ADVERTISEMENT FOR BIDS

Sealed proposals will be received in the Office of the Procurement Manager, Greenville Utilities Commission, 401 S. Greene Street, Greenville, North Carolina 27834 until 3:00 PM (EDST) on October 16, 2019 for the furnishing of Southside Pump Station Screening Structure Electrical Wireway Replacement.

Greenville Utilities Commission reserves the right to reject any or all bids. **Late bids will not be considered.**

SECTION I

GENERAL INSTRUCTIONS FOR BIDS

SOUTHSIDE PUMP STATION SCREENING STRUCTURE ELECTRICAL WIREWAY

REPLACEMENT MATERIALS & INSTALLATION

1.0 NOTICE TO BIDDERS

Sealed bids, subject to the conditions made a part hereof, will be received in the Office of the Procurement Manager, Greenville Utilities Commission, 401 S. Greene Street, Greenville, North Carolina 27834 until 3:00 pm (EDST) on October 16, 2019, the day of opening**. Bids submitted in a fax or e-mail in response to this Invitation for Bids will not be acceptable. Late Bids will not be considered.**

2.0 STANDARD FORMS REQUIRED

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

3.0 PREPARATION OF BID

Bids must be in sealed envelopes clearly marked on the outside with the name of the bid and the bid opening date and time. Bid shall be addressed to PROCUREMENT MANAGER, GREENVILLE UTILITIES COMMISSION, P. O. BOX 1847, 401 S. GREENE STREET, GREENVILLE, NORTH CAROLINA 27835-1847.

4.0 TIME FOR OPENING BIDS

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

5.0 DEPOSIT

A deposit is **NOT** required for this bid.

6.0 NC SALES TAX

Do **not** include NC sales taxes in bid figure; however, Greenville Utilities Commission (GUC) does pay sales tax. Sales tax should be added to the invoice as a separate item.

7.0 FEDERAL EXCISE TAX

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

8.0 EXCEPTIONS TO BE CLEARLY STATED

If bid is not in strict accordance with Section II, "Specifications," bidder must list or note all exceptions **on the Request for Proposal Form**, otherwise, it is fully understood that the successful bidder will furnish equipment and/or materials exactly as specified. GUC reserves the right to accept or reject bids with noted minor deviations from specifications and to determine the lowest responsible, responsive bid from the standpoint of quality, performance, and price.

9.0 EVALUATION AND AWARD OF BIDS

GUC reserves the right to reject any and all bids, to waive any and all informalities, and to disregard all nonconforming or conditional bids or counter proposals. In evaluating bids, GUC shall consider whether the bids comply with the prescribed requirements, plus all alternates or options requested. GUC reserves the right to include or exclude any option or alternative in GUC's opinion is in GUC's best interests. If a bid is to be awarded, it will be awarded to the lowest responsible, responsive bidder whose evaluation by GUC indicates that the award will be in GUC's best interests. Only firm prices will be considered for award of this bid.

10.0 PROMPT PAYMENT DISCOUNTS

Bidders are urged to compute all discounts into the price offered. If a prompt payment discount is offered, it may be considered in the award of the contract.

11.0 NUMERICAL ERRORS

In the case of a discrepancy between a unit price and the extension (the unit price multiplied by the number of units), the unit price governs. In the case where numerical bids are stated both in numbers and in words, the words govern.

2.0 BID WITHDRAWAL

A bidder must notify GUC in writing of its request to withdraw a bid within seventy-two (72) hours after the bid opening, not including Saturdays, Sundays, or holidays. In order to justify withdrawal, the bidder must demonstrate that a substantial error exists and that the bid was submitted in good faith.

13.0 MINORITY BUSINESS PARTICIPATION PROGRAM

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

14.0 QUANTITIES

Quantities specified are only estimates of GUC's requirements. GUC reserves the right to purchase more or less than the stated quantities at prices indicated in the submitted Proposal Form based on our actual needs.

15.0 DELIVERY, DELIVERY LOCATION, DELIVERY REQUIREMENTS

Shipments will be made to GUC only upon releases from a purchase order issued by GUC in accordance with its current needs.

Time is of the essence with respect to all deliveries under this Agreement.Delivery of all equipment, materials, or supplies shall be made Free on Board (FOB) to Greenville Utilities Wastewater Treatment Plant-240 Aqua Lane, Greenville, N.C.

Delivery hours are Monday-Friday 8am-3:30pm except for Holidays, when no deliveries will be accepted.

The agreed price for such equipment, materials, or supplies shall include all costs of delivery and ownership, and risks of loss shall not be transferred from Provider to GUC until express written acceptance of delivery and inspection by GUC. **GUC's purchase order number is to be shown on the packing slip or any related documents.** GUC reserves the right to refuse or return any delivery with no purchase order number or which is damaged. GUC will not be charged a restocking fee for any delivery which is refused or returned.

16.0 DELIVERY TIME

Delivery time is to be stated by the bidder and will be a factor in the evaluation of bids.

17.0 CONTRACT PERIOD

If applicable TBD.

18.0 MANUFACTURER

Bidder is to specify the manufacturer of items being quoted.

19.0 CONTACT INFORMATION

Questions regarding this bid request should be directed to Cleve Haddock, CLGPO, Procurement Manager, Finance Department at (252) 551-1533, haddocgc@guc.com.

20.0 UNIFORM GUIDANCE

Contracts funded with federal grant or loan funds must be procured in a manner that conforms with all applicable federal laws, policies, and standards, including those under the Uniform Guidance (2 C.F.R. Part 200).

21.0 TERMS AND CONDITIONS

The attached Terms and Conditions apply to all purchases made by Greenville Utilities Commission (GUC) and must be considered as part of the bid proposal.

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SECTION II

SPECIFICATIONS FOR

SOUTHSIDE PUMP STATION SCREENING STRUCTURE ELECTRICAL WIREWAY

REPLACEMENT MATERIALS & INSTALLATION

Greenville Utilities Commission (GUC), hereafter referred to as "Owner" is seeking proposals for replacement of electrical work at the Southside Pump Station, hereafter referred to as "Site". This document covers the scope of the electrical replacement work and contains attachments that provide direction on materials of construction and workmanship.

The following documents are attached to this Request for Proposals:

1. Bidding Documents
2. Photographs
3. Specifications Section 16050 – ELECTRICAL
4. Drawings
    a. E-001
    b. E-002
    c. E-10-101
    d. E-10-102
    e. E-20-101
    f. E-30-101
    g. E-501
    h. E-601
    i. E-602
    j. E-701
    k. E-702
    l. E-703

Scope – Three scope items are presented below. Contractor shall price all three and Owner will select which items they will issue a Purchase Order for.

1. The Work shall include replacement of an existing stainless steel electrical wireway and its appurtenant connections with a new wireway to be furnished by Owner. The wireway in question is attached to the southwest corner of an existing wastewater bar screen facility. Power and control circuits for two multi-rake bar screens, supply fan, exhaust fan, and appurtenant systems pass through the wireway. Contractor shall furnish all items necessary for installation of new wireway and re-connection of all existing electrical and control circuits. Contractor shall undertake the following work:
    A. Disconnection of existing power and control circuits within wireway.
    B. Removal of wiring from wireway.

C. Demolish existing wireway including removal of appurtenant connections back to a point where new connections can be attached to the existing conduit underneath the wireway and behind the wireway.

   NOTE: This work may involve some concrete removal to get back to a point where Contractor can make a new connection to the PVC conduit behind the wireway.

D. Install new wireway furnished by Owner and make all appurtenant conduit connections.
E. Re-pull and re-connect existing power and control circuits with new wiring such that existing functionality to entire wastewater screenings facility is re-established with ample length allowed for future maintenance activity.

2. At Owner's option, the Work shall include repair and touchup to all existing exposed PVC-coated conduit on operating floor of screenings structure, intermediate level of screenings structure, and biotrickling filter pad. Repair work shall be done in accordance with conduit manufacturer's recommended repair practices.
3. At Owner's option, the Work shall include replacement of all exposed PVC-coated conduit on operating slab of screenings structure, intermediate level of screenings structure, and biotrickling filter pad. Contractor shall be responsible for demolishing existing conduit. All power and control circuit wires shall be removed prior to demolishing of conduit. Contractor shall then procure and install new PVC-coated conduit in order to make all previous electrical and control connections to existing equipment.
4. At Owner's option, the contractor may reuse a portion of the wiring determined not damaged provided a terminal block is used in the cabinet and pricing deduct is mutually agreed to by both parties prior to reuse.

Pre-Bid Site Visit

Prior to submitting bid, contractor is highly encouraged to attend a pre-bid site visit meeting with Owner to inspect the existing wireway and PVC-coated rigid steel conduit to review and confirm understanding of the scope listed above prior to determining pricing of the bid. Pre-bid site visit meeting will be held on Wednesday, October 2 at 3:00 PM at the South Side Pump Station (2900 E Second St. Greenville, NC 27835).

Construction Duration

Contractor shall be allotted 30 days to complete all work outlined in Scope item #1 above. Contractor to provide with Bid the total number of calendar days to complete Scope items #2 and #3 if Owner elects to pursue Scope items #2 or #3

Coordination

Existing pump stations shall remain in service throughout the duration of the electrical work. Owner will operate trash basket to remove debris from wastewater stream. Contractor shall maintain clear access to area underneath the bridge crane to facilitate

this work by Owner. Power to electric wire rope hoist shall be maintained throughout the project. However, short shut-down periods not to exceed one day will be allowed upon advance coordination with Owner.

Materials of Construction and Workmanship

All materials of construction, workmanship, and installation shall be as specified in attached Specifications Section 16050 – ELECTRICAL with the following exception:

1. Contractor shall replace twist-on wire connectors for all 600V power conductors (solid or stranded) with crimp type connectors. Twist-on wire connectors shall only be used for lighting and receptacle circuits.

Owner's Responsibilities

Owner will be responsible for the following items related to the Work:

1. Procure new stainless steel electrical wireway to be installed by Contractor.
2. Shutting off power to wastewater screenings facility and ensuring proper lockout of electrical circuits.
3. Energizing power to existing facilities and equipment for check-out and startup following completion of work.
4. Providing Contractor with Site access.
5. Providing Contractor with information about operation of existing wastewater screenings facility including existing record drawings.

Contractor's Bid Pricing	**Price**	**Calendar Days to Complete**
1. Lump Sum Bid Price for Scope item #1	$	30 Days
2. Lump Sum Bid Price for Scope Item #2	$	Days
3. Lump Sum Bid Price for Scope Item #3	$	Days

Complete and Check All Math: It is the responsibility of the Bidder to extend bid prices and supply a total for all items.

Bids should be received no later than 3:00 PM (EDST) on October 16, 2019.
Late bids will not be considered.

Questions regarding this Advertisement for Bid should be submitted no later than October 11, 2019 via e-mail to: Cleve Haddock, CLGPO Procurement Manager, at haddocgc@guc.com.

EVALUATION AND AWARD:

Proposals will be evaluated by GUC personnel. Selected vendors may be requested to present formal presentations/demonstrations on site on a date and time mutually agreeable by both parties.

Evaluation Criteria:

Vendor/unit selection shall be based on evaluation and rating of Vendor's demonstrated competence and qualifications/performance for the type of services/products to be offered. The following guidelines will be used as minimum criteria for rating the Vendor:

- The quality of references from past customers of vendor.
- Quality of approach and methodology that demonstrates an understanding of the unit's requirements
- All warranties.
- Overall Costs

GUC reserves the right to reject all proposals or accept such proposals, as appears in its own best interest, and to waive technicalities or irregularities of any kind in the proposal. GUC is not obligated to accept the lowest cost proposal. If a proposal is to be awarded, it will be awarded to the responsible, responsive respondent whose evaluation by GUC indicates that the award will be in GUC's best interests.

MINORITY BUSINESS PARTICIPATION PROGRAM:

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

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E-VERIFY:

1. I have submitted a bid for contract or desire to enter into a contract with the Greenville Utilities Commission;
2. As part of my duties and responsibilities pursuant to said bid and/or contract, I affirm that I am aware of and in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):

3. ____ After hiring an employee to work in the United States I verify the work authorization of said employee through E-Verify and retain the record of the verification of work authorization while the employee is employed and for one year thereafter; or
4. ____ I employee less than fifteen (15) employees in the State of North Carolina.

5. As part of my duties and responsibilities pursuant to said bid and/or contract, I affirm that to the best of my knowledge and subcontractors employed as a part of this bid and/or contract, are in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):

6. ____ After hiring an employee to work in the United States the subcontractor verifies the work authorization of said employee through E-Verify and retains the record of the verification of work authorization while the employee is employed and for one year thereafter; or
7. ____ Employ less than fifteen (15) employees in the State of North Carolina.

Specify subcontractor: _____

_____ (Company Name)

By: _____ (Typed Name)

_____ (Authorized Signatory)

_____ (Title)

_____ (Date)

These Forms Must be Completed, Signed and Returned With The

Respondents Proposal.

BUSINESS STATEMENT

Company Name: _____

Mailing Address: _____

City: _____ State: _____ Zip: _____

Telephone No.: _____ Fax No.: _____

Contact Person's Name: _____

Telephone No.: _____ Fax No.: _____

Email Address: _____

Business License No.: _____ City: _____

State: _____ Expiration Date: _____

Federal ID No. or Social Security No.: _____

Type of Organization: (Check all that apply)

□ Corporation, under the laws of the State of _____
□ Individual
□ Joint Venture
□ Municipal, State, or Federal
□ S Corporation
□ General Partnership
□ Limited Partnership
□ Non-Profit Corporation
□ Small Business Enterprise: A business enterprise that is independently owned and operated; organized for profit; is not dominant in its field; and meets the criteria set forth by the Small Business Administration in Title 13, Code of Federal Regulations, Part 121.

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VENDOR PROFILE QUESTIONNAIRE

Question	Answer
Organization name and corporate location?	
What is your organizations primary business?	
Is your organization a subsidiary to a larger parent company? If so, whom?	
Length of time your organization has been in business providing this type of services/products?	
Organization ownership?	
Number of employees: • Total • Development • Product Support • Professional Services	

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REFERENCES

The respondent must provide 3 references where the requested unit/services/products of this RFP were implemented.

	REFERENCE NO. 1
NAME OF FIRM	
CUSTOMER'S BUSINESS/OPERATIONS	
ADDRESS	
CITY, STATE, ZIP	
TELEPHONE NO.	
CONTACT	
	REFERENCE NO. 2
NAME OF FIRM	
CUSTOMER'S BUSINESS/OPERATIONS	
ADDRESS	
CITY, STATE, ZIP	
TELEPHONE NO.	
CONTACT	
	REFERENCE NO. 3
NAME OF FIRM	
CUSTOMER'S BUSINESS/OPERATIONS	
ADDRESS	
CITY, STATE, ZIP	
TELEPHONE NO.	
CONTACT	

It is certified that this proposal is made in good faith and without collusion or connection with any other person responding on the same above listed item(s). It is also certified that this proposal is made in good faith and without collusion or connection with any GUC employee(s).

Certified check or cash for $____n/a____or bid bond for $____n/a____attached.

Firm Name _____ Phone (____)_____

Address _____

City _____ State_____ Zip Code_____

Fax (_____) _____ E-Mail _____

Authorized Official_____ Title_____
Typed Name

_____ Date _____
Signature

Bid should be received no later than 3:00 PM (EDST) on October 16, 2019.

Late bids will not be considered.

Questions regarding this Advertisement for Bid should be submitted no later than October 11, 2019 via e-mail to: Cleve Haddock, CLGPO Procurement Manager, at haddocgc@guc.com.

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SECTION III

TERMS AND CONDITIONS FOR THE PURCHASE OF

APPARATUS, SUPPLIES, MATERIALS, EQUIPMENT AND INSTALLATION

These Terms and Conditions, made and entered into on this the _____ day of _____, by and between GREENVILLE UTILITIES COMMISSION OF THE CITY OF GREENVILLE, PITT COUNTY, NORTH CAROLINA, with one of its principal offices and places of business at 401 S. Greene Street, Post Office Box 1847, Greenville, Pitt County, North Carolina 27835-1847, hereinafter referred to as "GUC" and _____, a _____ organized and existing under and by virtue of the laws of the State of _____, with one of its principal offices and places of business at _____, hereinafter referred to as "PROVIDER";

1.0 TAXES

No taxes shall be included in any bid prices. GUC is exempt from Federal Excise Tax. GUC is not exempt from North Carolina state sales and use tax or, if applicable, Pitt County sales and use tax. Such taxes shall be shown as a separate item on the invoice.

2.0 INVOICES

It is understood and agreed that orders will be shipped at the established contract prices and quantities in effect on dates orders are placed. Invoicing at variance with this provision may subject the contract to cancellation. Applicable North Carolina sales tax shall be invoiced as a separate line item. All invoices must bear the GUC purchase order number. Mail all invoices to Greenville Utilities Commission, Finance Department, P. O. Box 1847, Greenville, NC 27835-1847.

3.0 PAYMENT TERMS

Payments for equipment, materials, or supplies will be made after the receipt and acceptance of the equipment, materials, or supplies and after submission of a proper invoice. GUC's normal payment policy is thirty (30) days. GUC will not be responsible for any goods delivered without a purchase order having been issued. Payment will be made in U. S. currency only.

4.0 QUANTITIES

Quantities specified are only estimates of GUC's requirements. GUC reserves the right to purchase more or less than the stated quantities at prices indicated in the submitted Proposal Form based on our actual needs.

5.0 AFFIRMATIVE ACTION

The Provider will take affirmative action in complying with all Federal and State requirements concerning fair employment and employment of the handicapped, and concerning the treatment of all employees, without discrimination by reason of race, color, religion, sex, national origin, or physical handicap.

6.0 CONDITION AND PACKAGING

Unless otherwise indicated in the bid, it is understood and agreed that any item offered or shipped shall be new and in first class condition, that all containers shall be new and suitable for storage or shipment, and that prices include standard commercial packaging.

7.0 SAMPLES

Samples of items, if required, must be furnished free of expense to GUC, and if not destroyed, will, upon request, be returned at the Provider's expense. Request for the return of samples must be made at the bid opening, otherwise, the samples will become GUC's property. Each individual sample must be labeled with Provider's name.

8.0 SPECIFICATIONS

Any deviation from specifications must be clearly pointed out, otherwise, it will be considered that items offered are in strict compliance with specifications, and the Provider will be held responsible. Deviations must be explained in detail. **The Provider shall not construe this paragraph as inviting deviation or implying that any deviation will be acceptable.**

9.0 INFORMATION AND DESCRIPTIVE LITERATURE

Providers are to furnish all information requested. Further, as may be specified elsewhere, each Provider must submit with its proposal: cuts, sketches, descriptive literature, and/or complete specifications covering the products offered. Reference to literature submitted with a previous bid does not satisfy this provision. Bids which do not comply with these requirements will be subject to rejection.

10.0 AWARD OF CONTRACT

As directed by statute, qualified bids will be evaluated and acceptance made of the lowest responsible, responsive bid most advantageous to GUC as determined upon consideration of such factors as prices offered, the quality of the article(s) offered, the general reputation and performance capabilities of the Provider, substantial conformity with the specifications and other conditions set forth in the bid, the suitability of the article(s) for the intended use, the related services needed, the date(s) of delivery and performance, and such other factors deemed by GUC to be pertinent or peculiar to the purchase in question.

Acceptance of the order includes acceptance of all terms, conditions, prices, delivery instructions, and specifications as shown on this set of Terms and Conditions and in this order or attached to and made a part of this order.

The conditions of this order cannot be modified except by written amendment in the form of "Amended Purchase Order," which has been approved by GUC's Procurement Manager.

In the event of a Provider's failure to deliver or perform as specified, GUC reserves the right to cancel the order or any part thereof, without prejudice to GUC's other rights. The Provider agrees that GUC may return part of or all of any shipment at Provider's expense. GUC may charge the Provider with all reasonable expenses resulting from such failure to deliver or perform.

11.0 MEDIATION/BINDING ARBITRATION

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

In the event the matter is not resolved in mediation, either Party may request arbitration. The parties shall jointly select an Arbitrator, and shall be bound by the decision of the Arbitrator with respect to any dispute between the parties with respect to this Agreement. If the parties are unable to mutually agree upon an Arbitrator, the Parties shall each select an Arbitrator, and the two Arbitrators so selected shall select a third Arbitrator, and the decision of the majority of the Arbitrators shall be conclusive and binding upon the Parties. The Parties at all times agree to equally split the costs of any Arbitrator(s) selected in an effort to resolve the dispute between the Parties. Any party desiring to resolve a dispute under the terms of this Agreement shall notify the other Party in writing, and the Parties shall seek to agree upon a mutually agreed-upon Arbitrator within a period of ten (10) days from the date of such written demand. If the Parties are unable to agree within such ten (10) day period, the Parties shall each select an Arbitrator, and the two (2) Arbitrators so selected shall select a third Arbitrator within fifteen (15) days from the date of the written demand for arbitration, and a decision shall be rendered by the Arbitrator(s) so selected within five (5) days after such Arbitrator(s) is selected.

12.0 GOVERNMENT RESTRICTIONS

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

13.0 INSURANCE

13.1 Coverage – During the term of the contract, the Provider at its sole cost and expense shall provide commercial insurance of such type and with the following coverage and limits:

13.1.1 Workers' Compensation – The Provider shall provide and maintain Workers' Compensation Insurance, as required by the laws of North Carolina, as well as employer's liability coverage with minimum limits of $1,000,000 each accident, covering all Provider's employees who are engaged in any work under the contract. If any work is sublet, the Provider shall require the subcontractor to provide the same coverage for any of its employees engaged in any work under the contract.

13.1.2 General Liability – Commercial Liability Coverage written on an "occurrence" basis in the minimum amount of $1,000,000 per occurrence.

13.1.3 Automobile – Automobile Liability Insurance, to include coverage for all owned, hired, and non-owned vehicles used in connection with the contract with a minimum combined single limit of $1,000,000 per accident.

13.2 Requirements - Providing and maintaining adequate insurance coverage is a material obligation of the Provider. All such insurance shall meet all laws of the State of North Carolina. Such insurance coverage shall be obtained from companies that are authorized to provide such coverage and that are authorized to do business in North Carolina by the Commissioner of Insurance. The Provider shall at all times comply with the terms of such insurance policies and all requirements of the insurer under any of such insurance policies, except as they may conflict with existing North Carolina laws or this contract. The limits of coverage under each insurance policy maintained by the Provider shall not be interpreted as limiting the Provider's liability and obligations under the contract. It is agreed that the coverage as stated shall not be canceled or changed until thirty (30) days after written notice of such termination or alteration has been sent by registered mail to GUC's Procurement Manager.

14.0 PATENTS AND COPYRIGHTS

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

15.0 PATENT AND COPYRIGHT INDEMNITY

The Provider will defend or settle, at its own expense, any action brought against GUC to the extent that it is based on a claim that the product(s) provided pursuant to this agreement infringe any U.S. copyright or patent; and will pay those costs, damages, and attorney fees finally awarded against GUC in any such action attributable to any such claim, but such defense, settlements, and payments are conditioned on the following: (1) that Provider shall be notified

promptly in writing by GUC of any such claim; (2) that Provider shall have sole control of the defense of any action on such claim and of all negotiations for its settlement or compromise; (3) that GUC shall cooperate with Provider in a reasonable way to facilitate the settlement of defense of such claim; (4) that such claim does not arise from GUC modifications not authorized by the Provider or from the use of combination of products provided by the Provider with products provided by GUC or by others; and (5) should such product(s) become, or in the Provider's opinion likely to become, the subject of such claim of infringement, then GUC shall permit Provider, at Provider's option and expense, either to procure for GUC the right to continue using the product(s), or replace or modify the same so that it becomes non-infringing and performs in a substantially similar manner to the original product.

16.0 EXCEPTIONS

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

17.0 CONFIDENTIAL INFORMATION

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

18.0 ASSIGNMENT

No assignment of the Provider's obligations or the Provider's right to receive payment hereunder shall be permitted without the express written consent of GUC, provided however, upon written request approved by the GUC's Procurement Manager, solely as a convenience to the Provider, GUC may:

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

19.0 ACCESS TO PERSON AND RECORDS

GUC shall have reasonable access to persons and records of Provider as a result of all contracts entered into by GUC.

20.0 INSPECTION AT BIDDER'S SITE

GUC reserves the right to inspect, at a reasonable time, the item, plant, or other facilities of a prospective Provider prior to contract award and during the contract term as necessary for GUC's determination that such item, plant, or other facilities conform with the specifications/requirements and are adequate and suitable for the proper and effective performance of the contract. Provider may limit GUC's access to restricted areas.

21.0 AVAILABILITY OF FUNDS

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

22.0 GOVERNING LAWS

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

23.0 ADMINISTRATIVE CODE

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

24.0 EXECUTION

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

25.0 CLARIFICATIONS/INTERPRETATIONS

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

26.0 SITUS

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

27.0 TERMINATION OF AGREEMENT

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

28.0 DELIVERY

Shipments will be made to GUC only upon releases from a purchase order issued by GUC in accordance with its current needs.
Time is of the essence with respect to all deliveries under this Agreement.

Delivery of all equipment, materials, or supplies shall be made Free on Board (FOB) to Greenville Utilities Water Treatment Plant-1721 Waterway Road, Greenville, NC 27834.

Liquid chemicals shall be delivered by bulk tanker trucks designed and licensed to transport the chemical. All tanker trucks used shall comply with all safety regulations specified by the North Carolina Department of Transportation. The tanker trucks shall be in suitable condition for hauling the chemical and shall not contain any substances that might affect the usefulness of the chemical for drinking water treatment. Tanker trucks must be equipped with appropriate systems to off-load the chemical at each location.

Delivery hours are Monday-Friday 8am-3:30pm except for Holidays, when no deliveries will be accepted.

The agreed price for such equipment, materials, or supplies shall include all costs of delivery and ownership, and risks of loss shall not be transferred from Provider to GUC until express written acceptance of delivery and inspection by GUC. **GUC's purchase order number is to be shown on the packing slip or any related documents.** GUC reserves the right to refuse or return any delivery with no purchase order number or which is damaged. GUC will not be charged a restocking fee for any delivery which is refused or returned.

29.0 INDEMNITY PROVISION

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

30.0 FORCE MAJEURE

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

31.0 WARRANTY(IES)

The Provider hereby includes all warranties, whether expressed or implied, including, but not limited to, the Implied Warranty of Merchantability and the Implied Warranty of Fitness for a Particular Purpose.

32.0 INTEGRATED CONTRACT

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

33.0 CONTRACT PROVISIONS

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

34.0 E-VERIFY

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

35.0 IRAN DIVESTMENT ACT CERTIFICATION

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

36.0 UNIFORM GUIDANCE

Contracts funded with federal grant or loan funds must be procured in a manner that conforms with all applicable federal laws, policies, and standards, including those under the Uniform Guidance (2 C.F.R. Part 200).

37.0 NOTICES

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

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

Vendor Specified on Page 1 of Section III when awarded.

GREENVILLE UTILITIES COMMISSION

By: _____
Anthony C. Cannon

Title: General Manager/CEO
(Authorized Signatory)

Date: _____

Attest: _____

Name (Print): Amy Wade

Title: Executive Secretary

Date: _____

(OFFICIAL SEAL)

COMPANY NAME:

By: _____

Name (Print): _____

Title: _____
(Authorized Signatory)

Date: _____

Attest: _____

Name (Print): _____

Title: Corporate Secretary

Date: _____

(CORP. SEAL)

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

By: _____
Jeff W. McCauley

Title: Chief Financial Officer

Date: _____

APPROVED AS TO FORM AND LEGAL CONTENT:

By: _____
Phillip R. Dixon

Title: General Counsel

Date: _____

Photo 1 - Wireway to be replaced attached to southwest corner of screenings structure.

Photo 2 – Interior of wireway

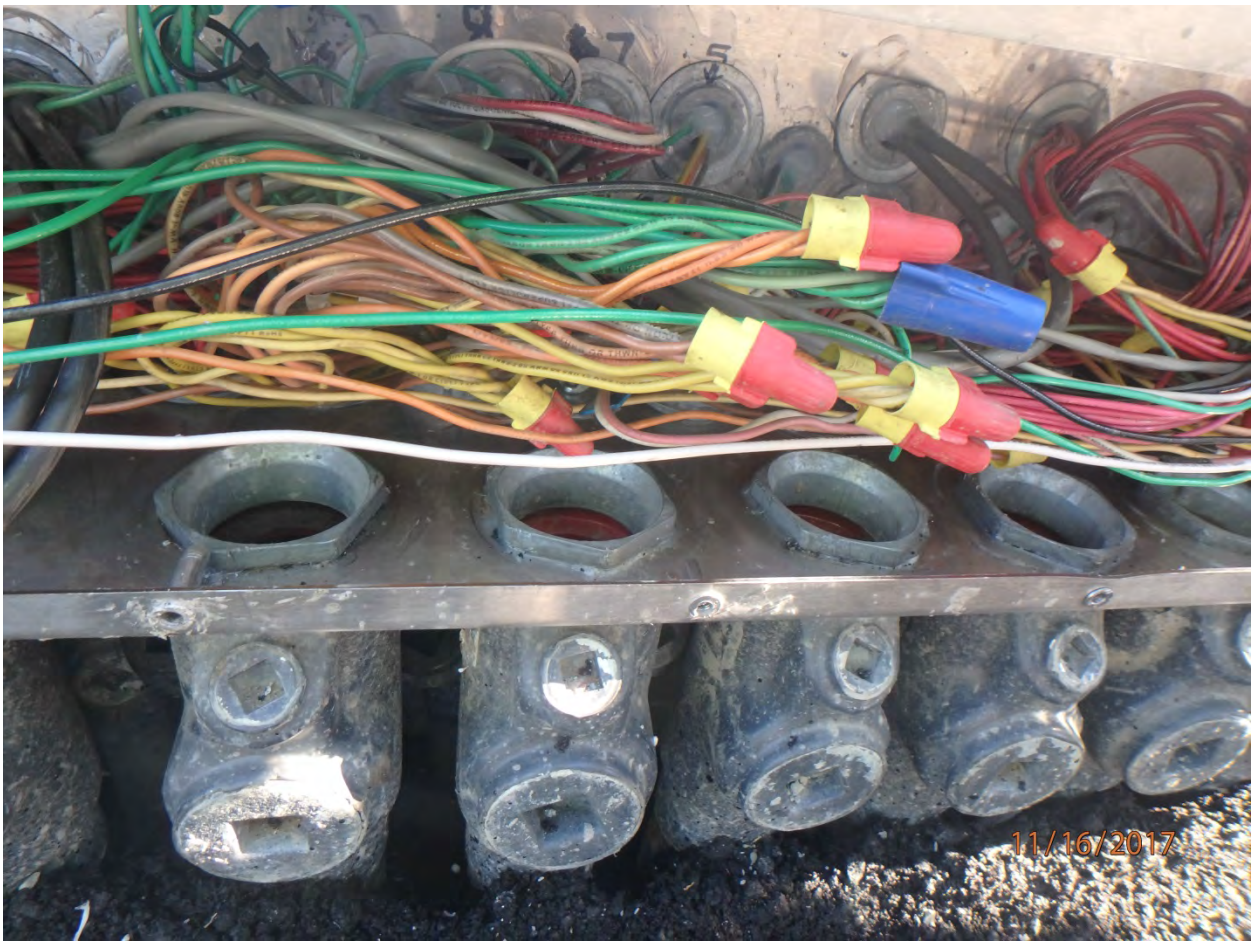

Photo 3 – interior of wireway

Photo 4 – Interior of wireway

Photo 5 – Area behind and underneath wireway

Section 16050

ELECTRICAL

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing and installation of all equipment and materials needed for the electrical requirements of this Contract. It also covers conduit, wiring, and terminations for electrical equipment installed under Electrical Equipment Installation section.

This section covers the installation and interconnection of electrical equipment furnished under other sections, except electrical items designated to be installed under those sections.

1-2. GENERAL. Electrical apparatus on all equipment shall be installed complete and placed in readiness for proper operation.

Electrical materials furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations section shall apply to all equipment provided under this section. If requirements in this section differ from those in the General Equipment Stipulations section, the requirements specified herein shall take precedence

1-2.02. Seismic Design Requirements. Seismic design requirements for products specified herein shall be as indicated in the Meteorological and Seismic Design Criteria section.

1-2.03. Coordination. Electrical work shall conform to the construction schedule and the progress of other trades.

1-2.04. Anchor Bolts and Expansion Anchors. All anchor bolts, nuts, washers, and expansion anchors shall comply with Anchorage in Concrete and Masonry section, except smaller than 3/4 inch will be permitted to match NEMA standard size bolt holes on motors and electrical equipment.

1-2.05. Drawings. Supplementing this section, the Drawings indicate locations of equipment and enclosures and provide one-line and schematic diagrams regarding the connection and interaction with other equipment.

1-3. CODES AND PERMITS. All work shall be performed and materials shall be furnished in accordance with the NEC - National Electrical Code, the NESC - National Electrical Safety Code, and the following standards where applicable:

ANSI	American National Standards Institute.
ASTM	American Society for Testing and Materials.
AWG	American Wire Gauge.
Fed Spec	Federal Specification.
ICEA	Insulated Cable Engineers Association.
IEEE	Institute of Electrical and Electronics Engineers.
IESNA	Illuminating Engineering Society of North America.
NEIS	National Electrical Installation Standards
NEMA	National Electrical Manufacturers Association.
NFPA	National Fire Protection Association.
UL	Underwriters' Laboratories.

Equipment covered by this section shall be listed by UL, or by a nationally recognized third party testing laboratory. All costs associated with obtaining the listing shall be the responsibility of Contractor. If no third-party testing laboratory provides the required listing, an independent test shall be performed at Contractor’s expense. Before the test is conducted, Contractor shall submit a copy of the testing procedure to be used.

1-4. SEISMIC DESIGN REQUIREMENT.

1-4.01. Seismic Design Requirements. Submit confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

1-5. IDENTIFICATION.

1-5.01. Conduit. Conduits in manholes, handholes, building entrance pull boxes, junction boxes, and equipment shall be provided with identification tags. Identification tags shall be 19 gage stainless steel, with 1/2 inch stamped letters and numbers as indicated on the Drawings. Identification tags shall be attached to conduits with nylon tie wraps and shall be positioned to be readily visible.

1-5.02. Conductors. All conductors in power, control, and instrumentation circuits shall be identified and color coded as described herein.

1-5.02.01. Conductor Identification Number. Except for lighting and receptacle circuits, each individual conductor in power, control, and instrumentation circuits shall be provided with wire identification markers at the point of termination.

The wire markers shall be of the heat-shrinkable tube type, with custom typed identification numbers.

The wire numbers shall be as indicated on the equipment manufacturer's drawings.

The wire markers shall be positioned to be readily visible for inspection.

1-5.02.02. Conductor Color Coding. Power conductors shall be color coded as indicated below. For conductors 6 AWG and smaller, the color coding shall be the insulation finish color. For sizes larger than 6 AWG, the color coding may be by marking tape. The equipment grounding conductor shall be green or green with one or more yellow stripes if the conductor is insulated.

The following color coding system shall be used:

120/240V single-phase — black, red, and white
120/208V, three-phase — black, red, blue, and white
120/240V, three-phase — black, orange, blue, and white
277/480V, three-phase — brown, orange, yellow, and gray

Where 120/240 and 120/208 volt systems share the same conduit or enclosure, the neutral for either the 120/240 volt system or the 208 volt system shall be white with a permanent identifiable violet stripe.

Control and instrumentation circuit conductors shall be color coded as indicated in the Cable Data Figures at the end of this section.

1-5.03. Motor Starters. Motor starters shall be provided with nameplates identifying the related equipment. Pilot controls and indicating lights shall have engraved or etched legends ("start", "stop", etc.) as indicated on the Drawings. Nameplates shall be laminated black-over-white plastic, with 1/8 inch engraved letters, and shall be securely fastened to the motor starters.

1-5.04. Control Stations. Control stations shall be provided with nameplates identifying the related equipment. Pilot controls and indicating lights shall have engraved or etched legends ("start", "stop", etc.) as indicated on the Drawings. Nameplates shall be laminated black-over-white plastic, with 1/8 inch engraved letters, and shall be securely fastened to the control stations.

1-5.05. Circuit Breakers. Circuit breakers shall be provided with nameplates identifying related equipment. Nameplates shall be laminated black-over-white

plastic, with 1/8 inch engraved letters, and shall be securely fastened to the circuit breakers.

1-5.06. Disconnect Switches. All switches shall have front cover-mounted permanent nameplates that include switch type, manufacturer's name and catalog number, and horsepower rating. An additional nameplate, engraved or etched, laminated black-over-white plastic, with 1/8 inch letters, shall be provided to identify the associated equipment. Both nameplates shall be securely fastened to the enclosure.

1-5.07. Arc Flash Hazard Labels. Lighting panels, power panels, power centers, and meter socket enclosures shall be provided with permanent labels warning the risk of arc flash and shock hazard. Labels shall be designed in accordance with ANSI Z535.4-1998 and shall include the following:

WARNING
Arc Flash and Shock Hazard

Appropriate personal protection equipment (PPE) required. SEE NFPA 70E.
Equipment must be accessed by qualified personnel only.
Turn off all power sources prior to working on or inside equipment.

Additional information shall be provided on the labels where specified in the Arc Flash Hazard Analysis section of this section.

1-6. SUBMITTALS. Complete assembly, foundation, and installation drawings, together with complete engineering data covering the materials used, parts, devices, and accessories forming a part of the work performed by the Contractor, shall be submitted in accordance with the Submittals Procedures section. The drawings and data shall include, but shall not be limited to, the following:

Drawings and data.
Operating manuals.
Samples.

1-6.01. Submittal Identification. Information covering all materials and equipment shall be submitted for review in accordance with the Submittals Procedures section. Each sheet of descriptive literature submitted shall be clearly marked to identify the material or equipment as follows:

a. Lamp fixture descriptive sheets shall show the fixture schedule letter, number, or symbol for which the sheet applies.

b. Equipment and materials descriptive literature and drawings shall show the specification paragraph for which the equipment applies.

c. Sheets or drawings covering more than the item being considered shall have all inapplicable information crossed out.

d. A suitable notation shall identify equipment and materials descriptive literature not readily cross-referenced with the Drawings or Specifications.

e. Schematics and connection diagrams for all electrical equipment shall be submitted for review. A manufacturer's standard connection diagram or schematic showing more than one scheme of connection will not be accepted, unless it is clearly marked to show the intended connections.

f. Surge protective device submittals shall include drawings (including unit dimensions, weights, component and connection locations, mounting provisions, and wiring diagrams), equipment manuals that detail the installation, operation and maintenance instructions for the specified unit(s), and manufacturer's descriptive bulletins and product sheets.

Contractor shall submit the name and qualifications of the Engineering and Testing Services firm proposed to perform the coordination study and the on site testing.

Within 90 days after the Notice to Proceed, Contractor shall furnish a submittal for all types of cable and conduit to be provided. The submittal shall include the cable manufacturer and type, and sufficient data to indicate that the cable and conduit meet the specified requirements.

In addition to the complete specifications and descriptive literature, a sample of the largest size of each type of cable shall be submitted for review before installation. Each sample shall include legible and complete surface printing of the cable identification.

1-6.02. Seismic Design Requirements. Submitted confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

1-7. PROTECTION AND STORAGE. During construction, the insulation on all electrical equipment shall be protected against absorption of moisture, and metallic components shall be protected against corrosion by strip heaters, lamps, or other suitable means. This protection shall be provided immediately upon receipt of the equipment and shall be maintained continuously.

PART 2 - PRODUCTS

2-1. POWER SERVICE ENTRANCE. Not used.

2-2. TELEPHONE SERVICE ENTRANCE. Not used.

2-3. CABLE. All cables of each type (such as lighting cable or 600 volt power cable) shall be from the same manufacturer.

All types of cable shall conform to the Cable Data Figures at the end of this section and as described herein.

2-3.01. Lighting Cable. Lighting cable (Figure 1-16050 THHN-THWN) shall be provided only in lighting and receptacle circuits operating at 277 volts or less. Lighting and receptacle circuits, 8 AWG or larger, shall be as specified for 600 volt (Figure 2-16050 XHHW) power cable.

2-3.02. 600 Volt Power Cable. Cable in power, control, indication, and alarm circuits operating at 600 volts or less, except where lighting, multiconductor control, and instrument cables are required, shall be 600 volt (Figure 2-16050 XHHW-2) power cable.

2-3.03. Instrument Cable. Cable for electronic circuits to instrumentation, metering, and other signaling and control equipment shall be two- or three-conductor instrument cable twisted for magnetic noise rejection and protected from electrostatic noise by a total coverage shield. Types of instrument cables shall be (Figure 4-16050 single pair).

2.3.04. Multiconductor Control Cable. Not used.

2-3.05. Medium Voltage Power Cable. Not used.

2-3.06. Tray Cable. Not used.

2-4. CONDUIT. Conduit and raceways shall be as described in the following paragraphs:

2-4.01. Rigid Steel Conduit. Rigid steel conduit shall be heavy wall, hot-dip galvanized, shall conform to ANSI C80.1, and shall be manufactured in accordance with UL 6.

2-4.02. Intermediate Metal Conduit (IMC). Not used.

2-4.03. Liquidtight Flexible Metal Conduit. Liquidtight flexible metal conduit shall be hot-dip galvanized steel, shall be covered with a moistureproof polyvinyl chloride jacket, and shall be UL labeled.

2-4.04. Utility (PVC) Duct. Not used.

2-4.05. Rigid Nonmetallic (PVC) Conduit. PVC conduit shall be heavy wall, Schedule 40, UL labeled for aboveground and underground uses, and shall conform to NEMA TC-2 and UL 651.

2-4.06. PVC-Coated Rigid Steel Conduit. The conduit shall be rigid steel. Before the PVC coating is applied, the hot-dip galvanized surfaces shall be coated with a primer to obtain a bond between the steel substrate and the coating. The PVC coating shall be bonded to the primed outer surface of the conduit. The bond on conduit and fittings shall be stronger than the tensile strength of the PVC coating. The thickness of the PVC coating shall be at least 40 mils.

A chemically cured two-part urethane coating, at a nominal 2 mil thickness, shall be applied to the interior of all conduit and fittings. The coating shall be sufficiently flexible to permit field bending the conduit without cracking or flaking of the coating.

Every female conduit opening shall have a PVC sleeve extending one conduit diameter or 2 inches, whichever is less, beyond the opening. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit before coating. The wall thickness of the sleeve shall be at least 40 mils.

All fittings, condulets, mounting hardware, and accessories shall be PVC-coated. All hollow conduit fittings shall be coated with the interior urethane coating described above. The screw heads on condulets shall be encapsulated by the manufacturer with a corrosion-resistant material.

PVC coated rigid steel conduit shall be manufactured by Ocal, Perma-Cote, or Robroy.

2-4.07. Electrical Metallic Tubing (EMT). Not used.

2-4.08. Rigid Aluminum Conduit (RAC). Not used.

2-5. WIRING DEVICES, BOXES, AND FITTINGS. Concealed conduit systems shall have flush-mounted switches and convenience outlets. Exposed conduit systems shall have surface-mounted switches and convenience outlets.

2-5.01. Conduit Boxes and Fittings.

a. Galvanized or cadmium plated, threaded, malleable iron boxes and fittings shall be manufactured by Crouse-Hinds, Appleton, or O Z Gedney. In applications utilizing aluminum conduit systems, aluminum boxes and fittings manufactured by Crouse-Hinds, Appleton, or O Z Gedney shall be installed.

b. Rigid PVC device boxes and fittings shall be manufactured by Carlon or Cantex.

c. Sheet steel device boxes shall be manufactured by Appleton, Raco, or Steel City.

d. PVC coated device boxes shall be manufactured by Ocal, Perma-Cote, or Robroy Industries.

e. Hub arrangements on threaded fittings shall be the most appropriate for the conduit arrangement to avoid unnecessary bends and fittings.

2-5.02. Device Plates.

a. Galvanized or cadmium-plated device plates shall be used on surface mounted outlet boxes where weatherproof plates are not required.

b. Device plates on flush mounted outlet boxes where weatherproof plates are not required shall be AISI Type 302 stainless steel, Eagle "93nnn series", Hubbell "S series", or Leviton "840nn-40 series"; nylon or polycarbonate, Eagle "513nV series", Hubbell "Pn series", or Leviton "807nn-I series".

c. Device plate mounting hardware shall be countersunk and finished to match the plate.

d. Device plates for switches outdoors or indicated as weatherproof shall have provisions for padlocking switches "On" and "Off", and shall be Appleton "FSK-1VS", Crouse-Hinds "DS185" or O Z Gedney "FS-1-WSCA".

e. Device plates for receptacles indicated as weatherproof shall be Appleton "FSK-WRD", Crouse-Hinds "WLRD1", or O Z Gedney "FS-1-WDCA.

f. Flush-mounted, weatherproof plates shall be provided with adapter plates, Appleton "FSK-SBA" or Crouse-Hinds "FS031".

g. Device plates for ground fault interrupter receptacles indicated to be weatherproof shall be Appleton "FSK-WGFI", Eagle "966", or O Z Gedney "FS-1-GFCA".

h. Receptacle covers outdoors or otherwise indicated to be weatherproof while in-use shall be die cast aluminum and shall include a padlock eye. Covers for standard convenience outlets shall be Hubbell “WP8M” or Thomas and Betts Red Dot “CKMUV”. Covers for ground fault interrupter receptacles shall be Hubbell “WP26M” or Thomas and Betts Red Dot “CKMUV”.

i. Engraved device plates, where required, shall be manufactured by Leviton, or equal.

j. Device plates on PVC conduit fittings shall be Carlon "E98 Series" or Cantex "513300 Series".

2-5.03. Wall Switches.

a. Switches on ac lighting panel load circuits through 277 volts shall be 20 amperes, 120/277 volts, Eagle "2221V" through "2224V", Hubbell "HBL 1221I" through "HBL 1224I", or Leviton "1221-2I" through "1224-2I".

b. Switches for pulse control of lighting contactors shall be 20 amperes, 120/277 volts, momentary, double-throw, center "Off", Eagle "2220V", Hubbell "1557I" or Leviton "1257-I".

c. Switches on ac lighting panel load circuits through 277 volts in Class I, Division 1 and Division 2, Group D hazardous areas indicated on the Drawings shall be 20 ampere, 120/277 volts. Hazardous area switches shall be factory sealed tumbler switches, Appleton “EDS” or Killark “FXS”.

2-5.04. Receptacles.

a. Standard convenience outlets shall be duplex, three-wire, grounding, 20 amperes, 125 volts, Eagle "5362V", Hubbell "5362I" or Leviton "5362-I" for 120 volt circuits, and 250 volts, Eagle "5462V", Hubbell "5462I" or Leviton "5462-I" for 240 volt circuits.

b. Ground fault circuit interrupter receptacles shall be duplex, 20 amperes, 125 volts, Eagle "GF8300V", Hubbell "GF5362I" or Leviton "7899-I".

c. Welding receptacles shall be 30 amperes, 600 volts, 3 phase, with grounding conductors connected through a fourth pole, Appleton "ACRE3034-100", Crouse-Hinds "AR348" plus "ARRC33" and "AR30" or Leviton " 430MI5W". One matching plug, Appleton "ACP3034BC", Crouse-Hinds "APJ3485" or Leviton "430P5W" with appropriate woven grip and plug cap shall be furnished for the cable size directed by Owner.

d. Welding receptacles shall be 60 amperes, 240 volts, 3 phase, with grounding conductors connected through a fourth pole, Appleton "ACRE6035-150", Crouse-Hinds "AREA6485" or Leviton "460MI9W". One matching plug, Appleton "ACP6034BC", Crouse-Hinds "APJ6485" or Leviton "460P9W" with appropriate woven grip and plug cap, shall be furnished for the cable size

directed by Owner.

e. Receptacles in Class I, Division 1 and Division 2, Group D hazardous areas indicated on the Drawings shall be three-wire, grounding, 20 amperes, 125 volts. Hazardous area receptacles shall be factory sealed, with an integral switch that is only activated when an approved matching plug is fully inserted and rotated into the engaged position. Hazardous area receptacles shall be Appleton “ENR”, Crouse-Hinds “ENR”, or Killark “UGR”.

2-5.05. Special Outlets. Not used.

2-6. JUNCTION BOXES, PULL BOXES, AND WIRING GUTTERS. Indoor boxes (larger than switch, receptacle, or fixture type) and gutters shall be constructed of sheet steel, shall be galvanized after fabrication, and shall be rigidly supported by hot-dip galvanized hardware and framing materials, including nuts and bolts.

Indoor boxes and gutters in corrosive areas indicated on the Drawings and outdoor boxes and gutters shall be NEMA Type 4X, ABS or stainless steel and shall be rigidly supported by PVC-coated or stainless steel framing materials. Mounting hardware, which includes nuts, bolts, and anchors, shall be stainless steel. All damaged coatings shall be repaired according to the manufacturer's instructions.

Bolt-on junction box covers 3 feet square or larger, or heavier than 25 lbs, shall have rigid handles. Covers larger than 3 by 4 feet shall be split.

Where indicated on the Drawings, junction and pull boxes with a removable side opposite the underground conduits shall be provided over building ends of underground conduit banks. Boxes shall be sized in accordance with the National Electrical Code, including space for full size continuations of all underground conduits not originally continued. Conduit arrangement shall leave maximum space for future conduits.

2-7. LIGHTING FIXTURES. Lighting fixtures shall be furnished as described in the fixture schedule and as indicated on the Drawings. Lighting fixtures shall be furnished complete with lamps. Pendant fixtures shall have swivel type box covers and threaded conduit pendants unless otherwise specified. Lighting fixtures shall be provided with disconnects in accordance with NEC requirements.

2-7.01. Electronic Ballasts. Electronic ballasts furnished with fluorescent type lighting fixtures shall be CBM certified as meeting requirements of ANSI C82.11 with a THD level of not more than 20 percent.

2-8. LIGHTING PANELS. Not used.

2-9. POWER PANELS. Unless otherwise specified, each power panel, without a neutral, shall be dead-front, 3 phase panelboard with circuit breakers, in accordance with the Drawings and the following:

2-9.01. Cabinet. The panel shall have a flush-mounted or surface-mounted enclosure with a NEMA designation appropriate for the location where it will be installed. The enclosure shall have a door with latch and lock. At the completion of the Contract, a neatly printed or typed directory listing the panel and circuit identities shall be mounted inside the door.

2-9.02. Circuit Breakers. Circuit breakers shall be thermal-magnetic, bolt-in, individually front replaceable, and shall indicate "On", "Off", and "Tripped". Breakers indicated as multiple-pole shall be common trip type. Breakers up to 240 volts shall have interrupting ratings not less than 65,000 amperes. Breakers for 277 volts shall have interrupting ratings not less than 65,000 amperes. Breakers for 480 volts shall be rated 600 volts, with interrupting ratings not less than 65,000 amperes at 480 volts. Handle clips to prevent casual operation of breakers shall be provided for 10 percent (at least two) of the breakers and applied to the circuits directed.

2-9.03. Buses. The panel shall have 3 phase buses and a ground bus. Buses shall be copper, with ampere and voltage ratings and main lugs or breakers as indicated. The ground bus shall be similar to a neutral bus and shall have a good ground connection to the cabinet, clamp type lugs for the ground cable in each supply conduit, and connections for a ground cable in each load conduit.

2-10. SURGE PROTECTIVE DEVICES.

2-10.01. Scope. Surge protective devices (SPD) shall be provided as specified herein and as indicated on the Drawings. Each unit shall be designed for parallel connection to the wiring system and shall utilize non-linear voltage-dependent metal oxide varistors (MOV) in parallel.

Each SPD shall be furnished and installed for the electrical equipment indicated on the Drawings or as specified herein. All new lighting and power panels shall be furnished with an integral SPD.

Lighting panels shall be rated for the low exposure level capacity unless otherwise noted.

Power panels shall have SPD’s rated for a medium-high exposure levels.

2-10.02. Standards. The specified unit shall be designed, manufactured, tested and installed in compliance with the following standards:

ANSI/IEEE C62.41 and C62.45;

ANSI/IEEE C62.1 and C62.11;

National Electrical Manufacturers Association (NEMA LS1 Guidelines);

National Fire Protection Association (NFPA 20, 70 [NEC], 75, and 780);

Underwriters Laboratories UL 1449 Third Edition and 1283

The unit shall be UL 1449 Third Edition Listed as a Type 2 Surge Protective Device and UL 1283 Listed as an Electromagnetic Interference (EMI) Filter.

2-10.03. Environmental Requirements.

a. Operating Temperature: 0°F to +140°F.

b. Relative Humidity: Reliable operation with 5 percent to 95 percent non-condensing.

2-10.04. Electrical Requirements.

a. Unit Operating Voltage. The nominal unit operating voltage and configuration shall be as indicated on the Drawings.

b. Maximum Continuous Operating Voltage (MCOV). The SPD shall be designed to withstand a MCOV of not less than 115 percent of nominal RMS voltage.

c. Operating Frequency. Operating frequency range shall be 47 to 63 Hertz.

d. Protection Modes. Four-wire configured systems shall provide, Line-to-Neutral (L-N), Line-to-Ground (L-G), and Neutral-to-Ground (N-G), and Line-to-Line (L-L) protection. Three-wire configured systems shall provide, Line-to-Line (L-L) protection and Line-to-Ground (L-G) protection.

e. Rated Single Pulse Surge Current Capacity. The rated single pulse surge current capacity, in amps, for each mode of protection of the unit shall be as required and shall be no less than listed in the following table.

	L-N	L-G	N-G	L-L
High Exposure Level	120 kA	120 kA	120 kA	120 kA
Medium-High Exposure Level	100 kA	100 kA	100 kA	100 kA
Medium Exposure Level	80 kA	80 kA	80 kA	80 kA
Low Exposure Level	60 kA	60 kA	40 kA	60 kA

f. UL 1449 Third Edition Voltage Protection Rating (VPR). The maximum VPR per mode for the device (inclusive of disconnect) shall be as

required and shall not exceed the following:

Voltage	L-N	L-G	N-G	L-L
480 V 3W		1200 V		2000 V

g. Noise Attenuation. The unit shall be capable of a minimum -30 dB attenuation at 100kHz when tested per the 50 ohm insertion loss method as defined by MIL-STD-220A.

h. Nominal Discharge Current. Each SPD shall have a nominal discharge current rating of 20 kA.

i. Overcurrent Protection. At high and medium-high exposure levels, the SPD shall incorporate internal fusing capable of interrupting, at minimum, up to 200 kA symmetrical fault current with 600 volts ac applied.

At medium and low exposure levels, the SPD shall incorporate internal fusing capable of interrupting, at minimum, up to 65kA symmetrical fault current with 600 volts ac applied.

The device shall be capable of allowing passage of the rated maximum surge current for every mode without fuse operation.

j. Unit Status Indicators. The unit shall include long-life, externally visible phase indicators that monitor the on-line status of the unit. When furnished integral to the panelboard, the status indicators shall be viewable through a clear window within the panelboard door, or similar provision made to ensure visibility with the door closed.

2-10.05. Warranty. The manufacturer shall provide a minimum Five Year Limited Warranty from date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

2-10.06. Installation. Each SPD shall be installed according to the manufacturer’s recommendations. If possible for the integral units, provide direct bus connections.

2-10.07. Options.

a. Disconnect Switch. Each SPD shall be furnished with an integral disconnect switch. The unit shall be UL 1449 Third Edition listed as such, and the UL 1449 Third Edition Voltage Protection Ratings shall be provided. The disconnect switch shall be fused and capable of withstanding, without failure, the published maximum surge current magnitude without failure or damage to the switch.

b. Enclosure. Not used.

c. Dual Form "C" Dry Contacts. Not used.

2-10.08. Acceptable Manufacturers. Integral SPD's shall be manufactured by Cutler-Hammer, General Electric, Siemens Energy & Automation, or Square D. External SPD's shall be manufactured by Cutler-Hammer, General Electric, Siemens Energy & Automation, Square D, or Current Technology. The products of other manufacturers will not be acceptable.

2-11. SEPARATELY ENCLOSED MOTOR STARTERS. Separately enclosed motor starters, unless otherwise specified, shall be full voltage, magnetic, nonreversing and NEMA rated. The starter enclosures shall have NEMA type designations appropriate for the locations where they will be installed. Unless otherwise noted, NEMA Type 4X stainless steel enclosures shall be provided for outdoor locations.

One thermal overload relay shall be provided in each phase lead. Each starter shall be provided with an external, manually reset push button for resetting the thermal overload relays.

Each starter shall include auxiliary contacts as required, plus one spare NO and one spare NC contact.

Contractor shall match the sizes of control power transformers, overload devices, heaters, and starters to the equipment furnished, as they may differ from the values indicated on the Drawings. Control power transformers shall have both primary leads fused, one secondary lead fused, and one secondary lead grounded.

All starters shall be provided with control terminal blocks. Terminal blocks shall be pull-apart type rated 20 amperes. All current carrying parts shall be tin-plated. The removable portion of the terminal blocks shall be used for factory installed wiring.

All push buttons, selector switches, and pilot lights indicated on the schematics to be provided on or in the starter enclosure shall be 30.5 mm heavy-duty, oiltight construction. Pilot lights shall be full voltage type with LED lamps. Push buttons on starters located outdoors shall be provided with protective caps.

2-11.01. Three Phase Starters. Three phase starters shall be circuit breaker combination type consisting of 3 phase, 60 Hz contactors with thermal overloads, a 120 volt ac coil, a dry type control power transformer where required, and a circuit breaker disconnect. Control power transformers shall be sized to handle all simultaneous loads. Starters shall be at least NEMA Size 1, or shall be sized as indicated on the Drawings.

Circuit breakers shall be 600 volt magnetic motor circuit protectors for motors smaller than 100 horsepower and 600 volt thermal-magnetic type for 100 horsepower and larger motors. Each breaker shall be manually operated with a quick-make, quick-break, trip-free toggle mechanism.

Three phase starters shall be furnished with external manual breaker operating handles and provisions for up to three padlocks. The access door shall be interlocked with the motor circuit protector, so that the door cannot be opened, except by an interlock override, while the breaker is closed.

The complete 3 phase starter shall have an interrupting rating of at least 14,000 amperes at 480 volts.

2-11.02. Single Phase Starters. Single phase starters shall consist of single phase, 60 Hz contactors with thermal overloads and an integral or separately enclosed short-circuit protection device. Starters shall be at least NEMA Size 0, or shall be sized as indicated on the Drawings. Integral short-circuit protection devices for single-phase starters shall be 120/240 volt, magnetic motor circuit protectors.

Separately enclosed short-circuit protection devices for single phase starters shall be molded-case circuit breakers for motor loads 6 amperes and higher and fused switch disconnects for motor loads lower than 6 amperes. Circuit breaker disconnects shall be 120/240 volt, molded-case, thermal-magnetic circuit breakers. Fused switch disconnects shall have quick-make, quick-break mechanisms and 250 volt, dual-element, time-delay fuses.

The short-circuit protection devices shall have external operating handles capable of being padlocked in the open position, and shall have an interrupting rating of at least 10,000 amperes at 240 volts.

2-11.03. Motor Current Relays. As indicated on the drawings, a motor current sensing relay shall be provided on all starters for all HVAC ventilation equipment required for NFPA 820 ventilation requirements. Motor current relays shall be rated for 600V alternating current applications. Current sensing range and CT window sizing shall be coordinated with the respective motor full load amperage to get reliable relay contact closure when the motor is running.

2-12. SEPARATELY ENCLOSED MANUAL STARTERS. Not used.

2-13. CONTROL STATIONS. Control stations shall be provided as indicated on the one-line diagrams or schematics or as required by the equipment furnished. Pilot devices shall be 30.5 mm heavy-duty, oiltight construction, and shall perform the functions indicated. Pilot lights shall be full voltage type with LED lamps. Indoor control stations shall have NEMA Type 13 enclosures. Control stations outdoors or indicated to be weatherproof shall have NEMA Type 4X

stainless steel enclosures with protective caps on the control devices. Control stations in NEC Class I, Division 1 and Division 2, Group D hazardous areas shall have NEMA Type 7 enclosures, or be factory sealed type, Appleton “Contender Series” or Killark “Seal-X Series”.

2-14. SEPARATELY ENCLOSED CIRCUIT BREAKERS. Not used.

2-15. DISCONNECT SWITCHES. Unless otherwise specified, each disconnect switch shall be 3 pole, nonfusible, 600 volts, with a continuous current rating as indicated on the Drawings.

Switches located indoors shall have NEMA type enclosure designations as required by the locations where they will be installed. Switches located outdoors shall have NEMA Type 4X enclosures. Switches in chlorine rooms, or in other areas where contact with caustic substances may occur, shall have NEMA Type 4X enclosures of molded reinforced polyester.

Switches shall have high conductivity copper, visible blades; nonteasible, positive, quick-make, quick-break mechanisms; and switch assembly plus operating handle as an integral part of the enclosure base. Each switch shall have a handle whose position is easily recognizable and which can be locked in the "Off" position with three padlocks. The "On" and "Off" positions shall be clearly marked.

All switches shall be UL listed and horsepower [kilowatt] rated, and shall meet the latest edition of NEMA KS1. Switches shall have defeatable door interlocks that prevent the door from being opened while the operating handle is in the "On" position.

2-16. LIGHTING AND AUXILIARY POWER TRANSFORMERS. Not used.

2-17. POWER CENTERS. Not used.

2-18. POWER FACTOR CORRECTION CAPACITORS. Not used.

2-19. LIGHTING CONTACTORS. Not Used.

2-20. PHOTOELECTRIC CONTROLS. Not Used.

2-21. RELAY ENCLOSURES. Not used.

2-22. ALARM HORN AND BEACON. Not used.

2-23. HEAT-TRACED PIPING. Outdoor exposed piping associated with the Odor Control Pad and Screenings Structure shall be heat-traced as indicated on the HVAC and electrical Drawings and as described herein. Heat tracing shall be

sized to maintain pipe temperatures at 40°F with an outdoor ambient temperature of -20°F. Heat tracing shall be of the self-regulating type and shall be suitable for single-phase, 120 volt service.

A single heat trace control panel shall be furnished that will power and control each run of heat trace tape as indicated on the drawings or as required by the system supplier. Each heat trace circuit shall be GFI protected by the heat trace control panel. Power supply to the heat trace control panel shall be 120 volt single phase 20 amp circuit. If the power supply is required to be larger the contractor shall make all required changes to the power supply circuit.

Each run of heat tracing tape shall be provided with a circuit controller, an end-of-line indicating light, junction boxes, mounting accessories, insulation and all other equipment for a complete, properly operating system. All heat trace components and accessories shall be rated for installation into a Class I Division 2 area as indicated on the drawings. The insulation for all heat tracing shall be as specified in Mechanical Insulation section. Each heat-tracing circuit shall be provided with a microprocessor-based circuit controller to monitor temperature and ground fault current. The controller shall be Chromalox “IntelliTrace Controls Series”, Nelson “CM Series”, Thermon “TC Series”, Tyco Thermal Controls "DigiTrace 910", or equal. On all plastic pipe equipped with heat tracing, a layer of conducting tape shall be installed on the pipe before heating cable installation and then again following installation of the heating cable.

2-24. EXISTING MCC-1 BREAKER. Control center disconnects shall be three pole, single-throw, 600 volt, molded-case air circuit breakers. Feeder circuit breakers shall be thermal-magnetic type and shall be manually operated, with quick-make, quick-break, trip-free toggle mechanism. Bimetallic thermal elements shall withstand sustained overloads and short-circuit currents without injury and without affecting calibration. Thermal elements shall trip the breaker at 125 percent of trip rating. Circuit breaker shall have an interrupting rating not less than 65,000 amperes.

The ampere rating of the trip unit shall be as indicated on the Drawings. The trip unit shall have adjustable settings for continuous amperes, and short-time pickup. The trip unit shall be provided with additional short delay trip time adjustment for better system coordination.

PART 3 - EXECUTION

3-1. INSTALLATION, TESTING, AND COMMISSIONING. All material, equipment, and components specified herein shall be installed, tested, and commissioned for operation in compliance with NECA 1000 – NEIS Specification System. Where required in NECA 1000, testing and commissioning procedures shall be followed prior to energizing equipment.

3-2. ARC FLASH HAZARD ANALYSIS. Contractor shall commission an Arc Flash Hazard Analysis for all new and modified equipment within this contract in accordance with OSHA 29 CFR Part 1910, NEC, NFPA 70E, and IEEE 1584 and shall submit an Arc Flash Hazard Analysis report as specified herein.

The Arc Flash Hazard Analysis shall be performed in association with, or as a continuation of, the short circuit study and protective-device coordination study.

Arc Flash Hazard Analysis calculations shall lead to a selection of a level of Personal Protective Equipment (PPE) that is a balance between the calculated incident energy exposure and the work activity being performed, while meeting the following concerns:

Provide adequate protection.

Avoid the need for more protection than is warranted.

Results of the Arc Flash Hazard Analysis shall be used to identify the flash-protection boundary and the incident energy at assigned working distances throughout any position or level in the overall electrical generation, transmission, distribution, or utilization system.

The analysis shall include, but shall not be limited to, the following:

A tabulation of the symmetrical RMS bolted fault current available and X/R ratio at each piece of electrical equipment.

A tabulation of the arc fault current available at each piece of electrical equipment.

A list containing the incident energy and the flash-protection boundary for all electrical equipment.

A list containing each piece of electrical equipment, its corresponding incident energy, hazard rating, and the required Personal Protective Equipment.

An Engineering and Testing Services firm acceptable to Engineer shall conduct the Arc Flash Hazard Analysis.

3-2.01. Arc Flash Analysis Software. The Arc Flash Hazard Analysis shall be performed using the latest version of SKM Power*Tools for Windows software, without exception. After the final version of the study and analysis are completed and accepted, Contractor shall provide two (2) copies of the SKM electronic file to Owner.

3-2.02. Arc Flash Hazard Report.

Contractor shall be responsible for submitting complete and accurate arc flash analysis information in the Arc Flash Hazard Report. The report shall be submitted to Engineer for review before the final report is prepared. Contractor shall ensure that calculated values for flash-protection boundary, working distance, incident energy, and required Personal Protective Equipment is submitted and provide substantiation that the information will be prominently displayed on electrical equipment.

The Arc Flash Hazard Analysis report shall be bound in a standard 8-1/2 by 11 inch three-ring binder and shall be submitted in accordance with the Submittals section. Final selection of required Personal Protective Equipment shall be subject to review and acceptance by Engineer.

3-2.03. Arc Flash Labeling. After approval of the Arc Flash Hazard Report, Contractor shall furnish and install arc flash warning labels on the applicable electrical equipment. All electrical equipment shall be provided with the appropriate ANSI compliant arc flash labeling. Labels shall include the flash protection boundary distance, incident energy, and minimum required Personal Protective Equipment.

3-3. COORDINATION STUDY. Contractor shall commission a short circuit study and protective-device coordination study of relays, fuses, circuit breakers, and all other protective devices and shall submit a coordination report as specified herein. The study shall include the entire distribution system, or the portion of the system indicated as required, starting with the smallest – 480 volt, 3 phase, 60 Hz – circuit protective device on the load end, to the nearest protective device on the power company's line side.

Contractor shall be responsible for and shall ensure that all relays and circuit breakers are set according to the study results.

The study shall include, but shall not be limited to, the following:

3-4. POWER AND SERVICE ENTRANCE INSTALLATION. Not used.

3-5. TELEPHONE SERVICE ENTRANCE INSTALLATION. Not used.

3-6. CABLE INSTALLATION.

3-6.01. General. Except as otherwise specified or indicated on the Drawings, cable shall be installed according to the following procedures, taking care to protect the cable and to avoid kinking the conductors, cutting or puncturing the jacket, contamination by oil or grease, or any other damage. Circuits to supply electric power and control to equipment and devices, communication and signal circuits as indicated on the one-line diagrams shall be installed continuous and may not be spliced unless approved by the Engineer.

a. Stranded conductor cable shall be terminated by lugs or pressure type connectors. Wrapping stranded cables around screw type terminals is not acceptable.

b. Stranded conductor cable shall be spliced by crimp type connectors. Twist-on wire connectors may be used for splicing solid cable and for terminations at lighting fixtures.

c. Splices may be made only at readily accessible locations.

d. Cable terminations and splices shall be made as recommended by the cable manufacturer for the particular cable and service conditions. All shielded cable stress cone terminations shall be IEEE Class 1 molded rubber type. Shielded cable splices shall be tape or molded rubber type as required. Shielded cable splices and stress cone terminations shall be made by qualified splicers. Materials shall be by 3M Company, Plymouth/Bishop, or Raychem Electric Power Products.

e. Cable shall not be pulled tight against bushings nor pressed heavily against enclosures.

f. Cable-pulling lubricant shall be compatible with all cable jackets; shall not contain wax, grease, or silicone; and shall be Polywater "Type J".

g. Cables operating at more than 2000 volts shall be fireproofed in all cable vaults, manholes, and handholes. Fireproofing shall be applied with a half-lapped layer of 3M "Scotch 77 Arc-Proofing Tape", anchored at each end with a double wrap of 3M "Scotch 69 Glass Cloth Tape" or with equivalent tape by Anixter or Plymouth/Bishop.

h. Where necessary to prevent heavy loading on cable connections, in vertical risers, the cable shall be supported by Kellems, or equal, woven grips.

i. Spare cable ends shall be taped, coiled, and identified.

j. Cables shall not be bent to a radius less than the minimum recommended by the manufacturer. For cables rated higher than 600 volts, the minimum radius shall be 8 diameters for nonshielded cable and 12 diameters for shielded cable.

k. All cables in one conduit, over 1 foot long, or with any bends, shall be pulled in or out simultaneously.

l. Circuits to supply electric power and control to equipment and devices are indicated on the one-line diagrams. Conductors in designated numbers and sizes shall be installed in conduit of designated size. Circuits shall not be combined to reduce conduit requirements unless acceptable to Engineer.

3-6.02. Underground Cable Pulling Procedure. Not used.

3-6.03. Cable Insulation Test. Not used.

3-7. CONDUIT INSTALLATION. Contractor shall be responsible for routing all conduits. This shall include all conduits indicated on the one-lines, riser diagrams, and home-runs shown on the plan Drawings. Conduits shall be routed as defined in these Specifications. Where conduit routing is shown on plans, it shall be considered a general guideline and shall be field verified to avoid interferences.

Except as otherwise specified or indicated on the Drawings, conduit installation and identification shall be completed according to the following procedures.

3-7.01. Installation of Interior and Exposed Exterior Conduit. This section covers the installation of conduit inside structures, above and below grade, and in exposed outdoor locations. In general, conduit inside structures shall be concealed. Large conduit and conduit stubs may be exposed unless otherwise specified or indicated on the Drawings. No conduit shall be exposed in water chambers unless so indicated on the Drawings.

Unless otherwise indicated on the Drawings, Contractor shall be responsible for routing the conduit to meet the following installation requirements:

a. Conduit installed in all exposed indoor locations, except corrosive areas indicated on the Drawings, and in floor slabs, walls, and ceilings of hazardous (classified) locations, shall be rigid steel. Exposed conduit shall be rigidly supported by hot-dip galvanized hardware and framing materials, including nuts and bolts.

b. Conduit installed in floor slabs and walls in non-hazardous locations shall be rigid Schedule 40 PVC.

c. Conduit installed in all exposed outdoor locations shall be PVC-coated rigid steel, rigidly supported by PVC-coated framing

materials. Mounting hardware, which includes nuts, bolts, and anchors, shall be stainless steel. All damaged coatings shall be repaired according to the manufacturer's instructions.

d. Final connections to dry type transformers, to motors without flexible cords, and to other equipment with rotating or moving parts shall be liquidtight flexible metal conduit with watertight connectors installed without sharp bends and in the minimum lengths required for the application, but not longer than 6 feet unless otherwise acceptable to Engineer.

e. Terminations and connections of rigid steel conduit shall be taper threaded. Conduits shall be reamed free of burrs and shall be terminated with conduit bushings.

f. Exposed conduit shall be installed either parallel or perpendicular to structural members and surfaces.

g. Two or more conduits in the same general routing shall be parallel, with symmetrical bends.

h. Conduits shall be at least 6 inches from high temperature piping, ducts, and flues.

i. Conduit installed in corrosive chemical feed and storage areas as indicated by Area Type on the Drawings shall be rigid Schedule 40 PVC.

j. Rigid Schedule 40 PVC conduit shall have supports and provisions for expansion as required by NEC Article 352.

k. Metallic conduit connections to sheet metal enclosures shall be securely fastened by locknuts inside and outside.

l. Rigid Schedule 40 PVC conduit shall be secured to sheet metal device boxes using a male terminal adapter with a locknut inside or by using a box adapter inserted through the knockout and cemented into a coupling.

m. Conduits in walls or slabs, which have reinforcement in both faces, shall be installed between the reinforcing steel. In slabs with only a single layer of reinforcing steel, conduits shall be placed under the reinforcement. Conduits larger than 1/3 of the slab thickness shall be concrete encased under the slab.

n. Conduits that cross structural joints where structural movement is allowed shall be fitted with concretetight and watertight expansion/deflection couplings, suitable for use with metallic conduits and rigid Schedule 40 PVC conduits. The couplings shall be Appleton Type DF, Crouse-Hinds Type XD, or O-Z Type DX.

o. Conduit shall be clear of structural openings and indicated future

openings.

p. Conduits through roofs or metal walls shall be flashed and sealed watertight.

q. Conduit installed through any openings cut into non-fire rated concrete or masonry structure elements shall be neatly grouted. Conduit penetrations of fire rated structure elements shall be sealed in a manner that maintains the fire rating.

r. Conduits shall be capped during construction to prevent entrance of dirt, trash, and water.

s. Exposed conduit stubs for future use shall be terminated with galvanized pipe caps.

t. Concealed conduit for future use shall be terminated in equipment or fitted with couplings plugged flush with structural surfaces.

u. Where the Drawings indicate future duplication of equipment wired hereunder, concealed portions of conduits for future equipment shall be provided.

v. Horizontal conduit shall be installed to allow at least 7 feet of headroom, except along structures, piping, and equipment or in other areas where headroom cannot be maintained.

w. Conduit shall not be routed across the surface of a floor, roof, or walkway unless approved by Engineer.

x. PVC-coated rigid steel conduit shall be threaded and installed as recommended by the conduit manufacturer's installation procedure using appropriate tools.

y. All conduits that enter enclosures shall be terminated with acceptable fittings that will not affect the NEMA rating of the enclosure.

z. Nonmetallic conduit, which turns out of concrete slabs or walls, shall be connected to a 90 degree elbow of PVC-coated rigid steel conduit before it emerges. Conduits shall have PVC-coated rigid steel coupling embedded a minimum of 3 inches when emerging from slabs or walls and the coupling shall extend 2 inches from the wall.

ab. Power conductors to and from adjustable frequency drives shall be installed in steel conduit.

3-7.02. Underground Conduit Installation. All excavation, backfilling, and concrete work shall conform to the respective sections of these Specifications. Underground conduit shall conform to the following requirements:

a. All underground conduits shall be concrete encased unless

indicated otherwise on the Drawings. Concrete encasement within 15 feet of building entrances, under and within 5 feet of roadways, and within 10 feet of indicated future excavations shall be reinforced as detailed on the Drawings.

b. Concrete encased conduit shall be schedule 40 PVC. Conduits shall have PVC-coated rigid steel coupling embedded a minimum of 3 inches when emerging from walls and the coupling shall extend 2 inches from the wall. All PVC joints shall be solvent welded in accordance with the recommendations of the manufacturer.

c. Concrete encasement on exposed outdoor conduit risers shall continue to 6 inches above grade, with top crowned and edges chamfered.

d. Conduit and concrete encasement installed underground for future extension shall be terminated flush at the bulkhead with a coupling and a screw plug. The termination of the duct bank shall be reinforced with bars 100 diameters long that shall be terminated 2 inches from the bulkhead. Matching splice bars shall be 50 bar diameters long. Each longitudinal bar shall be provided with a Lenton "Form Saver" coupler and plate or a Dayton "Superior DBR" coupler at the bulkhead. The coupler shall be threaded to accept a dowel of like diameter in the future. Threads shall be protected with screw-in plastic caps. A 1-3/4 by 3/4 inch deep horizontal shear key shall be formed in the concrete encasement above and below the embedded conduits. After concrete placement, conduit and bar connector ends shall be cleaned and coated with two coats of thixotropic coal tar.

e. Underground conduits indicated not to be concrete encased shall be rigid Schedule 40 PVC.

f. Underground conduit bend radius shall be at least 2 feet at vertical risers and at least 3 feet elsewhere.

g. Underground conduits and conduit banks shall have at least 2 feet of earth cover, except where indicated otherwise.

h. Underground conduit banks through building walls shall be cast in place, or concreted into boxouts, with water stops on all sides of the boxout. Water stops are specified in the Cast-In-Place Concrete section.

i. Underground nonmetallic conduits, which turn out of concrete or earth in outdoor locations, shall be connected to 90 degree elbows of PVC-coated rigid steel conduit before they emerge.

j. Conduits not encased in concrete and passing through walls, which have one side in contact with earth, shall be sealed

watertight with special rubber-gasketed sleeve and joint assemblies or with sleeves and modular rubber sealing elements.

k. Underground conduits shall be sloped to drain from buildings to manholes.

l. Each 5 kV or higher voltage cable, each 250 kcmil or larger cable, and each conduit group of smaller cables shall be supported from manhole walls by Kindorf "D-990" or Unistrut "P-3259" inserts, with Kindorf "F-721-24" or Unistrut "P-2544" brackets and Unistrut "P1753" or "P1754" fiberglass reinforced polyester cable saddles.

m. Telephone cables shall not be installed in raceways, conduits, boxes, manholes, or handholes containing other types of circuits.

n. Intercommunication and instrument cables shall be separated the maximum possible distance from all power wiring in pull-boxes, manholes, and handholes.

3-7.03. Sealing of Conduits. After cable has been installed and connected, conduit ends shall be sealed by forcing nonhardening sealing compound into the conduits to a depth at least equal to the conduit diameter. This method shall be used for sealing all conduits at handholes, manholes, and building entrance junction boxes, and for 1 inch and larger conduit connections to equipment.

Conduits entering chlorine feed and storage rooms shall be sealed in a junction box or conduit body adjacent to the point of entrance.

Conduits entering hazardous (classified) areas and submersible or explosion proof enclosures shall have Appleton "Type ESU" or Crouse-Hinds "EYS" sealing fittings with sealing compound.

3-7.04. Reuse of Existing Conduits. Existing conduits shall not be reused.

3-8. WIRING DEVICES, BOXES, AND FITTINGS INSTALLATION. Metallic and nonmetallic conduit boxes and fittings shall be installed in the following locations:

3-8.01. Conduit Boxes and Fittings.

a. Galvanized or cadmium plated, threaded, malleable iron boxes and fittings shall be installed in concrete walls, ceilings, and floors; in the outdoor faces of masonry walls; and in all locations where weatherproof device covers are required. These boxes and fittings shall also be installed in exposed rigid steel and intermediate metal conduit systems.

b. Galvanized or cadmium plated sheet steel boxes shall be installed in the indoor faces of masonry walls, in interior partition

walls, and in joist supported ceilings.

c. Rigid PVC device boxes shall be installed in exposed nonmetallic conduit systems.

d. PVC coated boxes and fittings shall be installed in PVC coated conduit systems.

e. Telephone conduit shall be provided with separate junction boxes and pull fittings.

3-8.02. Device Plates. Oversized plates shall be installed where standard-sized plates do not fully cover the wall opening.

3-8.03. Wall Switches.

a. Wall switches shall be mounted 3'-6" above floor or grade.

b. After circuits are energized, all wall switches shall be tested for proper operation.

3-8.04. Receptacles.

a. Convenience outlets shall be 18 inches above the floor unless otherwise required.

b. Convenience outlets outdoors and in garages; in basements, shops, storerooms, and rooms where equipment may be hosed down; shall be 4 feet above floor or grade.

c. Welding receptacles shall be surface-mounted 4 feet above the floor.

d. After circuits are energized, each receptacle shall be tested for correct polarity and each GFCI receptacle shall be tested for proper operation.

e. Conduit and wire for convenience outlet installation is not shown on the Drawings and shall be sized, furnished, and installed by Contractor. Conductors shall be minimum 12 AWG and conduit shall be minimum 3/4 inch for convenience outlet installation.

3-8.05. Special Outlets.

a. Wall thermostats shall be 4'-6" above the floor unless otherwise required. Thermostats on exterior walls shall be suitably insulated from wall temperature.

b. Not Used.

c. Not Used.

d. Horns and strobe lights for audio/visual alarms shall be mounted a minimum of 8 feet above finished floor and shall be positioned to provide maximum penetration of the surrounding area.

3-9. EQUIPMENT INSTALLATION. Except as otherwise specified or indicated on the Drawings, the following procedures shall be used in performing electrical work.

3-9.01. Setting of Equipment. All equipment, boxes, and gutters shall be installed level and plumb. Boxes, equipment enclosures, metal raceways, and similar items mounted on water or earth-bearing walls shall be separated from the wall by at least 1/4 inch thick corrosion-resistant spacers. Where boxes, enclosures, and raceways are installed at locations where walls are not suitable or available for mounting, concrete equipment pads, framing material, and associated hardware shall be provided.

3-9.02. Sealing of Equipment. All outdoor substation, switchgear, motor control center, and similar equipment shall be permanently sealed at the base, and all openings into equipment shall be screened or sealed with concrete grout to keep out rodents and insects the size of wasps and mud daubers. Small cracks and openings shall be sealed from inside with silicone sealant, Dow-Corning "795" or General Electric "SCS1200".

3-10. GROUNDING.

3-10.01. General. The electrical system and equipment shall be grounded in compliance with the National Electrical Code and the following requirements:

a. All ground conductors shall be at least 12 AWG soft drawn copper cable or bar, bare or green-insulated in accordance with the National Electrical Code.

b. Ground cable splices and joints, ground rod connections, and equipment bonding connections shall meet the requirements of IEEE 837, and shall be exothermic weld connections or irreversible high-compression connections, Cadweld "Exothermic" or Burndy "Hyground". Mechanical connectors will not be acceptable. Cable connections to bus bars shall be made with high-compression two-hole lugs.

c. Ground cable through exterior building walls shall enter within 3 feet below finished grade and shall be provided with a water stop. Unless otherwise indicated, installation of the water stop shall include filling the space between the strands with solder and soldering a 12 inch copper disc over the cable.

d. Ground cable near the base of a structure shall be installed in earth and as far from the structure as the excavation permits, but not closer than 24 inches. The tops of ground rods and ground cable interconnecting ground rods shall be buried a minimum of 30 inches below grade, or below the frost line, whichever is deeper.

e. All powered equipment, including lighting fixtures and receptacles, shall be grounded by a copper ground conductor in addition to the conduit connection.

f. Ground connections to equipment and ground buses shall be made with copper or high conductivity copper alloy ground lugs or clamps. Connections to enclosures not provided with ground buses or ground terminals shall be made with irreversible high-compression type lugs inserted under permanent assembly bolts or under new bolts drilled and inserted through enclosures, other than explosion proof enclosures, or by grounding locknuts or bushings. Ground cable connections to anchor bolts; against gaskets, paint, or varnish; or on bolts holding removable access covers will not be acceptable.

g. The grounding system shall be bonded to the station piping by connecting to the first flange inside the building, on either a suction or discharge pipe, with a copper bar or strap. The flange shall be drilled and tapped to provide a bolted connection.

h. Ground conductors shall be routed as directly as possible, avoiding unnecessary bends. Ground conductor installations for equipment ground connections to the grounding system shall have turns with minimum bend radii of 12 inches.

i. Ground rods not described elsewhere shall be a minimum of 3/4 inch in diameter by 10 feet long, with a copper jacket bonded to a steel core.

j. Test wells and covers for non-traffic areas shall be molded high density polyethylene. Test wells for traffic areas shall be precast concrete construction rated for traffic duty with concrete or cast iron covers.

3-10.02. Grounding System Resistance. The grounding system design depicted on the Contract Drawings is the minimum design required for each building or structure. Each system shall comply with the maximum resistance of 25 ohms to ground. Contractor shall confirm the system grounding resistance with the results of the testing specified herein. Systems exceeding the maximum resistance specified shall be supplemented with additional grounding provisions and retested until the maximum specified resistance is achieved.

3-10.03. Grounding System Testing. The grounding system of each new building or structure and each existing building or structure indicated below, shall be tested to determine the resistance to earth. Testing shall be performed by an independent electrical or grounding system testing organization. Testing shall be completed after not less than three full days without precipitation and without any other moistening or chemical treatment of the soil.

3-10.03.01. New Grounding Systems. Grounding systems of each new building or structure shall be tested for resistance to earth utilizing the three-point fall of potential test as defined by IEEE 81. Testing shall be completed prior to installation of the electrical distribution equipment to ensure the grounding system is isolated from the utility grounding system and the systems of other structures. The current source probe for the test shall be placed in soil at a distance of 5 to 10 times the distance of the widest measurement across the grounding system ring or grid to ensure adequate measurements outside of the grounding system's sphere of influence. Test probe measurements shall be taken at a distance of one foot from the grounding system reference connection and at each 10 percent increment from the grounding system reference connection to the current source probe location. Test results shall be documented on a graphical plot with resistance in ohms on the vertical axis and distance in feet on the horizontal axis. The results shall clearly indicate a system resistance plateau which confirms a valid test procedure.

3.10.03.02. Existing Grounding Systems. Not used.

3.10.03.03. Grounding System Test Report. A report certified by the testing organization shall be prepared and submitted in accordance with the Submittals section. The final report shall include complete testing results for each building or structure, graphical representation of the test point results for the three-point fall of potential method, and complete observations of all site weather conditions and other environmental conditions that may affect the test results. Final acceptance of the results reported shall be subject to the review and approval of Engineer.

3-11. LIGHTING FIXTURE INSTALLATION. The Drawings indicate the general locations and arrangements of the lighting fixtures. Fixtures in rows shall be aligned both vertically and horizontally unless otherwise specified. Fixtures shall be clear of pipes, mechanical equipment, structural openings, indicated future equipment and structural openings, and other obstructions.

Conduit and wire for lighting fixture installation is not shown on the Drawings and shall be sized, furnished and installed by Contractor. Circuits to emergency lighting units, exit signs, and fixtures indicated to be night lights shall not be switched. Circuits to fluorescent lighting fixtures indicated to have emergency battery packs shall include an additional un-switched hot conductor. Conductors shall be minimum 12 AWG and conduit shall be minimum 3/4 inch for lighting fixture installation.

3-12. POWER FACTOR CORRECTION CAPACITOR INSTALLATION. Not used.

3-13. MODIFICATIONS TO EXISTING EQUIPMENT. Modifications to existing equipment shall be completed as specified herein and indicated on the Drawings. All existing facilities shall be kept in service during construction. Temporary power or relocation of existing power and control wiring, equipment, and devices shall be provided as required during construction. Coordination and timing of outages shall be as specified in other sections of these Specifications. Electrical power interruptions will only be allowed where agreed upon in advance with Owner, and scheduling at times of low demand may be required.

3-13.01. Demolition. Unless otherwise specified or indicated on the Drawings, all cable and all exposed conduit for power and control signals of equipment indicated to be removed shall be demolished. Conduit supports and electrical equipment mounting hardware shall be removed, and holes or damage remaining shall be grouted or sealed flush. Conduit partially concealed shall be removed where exposed, and plugged with expanding grout flush with the floor or wall. Repairs shall be refinished to match the existing surrounding surfaces. Demolished equipment shall be discarded or salvaged as indicated on the Drawings and as specified in other sections of these Specifications.

3-13.02. Modifications to Existing MCC-1. Existing space within MCC-1 shall be retrofitted for installation of a new branch breaker, as indicated on the Drawings. Contractor shall be responsible to provide all provisions for installing new breaker within the existing MCC section, including but not limited to, retrofitting existing cubicles. New circuit breaker shall be as described within this specification.

End of Section

STANDARD SPECIFICATIONS

REFERENCE: UL 83, ICEA S-95-658 (NEMA WC70).

CONDUCTOR: Solid, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION: Polyvinyl chloride, UL 83, Type THHN and THWN, ICEA S-95-658.

SHIELD: None.

JACKET: Conductor: Nylon, 4 mils (100 µm) minimum thickness, UL 83.

FACTORY TESTS: Cable shall meet the requirements of UL 83 for Type THHN and THWN.

Cable Details

Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm^2		in.	µm	in.	mm
12	4.0	1	0.015	380	0.17	4.32
10	6.0	1	0.020	510	0.20	5.08

*The average thickness shall be not less than that indicated above. The minimum thickness shall not be less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches. Marking shall include manufacturer's name, THWN or THHN, conductor size, and 600 volt.

600 Volt, Single Conductor Lighting Cable (600-1-PVC-THHN-THWN)

BLACK & VEATCH	Cable Data	Figure 1-16050

STANDARD SPECIFICATIONS

REFERENCE: ICEA S-95-658 (NEMA WC 70).

CONDUCTOR: Concentric-lay, uncoated copper; strand Class B. Wet/dry maximum operating temperature 90°C.

INSULATION: Cross-linked thermosetting polyethylene, ICEA S-95-658, Paragraph 3.6.

SHIELD: None.

JACKET: None.

FACTORY TESTS: Cable shall meet the requirements of ICEA S-95-658.

Cable Details

Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm^2		in.	μm	in.	mm
14	2.5	7	0.030	760	0.17	4.32
12	4.0	7	0.030	760	0.19	4.83
10	6.0	7	0.030	760	0.21	5.33
8	10.0	7	0.045	1140	0.27	6.86
6	16.0	7	0.045	1140	0.31	7.87
4	25.0	7	0.045	1140	0.36	9.14
2	35.0	7	0.045	1140	0.42	10.67
1	40.0	19	0.055	1400	0.48	12.19
1/0	50.0	19	0.055	1400	0.52	13.21
2/0	70.0	19	0.055	1400	0.57	14.48
4/0	95.0	19	0.055	1400	0.68	17.27
250	120.0	37	0.065	1650	0.75	19.05
350	185.0	37	0.065	1650	0.85	21.59
500	300.0	37	0.065	1650	0.98	24.89
750	400.0	61	0.080	2030	1.22	31.00
1,000	500.0	61	0.080	2030	1.37	34.80

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, XLP, XHHW-2, conductor size, and voltage class.

600 Volt, Single Conductor Lighting/Power Cable (600-1-XLP-NONE-XHHW-2)

BLACK & VEATCH	Cable Data	Figure 2-16050

STANDARD SPECIFICATIONS

REFERENCE: UL 62, UL 1277.

CONDUCTOR: 16 AWG (1.5 mm^2), 7-strand, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION: Polyvinyl chloride, not less than 15 mils (380 μm) average thickness; 13 mils (330 μm) minimum thickness, UL 62, Type TFN.

LAY: Twisted pair with 1-1/2 inch to 2-1/2 inch (38.10 mm - 63.5 mm) lay.

SHIELD: Cable assembly, combination aluminum-polyester tape and 7-strand, 20 AWG (0.5 mm^2) minimum size, tinned copper drain wire, shield applied to achieve 100 percent cover over insulated conductors.

JACKET: Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 62.

Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.

CONDUCTOR IDENTIFICATION: One conductor black, one conductor white.

FACTORY TESTS: Insulated conductors shall meet the requirements of UL 62 for Type TFN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the vertical-tray flame test requirements of UL 1277.

Cable Details

	Assembly Jacket Thickness*		Maximum Outside Diameter	
	in.	**μm**	**in.**	**mm**
Single Pair	0.045	1140	0.34	8.64

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the value indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches. Marking shall include manufacturer's name, Type TC, Type TFN, conductor size, single pair, and voltage class.

600 Volt, Single Pair, Shielded Instrument Cable (600-SINGLE-PAIR-SH-INSTR)

BLACK & VEATCH	Cable Data	Figure 4-16050

ONE-LINE DIAGRAM LEGEND

1500KVA
2.4KVD-480Y/277
3ø, 60HZ — TRANSFORMER WITH PRIMARY AND SECONDARY VOLTAGE, AND KVA RATING AS NOTED

20 — 22: 3#8,#10G,2" — CIRCUIT NO.22 WITH #8 INSULATED CONDUCTORS, 1#10 BARE GROUND WIRE ALL IN 2" CONDUIT TO 20 HP MOTOR

AUXILIARY ITEMS MAY NOT BE SHOWN COMPLETELY
15 — ONE-LINE SHOWING POWER AND CONTROL TO A PACKAGE UNIT, AS FOR EXAMPLE A STEAM GENERATOR OR AN AIR HANDLING UNIT, SHALL IMPLY THAT ANY AND ALL ASSOCIATED EQUIPMENT SHALL ALSO BE INSTALLED AND WIRED AS REQUIRED BY THE EQUIPMENT FURNISHED.

INDICATES THAT ALL OR PART OF CIRCUIT MAY BE ROUTED IN DUCT BANK OR UNDERGROUND. CONDUIT SIZE SHOWN ON ONE-LINE IS ABOVE GROUND AND/OR INSIDE OF STRUCTURE. SEE DUCT BANK SCHEDULE AND SECTIONS FOR CONDUIT SIZE OF UNDERGROUND PORTION OF CIRCUIT.

HIGH VOLTAGE DRAWOUT AIR OR VACUUM CIRCUIT BREAKER

3P-20 — LOW VOLTAGE AIR CIRCUIT BREAKER, 3 POLE, 20 AMPERE

S4 — SIZE 4 COMBINATION MAGNETIC MOTOR STARTER

LOW VOLTAGE DRAWOUT AIR CIRCUIT BREAKER

HIGH VOLTAGE DRAWOUT CONTACTOR

FUSE AND DISCONNECT SWITCH

S2 — SIZE 2 COMBINATION MAGNETIC MOTOR STARTER, REVERSING OR 2 SPEED

S1 — SIZE 1 COMBINATION REDUCED VOLTAGE STARTER

POTENTIAL TRANSFORMER

CURRENT TRANSFORMER

CONDUIT & WIRING INSTALLATION LEGEND

CONDUIT EXPOSED

CONDUIT CONCEALED (I.E. IN SLAB)

CONDUIT TURNING UP. CONDUIT TURNING DOWN.

CONDUIT PLUGGED FLUSH. CONDUIT CAPPED.

L2-5 — TYPICAL FOR HOME RUN TO BE ROUTED TO LIGHTING PANEL L2 & CONNECTED TO CIRCUIT #5 (MINIMUM NO. 12 AWG CONDUCTORS AND 3/4" CONDUIT)

A — LIGHTING FIXTURE. REFER TO NUMBER OR LETTER IN FIXTURE SCHEDULE

11 — FLUORESCENT FIXTURE. REFER TO NUMBER OR LETTER IN FIXTURE SCHEDULE.

LP1-3 — RECEPTACLE POWERED FROM LIGHTING PANEL LP1, CIRCUIT 3

A LP2-2 — LIGHTING FIXTURE POWERED FROM LIGHTING PANEL LP2, CIRCUIT 2 (NON-SWITCHED)

PE — PHOTOCELL

LPA-4 A / 11 — LIGHTING FIXTURE POWERED FROM LIGHTING PANEL LPA, CIRCUIT 4, VIA SWITCH A

E — UNDERGROUND CONCRETE ENCASED ELECTRICAL DUCT BANK

UNDERGROUND CONCRETE ENCASED ELECTRICAL BANK ROUTED BENEATH SLAB-ON-GRADE

EE — DIRECT BURIED CONDUIT

GROUND CONDUCTOR

GROUND CONDUCTOR GOING UP

GROUND CONDUCTOR GOING DOWN

SWITCH & OUTLET SYMBOLS

S	SINGLE POLE SWITCH	S_{PL}	SWITCH WITH PILOT LIGHT		DUPLEX RECEPTACLE 120 VOLT		120 VOLT DUPLEX RECEPTACLE (UPS)
S_2	TWO POLE SWITCH	S_{KO}	KEY OPERATED SWITCH		SIMPLEX RECEPTACLE		DUPLEX FLOOR OUTLET
S_3	THREE-WAY SWITCH	S_{XP}	EXPLOSION PROOF SWITCH		RANGE RECEPTACLE		TELEPHONE OUTLET
S_4	FOUR-WAY SWITCH	S_{DM}	DIMMER SWITCH THREE-WAY SWITCH		TWISTLOCK RECEPTACLE		TELEPHONE FLOOR OUTLET
S_M^{C1}	MOMENTARY SWITCH CONTROLLING CONTACTOR C1	S_{3A}	CONTROLLING LIGHTS WITH "A" DESIGNATION	30	240V, 1ø RECEPTACLE, TYPICAL AMPERE RATING NOTED	CX	COAXIAL CABLE OUTLET
S_{WP}	WEATHERPROOF SWITCH			60	480V, 3ø WELDING RECEPTACLE, TYPICAL AMPERE RATING NOTED		

SCHEMATIC SYMBOLS

WIRE CONNECTION POINT

EXTERNAL CONNECTION POINT

NORMALLY OPEN CONTACT

NORMALLY CLOSED CONTACT

STARTER, CONTACTOR OR RELAY COIL

NORMALLY OPEN PUSH BUTTON

NORMALLY CLOSED PUSH BUTTON

MAINTAINED PUSH BUTTON

NORMALLY CLOSED GEARED LIMIT SWITCH

NORMALLY OPEN GEARED LIMIT SWITCH

INDICATING LIGHT

FUSE

POTENTIOMETER

CAPACITOR

DIODE

RESISTOR

CONTROL POWER TRANSFORMER

SWITCH

MS — MANUAL STARTER

OL — OVERLOAD

ELECTRODE

FLOAT SWITCH (CLOSING ON RISING LEVEL)

FLOAT SWITCH (OPENING ON RISING LEVEL)

P — PRESSURE SWITCH (CLOSING ON RISING PRESSURE)

P — PRESSURE SWITCH (OPENING ON RISING PRESSURE)

V — VACUUM SWITCH (CLOSING ON INCREASING VACUUM)

V — VACUUM SWITCH OPENING ON INCREASING VACUUM)

TEMPERATURE SWITCH (CLOSING ON RISING TEMPERATURE)

TEMPERATURE SWITCH (OPENING ON RISING TEMPERATURE)

FLOW ACTUATED SWITCH (CLOSING ON INCREASE IN FLOW)

FLOW ACTUATED SWITCH (OPENING ON INCREASE IN FLOW)

ON TIME DELAY CONTACT (NORMALLY OPEN, WHEN THE COIL IS ENERGIZED THE CONTACT WILL CLOSE AFTER A TIME DELAY)

ON TIME DELAY CONTACT (NORMALLY CLOSED, WHEN THE COIL IS ENGERGIZED THE CONTACT WILL OPEN AFTER A TIME DELAY)

OFF TIME DELAY CONTACT (NORMALLY OPEN, WHEN THE COIL IS DE-ENERGIZED THE CONTACT WILL OPEN AFTER A TIME DELAY)

OFF TIME DELAY CONTACT (NORMALLY CLOSED, WHEN THE COIL IS DE-ENERGIZED THE CONTACT WILL CLOSE AFTER A TIME DELAY)

TORQUE SWITCH (NORMALLY OPEN)

TORQUE SWITCH (NORMALLY CLOSED)

LIMIT SWITCH (NORMALLY OPEN)

LIMIT SWITCH (NORMALLY OPEN, HELD CLOSED)

LIMIT SWITCH (NORMALLY CLOSED)

LIMIT SWITCH (NORMALLY CLOSED, HELD OPEN)

DIFFERENTIAL PRESSURE SWITCH (NORMALLY OPEN, CLOSING ON INCREASING DIFF.)

DIFFERENTIAL PRESSURE SWITCH (NORMALLY CLOSED, OPENING ON INCREASING DIFF.)

MISCELLANEOUS SYMBOLS

BELL

HORN

T — THERMOSTAT

J — JUNCTION BOX

GROUND ROD

GROUND ROD WITH TEST WELL

GROUND CONNECTION

DISCONNECT SWITCH

COMBINATION STARTER

POWER PANEL

LIGHTING PANEL

MISCELLANEOUS PANEL

LIGHTING CONTACTOR

OC — CEILING MOUNT OCCUPANCY SENSOR

WALL MOUNT OCCUPANCY SENSOR

COMMUNICATION SYMBOLS

HORN SPEAKER

DUAL HORN SPEAKER

WALL MOUNTED CONE SPEAKER

SK — CEILING MOUNTED CONE SPEAKER

WS WP — WALL STATION

DS — DESK TOP STATION

RH WP — REMOTE HANDSET

SA — SPEAKER AMPLIFIER

LB — LINE BALANCE ASSEMBLY

TG — TONE GENERATOR

TI — TELEPHONE INTERFACE

IA — INTERFACE AMPLIFIER

IJB — INTERCOM JUNCTION BOX

NOTE: WP=WEATHERPROOF H=HAZARDOUS AREA

ABBREVIATIONS

A	AMBER, AMPERE, ALARM
AC	ALTERNATING CURRENT
ACB	AIR CIRCUIT BREAKER
AF	AMPERE FRAME
AFD	ADJUSTABLE FREQUENCY DRIVE
AM	AMMETER
ANN	ANNUNCIATOR
AR	ALARM RELAY
AS	AMMETER SWITCH
AT	AMPERE TRIP
AWG	AMERICAN WIRE GAGE
BC	BATTERY CHARGER
BR	BRAKE
BT	BEARING TEMPERATURE
C	CLOSE, COUNTER OR CONTACTOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CB"A"	CIRCUIT BREAKER AUXILIARY CONTACT (OPEN WHEN BREAKER IS OPEN OR TRIPPED CLOSED WHEN BREAKER IS CLOSED)
CB"B"	CIRCUIT BREAKER AUXILIARY CONTACT (CLOSED WHEN BREAKER IS OPEN OR TRIPPED OPEN WHEN BREAKER IS CLOSED)
CD	CONTROL DAMPER
CI	CELL INTERLOCK
CKT	CIRCUIT
CL2	CHLORINE
COS	CABLE OPERATED SWITCH
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CURRENT OR CONTROL RELAY
CS	CONTROL STATION
CT	CYCLE TIMER OR CURRENT TRANSFORMER
CTC	CYCLE TIMER CLUTCH
CTM	CYCLE TIMER MOTOR
2/C	2 CONDUCTOR
4"C	4" CONDUIT
DC	DIRECT CURRENT
DI	DOOR INTERLOCK
DM	DAMPER MOTOR OR DEMAND METER
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DPR	DIFFERENTIAL PRESSURE REGULATOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DS	DISCONNECT SWITCH
DVLS	DISCHARGE VALVE LIMIT SWITCH
E	ELECTRIC OPERATOR FOR CONTROL DAMPER OR VALVE
EC	EMPTY CONDUIT
EL	ELEVATION OR EMERGENCY LIGHT
EMH	ELECTRICAL MANHOLE
ER	ELECTRODE RELAY
ES	END SWITCH
ETM	ELAPSED TIME METER
EX	EXISTING
F	FORWARD
FS	FLOW SWITCH
G	GREEN OR GROUND
GD	GROUND DETECTOR
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GLS	GEARED LIMIT SWITCH
#8G	#8 GROUND WIRE
H	HIGH OR HUMIDISTAT
HC	HOT CIRCUIT
HH	HANDHOLE
HMT	HIGH MOTOR TEMPERATURE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HP	HORSEPOWER
HWCO	HIGH WATER CUTOFF
HZ	HERTZ (CYCLE)
I/O	INPUT/OUTPUT
INST	INSTANTANEOUS
J	JUNCTION BOX
JB	JUNCTION BOX
K	KEY INTERLOCK
KCMIL	THOUSAND CIRCULAR MIL
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KVAR	KILOVAR
KW	KILOWATT
KWH	KILOWATT HOUR
L	LOW, LEVEL
LA	LIGHTNING ARRESTER
LAN	LOCAL AREA NETWORK
LC	LIGHTING CONTACTOR
LOA	LOCAL-OFF-AUTO
LOR	LOCAL-OFF-REMOTE
LP	LIGHTING PANEL
LS	LIMIT OR LEVEL SWITCH
LWCO	LOW WATER CUTOFF
1-1PR#16S	ONE, SINGLE PAIR, TWISTED, SHIELDED #16 CABLE
3-7/C#14	THREE, SINGLE, SEVEN CONDUCTOR #14 MULTICONDUCTOR CONTROL CABLES
M	MAGNETIC MOTOR STARTER
MA	MILLIAMPERE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCLU	MOTOR CONTROL LINEUP
MCR	MOTOR CURRENT RELAY
MD	MOISTURE DETECTOR
MFM	MAGNETIC FLOW METER
MFR	MANUFACTURER
MH	MANHOLE OR MOUNTING HEIGHT
MOV	MOTOR OPERATED VALVE
MPR	MOTOR PROTECTION RELAY
MS	MANUAL MOTOR STARTER
MSH	MOTOR SPACE HEATER
MV	MILLIVOLT
MVA	MEGA VOLT AMPERE
N	NEUTRAL
NC	NORMALLY CLOSED
NO	NORMALLY OPEN, NUMBER
O	OPEN
OCB	OIL CIRCUIT BREAKER
OL	OVERLOAD
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
P	PRIMARY
PCS	PLANT CONTROL SYSTEM
PB	PUSH BUTTON OR PULL BOX
PF	POWER FACTOR METER
PH	PHASE, CHEMICAL TERM
PLC	PROGRAMMABLE LOGIC CONTROLLER
PP	POWER PANEL
PRS	PROXIMITY SWITCH
PS	PRESSURE SWITCH
PT	POTENTIAL TRANSFORMER, PROGRAM TIMER
2P	2 POLE
R	RED, RAISE, RELAY OR REVERSE
RECP	RECEPTACLE
RES	RESISTOR
RMP	REMOTE MAINTENANCE PANEL
RT	REPEATING TIMER
RTD	RESISTANCE TYPE TEMP DETECTOR
RTU	REMOTE TERMINAL UNIT
RVSS	REDUCED VOLTAGE SOLID STATE STARTER
S2	SIZE 2 STARTER
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SH	SPACE HEATER
SN	SOLID NEUTRAL
SO	SOLENOID OILER
SP	SINGLE POLE
SPD	SURGE PROTECTIVE DEVICE
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SS	SELECTOR SWITCH
SSM	SOLID STATE MONITOR
SSS	SOLID STATE STARTER
SUPV	SUPERVISORY CONTROL
SV	SOLENOID VALVE
SWB	SWITCHBOARD
SWGR	SWITCHGEAR
T	THERMOSTAT, TIMER, OR TOTALIZER
TACH	TACHOMETER
TB	TERMINAL BLOCK
TC	TIMER CLUTCH
TD	TIME DELAY RELAY
TEMP	TEMPERATURE
TM	TIMER MOTOR
TQ	TORQUE
TS	TEMPERATURE SWITCH
TTB	TELEPHONE TERMINAL BOX
UG	UNDERGROUND
UV	UNDER VOLTAGE
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTS
VA	VOLT AMPERE
VAR	VARMETER
VLS	VALVE LIMIT SWITCH
VM	VOLTMETER
VPI	VALVE POSITION INDICATOR
VS	VOLTMETER SWITCH
W	WHITE OR WATTS
WH	WATTHOUR METER
WM	WATT METER
WP	WEATHERPROOF
WPI	WEATHERPROOF IN-USE
X	AUXILIARY RELAY
XFMR	TRANSFORMER
XP	EXPLOSION PROOF
Y	YELLOW
Z	AUXILIARY RELAY
ZS	POSITION SWITCH
ZSS	ZERO SPEED SWITCH

AREA DESIGNATIONS

THE SPECIAL AREA DESIGNATION BOXES, AS DEFINED BELOW, ARE LOCATED ON THE PLAN DRAWINGS TO DEFINE ELECTRICAL INSTALLATION REQUIREMENTS. DESIGNATION BOXES ARE LOCATED WITHIN ROOM OR BELOW ROOM NUMBER. ALL INDOOR AREAS NOT INDICATED OTHERWISE ARE AREA TYPE 12 AND MINIMUM NEMA TYPE 12 ENCLOSURES.

AREA TYPE 1A — CORROSIVE CHEMICAL FEED AND STORAGE ROOMS. CONDUIT SYSTEM SHALL BE EXPOSED PVC RIGID NON-METALLIC CONDUIT WITH PVC FITTINGS, BOXES, AND ACCESSORIES.

AREA TYPE 4 — INDOOR WET LOCATIONS SUCH AS VAULTS, HOSEDOWN AREAS, BASEMENTS, ETC. MINIMUM NEMA TYPE 4X STAINLESS STEEL ENCLOSURE FOR EQUIPMENT AND GASKETED FITTINGS IN A CONDUIT SYSTEM.

AREA TYPE 7A — CLASS I, DIVISION 1 AREA AS DEFINED BY NEC. ALL EQUIPMENT AND CONDUIT SYSTEMS SHALL BE RATED FOR USE IN THIS AREA.

AREA TYPE 7B — CLASS I, DIVISION 2, GROUP C AND D (METHANE, GASOLINE) AS DEFINED BY NEC. EQUIPMENT AND CONDUIT SYSTEMS SHALL BE RATED FOR USE IN THIS AREA.

AREA TYPE 12 — INDOOR, DRY, DIRTY AREA. REQUIRES MINIMUM NEMA TYPE 12 GASKETED ENCLOSURES FOR ALL EQUIPMENT AND GASKETED FITTINGS IN CONDUIT SYSTEMS.

AREA TYPE 9A — CLASS II, DIVISION 1 AREA AS DEFINED BY NEC. ALL EQUIPMENT AND CONDUIT SYSTEMS SHALL BE RATED FOR USE IN THIS AREA.

AREA TYPE 9B — CLASS II, DIVISION 2 AREA AS DEFINED BY NEC. ALL EQUIPMENT AND CONDUIT SYSTEMS SHALL BE RATED FOR USE IN THIS AREA.

GENERAL REQUIREMENTS

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ROUTING ALL CONDUITS NOT SHOWN ON THE PLANS. THIS SHALL INCLUDE ALL CONDUITS SHOWN ON THE ONE-LINES AND HOME-RUNS SHOWN ON THE PLAN DRAWINGS. CONDUITS SHALL BE ROUTED AS DEFINED IN THE SPECIFICATIONS.
2. SPARE WIRES SHALL BE TAPED AND COILED.
3. IF EQUIPMENT SUPPLIED BY MANUFACTURER HAS A LARGER LOAD THAN VALUE SHOWN, THE CABLE CONDUIT AND ELECTRICAL EQUIPMENT SHALL BE ENLARGED, AS REQUIRED, TO ACCOMMODATE THE HIGHER VALUE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING PROPERLY SIZED STARTER OVERLOADS FOR EQUIPMENT FURNISHED.
5. LIGHTING AND RECEPTACLE CIRCUITS DESIGNATED ON THE FLOOR PLANS ARE NOT SHOWN ON THE ONE-LINES. CONDUCTORS FOR LIGHTING, RECEPTACLES, AND MISCELLANEOUS 120VAC CIRCUITS SHALL BE MINIMUM NO. 12 AWG. CONDUIT FOR LIGHTING, RECEPTACLES, AND MISCELLANEOUS 120VAC CIRCUITS SHALL BE MINIMUM 3/4".
6. IN AREAS WHERE THERE ARE OVERHEAD BRIDGE CRANES, HOISTS, ETC., NO CONDUITS SHALL BE RUN OVERHEAD THAT WILL INTERFERE WITH THE OPERATION OF THE EQUIPMENT.

GENERAL NOTES

1. SOLID LINES (———) INDICATE NEW WORK OR EQUIPMENT.
2. SCREENED LINES (———) INDICATE EXISTING WORK OR EQUIPMENT.
3. DASHED LINES (– – – – –) INDICATE FUTURE WORK OR EQUIPMENT.
4. REFER TO THE FOLLOWING DRAWING(S) FOR INSTRUMENTATION LEGEND: I-001 & I-002.
5. THIS IS A GENERAL LEGEND SHEET. SOME SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED ON THIS SPECIFIC PROJECT.
6. INFORMATION RELATED TO CIRCUIT IDENTIFICATION, WIRE & CONDUIT SIZES, AND ROUTING, IS ON THE FOLLOWING DRAWING TYPES.
   A. ONE-LINE DIAGRAMS SHOW CIRCUIT IDENTIFICATION, WIRE QUANTITY AND SIZES, AND CONDUIT SIZE WITHIN STRUCTURES. ONE-LINE DIAGRAMS ALSO INDICATE ORIGIN AND DESTINATION OF CIRCUITS, AND IDENTIFY CIRCUITS ROUTED UNDERGROUND.
   B. FOR CIRCUITS WITHOUT UNDERGROUND PORTIONS, BUILDING FLOOR PLANS SHOW LOCATION OF EQUIPMENT FOR DETERMINING CIRCUIT LENGTH WITHIN THE STRUCTURE. FOR CIRCUITS WITH UNDERGROUND PORTIONS, ANTICIPATED PENETRATION OF UNDERGROUND CONDUITS ARE SHOWN ON STRUCTURE PLANS FOR DETERMINING THE LENGTH OF THE IN-STRUCTURE PORTIONS OF CIRCUITS. BUILDING FLOOR PLANS MAY ALSO SHOW HOME RUNS FOR LIGHTING, RECEPTACLE, AND OTHER MISCELLANEOUS EQUIPMENT CIRCUITS.
   C. SITE PLANS INDICATE THE GENERAL ROUTING OF UNDERGROUND CONDUITS AND DUCT BANKS. CIRCUITS ROUTED IN UNDERGROUND CONDUITS OR DUCT BANKS ARE INDICATED IN DUCT BANK SECTIONS REFERENCED ON THE SITE PLAN.
   D. DUCT BANK SECTIONS AND SCHEDULES IDENTIFY CONDUIT SIZE CONDUIT MATERIAL, ARRANGEMENT OF THE UNDERGROUND CONDUITS, AND CIRCUITS ROUTED IN EACH UNDERGROUND CONDUIT.
7. REFER TO DRAWING E-09 FOR DEMOLITION NOTES.

RECORD DRAWING

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NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE

XREF1: WF-50.3040 - Electrical Drawings
XREF2: PW ID: - E-001.dwg
XREF3: SAVED:PAS12835, 10/27/2014 10:45:35 AM
XREF4: PLOTTED:5/17/2016 2:36:51 PM
XREF5: USER:PWAGNIN | DWG VER:TOOT

THIS DRAWING WAS ORIGINALLY ISSUED ON 01, CUTTING, A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF SOUTH CAROLINA, LICENSE NO. 033006.

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
LEGEND AND ABBREVIATIONS

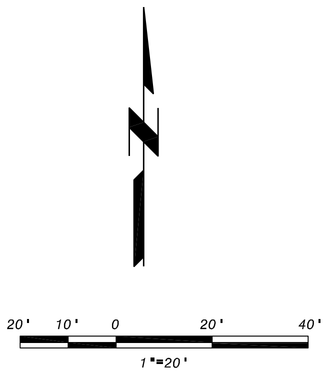
DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 8/17/2015

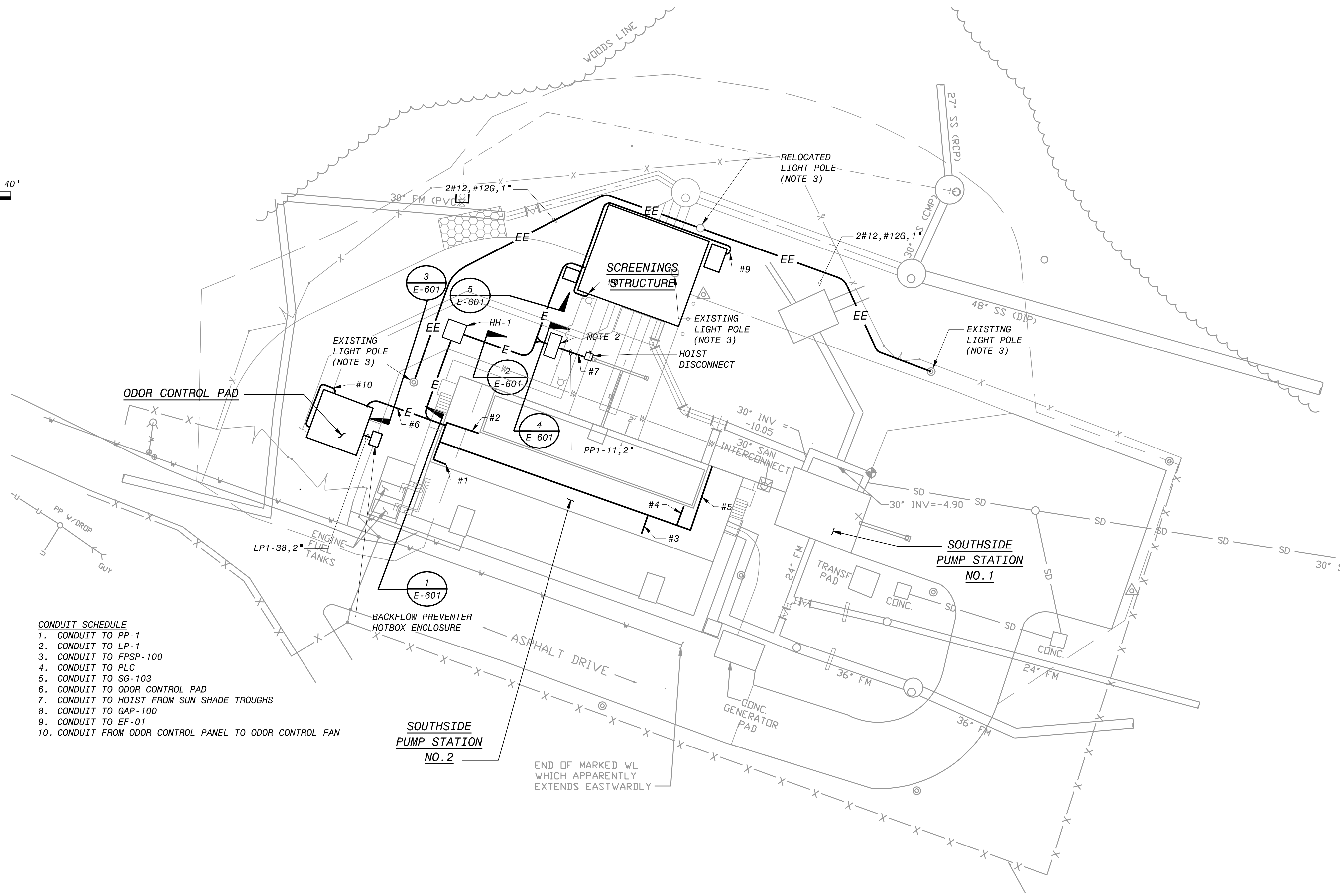
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEM DRAWING IS NOT TO FULL SCALE

PROJECT NO.
184585

E-001
SHEET
39 OF 54

FD7000
D6048WCA





CONDUIT SCHEDULE

1. CONDUIT TO PP-1
2. CONDUIT TO LP-1
3. CONDUIT TO FPSP-100
4. CONDUIT TO PLC
5. CONDUIT TO SG-103
6. CONDUIT TO ODOR CONTROL PAD
7. CONDUIT TO HOIST FROM SUN SHADE TROUGHS
8. CONDUIT TO GAP-100
9. CONDUIT TO EF-01
10. CONDUIT FROM ODOR CONTROL PANEL TO ODOR CONTROL FAN

SITE PLAN
1" = 20'-0"

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. SEE TYPICAL EQUIPMENT MOUNTING INSTALLATION DETAIL ON E-501 FOR DETAILS. CONTRACTOR SHALL INSTALL PULL BOX ADJACENT TO CONCRETE SLAB FOR TERMINATION OF CONDUITS. PULL BOX INSTALLED UNDER CONTROL PANELS.
3. CONTRACTOR SHALL DISCONNECT AND RELOCATE EXISTING LIGHT POLE AS INDICATED. CONTRACTOR SHALL INTERCEPT AND REPOWER RELOCATED LIGHT POLE FROM ADJACENT EXISTING POLES. CONTRACTOR SHALL PROVIDE NEW CABLE AND CONDUIT AS SHOWN TO REPOWER EXISTING LIGHTS.

NO.	BY	CK	APP

DATE REVISIONS AND RECORD OF ISSUE

WF:50.3040 - Electrical Drawings XREF1:
PW ID: E-002.dwg XREF2:
SAVED:PAS12835, 4/22/2015 4:16:15 PM XREF3:
PLOTTED: XREF4:
USER:JOH65045 DWG VER:1002 XREF5:

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
SITE PLAN

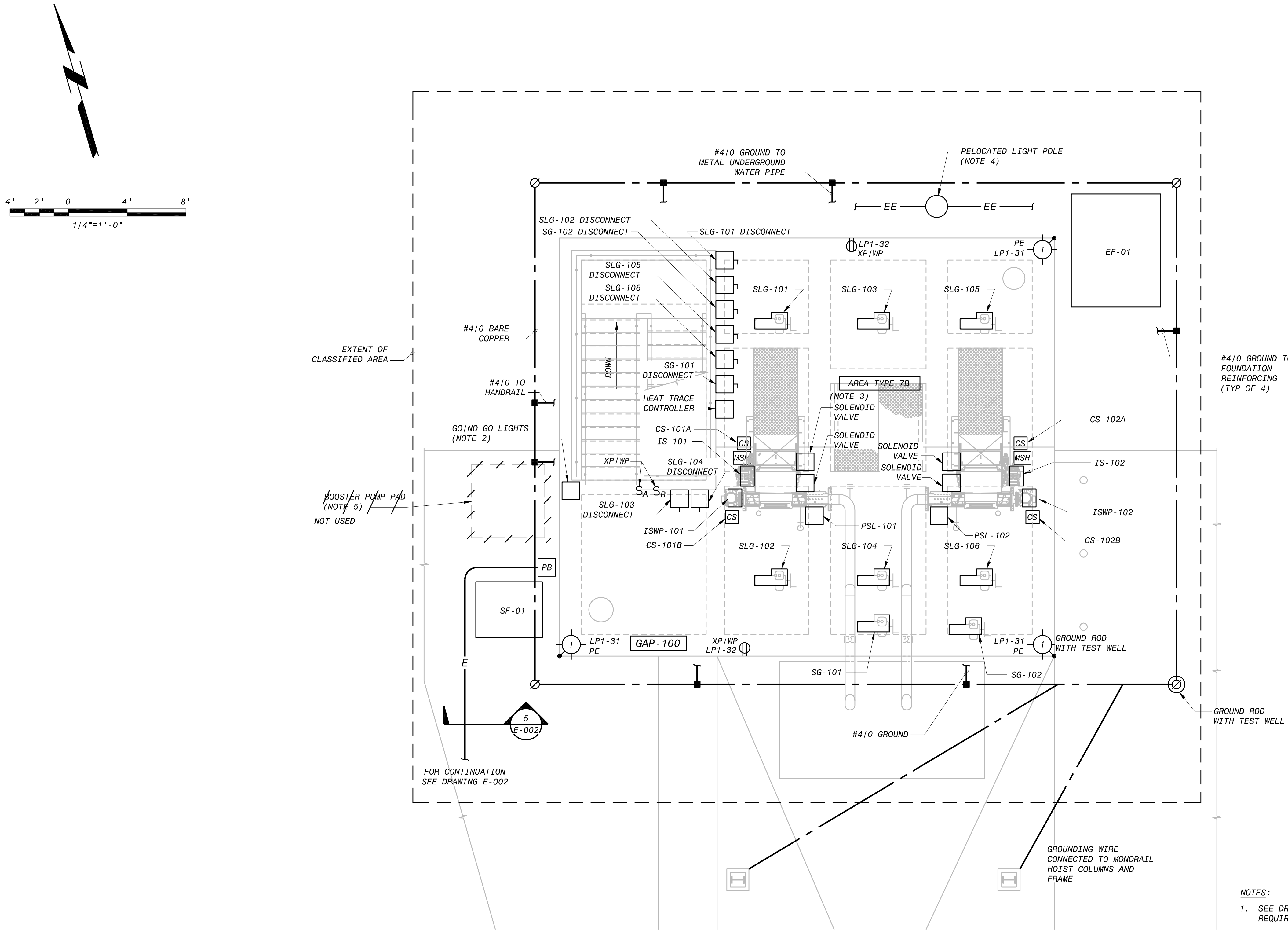
DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 4/27/2015

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
184585

E-002
SHEET
40 OF 54

FD7000
D6048NCA



TOP PLAN

1/4" = 1'-0"

RECORD DRAWING

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND AND ABBREVIATION AND GENERAL REQUIREMENT.
2. GO/NO GO LIGHTS SHALL BE PROVIDED AS SPECIFIED IN 16723.
3. THE SCREENINGS STRUCTURE IS CLASS 1 DIVISION 2 PER NFPA 820 TABLE 5.2 ROW 1(C). ALL EQUIPMENT SHALL BE RATED FOR USE IN THIS AREA. EXTENT OF THE CLASSIFIED AREA IS WITHIN A 10 FOOT ENVELOPE AROUND EQUIPMENT AND OPEN CHANNEL.
4. CONTRACTOR SHALL RELOCATE EXISTING LIGHT POLE TO THE LOCATION SHOWN. CONTRACTOR SHALL REPOWER LIGHT FROM ADJACENT SITE LIGHTS. SEE SITE PLAN FOR ADDITIONAL DETAILS.
5. ~~CONTRACTOR SHALL PROVIDE BOOSTER PUMPS AND HOTBOX ENCLOSURE AS REQUIRED BY SCREENINGS MANUFACTURER.~~

NOT USED

DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CK	APP

WF:50.3040 - Electrical Drawings
PW ID: E-10-101.dwg
SAVED:PAS12835, 4/23/2015 6:53:47 AM
PLOTTED:
USER:JOH65045 DWG VER:1001
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XREF2:
XREF3:
XREF4:
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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
SCREENING STRUCTURE
POWER & LIGHTING TOP PLAN

DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 4/27/2015

0 1/2 1
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PROJECT NO.
184585

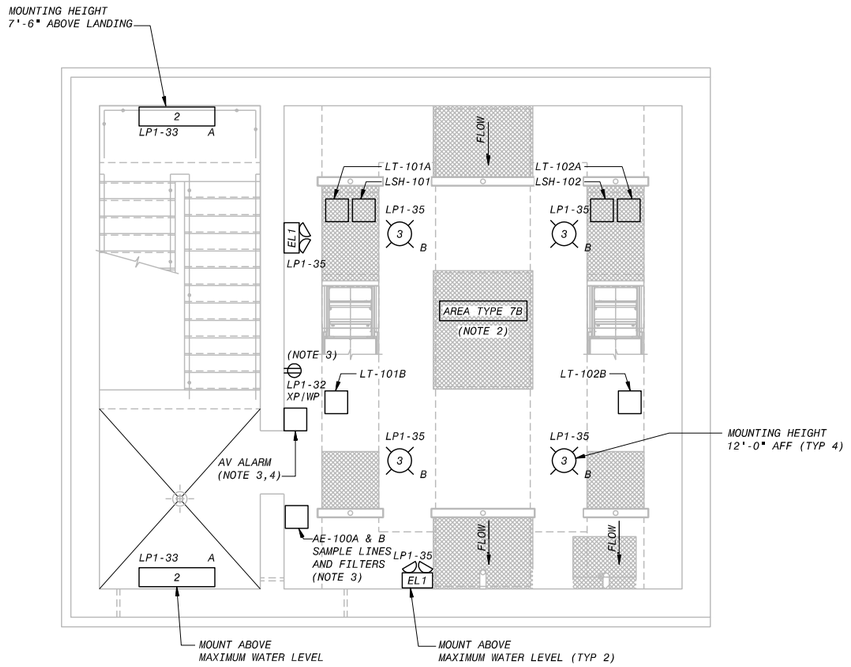
E-10-101

SHEET
41 OF 54

F07000_PW
D6048NCA

4' 2' 0 4' 8'

1/4"=1'-0"



INTERMEDIATE PLAN

1/4" = 1'-0"

RECORD DRAWING

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. THE SCREENING STRUCTURE IS CLASS 1 DIVISION 2 PER NFPA 820 TABLE 5.2 ROW 1(B). EXTENT OF THE CLASSIFIED AREA IS WITHIN A 10 FOOT ENVELOPE AROUND EQUIPMENT AND OPEN CHANNEL. ALL EQUIPMENT SHALL BE RATED FOR USE IN THIS AREA.
3. CONTRACTOR SHALL MOUNT ALL GAS DETECTION EQUIPMENT, RECEPTACLES AND AUDIO/VISUAL ALARM ABOVE THE MAXIMUM WATER LEVEL FOR THIS FLOOR. GAS DETECTION SYSTEM SAMPLE LINES AND FILTERS LOCATED WITH ONE SAMPLE POINT NEAR TOP OF INTERMEDIATE LEVEL AND ONE SAMPLE POINT AT APPROXIMATE EL 13.0.
4. AUDIO/VISUAL ALARM SHALL BE PROVIDED AS SPECIFIED IN 16723.

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE

WF:90.3040 - Electrical Drawings
PW ID: E-10-102.dwg
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USER:PAS12835

XREF1:
XREF2:
XREF3:
XREF4:
XREF5:
DWG VER:1000

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
SCREENINGS STRUCTURE
POWER AND LIGHTING INTERMEDIATE PLAN

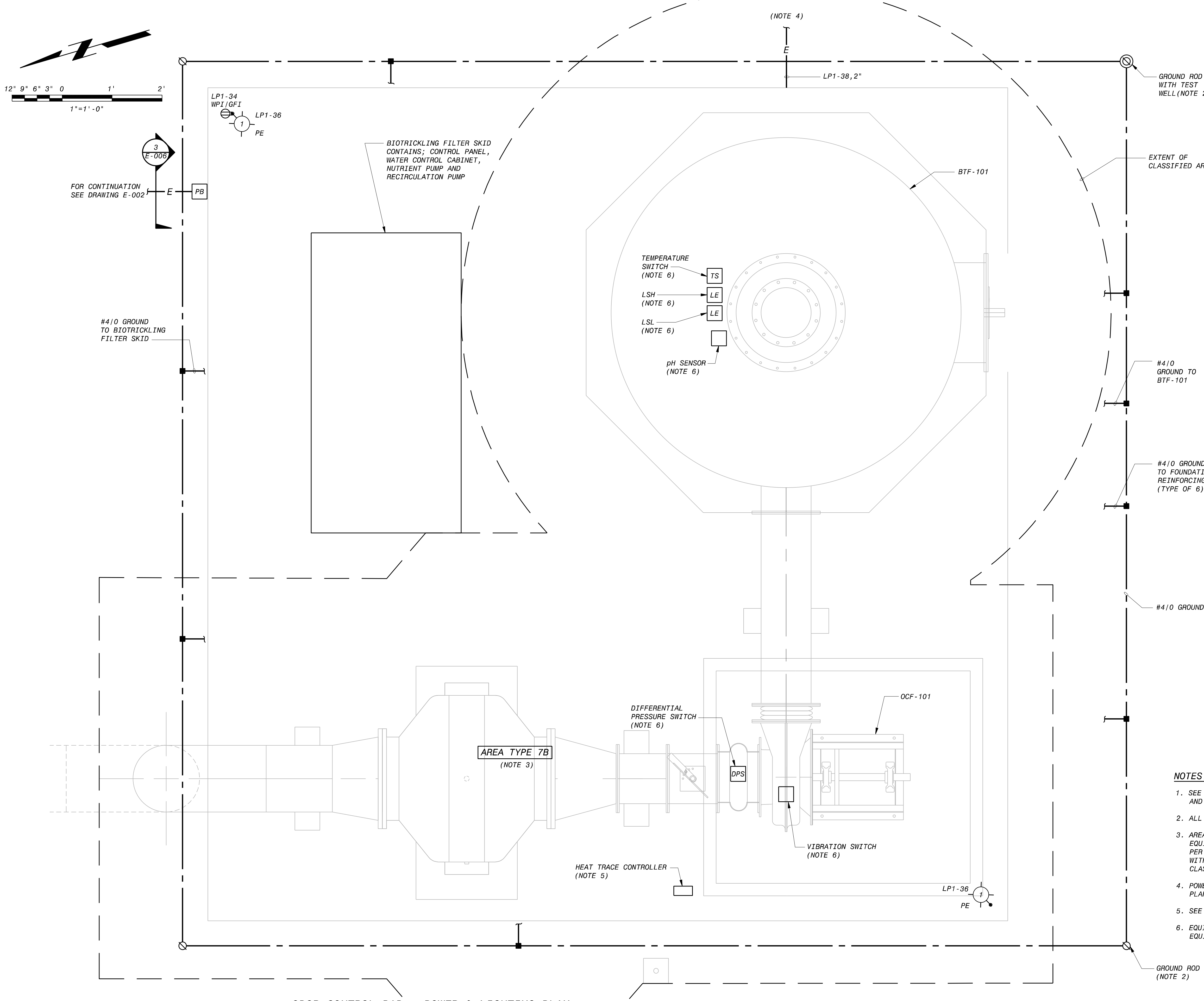
DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 4/27/2015

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
184585

E-10-102
SHEET
42 OF 54

FD7000
D8048MCA



ODOR CONTROL PAD - POWER & LIGHTING PLAN
1" = 1'-0"

RECORD DRAWING

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. ALL GROUND RODS SHALL BE LOCATED 20' APART.
3. AREA WITHIN 3 FEET OF LEAKAGE SOURCES ABOUT ODOR CONTROL EQUIPMENT SHALL BE CONSIDERED A CLASS I, DIVISION 2 AREA PER NFPA 820, TABLE 5.2 ROW 26B. EQUIPMENT AND INSTALLATION WITHIN THIS ENVELOPE SHALL MEET NEC REQUIREMENTS FOR A CLASS I, DIVISION 2 AREA.
4. POWER FEED TO BACKFLOW PREVENTER HOTBOX ENCLOSURE. SEE SITE PLAN FOR CONTINUATION.
5. SEE HVAC ODOR CONTROL PAD DRAWING FOR PIPING TO BE HEAT TRACED.
6. EQUIPMENT MOUNTED INSTRUMENTS INSTALLED AND PROVIDED BY EQUIPMENT MANUFACTURER. CONTRACTOR RESPONSIBLE FOR FIELD WIRING.

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE

WF:50.3040 - Electrical Drawings | XREF1:
PW ID: E-20-101.dwg | XREF2:
SAVED:PAS12835, 4/23/2015 7:54:13 AM | XREF3:
PLOTTED:5/17/2018 2:36:21 PM | XREF4:
USER:PWADMIN | DWG VER:1000 | XREF5:

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
ODOR CONTROL PAD
POWER PLAN

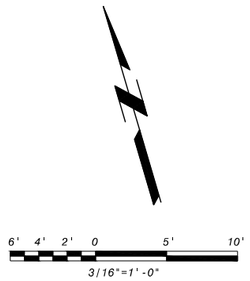
DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 8/17/2015

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
184585

E-20-101
SHEET
43 OF 54

FD7000_PW
D6048NCA



SOUTHSIDE PUMP STATION NO. 2 POWER PLAN

3/16"=1'-0"

RECORD DRAWING

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. CONTRACTOR SHALL MOUNT NEW HOIST DISCONNECT SWITCH NEAR NEW SUPPORT STRUCTURE AND RUN NEW CONDUIT AND CABLE TO REACH THE HOIST MOTOR.

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE

WF:50.3040 - Electrical Drawings
PW ID: E-30-101.dwg
SAVED:PAST2835, 3/13/2015 2:36:07 PM
PLOTTED:5/17/2018 2:36:45 PM
USER:PWADMIN

XREF1:
XREF2:
XREF3:
XREF4:
XREF5:
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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
EXISTING SOUTHSIDE PUMP STATION NO. 2
POWER PLAN

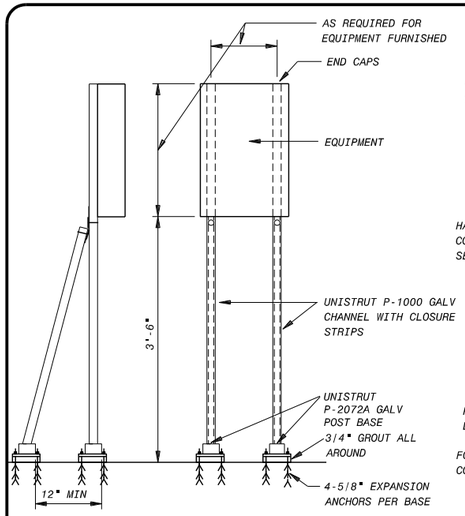
DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 8/17/2015

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
184585

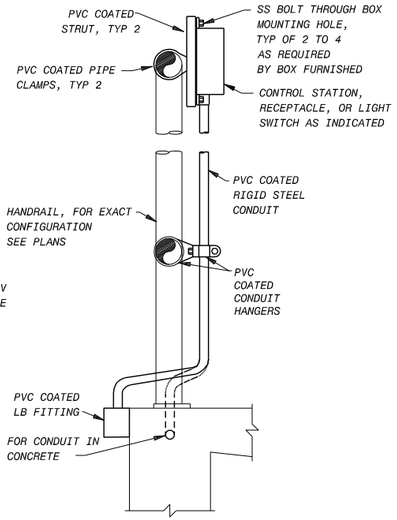
E-30-101
SHEET
44 OF 54

FD7000_PW
D6048NCA

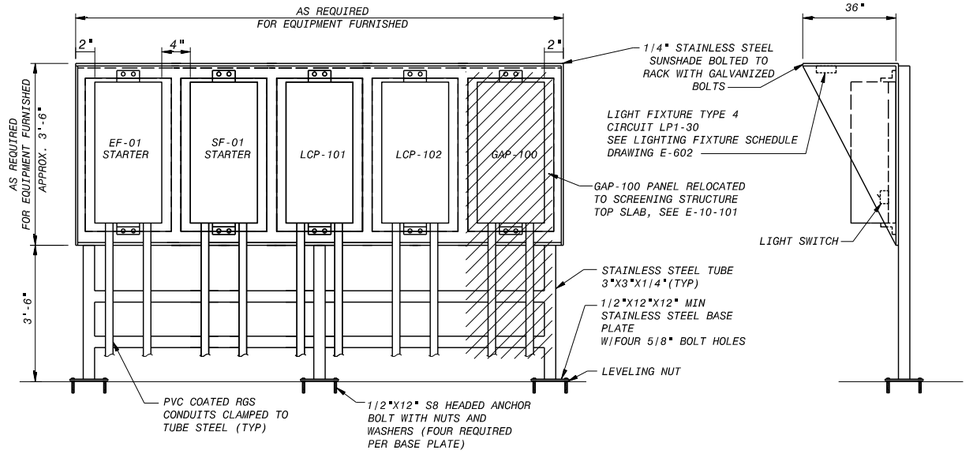


NOTE: IN OUTDOOR LOCATIONS, USE STAINLESS STEEL BOLTS, NUTS, WASHERS, AND ANCHOR BOLTS.

TYPICAL EQUIPMENT MOUNTING DETAIL
NO SCALE



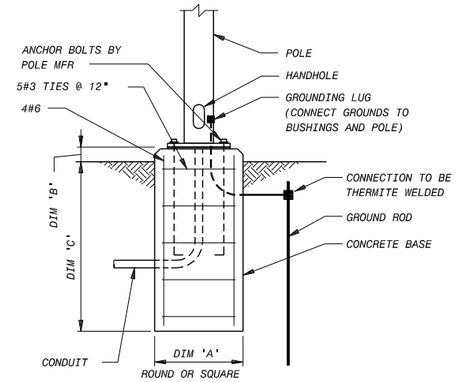
TYPICAL HANDRAIL MOUNTING DETAIL
NO SCALE



FRONT VIEW

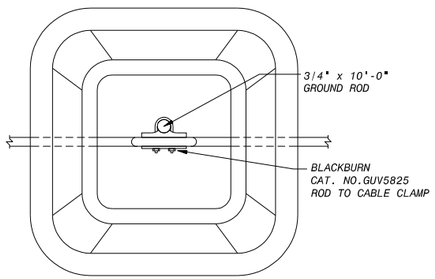
SIDE VIEW

TYPICAL EQUIPMENT MOUNTING INSTALLATION DETAIL
NO SCALE



TYPICAL POLE MOUNTING DETAIL
NO SCALE

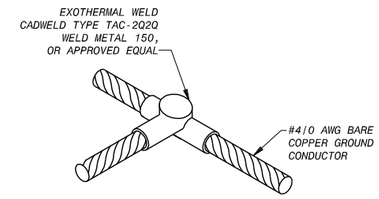
A	B	C	POLE LENGTH
1'-0"	2"	3'-0"	10' TO 12'
1'-6"	2"	4'-0"	12' TO 20'
2'-0"	2"	5'-0"	20' TO 40'
2'-0"	2'-6"	5'-0"	20' TO 40'



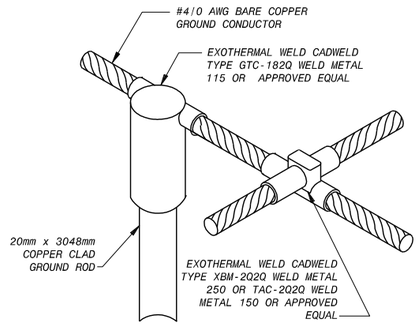
PLAN

ELEVATION

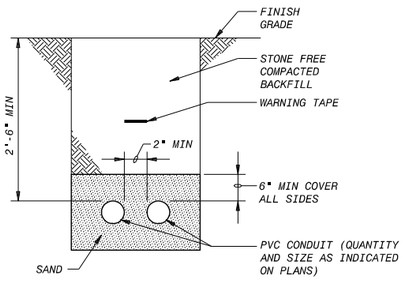
TYPICAL GROUND TEST STATION
NO SCALE



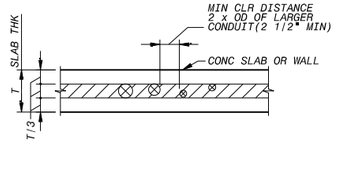
TYPICAL EXOTHERMAL WELD TEE CONNECTION DETAIL
NO SCALE



TYPICAL EXOTHERMAL WELD GROUND ROD AT CROSS OR TEE CONNECTION DETAIL
NO SCALE

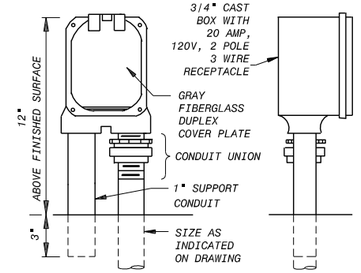


TYPICAL DIRECT BURIED CONDUIT SECTION
NO SCALE



NOTES:
1. PLACE CONDUIT ONLY IN SHADED AREA
2. FOR CONDUIT REQUIREMENTS SEE THE ELECTRICAL DRAWINGS AND SPECIFICATIONS.

CONDUIT PLACING DETAIL
NO SCALE

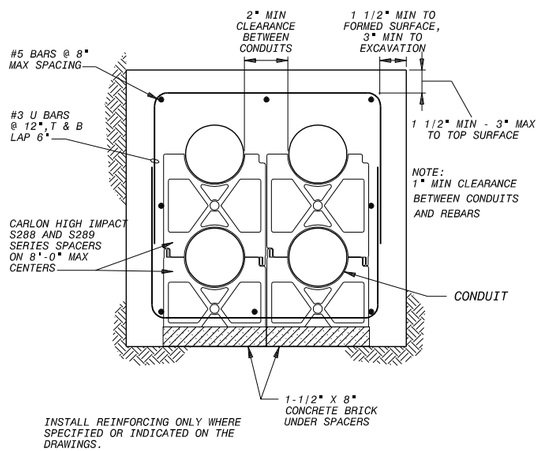


FRONT VIEW

SIDE VIEW

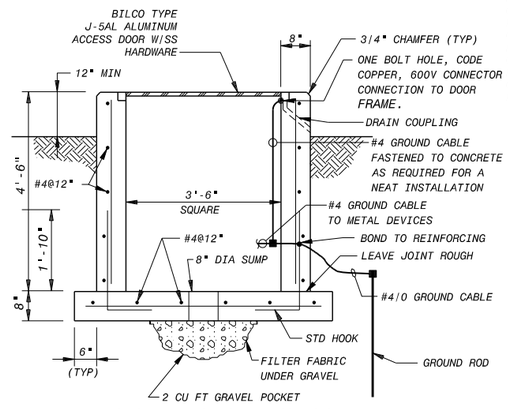
NOTE: ALL EXPOSED CONDUIT SHALL BE PVC COATED RIGID STEEL.

TYPICAL WEATHERPROOF RECEPTACLE MOUNTING DETAIL
NO SCALE



INSTALL REINFORCING ONLY WHERE SPECIFIED OR INDICATED ON THE DRAWINGS.

TYPICAL DUCT BANK SECTION
NO SCALE



NOT SUITABLE FOR ROADWAY LOCATIONS

TYPICAL ELECTRICAL HANDHOLE DETAIL
NO SCALE

RECORD DRAWING

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NORTH CAROLINA PROFESSIONAL SEAL 035701 ENGINEER MATTHEW B. SKIDMORE

NOTES:
1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE

XREF1:
XREF2:
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XREF4:
XREF5:

WF:90.3040 - Electrical Drawings
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USER: JOH65045
DWG VER: 1000

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
MISCELLANEOUS DETAILS

DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: WBS
DATE: 4/27/2015

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

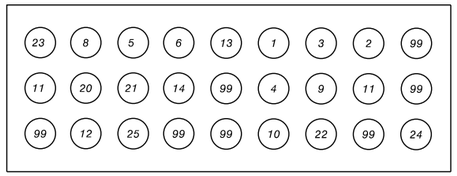
PROJECT NO. 184585

E-501
SHEET 45 OF 54

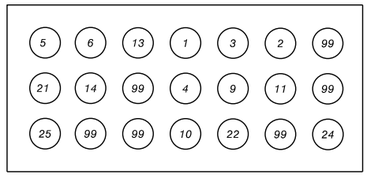
FD7000
D6048NCA

DUCT BANK SCHEDULE

COND. NO.	SIZE	CIRCUIT	REMARKS
1	2"	PP1-1	POWER
2	2"	PP1-2	POWER
3	2"	PLC-4, PLC-2, FPSP100-3	CONTROL
4	2"	PLC-7, FPSP100-2,-5	CONTROL
5	2"	PP1-3, PP1-5	POWER
6	2"	PP1-4	POWER
7	2"	NOT USED	
8	2"	PP1-6	POWER
9	2"	PP1-7	POWER
10	2"	PLC-1, PLC-3, PLC-6	ANALOG
11	2"	LP1-38	POWER
12	2"	FPSP100-1, PLC-9	CONTROL
13	2"	LP1-37, LP1-40	POWER
14	2"	LP1-31, LP1-32	POWER
15	2"	LCP101-1	POWER
16	2"	LCP102-1	POWER
17	2"	LCP101-2, LCP102-2	ANALOG
18	2"	LCP101-3,4,5, LCP102-3,4,5	CONTROL
19	2"	PP1-7A	POWER
20	2"	LP1-9	POWER
21	2"	FPSP100-4	CONTROL
22	2"	LP1-2, LP1-30	POWER
23	2"	LP1-34, LP1-36	POWER
24	2"	PP1-11	POWER
25	2"	LP1-33, LP1-35	POWER
26	2"	LCP201-7	POWER
27	2"	GAP100-1, GAP100-2	ANALOG
28	2"	LCP101-6	POWER
29	2"	LCP102-6	POWER
30	2"	LCP101-7	POWER
99	2"	SPARE	PULLSTRING



SECTION 1 / E-601 — NO SCALE



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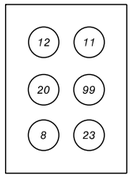

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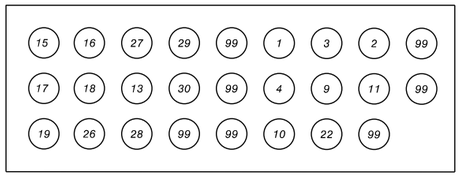

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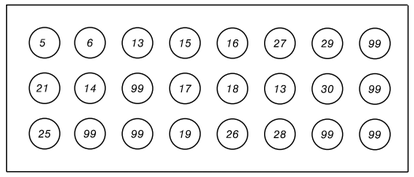

SECTION 5 / E-601 — NO SCALE

RECORD DRAWING

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGENDS & ABBREVIATIONS AND GENERAL REQUIREMENTS.

NO.	BY	CK	APP	REVISIONS AND RECORD OF ISSUE	DATE

WF:50.3040 - Electrical Drawings
PW ID: E-601.dwg
SAVED:JOHNSONJS, 4/24/2015 7:06:03 AM
PLOTTED:5/17/2018 2:37:07 PM
USER:PWADMIN

XREF1:
XREF2:
XREF3:
XREF4:
XREF5:
DWG VER:1000

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
DUCT BANK SCHEDULE

DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 8/17/2015

0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO FULL SCALE

PROJECT NO.
184585

E-601
SHEET
46 OF 54

FD7000
D6048WCA

PHASE		PANELBOARD: LP-1	BUS: COPPER				MAINS: 2P-225A MAIN BREAKER	PHASE	
"L1"	"L2"	SERVICE: 120/240V, 1PH, 3W, S/N	RATING: 225A				LOCATION: SOUTHSIDE PUMP STATION NO.2	"L1"	"L2"
V.A.	V.A.	MOUNTING: SURFACE					ELECTRICAL ROOM	V.A.	V.A.
		LOAD	P	BKR	CKT #	BKR	P LOAD		
		ELECTRICAL ROOM LIGHTS	1	20	1	2	20 1 GAS ANALYZER PANEL	150	
		INTERMEDIATE POOL LIGHTS	1	20	3	4	20 1 INTERMEDIATE POOL RECEPTACLE		
		PUMP ROOM LIGHTS	1	20	5	6	20 1 FIRE PROTECTION & SIGNALING PANEL FPSP-100	150	
		PUMP ROOM LIGHTS	1	20	7	8	20 1 BATTERY CHARGER REC 1,2,3		
150		HEAT TRACE CONTROLLER (ODOR CONTROL)	1	20	9	10	20 1 BATTERY CHARGER REC 4,5,6		
		OUTSIDE LIGHTS NORTH	1	20	11	12	20 1 OUTSIDE RECEPTACLE SOUTH WALL		
		OUTSIDE GFI RECEPTACLE	1	20	13	14	20 1 OUTSIDE RECEPTACLE SOUTH WALL		
		OUTSIDE LIGHTS	1	20	15	16	20 1 FUEL LEVEL		
		RECIRCULATING FILTER SYSTEM #1	1	20	17	18	20 1 INFLUENT SAMPLER		
		STAIRWELL LIGHTS	1	20	19	20	20 1 SPARE		
		OUTSIDE LTS SOUTH (DEMO 2011)	1	20	21	22	20 1 PLC		
		SPARE	1	20	23	24	20 1 PLC ACCESSORIES		
		SPARE	1	20	25	26	30 2 OUTSIDE POLE LIGHTS		
		SPARE	1	20	27	28			
		PUMP ROOM RECEPTACLE	1	20	29	30	20 1 SUNSHADE LIGHT	74	
	522	SCREENING TOP AREA LIGHTING	1	20	31	32	20 1 SCREENING TOP AREA RECEPTACLES		360
125		SCREENING STAIRWAY LIGHTING	1	20	33	34	20 1 ODOR CONTROL RECEPTACLE	180	
	480	SCREENING INTERMEDIATE LVL LTG	1	20	35	36	20 1 ODOR CONTROL LIGHTING		348
150		HEAT TRACE CONTROLLER (SCREENINGS STRUCTURE)	1	20	37	38	20 1 BACKFLOW PREVENTER HOTBOX	150	
		SPARE	1	20	39	40	20 1 BOOSTER PUMP HOTBOX		150
		SPARE	1	20	41	42	1 SPARE		
425		TOTAL "L1"			1129		TOTAL "L1"	704	
	1002	TOTAL "L2"			1860		TOTAL "L2"		858
		TOTAL LOAD =			2989				

LIGHTING FIXTURE SCHEDULE

FIXTURE	LAMP	MTG HGT	DESCRIPTION	MANUFACTURER
1	150W MH 14000 LUMENS	SEE POLE HEIGHT IN DESCRIPTION	ONE CLEAR VBU M102 150 WATT ED28 PULSE START METAL HALIDE LAMP, CAST ALUMINUM HOUSING CLEAR PRISMATIC GLASS , PATTERNED REFRACTOR POLES: 10 FOOT AT ODOR CONTROL, 12 FOOT AT SCREENINGS	CROUSE-HINDS VMVMS2C150G245-S828 POLES: 10' = RSA 4T10NAA1 12' = RSA 4T12NAA1
2	2-32W T8 FLUORESCENT	AS NOTED ON PLANS	CLASS I, DIVISION 2 RATED FLUORESCENT FIXTURE, WET LOCATIONS, COLD WEATHER START, ACRYLIC LENS, ELECTRONIC BALLAST, WITH EMERGENCY BATTERY BACKUP, 120V	CROUSE-HINDS NFL4232/UNV FA S799
3	100W MH 9000 LUMENS	AS NOTED ON PLANS	ONE CLEAR 100 WATT PULSE START METAL HALIDE LAMP, CAST ALUMINUM HOUSING CLEAR PRISMATIC GLASS ,PATTERNED REFRACTOR	CROUSE-HINDS VMVM2A100G241
EL1	2-3 WATT LED	AS NOTED ON PLANS	CLASS I, DIVISION 2 RATED EMERGENCY LIGHTING FIXTURE, ENCLOSED & GASKETED HOUSING, NI-CAD BATTERY, SOLID STATE BATTERY CHARGER, 120V INPUT	CROUSE-HINDS N2LPS12222
4				DMV 2 32 MVOLT GEBIORS

RECORD DRAWING

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.

NO.	BY	CK	APP
1	AAS	KBP	MBS

REVISIONS AND RECORD OF ISSUE

DATE	
01/16/2018	CONFORMED TO CONSTRUCTION RECORDS

WF:
PW ID:
SAVED:PAS12835, 3/13/2015 3:07:56 PM
PLOTTED:
USER:
DWG VER:1000
XREF1:
XREF2:
XREF3:
XREF4:
XREF5:

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
LIGHTING PANEL AND FIXTURE SCHEDULE

DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 4/27/2015

0 1/2 1
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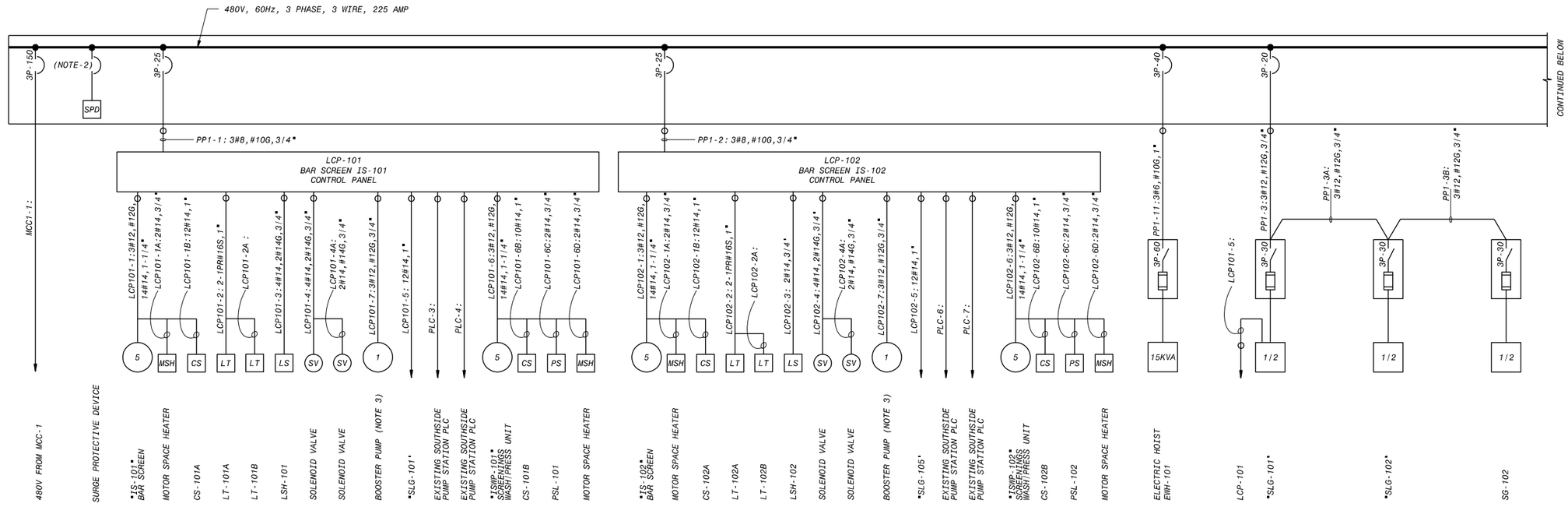
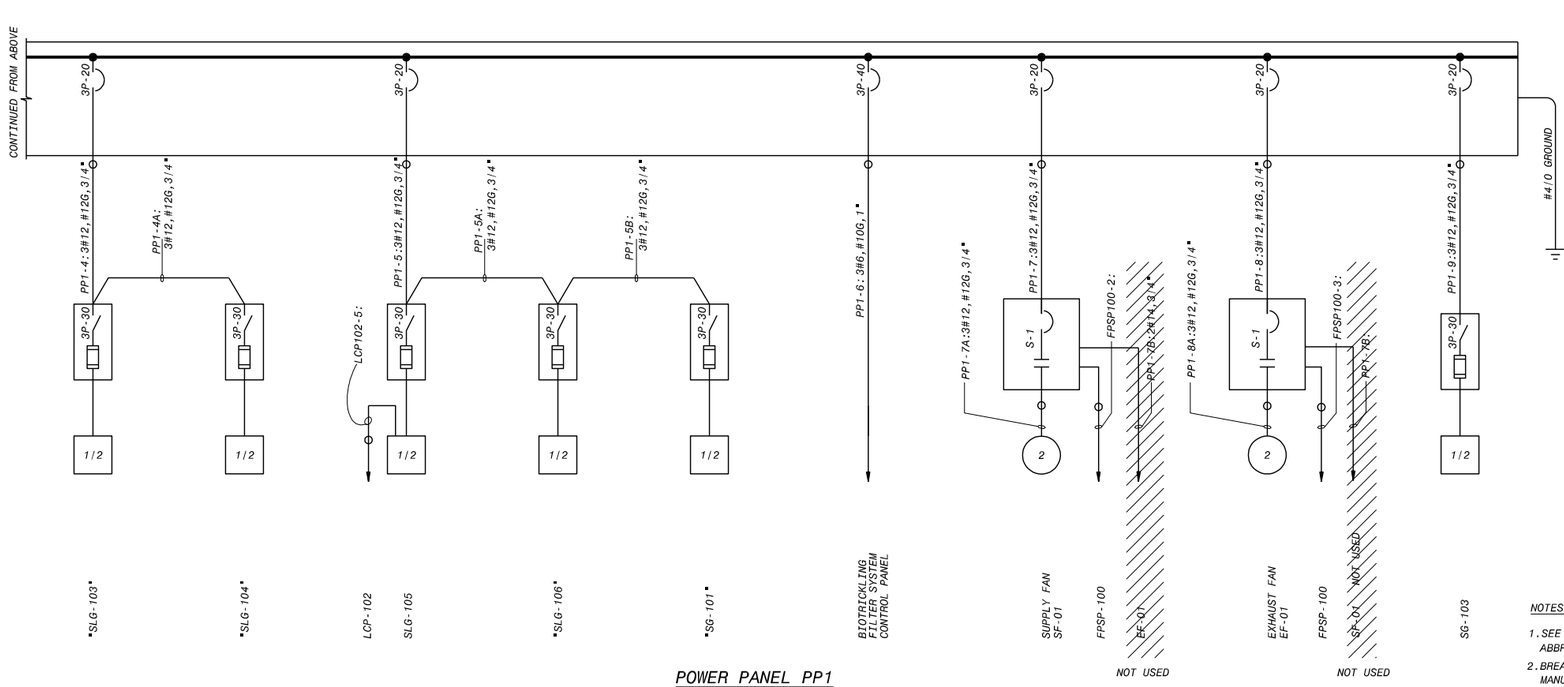
PROJECT NO.
184585

E-602
SHEET
47 OF 54

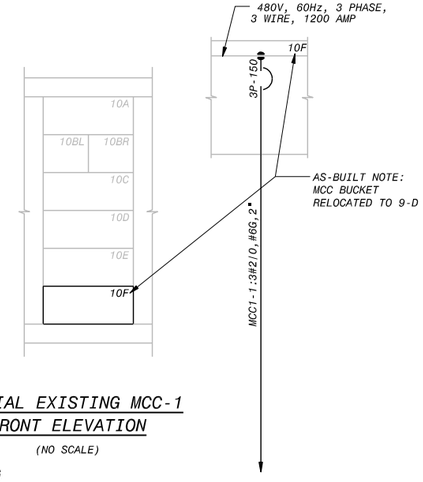
FD7000
D8648MCA



POWER PANEL PP-1
ONE-LINE DIAGRAM
(SOUTHSIDE PUMP STATION NO.2)



POWER PANEL PP1
ONE-LINE DIAGRAM
(SOUTHSIDE PUMP STATION NO.2)



PARTIAL EXISTING MCC-1
FRONT ELEVATION
(NO SCALE)

RECORD DRAWING

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND AND ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. BREAKER SHALL BE SIZED AS REQUIRED BY MANUFACTURER.
3. CONTRACTOR SHALL PROVIDE CABLE AND CONDUIT TO BOOSTER PUMPS AS REQUIRED BY SCREENINGS MANUFACTURER.

EXISTING MCC-1
PARTIAL ONE LINE DIAGRAM
(SOUTHSIDE PUMP STATION NO.2)

PP-1

NO.	BY	CK	APP
REVISIONS AND RECORD OF ISSUE			
DATE			
WF:s0-3040 - Electrical Drawings		XREF1:	
FN ID: E-701.dwg		XREF2:	
SAVED: JOHS0345, 3/23/2015 4:36:27 PM		XREF3:	
PLOTTED:		XREF4:	
USER: JOHS0345	DWG VER:1000	XREF5:	

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
ONE-LINE DIAGRAMS

DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 4/27/15

0 1/2 1
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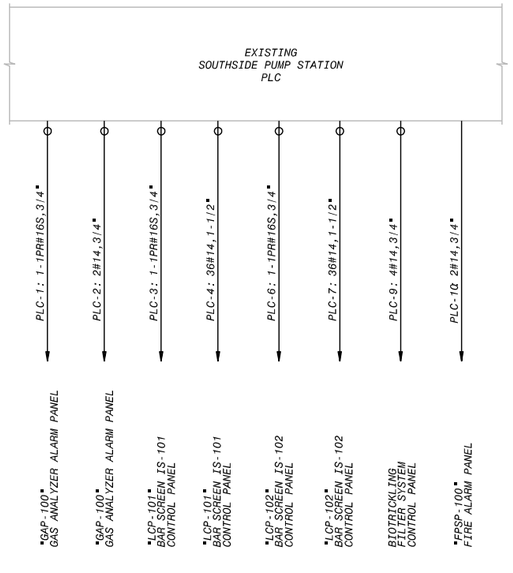
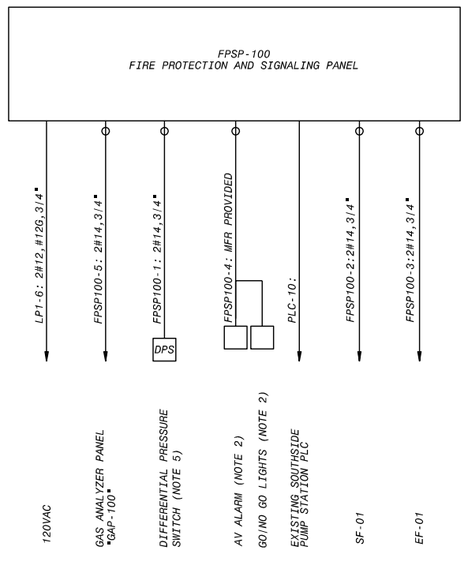
PROJECT NO.
184585

E-701
SHEET
48 OF 54

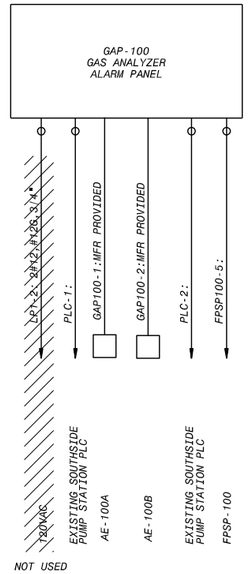
FD7000
D6048NCA



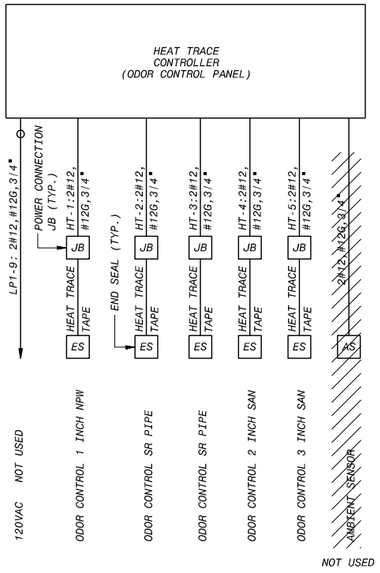
EXISTING PLC
PARTIAL ONE-LINE DIAGRAM
(SOUTHSIDE PUMP STATION NO.2)



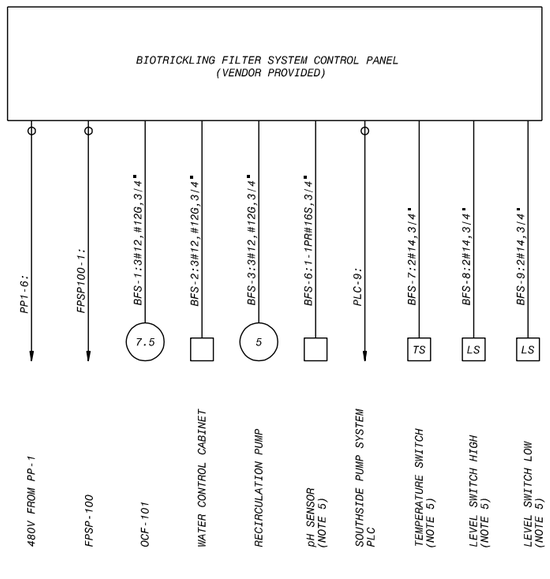
FPSP-100
FIRE PROTECTION AND SIGNALING PANEL
ONE-LINE DIAGRAM



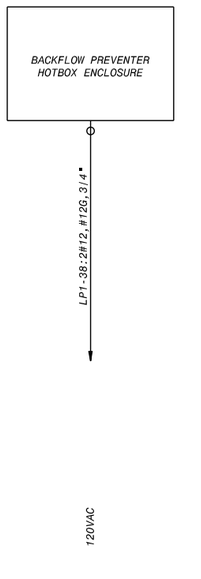
GAP-100
GAS ANALYZER ALARM PANEL
ONE-LINE DIAGRAM



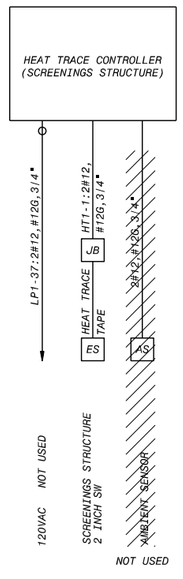
HEAT TRACE CONTROLLER
ONE-LINE DIAGRAM
(NOTE 3)



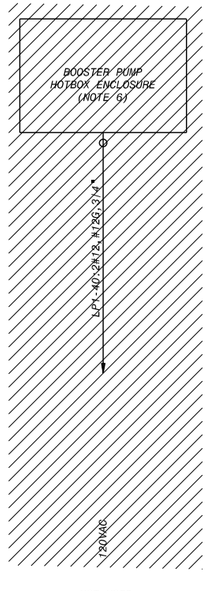
BIOTRICKLING FILTER SYSTEM CONTROL PANEL
ONE-LINE DIAGRAM



BACKFLOW PREVENTER
HOTBOX ENCLOSURE
ONE-LINE DIAGRAM



HEAT TRACE CONTROLLER
ONE-LINE DIAGRAM
(NOTE 4)



BOOSTER PUMP
HOTBOX ENCLOSURE
ONE-LINE DIAGRAM

RECORD DRAWING

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NOTES:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. AUDIO/VISUAL ALARM AND GO/NO GO LIGHTS SHALL BE PROVIDED AS SPECIFIED BY 16723.
3. SEE ODOR CONTROL PAD HVAC PLAN AND ELEVATIONS FOR ADDITIONAL INFORMATION. POWER CONNECTION JUNCTION BOXES AND END SEALS (ES) ARE NOT SHOWN ON POWER PLAN DRAWING. DEVICES SHALL BE LOCATED AT EQUIPMENT AS REQUIRED BY EQUIPMENT MANUFACTURER.
4. SEE SCREENINGS STRUCTURE MECHANICAL TOP AND INTERMEDIATE PLANS FOR ADDITIONAL INFORMATION. POWER CONNECTION JUNCTION BOXES AND END SEAL (ES) ARE NOT SHOWN ON POWER PLAN DRAWINGS. DEVICES SHALL BE LOCATED AT EQUIPMENT AS REQUIRED BY EQUIPMENT MANUFACTURER.
5. INSTRUMENTS PROVIDED BY EQUIPMENT MANUFACTURER. CONTRACTOR SHALL PROVIDE CABLE AND CONDUIT.
6. BOOSTER PUMP HOTBOX ENCLOSURE SHALL BE PROVIDED AS REQUIRED BY SCREENINGS MANUFACTURER.

NO.	BY	CK	APP	DATE	REVISIONS AND RECORD OF ISSUE

WF:50.3040 - Electrical Drawings | XREF1:
PW ID: E-702.dwg | XREF2:
SAVED: JOHB5045, 3/24/2015 9:00:54 AM | XREF3:
PLOTTED: | XREF4:
USER: JOHB5045 | DWG VER:1000 | XREF5:

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
PLC & MISCELLANEOUS ONE-LINE DIAGRAMS

DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 4/27/2015

0 1/2 1
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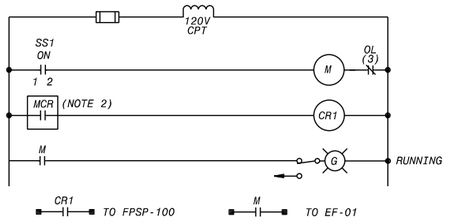
PROJECT NO.
184585

E-702
SHEET
49 OF 54

FD7000
D6048NCA



SF-01

SWITCH DEVELOPMENT

SS1

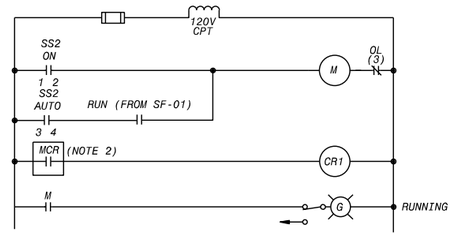
CONTACTS	POSITION	
	ON	OFF
1-2	X	
3-4		X

SS2

CONTACTS	POSITION		
	ON	OFF	AUTO
1-2	X		
3-4			X

LEGEND:

◇ FROM PLC



EF-01

RECORD DRAWING

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NOTE:

1. SEE DRAWING E-001 FOR ELECTRICAL LEGEND & ABBREVIATIONS AND GENERAL REQUIREMENTS.
2. MOTOR CURRENT SWITCH SHALL BE PROVIDED WITH CT'S OVER THE PHASE CONDUCTORS NOT SHOWN. REFER TO SPECIFICATION 16050 FOR DETAILS.

NO.	BY	CK	APP

REVISIONS AND RECORD OF ISSUE

DATE

WF:50.3040 - Electrical Drawings
PW ID: E-703.dwg
SAVED:PAST2835, 11/21/2014 1:16:40 PM
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XREF2:
XREF3:
XREF4:
XREF5:
DWG VER:1001

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GREENVILLE UTILITIES COMMISSION
SOUTHSIDE PUMP STATION IMPROVEMENTS

ELECTRICAL
SCREENINGS STRUCTURE
ONE-LINE DIAGRAMS

DESIGNED: JRTJ
DETAILED: DGP
CHECKED: WML
APPROVED: MBS
DATE: 8/17/15

0 1/2 1
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PROJECT NO.
184585

E-703
SHEET
50 OF 54

FD7000
D6048WCA