation
Hope Mills, North Carolina
S&ME Project No. 1305-14-003 (Revised)

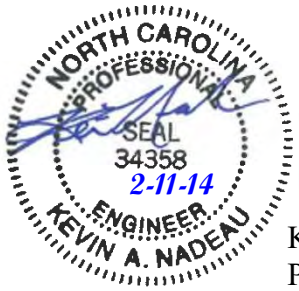
Dear Mr. Moore:

This report presents the results of the subsurface exploration performed by S&ME, Inc. (S&ME) for the referenced project. Our subsurface exploration was completed in general accordance with our Proposal No. P258-13E (2nd Revised) dated January 13, 2014. These services were authorized by execution of the Agreement for Services Form AS-071 on January 13, 2014.

The purpose of our explorations was to explore and evaluate subsurface conditions as they relate to the construction of 15 antennas in the Fayetteville, North Carolina area. This report describes our understanding of the project, presents the results of our field exploration, and our recommended soil parameters for encountered subsurface soils at the Black & Decker Substation site located at 2813 Peacock Street in Hope Mills, North Carolina. A Boring Location Plan, Boring Log and laboratory test results are attached.

S&ME appreciates the opportunity to provide our professional engineering services on this project. Should you have any questions concerning this report or if we may be of further assistance, please contact us at your convenience.

Sincerely,
S&ME, Inc.



J. Adam Browning, P.E.
Project Manager
N.C. Registration No. 034984

Kevin A. Nadeau, P.E.
Project Engineer
N.C. Registration No. 034358

Senior reviewed by: John R. Browning, P.E.

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APPENDIX

1. PROJECT DESCRIPTION

We understand that fifteen (15) antenna collector sites (tower sites) will be constructed in the Fayetteville, North Carolina area. We understand the towers will be 100 to 150 feet tall and will be supported on approximately 12 to 15 feet square footings installed approximately 5 to 6 feet below existing grade. We understand the foundations will be 1.5 to 2 feet thick. We have assumed the sustained dead load of the tower is 50 kips or less, thus the footing contact pressure with the weight of concrete will be about 650 psf. Factored design live loads provided by Advanced Wireless Solutions are summarized below for the 100-foot tower design:

Design Wind	Axial (down)	Shear	Moment	Torque
30 mph w/ ice	7 kips	0	25 kip-ft	0
105 mph	4 kips	6 kips	303 kip-ft	0

Load/moment data for the taller towers was not provided.

The Black & Decker substation site is currently developed as an electrical substation with a relatively level, gravel-covered ground surface. We understand that the grounding grid installed around the existing substation is approximately 3 feet below existing grades. Therefore, an existing fill soil depth of at least 3 feet is anticipated.

S&ME was retained to perform a subsurface exploration at each proposed tower location, consisting of Standard Penetration Testing to a minimum depth of 30 feet below the existing ground surface.

2. AREA GEOLOGY

The site is located within the Coastal Plain Physiographic and Geologic Province of North Carolina. The Coastal Plain is typically characterized by marine and eolian sediments that were deposited during periods of fluctuating sea levels and moving shore lines. Near surface soils often consist of more recent undifferentiated deposits of interbedded sands, silts, and clays. Deeper deposits also consist of sands, silts, or clays, but can be defined as particular geological formations with distinguishable characteristics and engineering properties.

Based on previous mapping (North Carolina Geologic Map 1985), the geology in the area of the site primarily consists of undifferentiated Coastal Plain deposits underlain by the Black Creek Formation, consisting of Cretaceous-period thin beds and laminae of fine-grained micaceous sand and thick lenses of cross-bedded sands.

3. EXPLORATION PROGRAM

3.1 Field Exploration

The field exploration for this project included drilling of one soil test boring identified as PWC-07. The boring location was marked in the field by Mr. Rick Moore with

Advanced Wireless Solutions. The approximate boring location is shown on Figure 1 in the Appendix.

The soil test boring was drilled by S&ME personnel on January 17, 2014 using a CME 45-B truck-mounted drill rig equipped with an automatic hammer. The boring was advanced to a depth of 30 feet below the existing ground surface using hollow stem augers and/or mud rotary techniques. Samples of subsurface soils were taken at 2.5-foot intervals above a depth of 10 feet and at 5-foot intervals below 10 feet using a split-spoon sampler. Standard Penetration Tests (SPTs) were conducted in conjunction with split spoon sampling in general accordance with ASTM D1586-11.

Following termination of drilling and sampling, the borehole was observed for groundwater. The measured depth reflects the depth to water at the time of boring. Recording of high water levels would require periodic observations of temporary piezometers over typical seasonal activities. Prior to demobilizing from the site, the borehole was backfilled up to the original ground surface using soil cuttings and a commercial plastic hole closure appliance was installed.

3.2 Laboratory Testing

Resistivity testing was performed on the 1-2.5 foot sample extracted from the borehole. A resistivity value of 3,513 ohm-cm was measured after the sample was soaked for 24-hours. The as-received resistivity value was 4,029 ohm-cm.

4. SUBSURFACE CONDITIONS

A general description of subsurface conditions is provided below. More detailed information on subsurface conditions is presented on the Boring Log in the Appendix.

A layer of gravel, 2 inches thick, was encountered at the ground surface. Beneath the gravel, man-placed fill soils were encountered to an approximate depth of 5.5 feet. Fill soils encountered in the boring generally consisted of loose clayey to silty sand (USCS Classification SC, SM) with uncorrected SPT N-values of 4 to 6 blows per foot (bpf) and visually observed to be wet to saturated. These SPT N-values are indicative of fill that was poorly compacted. Some wood, organics and grass were noted in the sample.

Coastal Plain soils were encountered beneath the fill. The Coastal Plain soils encountered generally consisted of very loose to medium dense silty sands (SM and SW) with uncorrected SPT N-values ranging from 2 to 14 bpf. Moisture contents within the Coastal Plain soils were visually observed to be saturated.

Groundwater was recorded at a depth of approximately 4 feet below the ground surface within the borehole at the time of drilling. Examination of the split spoon samples also suggested groundwater is present at this level. Water levels tend to fluctuate with

seasonal and climatic variations. Therefore, groundwater may be encountered during construction at a depth not indicated by the boring.

5. RECOMMENDED SOIL PARAMETERS

Conditions encountered by the soil test boring indicate the presence of loose to very loose fill soils to a depth of approximately 5-½ feet. These soils are not considered suitable for foundation support of the tower. We recommend that the proposed footing bear at a depth of at least 6 feet below the current ground surface elevation (on natural soils). We recommend that a geotechnical engineer or his representative verify that the footing is bearing in natural soils prior to the placement of rebar and pouring of concrete.

Based on the subsurface conditions encountered at the boring and anticipated excavation depth, we anticipate that the footing excavation can be performed using a track hoe. With the water table at approximately 4 feet below ground level, the contractor should be prepared to dewater the excavation so the footing construction can occur in dry conditions. We recommend that the groundwater table be temporally lowered by appropriate means to at least 2 feet below the excavation bottom. We also recommend that a 6 to 12-inch layer of washed stone (NCDOT #57 stone) be placed on the excavation bottom to provide a construction working surface and uniform bearing conditions.

Soil forces may be used to resist uplift and sliding of the footing. Soil adjacent to the footing will provide passive resistance to lateral movement, while the soil at the base of the footing will provide resistance to lateral movement through friction. Recommended soil parameters are provided below.

- Spread Foundation Net Allowable Bearing Pressure = 2,000 psf[1].
- The buoyant unit weight of concrete should be used for overturning calculations.
- Passive Lateral Earth Coefficient = 2.7 (ultimate value, recommend factor of safety of at least 3 for sliding resistance)
- Effective unit weight of existing soils or compacted fill for use in lateral earth pressure calculations = 53 pcf. This lower unit weight is a result of the soils along the face of the footing being below the water table.
- Friction coefficient along base of footing = 0.35 (ultimate value)

The volume of soil mass above the footing for uplift resistance may be calculated by assuming that it extends vertically from the top perimeter edge of the footing to the ground surface. We also recommend a unit weight of 115 pcf for soils above the water table and 53 pcf for soils below the water table to compute the soil mass weight.

[1] Foundation must bear on approved soils. Actual foundation dimensions are anticipated to generate contact pressures well below the 2,000 psf allowable value. Footing edge pressures generated by overturning moments should not exceed the allowable bearing capacity. Based on the anticipated 12 to 15-foot wide square footing design, total settlement of less than 1 inch and negligible tilt are anticipated.

6. QUALIFICATIONS OF REPORT

This data report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The recommendations contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty, express or implied, is made.

Analysis and recommendations submitted in this data report are based, in part, upon the data obtained from the geotechnical exploration. The nature and extent of variations outside of the boring made may not become evident until construction. If variations appear evident, then it will be necessary to re-evaluate the recommendations of this report. In the event that any changes in the grades, nature, design, or location of the proposed tower are planned, the recommendations contained in this report should be reviewed and modified or verified in writing. We recommend that our firm be provided the opportunity for general review of final design plans and specifications to verify that geotechnical recommendations are properly interpreted and implemented.

APPENDIX

SCALE:	As Shown
DATE:	JAN 2014
DRAWN BY:	MWL
PROJECT NO:	1305-14-003

S&ME
WWW.SMEINC.COM

BORING LOCATION PLAN

ADVANCE WIRELESS PWC ANTENNAS
BLACK AND DECKER SUBSTATION
2813 PEACOCK STREET
HOPE MILLS, NORTH CAROLINA

FIGURE NO. 1

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES

(Shown in Graphic Log)


Fill


Asphalt


Concrete


Topsoil


Gravel


Sand


Silt


Clay


Organic


Silty Sand


Clayey Sand


Sandy Silt


Clayey Silt


Sandy Clay


Silty Clay


Partially Weathered Rock


Cored Rock

WATER LEVELS

(Shown in Water Level Column)

▽ = Water Level At Termination of Boring
▼ = Water Level Taken After 24 Hours
◄ = Loss of Drilling Water
HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

RELATIVE DENSITY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES

(Shown in Samples Column)

Shelby Tube


Split Spoon


Rock Core


No Recovery

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

PROJECT: **Advanced Wireless PWC Antennas**
Fayetteville, North Carolina
S&ME Project No. 1305-14-003

BORING LOG PWC-07

DATE DRILLED: **1/17/14** | ELEVATION:

DRILL RIG: **CME 45-B** | BORING DEPTH: **30.0 ft**

DRILLER: **J. Walker** | WATER LEVEL: **4' ATD**

HAMMER TYPE: **Automatic** | LOGGED BY: **F. Lloyd**

NOTES: **Black & Decker Substation**
Boring location is approximate.

SAMPLING METHOD: **Split spoon**

LATITUDE: **34.9992394193** | LONGITUDE: **-78.9056331514**

DRILLING METHOD: **3¼" H.S.A.**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
	GRAVEL/SAND MIX (2 INCHES)									
	FILL: CLAYEY SAND (SC) loose, gray tan, fine to medium, wet, with 1/2" dia wood and organics	▽				2	2	4		6
5	**POSSIBLE FILL: SLIGHTLY CLAYEY SILTY SAND (SM)** very loose, gray, trace grass, fine, saturated					3	2	2		4
	COASTAL PLAIN: SAND (SW) loose to medium dense, white tan, fine to medium, saturated, with sparse rounded coarse gravel and 1/8" wood piece below 8 ft	HC				4	4	4		8
10						6	6	8		14
	COASTAL PLAIN: SILTY SAND (SM) very loose, white gray dark gray, fine to medium, saturated					2	2	2		4
15										
20						2	1	1		2
25						1	2	1		3
	COASTAL PLAIN: SLIGHTLY SILTY SAND (SW) loose, dark gray, trace mica, fine to medium, saturated					2	4	5		9
30	Boring terminated at 30 ft									

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS: 10 20 30 60 80

S&ME BORING LOG 14-003.GPJ S&ME.GDT 2/6/14

NOTES:

1. ***THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.***
2. ***BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.***
3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

S&ME

Soil Resistivity

ASTM G 57

Quality Assurance

S&ME, Inc. - Ralaigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	**1305-14-003**	Report Date:	2/7/14
Project Name:	Advanced Wireless PWC Antennas	Test Date(s):	1/31 - 2/7/14
Client Name:			
Client Address:			
Boring:	PWC-07	Sample #: SS-1	Sample Date: Varies
Location:	Site-Borehole	Offset: N/A	Depth (ft): 1 - 2.5 ft.
Sample Description:	Brown Silty Clayey SAND		

Equipment:	*Standard Box*	*S&ME ID#*	*13240*		*Amp-Meter*	*S&ME ID#*	*13239*
Balance		*S&ME ID#*	*1024*	*Cal. Date:*	*11/3/13*	*Due:*	*11/3/14*
Oven		*S&ME ID#*	*1454*	*Cal. Date:*	*10/1/13*	*Due:*	*10/1/14*

Moisture Content Determination	
As Received Condition	***21.8%***
Saturated Condition	***23.7%***
Resistivity (ohms - cm)	
As Received Condition	***4029***
Saturated Condition	***3513***

Notes / Deviations / References:

ASTM G 57: Field Measurements of Soil Resistivity Using the Wenner Four-Electrode Method

Mal Krajan, ET		Labotatory Manager	
Technical Responsibility	*Signature*	*Position*	*Date*

APPENDIX B

SUBMITTAL LOG

PRINT DATE: 7/29/2021

Project Submittals

Owner: PWC Fayetville
Contractor:
Project: Black & Decker Substation
Scope: Foundations and Oil Containment

DESCRIPTION	SUBM. #	RECEIVED	REJECTED	APPROVED	NOTES
Concrete					
Pad Mix Design					
Pad Concrete Materials (Cement, Stone, etc.)					
Pad Admixtures (Air, Plasticizers, etc.)					
Pier Mix Design					
Pier Concrete Materials (Cement, Stone, etc.)					
Pier Admixtures (Air, Plasticizers, etc.)					
Reinforcement					
Curing Compounds					
Concrete Testing Firm with Contacts					
Geotechnical Firm with Contacts					
Oil Containment					
Reinforcement					
PVC Pipe					
Expansion Joints					
Reinforced Concrete Pipe					
Joint Sealants					
Ground Clamps					
Waterstop Materials					
Pump					
Oil Sensing Device					
Grading					
Materials					
Geotechnical Firm with Contacts					
Helical Pile					
Manufacturer Cut Sheets					
Grating					
Grating Materials					
Support Materials					
Support layout					
Grating Layout					

6 – Technical Specifications
Structures & Equipment

PUBLIC WORKS COMMISSION
FAYETTEVILLE, NORTH CAROLINA

STRUCTURES AND EQUIPMENT FOR
BLACK AND DECKER SUBSTATION

TECHNICAL SPECIFICATIONS

1.0 Scope

Public Works Commission of Fayetteville, North Carolina, is procuring materials for the installation of the BLACK AND DECKER Substation. These Technical Specifications describe the structural materials, equipment, and the associated components for the installation of these facilities.

The Bidder's work shall include furnishing all equipment and materials so represented by the Bill of Materials, the accompanying Drawings, these Technical Specifications, and as set forth in the Bid Schedule. The Owner reserves the right to select any combination of alternate schedules as may be allowed. The Owner also reserves the right to reject any or all bids.

The Bill of Materials supplied with these Specifications represents the type of materials to be supplied. The Bidder has the responsibility of furnishing the quantity, all mounting hardware, and miscellaneous other materials necessary for a complete and functional substation, except for items designated to be furnished by Owner.

2.0 General Conditions

These Specifications describe the type, size, and characteristics of the various materials and equipment required to be furnished. The Drawings indicate general arrangement, equipment location, and spacing.

Strict adherence to these general Specifications and Drawings is requested to facilitate checking and consideration of the Proposal.

Proposals shall include the following:

2.1. Catalog numbers, manufacturer, ratings, characteristics, types, sizes, etc., of all materials and equipment included. A simple statement that all necessary materials and equipment will be provided is not satisfactory. A List of Materials is included at the end of these Specifications for providing this information.

2.2. Proposal for the substation shall include all materials and equipment required for a complete and coordinated substation. The Successful Bidder shall submit along with his quotation a complete list of materials to be furnished for the substation.

2.3. Prices shall include the cost of delivery to Fayetteville, North Carolina.

2.4. Coordinated shipment shall be made to reduce storage by Contractor and to facilitate the accumulation of component parts. Small piecemeal shipments will not be accepted. The number of shipments shall not exceed five (5) unless approved by the Owner. Direct-manufacturer, factory-drop shipments shall not be accepted.

2.5. All components in the steel package shall be distinctly marked or identified and shall be completely assembled before shipment, insofar as is practical. Each Bidder shall so state in his Proposal the manner in which trusses and columns will be shipped.

2.6. The Bidder shall furnish specification sheets (and installation manuals when required) for all switches, connectors, fittings, insulators, and lightning arresters not explicitly called out in the approved Bill of Materials. These specification sheets shall be provided with the approval drawings.

2.7. Any design work performed by the Bidder shall be sealed by a Professional Engineer registered in the State where the project is located.

3.0 Special Conditions

3.1. Material Shipments

The structures, crates, pallets, boxes, packing lists, etc. shall be maintained and clearly marked to correspond appropriately with the correct project.

3.2. Defective Materials, Equipment, and Workmanship

All materials and equipment furnished hereunder shall be subject to the inspection, tests, and approval of Owner; and the Bidder shall furnish all information required concerning the nature or source of any materials and equipment and provide adequate facilities for testing and inspecting the materials and equipment at the plant of the Bidder.

The materials and equipment furnished hereunder shall become the property of Contractor when delivered at the point to which shipment is to be made; provided, however, that Contractor may reject any such materials and equipment as does not comply with the Specifications for materials and equipment and warranties of the Bidder and manufacturers. Recognition and subsequent rejection of any defective materials and equipment may occur either before or after incorporation of such materials and equipment into the facilities, provided such rejection is made within one (1) year of date of delivery of the materials and equipment. Upon any such rejection, the Bidder shall replace the rejected materials and equipment with materials and equipment complying with the Specifications for materials and equipment and warranties FOB open-top truck or open trailer at suitable destination as determined by Contractor. Contractor shall return the rejected materials FOB open-top truck or open trailer at the same destination. In the event of the failure of the Bidder to so replace rejected materials and equipment, Contractor may make such replacement; and the cost and expense thereof shall be paid by and be recoverable from the Bidder.

3.3. Miscellaneous

The Bidder shall hold harmless and indemnify the Owner, its agents, and employees from any and all claims, suits, and proceedings for infringement of any patent or patents covering materials and equipment purchased hereunder. The Bidder shall defend any suit or proceeding brought against Owner, its agents, or employees based upon a claim that the materials and equipment, or any part thereof, constitute an infringement of any patent; or if the Bidder shall fail to defend such suit or proceeding, Owner may do so and the Bidder shall make reimbursement for the expense of such litigation. If the materials and equipment, or any part thereof, are held to constitute infringement and the use thereof is enjoined, the Bidder shall, at its own expense, either procure for Owner the right to continue to use the materials and equipment, or such part thereof, or shall replace the materials and equipment, or such part thereof, with non-infringing materials and equipment.

4.0 Standards

4.1. All equipment and materials covered by these Specifications shall be in accordance with the applicable provisions of the latest editions of the Standards of the ASTM, ANSI, NEMA, IEEE, OSHA, RUS, and latest revision of the NESC. Where a manufacturer's name and type of equipment is indicated in the Specifications, it is for clarity and the establishment of a standard and is restrictive unless use of an approved equal is specifically mentioned.

The Bidder may offer alternate pricing for equivalent items by other manufacturers. However, all base bids must explicitly comply with the designated materials specified herein. The Owner may elect to purchase alternates, as proposed by the Bidder. The alternate materials are subject to review and approval by the Owner.

The basic system ratings for the substations shall be as follows:

System High-Side Voltage	69,000 volts, three-phase wye, Basic Insulation Level shall be 350 kV, 60 Hertz.
System Low-Side Voltage	25 kV at 150 BIL, 60 Hertz operated at 25 kV
Transformer Capacity	One (1) substation class power transformer rated 67 to 26.18 x 13.09 kV, rated 20/26.7//33.3.0 MVA, ONAN/ ONAF/ ONAF (55°C).
Structural Design	Medium Loading District, plus allowance for 0.50 inches of ice and 90 mph. wind with 150 mph. gusts.
Primary Bus and Secondary Bus	Strength requirements to match weight of equipment, ice, and wind loadings.
Incoming Circuit	2,500 lbs. factored per 69 kV phase conductor design tension, 1,500 lbs. unfactored per static conductor, +/- 15° take-off angle in any direction
Outgoing Circuits	Underground
69 kV Power Circuit Breaker	48 volt dc and 120/240 volt ac single-phase
Transformer	48 volt dc and 120/240 volt ac single-phase
Bus & Feeder Circuit Breakers	48 volt dc and 120/240 volt ac single-phase
Protective Relaying Panels	48 volt dc and 120/240 volt ac single-phase

5.0 Drawings and Documentation

5.1 Conceptual Design
The work shall conform to the Booth & Associates, Inc. Drawings listed in the Appendices, all of which form a part of these Specifications.

5.2 Load Calculations
The Commission's Engineer will prepare calculated loading reactions.

5.3 Design and Fabrication Drawings
The Commission's Engineer will prepare all Shop Drawings and Bill of Materials.

5.4 Bus Cutting Schedule
The Bidder shall provide a bus cutting schedule to demonstrate the bus quantity and be used by the construction contractor.

6.0 Structural Steel

6.1. The substation structures to be included in the Form of Proposal shall conform to the following specifications and are identified on the appropriate substation project drawing.

The Substation Structures are to include:

1) 69 kV, 4-inch diameter IPS aluminum bus and bus supports
2) 69 kV line A-frame terminating structure with 69 kV group-operated disconnect switches
3) Two (2) 69 kV group-operated switch structures
4) 85-foot direct embedded steel static masts, (one (1) required)
5) 25 kV, 6-bay underground feeder distribution structure

6.2. Specifications for the fabrication, erection and shipping of structural steel can be found in the Appendices of this specification.

7.0 Lightning Protection Structures

7.1. Lightning masts shall be one-inch diameter galvanized steel pipe capped at top end, of required length, and shall extend a minimum of ten feet (10') above the structure as shown on the Drawings. Lightning masts shall be supplied with mounting provisions for

attachment to the steel columns of the substation structures. Lightning mast ground clamps shall be included for attachment of 2/0 AWG copper-clad steel leads as defined in **Section 12.0 Connectors**.

7.2. One (1) hot-dip galvanized steel pole shall be provided by the Bidder for primary bus static protection. The static pole shall be two-piece units, and shall be 85'-0" in length (for 10'-0" embedment), furnished complete with 10'-0" static rod designed for top mast mounting, for a total height of eighty-five feet (85') above-grade. The poles shall be equipped with Aeolian vibration suppression, service hand-hole, below-grade cable entrance slot, NEMA 2-hole pads for grounding, and two (2) floodlight brackets, as indicated on the Drawing details. The Bidder shall provide all mounting hardware, conductor, and connectors to complete assembly of the static masts per the Detail Drawings.

8.0 Miscellaneous Structures / Hardware

8.1. A switch grounding platform used for protecting the switch operator in the event of a fault at the switch during manual operation shall be furnished for each group-operated switch. The platform shall be open-grating design with the grounding connector locations on opposite corners for attachment of 2/0 AWG copper as shown on the drawings.

8.2. Miscellaneous fastener hardware shall conform to the industry standards for the purpose for which they are to be used. Bolts, nuts, and washers for structural steel shall be hot-dip galvanized. Hardware shall be of low-alloy, corrosion-resistant steel, ASTM Specification A242.

All quantities of fastener hardware shall be shipped with a **minimum of ten percent (10%) overcount** above the designated quantity necessary for assembly.

9.0 Insulators

All insulators shall be wet-processed porcelain colored sky gray, shall conform to the IEEE Standards for insulators, and shall have the following minimum electrical mechanical characteristics:

9.1. Bus Insulators

Bus insulators for supporting bus and leads shall be standard station post non-stacking or uniform-diameter stack type meeting ANSI-BIL units complete with connectors, bolts, and washers as required:

Voltage Rating	25 kV	69 kV
BIL	150 kV	350 kV
Impulse Flashover-Positive	170 kV	390 kV
Low Frequency Withstand-Wet, 60 cycle	60 kV	145 kV
Leakage Distance, Inches	24	72
Mechanical Strength Tension Pounds	10,000	16,000
Insulators per Stack	1	1
Bolt Circle	3"	3"
Technical Reference Number	TR 208	TR 216

Bus insulators shall be as manufactured by Lapp, Locke, Newell, or approved equal.

10.0 Bus and Leads

The Drawings include a sheet of details to indicate the several methods to be used for connecting and supporting the bus and leads. The conductors shall be provided with the necessary supports and connectors as illustrated by these details. The hardware required for the conductor and overhead ground wire attachments shall be furnished by the Bidder and shall conform to the following specifications: ANSI C135 for bolts, ASTM A36 for steel, ASTM A47 for malleable iron and ASTM A153 for galvanizing. All hardware supplied shall be hot-dipped galvanized.

Bus and leads shall be as follows:

10.1. Primary rigid bus, 69 kV: 4-inch aluminum tubing, alloy 6063-T6, Schedule 40, with single conductor 336.4 kcmil ACSR internal damping cable.

10.2. Leads to and from 69 kV Breaker: 477 AAC.

10.3. Leads from 69 kV bus to transformer primary: 477 AAC, 19 strand.

10.4. Leads from the 67 to 26.18kV transformer secondary to secondary bus: Dual 954 AAC.

10.5. Secondary rigid bus, 25 kV, main bus - 3-inch and transfer bus - 2-inch: aluminum tubing, alloy 6063-T6, Schedule 40, with single conductor 336.4 kcmil ACSR internal damping cable.

10.6. Leads to and from feeder breakers: Single 954 AAC.

10.7. Surge arrester leads: 69 kV leads on 67 to 26.18 kV transformer mounted units: 477 AAC, via bolt-on tee. 25 kV leads on 67 to 26.18 x 13.09 kV transformer mounted units: 954 kcmil AAC via bolt-on tee to 954 kcmil AAC. 25 kV leads on outgoing distribution circuits: #2 AWG solid tinned copper.

10.8. Ground grid bus: 4/0 AWG S.D. bare copper, 7-strand.

10.9. Equipment and structure ground bonding leads:
   a. Connections extending below grade shall have 2/0 or 4/0 S.D. bare copper, 7-strand.
   b. Connections and runs existing only above grade shall be 2/0 AWG 40% conductivity 7-strand copper clad steel.

10.10. Transformer neutral and tank bonds: Single or parallel 2/0 or 4/0 S.D. bare copper, 7 strand.

10.11. Fence ground leads: #2 AWG copper clad.

11.0 Bus Supports

All substation tubular bus shall be supported by either fixed, slip-fit, or expansion attachment to the station post insulators using aluminum weldment tube to insulator fittings, as indicated on the Drawings. Bus supports shall be radio noise-free, equal to Travis.

12.0 Connectors

Connectors shall be suitable for the purpose they are intended and shall provide a sound electrical and mechanical connection.

The Bidder is responsible for supplying the connectors and hardware for all bus and leads and as defined in **Section 10.0 Bus and Leads**, and shown on the Drawings. A corrosion-inhibiting compound shall be furnished in a sufficient quantity to be applied to all connections. Non-gritted, Anderson Type VS compound shall be used on all bolted connections. Gritted, Anderson Type VSG compound shall be used on all compression connections.

12.1. All connector fittings to the tubular bus shall be aluminum weldment type as manufactured by Travis, unless otherwise shown in the Bill of Material.

12.2. Cable terminal fittings required for the incoming lines, bus leads around switches, equipment, and between switches and rigid bus shall be aluminum bolted or compression type or bolted bronze type with the appropriate 2-hole or 4-hole NEMA spacing pad, as manufactured by Travis, unless otherwise shown on Bill of Material.

12.3. Expansion terminal connectors for tubular bus shall be aluminum weldment type for various locations as shown on the Drawings and as manufactured by Travis, unless otherwise shown on Bill of Material.

12.4. Grounding clamp connectors will be required for supporting or bonding the grounding cable to steel columns, beams, lightning masts, and/or fence/fabric posts. Supporting

grounding clamp connectors will be required every four feet (4') minimum for columns and beams to minimize the sag in the cable.

12.5. A copper to aluminum bimetallic transition plate shall be provided for all non-similar connections between terminal connections on all equipment, including transformers, breakers, and switches to bus leads, where it is necessary to make an aluminum to copper connection. The transition plates shall be equal to Travis Type TP.

12.6. All hardware supplied for bolted aluminum-to-aluminum electrical fittings shall be stainless steel, 18-8 alloy.

12.7. All hardware supplied for bolted aluminum-to-copper electrical fittings shall be stainless steel 18-8 alloy.

12.8. All hardware supplied for bolted copper-to-copper electrical fittings shall be stainless steel 18-8 alloy.

12.9. All quantities of fastener hardware shall be shipped with **a minimum ten percent (10%) over count** above the designated quantity necessary for assembly.

12.10. Bidder to verify that all conductor terminal pads shall **match and fit onto switch terminal pads** with regard to pad size, NEMA rating and pad shoulder configurations.

13.0 Group-Operated Disconnect Switches

13.1. Switch Construction

The switches shall meet all applicable ANSI and other industry mechanical and electrical standards, and shall be completely assembled and adjusted at the factory. The switches shall be of the manual-operating type by means of an operator pipe handle, and all parts of the operating mechanism shall be furnished for installing the complete three-phase switch and mechanism on the supporting structure. The switches shall be physically sized to fit properly in the locations shown on the Drawings. Switches shall be suitable for either horizontal or vertical mounting. A galvanized steel double-channel base plate shall be furnished and drilled for the particular installation prior to galvanizing.

The switches shall be of copper or aluminum construction with tin-plated copper contacts for both the center contacts and the hinge contacts.

All switches shall be complete with stainless steel arcing horns, pipe handle operating mechanism for manual operation, outboard bearings guide plate, operating pipe, and flexible grounding braid, an open- and closed-position indicator, and provisions for pad-locking in either the open or closed position. Oilite bearings shall be used for moving parts not provided with greaseless ball-bearing assemblies having stainless steel balls and races. Bearings shall be permanently sealed and require no greasing or other field maintenance. The switches shall be designed such that when they are fully open to ninety degrees (90°), the metal-to-metal spacing to the adjacent phase will not be less than specified for each voltage class. Switch terminals shall be provided with 4-hole NEMA spacing electro tin-plated terminals for copper or aluminum conductor connections as per the Drawings.

The switch insulators shall be ANSI No. 70 sky gray standard or high strength, non-tapered, uniform-diameter stacks, station post with three or five inch (3-inch or 5-inch) diameter bolt circles both top and bottom. The switch shall be two (2) or three (3) insulators per pole, as indicated on the Drawings. The switch insulators shall be free to rotate without affecting the position of the terminal pads.

13.2. Ratings for 69 kV Group-Operated Switches

13.2.1. Vee-type, center-break, group-operated air-break switch located on the A-frame shall be outdoor type, two-insulator, group-operated, air-break disconnect, complete with arcing horns, operating mechanism for pipe operation, outboard bearing, and guide plate. Oilite bearings shall be used for moving parts not provided with greaseless ball-bearing assemblies having stainless steel balls and races. Terminals shall be tin-plated NEMA four-hole suitable for bronze or

aluminum conductor connectors as per the Drawings. High-side switches shall be 69 kV nominal, 350 kV BIL, 1200 Ampere continuous, 61,000 Ampere momentary. Switches shall be completely assembled with TR 216 standard strength post insulators.

13.2.2. Vertical break, group-operated air break switches located on the 69kV bus shall be outdoor type, three (3) insulator, group operated, air-break disconnect, complete with arcing horns, operating mechanism for pipe operation, outboard bearing, and guide plate. Oilite bearings shall be used for moving parts not provided with greaseless ball-bearing assemblies having stainless steel balls and races. Terminals shall be tin-plated NEMA four-hole suitable for bronze or aluminum conductor connectors as per the Drawings. High-side switches shall be 69 kV nominal, 350 kV BIL, 1200 Ampere continuous, 61,000 Ampere momentary. Switches shall be completely assembled with TR 216 standard strength post insulators.

13.3. Ratings for 25 kV Group-Operated Switches

13.3.1. Vee-type center-break disconnect switches located on the 25 kV main secondary bus shall be rated 27 kV, 150 kV BIL, 2000 Amperes continuous, 80,000 Amperes momentary, **completely assembled** with TR-208 standard-strength, post insulators with pipe handle manual operator mechanism.'

13.3.2. Vee-type center-break disconnect switches located on the 25 kV transfer bus shall be rated 27 kV, 150 kV BIL, 1200 Amperes continuous, 61,000 Amperes momentary, completely assembled with TR 208 standard strength post insulators with pipe handle manual operator mechanism.

13.4. Approved Switch Manufacturers and Alternates

All bids for substation structures and equipment shall incorporate only switches as approved and noted herein. The Bidder may offer an alternate quotation for an alternate switch. **However, all base bids must include the type switch so designated below.**

13.4.1. 69 kV, 1200 Ampere group-operated switches per Section 13.3.1:
All Base Bids: Cleaveland-Price C26A018G01 / CB-AV or approved equivalent

13.4.2. 69 kV, 1200 Ampere group-operated switches per Section 13.3.2:
All Base Bids: Cleaveland Price C06A032G22 / V2-CA or approved equivalent

13.4.3. 25 kV, 2000 Ampere vee-type center-break group-operated switches per Section 13.4.1:
All Base Bids: Cleaveland Price C26A39G02 / CB-CV or approved equivalent

13.4.4. 25 kV, 1200 Ampere vee-type center-break group-operated switches per Section 13.4.2:
All Base Bids: Cleaveland Price C26A038G02 / CB-CV or approved equivalent

14.0 Surge Arresters

Surge arresters for the high- and low-voltage sides for the power transformers will be provided by the power transformers manufacturer, as furnished by the Owner.

Surge arresters on the incoming 69 kV A-Frame shall be furnished by the Bidder and shall be surge type, sky gray metal oxide, base-mounted, polymer, Station Class rated as follows:

Nominal Voltage	MCOV Arrester Rating	Location	Class	Type
69 kV	48 kV	69 kV A-Frame	Station	EVP

Surge arresters for the 25 kV circuit exits shall be furnished by the Bidder and shall be surge type, polymer, sky gray, metal oxide, Station Class rated as follows:

Nominal Voltage	MCOV Arrester Rating	Location	Class	Type
13.2/7.2 kV	8.4 kV	15 kV Circuit Exits	Station	EVP

Metal oxide surge arresters are rated in terms of maximum continuous operating voltage (MCOV). However, metal oxide arresters which are given conventional ratings may be furnished if the MCOV equivalent ratings are as specified here.

The 48 kV MCOV station class surge arresters shall be provided with a 4-hole NEMA spacing terminal on the line-side bushing terminals and ground connectors suitable for a maximum 250 kcmil copper (loop configuration) on the arrester base. The distribution structure MCOV station class arresters shall include line and ground connectors for up to #2 stranded tinned copper.

The surge arresters shall comply with ANSI Standard C-62.1.

15.0 Single-Pole Disconnect Switches

The switches shall be outdoor type, meet all applicable ANSI, NEMA and other industry mechanical and electrical standards, and shall be completely assembled and adjusted at the factory. The switches shall be physically sized to fit properly in the locations shown on the Drawings. Switches shall be suitable for either horizontal or vertical mounting, as shown on the Drawings. A galvanized steel channel base plate shall be furnished and drilled for the particular installation prior to galvanizing.

The switches shall be of copper construction with electro tin-plated contacts for both the jaw and the hinge contacts. The switch terminals shall be provided with 2-hole or 4-hole NEMA spacing, electro tin-plated terminals for copper or aluminum conductor connectors as per the Drawings.

Bidder to verify that all conductor terminal pads shall **match and fit onto switch terminal pads** with regard to pad size, NEMA rating and pad shoulder configurations.

The power fuses shall be outdoor type, meet all applicable ANSI, NEMA and other industry mechanical and electrical standards, and shall be completely assembled at the factory. Fuse mounting hardware shall consist of the base, insulators, complete upper and lower contact assemblies, terminal connectors sized for specified cable as shown on the Drawings, and fuse unit end fittings. The mounting shall be suitable for vertical offset or inverted installation.

The 25 kV switch and fuse insulators shall be ANSI No. 70 sky gray, post type, TR-208 standard strength (or TR-227 high-strength, as required), with three or five inch (3-inch or 5-inch) diameter bolt circles both top and bottom. The switches shall be shipped completely assembled on bases with post insulators oriented to accommodate the appropriate mounting location.

15.1. Hookstick Switches

High-side switches shall be 69 kV nominal, 350 kV BIL, 1200 Ampere continuous, 61,000 Ampere momentary. Switches shall be completely assembled with TR 216 standard strength post insulators. Switches shall be Cleaveland-Price model C102A150G17 Type LCO-C or approved equivalent.

Single-pole hookstick disconnect switches shall be provided for isolation of the 25 kV feeder vacuum circuit breakers, and shall be rated 27 kV, 150 kV BIL, 1200 Amperes continuous, 61,000 Amperes momentary. The 27 kV, 1200 Ampere hookstick disconnect switches shall be Cleaveland-Price model C102A230G08 Type LCO-C or approved equivalent.

15.2. Fuses and Fuse Mounting Hardware

Fuses, fuse barrels and fuse mounting hardware shall be provided for isolation of the 25 kV station service transformers and potential transformers. One (1) fuse (and end fittings) of

the proper rating shall be supplied with each mounting, plus additional spares, as specified on the Bill of Materials.

15.2.1. Fuses and mountings to be provided for the station service transformers shall be rated similar to S & C Type SMD-20 power fuse equipped with a current limiting fuse, or approved equal.

15.2.2. Fuses and mountings to be provided for the potential transformers shall be rated similar to S & C Type SMD-20 power fuse equipped with a current limiting fuse, or approved equal.

15.2.3. Current limiting fuses shall be Type "K-Mate" 50,000 A.I.C., rated 12 Amperes, or approved equal.

15.2.4. Insulators for fuse mounting shall be rated for 25 kV, TR-208.

16.0 Hookstick and Container

One (1) station class hookstick shall be provided as follows: one (1) sixteen-foot (16'), fiberglass stick similar or equal to Hastings 541-16. An appropriate length storage container, along with fence mounting kit shall be supplied with each hookstick.

17.0 Instrument Transformers

Potential transformers (PTs) shall be provided by the Bidder for use of metering the medium voltage bus. PTs shall be outdoor type, metering class, single primary, tapped secondary, 60 cycle, dual bushing.

The PTs shall be ABB Type PTT-110-977 or ABB Type VOZ-11, or approved equal.

18.0 Distribution Transformers

The Owner will supply one (1) 120/240 volts distribution transformers to supply ac station service for the substation equipment in the 69 to 15 x 25 kV Substation.

The Bidder shall provide mounting provisions for this transformer on the structure in the location as shown on the Drawings included with these Specifications. The Bidder shall assure the mounting clearance between the transformer's primary insulator and the power fuse mounting base or truss exceeds the minimum clearance requirements of the National Electrical Safety Code. The Bidder shall also assure that National Electrical Safety Code requirements are met for minimum distance to the ground for personal safety.

All transformers utilize an industry standard hanger bracket with two (2) 5/8" (5/8") bolts in-line on eleven and one quarter-inch (11-1/4") spacing.

19.0 Station Grounding

a. The station grounding below grade conductors shall be provided by the Contractor as follows: Ground grid bus: 4/0 AWG bare SD copper, 7-strand, 2/0 AWG bare SD copper, 7-strand for perimeter conductor

b. The fence grounding conductors shall be provided by the bidder as follows: Fence ground leads: #2 AWG bare SD copper clad.

c. Equipment and structure ground bonding leads:
   1) Connections extending below grade shall have 2/0 or 4/0 S.D. bare copper, 7-strand.
   2) Connections and runs existing only above grade shall be 2/0 AWG 40% conductivity 7-strand copper clad steel.

d. The transformer ground bonding leads shall be provided by the Contractor as follows: Dual 4/0 AWG, SD copper, 7-strand.

e. Ground rods shall be provided by the Contractor and shall be Copperweld three-fourths inch (3/4") diameter, ten feet (10'-0") in length, of the sectional type. Ground rod

connections shall be Cadweld type, suitable for 4/0 AWG copper ground bus. Drive heads and couplings shall be furnished with the sectional rods.

f. All connections below grade shall be Cadweld and shall be provided by the Contractor.

g. All fence grounding connectors as shown in the Bill of Materials shall be provided by the Bidder.

20.0 List of Materials – Substation Structures and Equipment

A list of the major items required for the substation is included in the appendices. Items noted as "(N/A)" in the list are to be furnished by Owner.

7 – Contractor Furnished Cable Material List

CONTRACTOR-FURNISHED CABLE MATERIAL LIST

ITEM NO.	DESCRIPTION	SUPPLIER OR MFR.	CATALOG NO./TYPE
1	**SCADA CABLE** EPR/CPE shielded multi pair, #16 AWG, 600 volt, stranded tinned copper conductors, flame-retardant Ethylene Propylene Rubber (EPR) insulation, color coded per ICEA Method I: pairs-black/white with alpha numeric designation (1-ONE). Aluminum/polyester shield and stranded tinned copper drain wire, black sunlight -resistant flame-retardant Chlorinated Polyethylene (CPE) jacket, all per ICEA S-82-552 for Type TC cables. a. Three (3) pair twisted / shielded overall shield, #16 AWG	Anixter	2MR-1603 SPOS or equal
2	**CONTROL CABLE** EPR/CPE insulated general purpose control cable, 600 volt, stranded tinned copper conductors, Class B stranding (7 strands), 30 mils flame-retardant Ethylene Propylene Rubber (EPR) insulation color coded per ICEA Method 1, non-hygroscopic fillers with black flame-Retardant Chlorinated Polyethylene (CPE) outer jacket 45 to 80 mils as applicable, all per ICEA S-95-658/NEMA WC 70 for Type TC cables.		
	a. 2 conductor, #10 AWG, Color Table E-2, black, red	Anixter	2MR-1002 or equal
	b. 4 conductor, #10 AWG, Color Table E-1, black, white, red, green	Anixter	2MR-1004-1 or equal
	d. 4 conductor, #16 AWG, Color Table E-1, black, white, red, green	Anixter	2MR-1604-1 or equal
	e. 2 conductor, #16 AWG, Color Table E-2, black, red	Anixter	2MR-1602 or equal
	f. 12 conductor, #10 AWG, Color Table E-1	Anixter	2MR-1012 or equal
	g. 12 conductor, #14 AWG, Color Table E-1	Anixter	2MR-1412 or equal
3	**POWER CABLE** EPR/CPE power cable, 600 volt, stranded tinned copper conductors, Class B stranding flame-retardant Ethylene Propylene Rubber (EPR) insulation, color coded per ICEA Method 4 (printed numbers), non-hygroscopic fillers with black flame-retardant Chlorinated Polyethylene (CPE) outer jacket, all per ICEA S-95-658/NEMA WC 70 for Type TC cables.		
	a. 4 conductor, #8 AWG, Color Table E-1	Anixter	2MR-0804-1 or equal
	b. 3 conductor, #6 AWG	Anixter	3MR-0603 or equal

CONTRACTOR-FURNISHED CABLE MATERIAL LIST

ITEM NO.	DESCRIPTION	SUPPLIER OR MFR.	CATALOG NO./TYPE
	EPR/RHH power cable, 600 volt, stranded tinned copper conductors, Class B stranding flame-retardant and sunlight resistant Ethylene Propylene Rubber (EPR) insulation with hypalon (CSPE) outer jacket, all per ICEA S-68-516/NEMA WC8. Color code as per application.		
	a. 1 conductor, #6 AWG	Anixter	3BE-0601 or equal
	b. 1 conductor, #2 AWG	Anixter	3BE-0201 or equal
	c. 1 conductor, #4/0 AWG, black	Anixter	3BE-4041 or equal
	d. 1 conductor, #4/0 AWG, red	Anixter	3BE-4041 or equal
4	**TELEMETRY/DATA CABLE**		
	a. RG-213U coaxial cable, power limited cable Class 2, #13 AWG stranded copper conductor, 7 strands, bare copper shield, 97% shield overage, black, non-contaminating PVC Jacket	Belden	8267 or equal
	b. 4 conductor telephone cable, #22 AWG, 300 volt, solid copper conductors, 16 mils polyethylene insulation, gray PVC jacket. Conductors are colored green, red, yellow, black	Belden	9794 or equal
	c. RG-58A/U coaxial cable, #20 AWG, stranded copper conductor, 19 strands, bare copper shield, 95% shield coverage, black non-contaminating PVC jacket	Belden	8259 or equal
5	**PRE-TERMINATED FIBER OPTIC CABLE**	Anixter	019-0710-1-LLL
	Measure lengths for pre-terminated fiber cable (**FIBER PT**) as specified in Fenix Drawing 12534C3, CABLE AND CONDUIT SCHEDULE. See document pages **FIBER PRE-TERM ORDER- BK 1** and **FIBER PRE-TERM ORDER- BK 2** to see how many to order and what CABLE NUMBER for each cable required. Perform measurements as directed and record on the print. Order is directed to Anixter Morrisville, see contact information below. Order information for each cable to include LENGTH as determined on form from Column E, ORDER LENGTH, and CABLE NUMBER from CABLE NUMBER column on form. "**CABLE WIRE NO. & SIZE**" column in Cable and Conduit Schedule, Cable Schedule, is: **FIBER-PT** (Fiber Pre Terminated). Send Quote request and Purchase Order to: **Anixter,** Attention: **Chris Riggsbee**, Preferred contact method Email: chris.riggsbee@anixter.com phone: 919-616-6124, Address: **1055 Schieffelin Rd., Apex, NC 27502**		

ITEM NO.	DESCRIPTION	SUPPLIER OR MFR.	CATALOG NO./TYPE
	Request Quote for each cable needed: PART NUMBER: **D18-0710-1-LLL,** where LLL is cable length in feet. In DESCRIPTION field, state: "**Cable Length is LLL FEET as indicated in part number suffix. Label cable both ends with Cable Number NNNN.**", where NNNN is Cable Number from Cable and Conduit Schedule. Upon receiving quote, Send Purchase Order.		
6	**JUMPER CABLES – FACTORY MADE FIBER OPTIC AND COPPER CABLE**		
	a. Cable and Conduit Schedule Cable Type: **ZLC2M**. Corning, 2 fiber Zipcord Jumper, 2.0mm subunit, multimode, 62.5 micron, OM1, LC duplex to LC duplex connectors. Minimum Bend Radius during install is 2.0 inches, during operation 0.55 inches. Maximum tensile strength during install is 50 lbf. Length 7 feet. No substitutions.	Corning	050502K5120007F
	b. Cable and Conduit Schedule Cable Type: **ZLC3M**. Corning, 2 fiber Zipcord Jumper, 2.0mm subunit, multimode, 62.5 micron, OM1, LC duplex to LC duplex connectors. Minimum Bend Radius during install is 2.0 inches, during operation 0.55 inches. Maximum tensile strength during install is 50 lbf. Length 3 meters. No substitutions.	Corning	050502K5120003M
	c. Cable and Conduit Schedule Cable Type: **ZLC3S**. Corning, 2 fiber Zipcord Jumper, 2.0mm subunit, single mode, 9 micron, OS1, LC duplex to LC duplex connectors. Minimum Bend Radius during install is 2.0 inches, during operation 0.55 inches. Maximum tensile strength during install is 50 lbf. Length 3 meters. No substitutions	Corning	050502G5120003M
	d. Cable and Conduit Schedule Cable Type: **CA605C-xxx**. SEL CAT5E Shielded Patch Cord, STP, RJ-45 connectors both ends, jacket color Blue. Length is xxx feet as indicated in part number. PN: CA605CBXxxx. CAT5-04, CAT5-08	SEL	CA605C-004
	e. Cable and Conduit Schedule Cable Type: **C605A-xxx**. SEL EIA-232, DB9 connectors both ends. Length is xxx feet as indicated in part number. PN: C605Axxx. C605A-36, C605A-25	SEL	C605A-36 C605A-25
	f. Cable and Conduit Schedule Cable Type: **C961-xxx**. SEL Coaxial cable, LMR400 cable, TNC connectors both ends. Length is xxx feet as indicated in part number. PN: C961-xxx. C961-25, C961-50	SEL	C961-25 C961-50
	g. Cable and Conduit Schedule Cable Type: **C953-xxx**. SEL C953-6, C953-15, C953-25 SEL Coaxial cable, IRIG, RG58 cable, BNC connectors both ends. Length is xxx feet as indicated in part number. PN: C953-xxx. C953-6, C953-15, C953-25	SEL	C953-6 C953-15

CONTRACTOR-FURNISHED CABLE MATERIAL LIST

	C953-25

8 – Forms

a. Contractor's Concrete Test Sample Report
b. Materials Receipt
c. Ground System Test

SUBSTATION FOUNDATION AND CONCRETE REPORT

OWNER: PWC-Fayetteville, NC

PROJECT NAME: BLACK AND DECKER Substation

PROJECT NO.: 19-9224-8015

CONTRACTOR:

Foundation				
Concrete				
Depth of Excavation				
Excavated Material				
Dewatering Required				
Rebar Placed Properly				
Imbedments				
Anchor Bolt				
Size				
Spacing				
Alignment				
Nuts				
Construction Joint				
Chamfer				
Pad / Footing Size				
Pier Diameter / Size				
Pier Length				
Concrete Date				
Time Batched				
Time Arrived				
Time Placed				
Truck No.				
Quantity (C.Y.)				
Slump				
Air Percent				
Concrete Temperature				
Test Cyl. Results				

Remarks:

By:
Date:
Sheet:
Rev.:

Booth & Associates CONSULTING ENGINEERS

MATERIALS RECEIPT

OWNER: PWC-Fayetteville, NC
CONTRACTOR:
PROJECT NAME: BLACK AND DECKER Substation
PROJECT NO.: 19-9224-8015
DATE:

ITEM*	QUANTITY	DESCRIPTION OF ITEM	MANUFACTURER AND CATALOG NUMBER	UNIT COST	EXTENDED COST
TOTAL					

RECEIVED BY	**FOR**
	Contractor
	Owner

*Item corresponds with item in list of materials in construction drawings.

Booth & Associates CONSULTING ENGINEERS

GROUND SYSTEM TEST
SIMPLIFIED FALL-OF-POTENTIAL
(THREE-POINT METHOD)

CLIENT: PWC-Fayetteville, NC
LOCATION:
PROJECT NAME: BLACK AND DECKER
PROJECT NO.: 19-9224-8015
RECORDED BY:
DATE:

Instrument Mfr. _____
Model _____
Serial # _____

Ground System Type: ☐Single Rod ☐Ground Well ☐Multiple Rods (Grid)

Rod Depth (ft.) _____
Well Depth (ft.) _____
Longest Diagonal Dimension (ft.) _____

Current Probe Distance _____

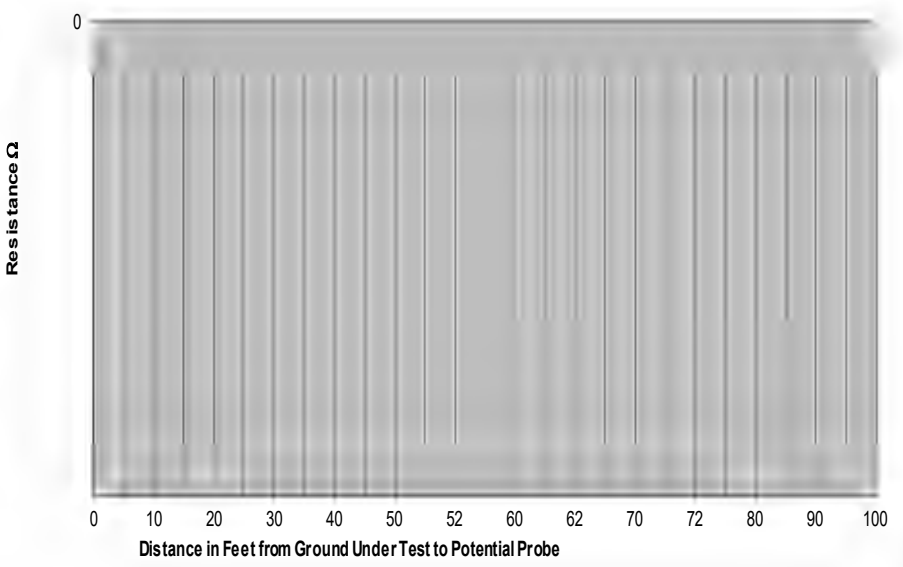
TEST CONDITIONS

Temp: _____ Soil: ☐Wet ☐Moist ☐Dry

Soil Type

☐Loam ☐Sand & Gravel ☐Shale ☐Clay ☐Limestone
☐Sandstone ☐Granite ☐Slate ☐Other

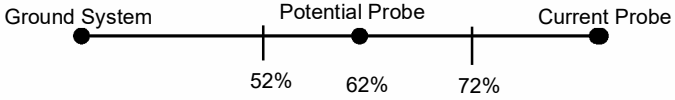
%	Potential Probe Distance from Ground System FEET	Measured Resistance OHMS
0		
10		
20		
30		
40		
50		
52		
60		
62		
70		
72		
80		
90		
100		



Resistance Scale Multiplier

☐X1
☐X10

Distance Scale Multiplier: ☐ x 1 ☐ x 10

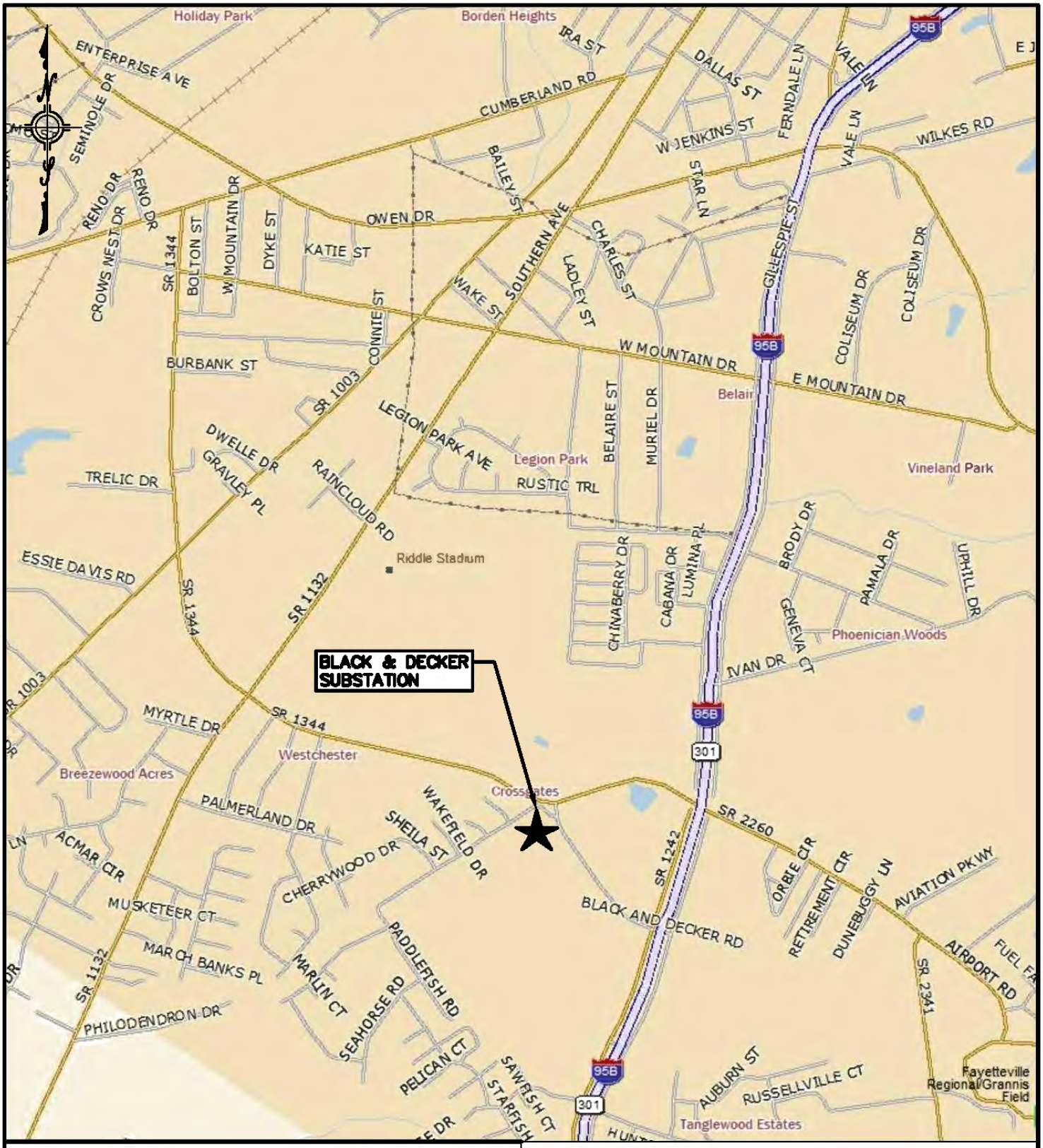


Of distance from ground system to current probe

Remarks:

Booth & Associates CONSULTING ENGINEERS

9 – Vicinity Map



SITE LOCATION

ADDRESS:
2901 PEACOCK STREET
HOPE MILLS, NC 28348

PWC OF THE CITY OF FAYETTEVILLE
FAYETTEVILLE, NORTH CAROLINA

BLACK & DECKER
69 TO 15 X 25 kV SUBSTATION
VICINITY MAP

Booth & Associates, LLC
3011 Glenwood Avenue | Raleigh, NC 27612 CONSULTING ENGINEERS NC F-0221

DWN. AAI	DATE: 01/08/2021		DWG. NO.
CKD. BDE	APPD. RSY		
SCALE: 1" = 1,500'	FILE: 12502VM		VM-1
JOB NO. 19-9224	DATE	REVISION	
© 01/2021			