PUBLIC NOTICE
INVITATION TO BID #1287

The Springfield Electric Department will be accepting sealed bids for:

PREFABRICATED RELAY HOUSE

Specifications and bid requirements may be downloaded at www.springfieldtn.gov. Please contact Project Engineer Phillip Van Deventer at 865-895-5963 with questions. Please reference **BID NUMBER 1287** on the outside of the sealed envelope. **Sealed** bids must be received in the Office of the City Recorder, 405 N. Main Street Springfield, TN 37172 by 2:00 PM local time, Tuesday, June 11, 2024.

The City reserves the right to reject any or all bids.

Lisa H. Crockett
City Recorder

PREFABRICATED RELAY HOUSE BID PACKAGE

Springfield Electric Department
Bid Number 1287

END OF SECTION

DOCUMENT 00002
CERTIFICATIONS

The Plans and Specifications covered by these Contract Documents were prepared under the supervision and direction of the undersigned Registered Engineers and/or Architects.

Philip Van Deventer, P.E

Name
Electrical Engineer

END OF SECTION

DIVISIONS 0 and 1 - CONTRACT DOCUMENTS AND GENERAL REQUIREMENTS

END OF SECTION

LIST OF DRAWINGS TABLES AND SCHEDULES

The following is a list of Contract Drawings which this contract is to be based. These drawings are entitled "Appendix A Prefabricated Relay House Reference Drawings" and dated 5.6.24 with revision dates (if any), as noted. They will be supplemented by additional shop and dimensional drawings of materials and equipment and other drawings where specified.

Drawing Number	Sub-Title	Revision Date
300-EP02-01	One Line Diagram	5.6.24
300-EP03-01	Relay Vault Layout	5.6.24
300-EP03-02	Transformer #1 & #2 Arrangement	5.6.24
300-EP03-03	Feeder Breaker and Bus #1 & #2 Arrangement	5.6.24
300-EP03-04	Relay Rack and Fiber Panel Arrangement	5.6.24

END OF SECTION

Sealed proposals for a Prefabricated Relay House will be received by Springfield Electric Department at 405 N Main St, Springfield, TN 37172 until 2PM Central Time on June 11th, 2024, and immediately thereafter will be opened and read.

The Owner reserves the right to reject any or all bids and to waive any informalities or technicalities therein. Bids shall be on a Lump Sum basis for the Base Bid.

The work to be done consists generally of:

- Provide a 40' Long by 15' wide Prefabricated Relay House Enclosure (Includes Lights, House Power, HVAC, Outlets, etc.)
- Provide Five Relay Control Panels and a Fiber Rack.
- Provide Battery Bank and Charger.
- Provide AC and DC Distribution Panels for Substation/Panel Loads.
- Provide Disconnect Switches and Transfer Switches AC and DC Power.
- Provide Overhead Cable Tray System.

and other related work, as shown on the drawings and/or described in the specifications.

Drawings and specifications may be obtained from Gresham Smith, Engineers Planners, 222 2nd Ave S #1400, Nashville, TN 37201 or 2095 Lakeside Centre Wy #120, Knoxville, TN 37922, for a deposit of $50 per set non-refundable.

Drawings and specifications may be examined at:

Gresham Smith
Engineers Planners
222 2nd Ave S #1400
Nashville, Tennessee 37201

Gresham Smith
Engineers Planners
2095 Lakeside Centre Wy #120
Knoxville, Tennessee 37922

Owner's Office
Springfield Electric Department
1000 Central Ave W
Springfield, TN 37172

Each bid shall be accompanied by a Certified Check on a solvent bank or a Bidder's Bond issued by a Surety Company licensed to operate in the State of Tennessee, in the amount of five percent of the total bid price, as a guarantee that if the bid is accepted, the Bidder will enter into a contract and execute the Performance and Payment Bonds in the form and within the time specified.

The successful Bidder will be required to execute a Performance Bond and a Payment Bond, each in the amount of 100 percent of the Contract, issued by a Surety Company licensed to operate in the State and shall be named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department.

No Bidder may withdraw his bid for a period of forty-five (45) days after date of actual bid opening, without Owner's consent.

END OF SECTION

1.1 DEFINED TERMS.

A. Terms used in these INSTRUCTIONS TO BIDDERS have the meanings assigned to them in the GENERAL CONDITIONS.

1.2 EXAMINATION OF CONTRACT DOCUMENTS AND SITE.

A. It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work, (c) study and carefully correlate Bidder's observations with the Contract Documents, and (d) notify Engineer of all conflicts, errors or discrepancies in the Contract Documents.

B. The Proposal provides for quotation of a price for one or more Bid Items, which may be lump sum prices, alternate Bid prices, or a combination thereof. No payment will be made for any Items not set up in the Proposal, unless otherwise provided by a Contract Amendment. All Bidders are cautioned that they should include in the prices quoted for the various Bid Items, all necessary allowances for the performance of all work required for the satisfactory completion of the Project.

1.3 BIDDING REQUIREMENTS

A. Bidder will submit two (2) copies of Section 00 4143 – BID FORM and all supporting documents specified.

B. Bids that are sent by U.S. Postal Service or private carrier, shall be clearly marked **"BID ENVELOPE ENCLOSED"**. The Bid shall be sealed in a separate envelope and shall have the following information shown on the outside of the envelope:

BID FOR:	DISTRICT SUBSTATION RELAY HOUSE
BID DUE:	June 11th, 2024 by 2:00 PM
OWNER:	SPRINGFIELD ELECTRIC DEPARTMENT

C. As an alternative option, the Label provided in Section 00 4140 – BID FORM ENVELOPE LABEL can be filled out and secured to the outside of the envelope.

D. The Engineer for this project is:

Gresham Smith
222 Second Avenue South, Suite 1400
Nashville, Tennessee 37201
Phone: (615) 770-8100
Primary Contact: Scott Ribble, P.E.
Secondary Contact: Philip Van Deventer, P.E.

1.4 CHECKLIST FOR BIDDERS.

A. Submit two (2) copies of Section 00 4143 – BID FORM, and verify the following information has been included as required:
    a. Date
    b. Bid Price
    c. Delivery Site and Date
    d. Alternative Delivery Date
    e. Required Submittal Data
    f. Addenda (if any)
    g. Exceptions to the Specifications (if any)
    h. Iran Divestment Act Notice ****Must be Signed/Dated and returned in bid submittal****
    i. Signature

END OF SECTION

1.1 GENERAL

A. This form is for the Bidder's convenience as noted in Section 00 2113 – INSTRUCTIONS TO BIDDERS.

This form is not required, however, **the information IS required on the front of the Bid Envelope**.

PROJECT: _____

OWNER: _____

ADDRESS: _____

BIDDER IDENTIFICATION

BIDDER: _____

ADDRESS: _____

BIDDER'S CONTRACTOR'S LICENSE INFORMATION

LICENSE NUMBER: _____

LICENSE CLASSIFICATION APPLICABLE TO PROJECT: _____

LICENSE EXPIRATION DATE: _____ DOLLAR LIMIT: _____

SUBCONTRACTORS TO BE USED ON THIS PROJECT

Provide following for each listed subcontractor or so designate if Bidder is providing the Work Classification.
Indicate "NONE" if Work Classification is not applicable.

Type of Work	License No.	Expires	Classification

B. Cut and tape securely to front of Bid Envelope. **The Bid Envelope shall be separate from the postal/mailing/delivery service Deliver Envelope (when delivery envelope is required. See also INSTRUCTIONS TO BIDDERS)**.

END OF SECTION

Project Identification: Springfield Electric District Substation

This Bid shall be submitted as follows:

By Regular Mail, In Person, or By Overnight Delivery:

Office of the City Recorder
405 N. Main Street
Springfield, TN 37172

This Bid is submitted from:

Contractor Name: _____

Address: _____

City, State, Zip: _____

The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with Owner in the form included in the Contract Documents to sell and deliver the material described in these Specifications, for the Price and within the Time indicated in this Bid and in accordance with other terms and conditions of the Contract Documents.

BASE BID:

ITEM	QTY	DESCRIPTION	UNIT BID PRICE	TOTAL BID PRICE
1	1	Prefabricated Relay Vault with Relay Panels and Battery Bank		

PROJECT LOCATION AND SCHEDULE:

Delivery Site: Josephine Street & Industrial Drive
Springfield, Tennessee

Delivery Period: October 1st, 2026

Completion Date: January 1st, 2027

Site Conditions: Prefabricated Relay Vault will be delivered to substation under construction and off-loaded on prepared foundation.

An alternate Delivery Date of _____ is proposed by the Bidder. If this alternate Delivery Date is accepted by the Owner, a bid price **DEDUCT per unit** of $_____ is offered.

The Bidder shall provide shop drawings, as specified in Section 33 7230, Section 1.5.B, _____ weeks after receipt of order.

The Bidder shall provide "FOR CONSTRUCTION" drawings at least **four (4) weeks** prior to shipping.

GENERAL:

In submitting this BID FORM, the Bidder agrees as follows:

The prices set forth herein do not include any sums which are or may be payable by the Bidder on account of taxes imposed by any taxing authority upon the sale, purchase, or use of the equipment. If any such tax is applicable to the sale, purchase, or use of the equipment, the amount thereof shall be added to the purchase price and paid by the Owner.

The prices set forth herein are firm if accepted by the Owner within **forty-five (45)** days and shall include the cost of:

1. Delivery to the job site.
2. Offloading onto an Owner furnished foundation(s).
3. Field inspection, testing, and certification.
4. All other labor or other cost to provide the Owner with transformer filled with oil and ready for external connection.

The metal clad medium voltage switchgear shall be delivered to the Delivery Site during the Delivery Period specified above. The Delivery Period defines the time during the project schedule from completion of the concrete pad until other project tasks could make the pad inaccessible. Delivery outside the specified Delivery Period could result in liquidated damages being assessed.

The Bidder shall be responsible for securing all permits required for shipping to the Delivery Site and shall be responsible for any damages to road and utilities or other damages caused by the Bidder or his Delivery Agent during shipment to Delivery Site.

Notice of Shipment - The Bidder shall notify the Owner at the following times:

1. 10 days prior to shipment.
2. 24 hours prior to shipment.
3. 24 hours prior to delivery.

Shipments arriving after 2:00 p.m. on weekdays or arriving on weekends or holidays shall not be offloaded until the next working day and the Bidder shall be responsible for any demurrage.

Failure to provide notice shall result in Bidder being responsible for any demurrage charges resulting from the unavailability of equipment to unload equipment.

The Bidder agrees that all requests for time extensions shall be in writing, and that only such time extensions as are granted by the Owner in writing shall be considered.

Time is of the essence in order for the Owner to comply with established construction schedules. Should the Bidder fail to complete the terms of this BID FORM by the Completion Date, after all time extensions granted by the Owner have been added, then in that event the Owner shall have and is hereby given the right to deduct and retain out of such monies which may then be due, or which may become due and payable to the Bidder, the DAMAGE AMOUNT per calendar day as liquidated damages for each and every day that Certification is delayed beyond the Completion Date. The Bidder and Owner agree that liquidated damages are for costs associated with project delay and not as a penalty and that proof of such losses or damages shall not be required. The DAMAGE AMOUNT shall be $_____ per day.

The qualifications of the Bidder's Field Services Representative for field inspection, testing and certification shall be attached to this BID FORM. Include the name of the proposed field service firm, if these services are not supplied by employees of the manufacturer. A schedule of field tests, if different from those specified in 33 7230, shall be submitted by the Bidder. The qualifications of the Field Service Representatives or Field Service Firm will be included in the overall evaluation of this BID FORM.

In estimating the lowest cost to the Owner as one of the factors in deciding the award of an order, the Owner will consider, in addition to the price quoted in the BID FORM, the following:

1. Stated exceptions to the specifications.
2. Method of delivery.
3. Warranty.
4. Installation, erection and operating costs.
5. Delivery time.
6. Work history on previous projects.

The bid prices submitted for spare parts will not be used in the evaluation.

Failure to submit bid evaluation data as specified can lead to bid rejection.

Title of each equipment item shall pass to the Owner upon:

1. Delivery and placement of equipment onto foundation at location specified.
2. Satisfactory inspection for in transit damage.
3. Satisfactory installation and field test by the Materialman's Field Services Representative and Certification that the unit is ready to place in service.
4. Acceptance by the Owner following completion of Item 3.

The Bidder shall submit bids on this BID FORM. Submit complete BID FORM in (2) two unaltered copies with all blank spaces completed. There shall be no exceptions for basic bid submitted by the Materialman; however, an alternate, with exceptions, may be bid as an attachment to a basic bid.

The Bidder acknowledges that he has received the following Addenda:

ADDENDUM NUMBER	DATE
_____	_____
_____	_____

EXCEPTIONS:

Any and all exceptions that the Bidder takes to the attached specifications shall be itemized on this BID FORM. All items or exceptions not listed on this BID FORM will be deemed in full compliance of these specifications. Detailed description of the exceptions may be provided elsewhere in the bid materials. The Bidder shall indicate to which specification sections and paragraphs the exceptions apply or indicate no exceptions.

Specification Section Associated with EXCEPTION	Description of Exception
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

It is understood by the undersigned that the Owner retains the privilege of accepting or rejecting all or any part of this BID FORM and to waive any informalities or technicalities therein.

BIDDER: _____

BY: _____

TITLE: _____ DATE: _____

MAILING ADDRESS: _____

_____

_____

STREET ADDRESS: _____

_____

_____

TELEPHONE: _____ FAX: _____

PRIMARY CONTACT: _____

ALTERNATE CONTACT: _____

END OF SECTION

DOCUMENT 00420
BIDDERS QUALIFICATION STATEMENT

The contents of this statement are CONFIDENTIAL. This Document is to be submitted separately from the Bidding Documents. See Document 002113, INSTRUCTIONS TO BIDDERS.

Submitted by:

Name of Organization _____

Name of Individual _____

Title _____

Address _____

_____

Telephone _____

Email Address _____

BUSINESS ORGANIZATION INFORMATION:

Check one: □ Corporation □ Partnership □ Joint Venture □ Sole Proprietorship

If Corporation:

a. Date and State of Incorporation

_____

b. List of Executive Officers

Name Title

_____

_____

_____

If Partnership:

a. Date and State of Organization

_____

b. Name of Current General Partners

_____

_____

c. Type of Partnership:

□ General □ Publicly Traded □ Limited □ Other (describe):

If Joint Venture:

a. Date and State of Organization

_____

b. Name, Address, and Form of Organization of Joint Venture Partners: (indicate managing partner with an asterisk*)

_____

_____

_____

If Sole Proprietorship:

a. Date and State of Organization

_____

b. Name and Address of Owner or Owners

_____

_____

_____

GENERAL BUSINESS INFORMATION:

1. Name of Surety Company and name, address, and phone number of agent.

_____

_____

_____

2. What is your approximate total bonding capacity?

□ $500,000 to $2,000,000 □ $2,000,000 to $5,000,000

□ $5,000,000 to $10,000,000 □ $10,000,000 or more

3. Is your organization a member of a controlled group of corporations as defined in I.R.C. Sec 1563? □ Yes □ No

If yes, show names and addresses of affiliated companies

_____

4. Describe the permanent safety program you maintain within your organization. Use attachment if necessary.

5. Furnish the following information with respect to an accredited banking institution familiar with your organization.

   Name of Bank _____

   Address _____

   _____

   Account Manager _____

   Telephone _____

GENERAL PROJECT INFORMATION:

6. Value of Relay Vault Fabrication Work completed during the last calendar year
   $_____

7. Attach a Schedule A listing major Substation Rely Vault Fabrication projects, similar to the proposed Project, completed by this organization in the past three (3) years, with contact names and phone numbers. (If joint venture, list each participant's projects separately). List dollar value of Substation Relay Vault Fabrication projects.

8. Attach a Schedule B listing current Substation Rely Vault Fabrication projects under construction by this organization, with contact names and phone numbers. (If joint venture, list each participant's projects separately).

9. Has your organization ever failed to complete any construction contract awarded to it?

   □ Yes □ No

   If yes, describe circumstances on attachment.

10. In the last five years, has your organization ever failed to substantially complete a project in a timely manner?

    □ Yes □ No

11. Has any Corporate officer, partner, joint venture participant or proprietor ever failed to complete a project in a timely manner while an employee/officer of another firm?

☐ Yes ☐ No

If yes, describe circumstances on attachment.

12. Contractor's License Number (if applicable) for the state(s) in which this organization is licensed to do business:

_____

_____

I hereby certify that the information submitted herewith, including any attachment is true to the best of my knowledge and belief.

By: _____

Title: _____

Dated: _____

END OF SECTION

DOCUMENT 00711
GENERAL CONDITIONS

TABLE OF CONTENTS

DOCUMENT 00711
GENERAL CONDITIONS

1. DEFINITIONS

A. The word "Owner" means the person(s), or organization, or municipality to which the Proposal is addressed.

B. The words "Engineer", "Architect", "Engineer/Architect" mean Gresham Smith, Architects Engineers.

C. The word “Materialman”, “Contractor”, or “Bidder” means the successful Bidder to whom the contract is awarded.

D. The words "install", "furnish", "provide", or words of like import mean the Materialman shall install, furnish, or provide, and similarly the words "approved", "authorized", "required", "satisfactory", "acceptable", or words of like import mean approved by, authorized by, required by, satisfactory to, or acceptable to the Engineer/Architect, unless otherwise expressly stated.

E. The words "indicated", "shown", "detailed", or "scheduled" mean indicated, shown, detailed, or scheduled on the contract documents, specifications, or drawings, unless otherwise expressly stated.

F. The word "work" means the labor, materials, equipment, supplies, and services to be furnished under the contract, and the performing of all duties and obligations required by the contract documents.

G. The word "submit" means the Materialman shall submit to the Engineer/Architect for approval, unless otherwise expressly stated.

H. The word "provide" means the Materialman shall furnish and install, complete and ready for use, unless otherwise expressly stated.

I. The word "selected" means selected by the Engineer/Architect, unless otherwise expressly stated.

2. ENGINEER/ARCHITECT'S DECISION

A. The Engineer/Architect shall in all cases determine the amount, quality, acceptability, and fitness of the several kinds of finished work and materials which are to be paid for hereunder, and shall decide all questions which may arise as to fulfillment of this contract on the part of the Materialman, and the Engineer/Architect’s interpretation of the contract and the Engineer/Architect’s determination and decision thereon shall be final and conclusive; such determinations and decisions, in case any question arises, shall be a condition precedent to the Materialman’s right to receive any money hereunder. The Engineer/Architect shall have the right to correct all clerical, mathematical, or minor errors or omissions in the specifications when such corrections are necessary for the proper coordination of the contract documents.

3. DRAWINGS AND SPECIFICATIONS

A. The drawings accompanying these specifications and forming a part thereof are listed elsewhere and together with the specifications they cover the work to be performed under the Contract. The Materialman and each Subcontractor employed on this work shall carefully examine all contract drawings and read all specifications. They will be bound by all things therein affecting their special work no matter under what heading they may appear.

B. The drawings and specifications are mutually explanatory and supplementary, and all features covered in one and not in the other shall have the same force and effect as though covered in both. In the event of any conflicts between the drawings and specifications, the Engineer/Architect's decision shall govern. Should any error, discrepancy, or variance be discovered in the drawings or specifications, the Materialman (or Subcontractor, as the case may be) shall immediately notify the Engineer/Architect before beginning the work and submit the question to the Engineer/Architect for his interpretation and decision. The Engineer/Architect will be governed by overall meaning of the documents.

C. No deviations from the drawings and specifications shall be made without the Engineer/Architect's prior written approval.

D. The GENERAL CONDITIONS shall apply to each and every division and/or section of the Technical Specifications, as fully as if quoted verbatim therein.

4. STANDARD PUBLICATIONS

A. Wherever in these documents reference is made to standard specifications, standards, codes, or other standard publications, such as "ASTM" (American Society for Testing and Materials), "AASHTO" (American Association of State Highway and Transportation Officials), "ANSI" (American National Standards Institute), "AWWA" (American Waterworks Association), "ACI" (American Concrete Institute), "AISC" (American Institute of Steel Construction), "AWS" (American Welding Society), Federal Specifications, "NEC" (National Electrical Code), or others, in all cases the latest published editions of such referenced standard publications in effect at the time of receipt of bids shall apply.

5. STANDARD EQUIPMENT AND EQUIPMENT INSTALLATION

A. Except where special equipment is required, it is the general intent of the Technical Specifications that manufacturers' standard equipment shall be furnished, and minor variations from the Technical Specifications to accommodate manufacturers' standard equipment will be permissible, provided that the proposed equipment complies substantially with the Technical Specifications, and that it will accomplish the required results, all to the Engineer/Architect's satisfaction.

1. In addition to the requirements specified in the Technical Specifications, each item of equipment shall have all features and accessories as standard with its manufacturer and/or required for a complete operational unit.

6. STANDARDS FOR MATERIALS

A. All materials shall be new. Used or salvaged materials shall not be considered unless specifically authorized by the Engineer/Architect.

7. PATENTS

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

8. CONTRACT SECURITY

A. The Materialman shall furnish a surety bond in an amount equal to at least 100 percent of the contract price as security for the faithful performance of this contract and for the payment of all persons performing labor and furnishing materials in connection therewith. The surety shall be a bonding company or companies legally authorized to do business in the State in which the work is located.

B. The Owner shall have the right to waive the surety bond requirements, in which case the Materialman shall reduce his bid price in the amount of the Materialman's cost for such security.

9. SUBCONTRACTING

A. The Materialman shall not award any subcontract to any Subcontractor without the Engineer/Architect's prior approval. Only those Subcontractors of proven ability whose reputation is known to the Engineer/Architect for executing first-class work, will be approved. The Engineer/Architect's approval will not be given until the Materialman submits to the Engineer/Architect an itemized written statement designating the name of each Subcontractor, and the amount of each subcontract. This statement shall also designate the items of the contract which the Materialman proposes to execute directly with his own organization. The amount of these items, combined with the amounts of the various subcontract proposals, shall correspond to the contract price for the entire project. The contract will not be signed until all subcontracts have been approved.

B. The Materialman shall be as fully responsible to the Owner for the acts and omissions of his Subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

C. The Materialman shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind Subcontractors to the Materialman by the terms of the General Provisions and other Contract Documents insofar as applicable to the work of Subcontractors and give the Materialman the same power as regards terminating any subcontract that the Owner may exercise over the Materialman under any provisions of the Contract Documents.

D. Nothing contained in this contract shall create any contractual relation between any Subcontractor and the Owner. It is specifically pointed out that the contractual relationship shall exist between the Owner and the Materialman only. It is the Materialman's duty, in his own interest, to enter subcontractural agreements in strict accordance with all provisions of the Contract Documents. The failure of the Materialman to make the proper agreements with his Subcontractors and suppliers shall in no way relieve the Materialman of his responsibilities and obligations to the Owner.

E. The Materialman and all Subcontractors for the various branches of work employed on the project shall cooperate fully with each other to facilitate the progress of the work, and to avoid all interferences between the various parts of the work.

F. Whenever his work is in progress, each Subcontractor shall have present at the job site a Job Superintendent, foreman, or other duly authorized agent with authority to control the Subcontractor's work. This duly authorized agent shall meet with the approval of the Engineer/Architect and the Owner. The Owner reserves the right to remove from the project the Subcontractor's agent or any other employee of the Subcontractor, if, in the Engineer/Architects or Owners judgement, such removal is necessary to protect the Owner's interest.

10. LIQUIDATED DAMAGES

A. If so stated in the PROPOSAL, the time of completion of the construction is of the essence of the contract and should the Materialman neglect, refuse, or fail to complete the work to be done under the contract within the time stated in the PROPOSAL, after all extensions of time granted by the Owner have been added, then in that event the Owner shall have and is hereby given the right to deduct and retain out of such monies which may then be due, or which may become due and payable to the Materialman for the work to be done under this contract, the amount stated in the PROPOSAL per calendar day for each and every day that the work is delayed in its completion beyond the specified time. The amount stated in the PROPOSAL will be held by the Owner to pay Engineering, Architectural, and legal fees and other costs occasioned by the delay in completion of construction.

11. NOTICES AND SERVICE THEREOF

A. All notices, demands, requests, instructions, approvals, and claims shall be in writing.

B. Each notice to or demand upon the Materialman shall be sufficiently given if delivered at the office of the Materialman shown by him in the Bid (or at such other office as the Materialman may from time to time designate to the Owner in writing), or if deposited in the United States mail in a sealed postage-prepaid envelope, or if delivered with charges prepaid to any telegraph company for transmission, in each case addressed to such office.

C. Unless otherwise specified in writing to the Materialman, all papers required to be delivered to the Owner shall be delivered to the Engineer/Architect, and each notice to or demand upon the Owner shall be sufficiently given if delivered to the Engineer/Architect's office, or if deposited in the United States mail in a sealed postage-prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to the Engineer/Architect, or to such other representative of the Owner or to such other address as the Owner may subsequently specify in writing to the Materialman for such purposes.

D. Each such notice or demand shall be deemed to have been given or made as of the time of actual delivery, or (in the case of mailing) when it should have been received in due course of post, or (in case of telegrams) at the time of actual receipt.

12. RIGHTS OF THE OWNER TO TERMINATE CONTRACT

A. If the Materialman should be adjudged bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed for the Materialman or any of his property, or if he should persistently or repeatedly refuse or fail to supply enough properly skilled workmen or proper material, or if he should refuse or fail to make prompt payment to persons supplying labor or material for the work under the Contract, or persistently disregard instructions or fail to observe or perform any provisions of the Owner's instructions, or fail to observe or perform any provisions of the Contract Documents, or otherwise be guilty of a substantial violation of any provision of the Contract Documents, then the Owner may by at least five days prior written notice to the Materialman without prejudice to any other rights or remedies of the Owner in the premises, terminate the Materialman's right to proceed with the work. The foregoing provisions are in addition to, and not in limitation of, the rights of the Owner under all other provisions of the Contract Documents.

13. ASSIGNMENT OF CONTRACT

A. The Materialman shall not assign the whole or any part of this contract or any monies due or to become due hereunder without the Owner's written consent. In case the Materialman assigns all or any part of any monies due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Materialman shall be subject to prior liens of all persons, firms, and corporations for services rendered or materials supplied for the performance of the work called for in this contract.

14. WARRANTY

A. All material furnished by the Materialman, covered by the drawings and specifications and official modifications thereof, shall be warranted by the Materialman for a period of one year from the date of acceptance by the Owner. All necessary repairs required during this period due to defective workmanship or material shall be made promptly by the

Materialman at his facilities or at the customer's site, whichever is best, without cost to the Owner, including all costs for transportation in both directions between the manufacturer's facilities and the delivery site, including Owners costs for removal and installation, at times convenient to the Owner.

B. After the beginning of the warranty period, the Materialman shall not be responsible for lubrication, filter servicing, adjusting of belts and other items normally requiring periodic adjustments, cleaning out strainers, and other normal maintenance operations, all of which shall be the Owner's responsibility.

C. The Engineer/Architect shall have the sole right to establish the beginning of the warranty period for all portions of the project, and if so stated in the TECHNICAL SPECIFICATIONS, the guarantee period shall not begin until a trial run has been completed with satisfactory operation for the period of time stated in the TECHNICAL SPECIFICATIONS.

15. MODIFICATIONS TO GENERAL CONDITIONS

A. Modifications to these GENERAL CONDITIONS, if any, shall be as specified in SUPPLEMENTARY CONDITIONS.

B. Prior to Execution of the Contract, the liability insurance shall be provided with the following as to limits of coverage and certain other special provisions (if any):

1. Workers' Compensation - In accordance with the laws of the State.

2. Contractor shall provide Comprehensive General Liability insurance, written on a Job Site Basis and name the Owner and Engineer as additionally insured, as follows on an Occurrence Form:

General Liability -	
General Aggregate:	$1,000,000
Completed Operations:	$1,000,000
Property Damage:	$1,000,000 each occurrence
Personal Injury:	$1,000,000
annual aggregate:	$1,000,000 each occurrence
Auto Liability -	
Combined Single Limit:	$1,000,000
Bodily Injury and Property Damage:	$500,000 each person $500,000 each accident $1,000,000 annual aggregate
Umbrella Liability –	
Aggregate:	$3,000,000
Each Occurrence:	$3,000,000

END OF SECTION

SECTION 01040
PROJECT COORDINATION

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Coordination

B. Project Representatives and Addresses

1.02 COORDINATION

A. All work, submittals, and testing shall be coordinated with the Work listed in the Contract Documents to assure efficient progress of the Project Construction.

1.03 PROJECT REPRESENTATIVES AND ADDRESS

A. Owner: Springfield Electric

MAIL:
STREET: 1000 Central Avenue
Springfield, TN 37172

PHONE: 615-384-6770
FAX: 615-382-1642

Contact: Terry Resha
Alternate: Sandra Vallejo

B. Engineer: Gresham Smith
Engineers Architects Planners

MAIL:
STREET: 222 2nd Ave S #1400
Nashville, Tennessee 37201

PHONE: (615) 399-2661
FAX: (615) 399-2657

STREET: 2095 Lakeside Centre Wy #120
Knoxville, Tennessee 37922

PHONE: (865) 693-7881
FAX: (865) 693-7824

CONTACT: Scott Ribble, PE
ALTERNATE: Philip Van Deventer, PE

C. All correspondence to the Owner shall be addressed as in Article 1.03, A.

D. All correspondence, submittals, shop drawings, test reports, instruction manuals, operation manuals and any other pertinent Project materials shall be addressed to the Engineer as in Article 1.03, B.

E. Forward a copy of all correspondence addressed to the Owner to the Engineer.

F. Notify Owner and Engineer of the Primary Project Representative, Alternate Project Representative, mailing address, package delivery address, phone number (normal working hours), phone number (after working hours) and fax number.

G. All correspondence, submittals or other items associated with the Contract shall be identified by the Project Owner and Project name as listed in the Contract Documents.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

(NOT USED)

END OF SECTION

SECTION 01301
SUBMITTALS

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Submittal Procedures

B. Submittal Schedule

1.02 RELATED SECTIONS

A. DIVISIONS 0 and 1 - CONTRACT DOCUMENTS, and GENERAL REQUIREMENTS: These shall apply to all work included in this section.

B. Section 01040 - PROJECT COORDINATION

C. Section 01341 - SHOP DRAWINGS

D. Section 01721 - PROJECT RECORD DOCUMENTS

1.03 SUBMITTAL PROCEDURES

A. Transmit each submittal with transmittal letter or Engineer accepted form.

B. Submit shop drawings as specified in Section 01341 - SHOP DRAWINGS

C. Identify **Springfield Electric Department, District Substation**, pertinent drawing sheet and detail number(s), and specification section number, as appropriate.

D. Schedule submittals to expedite the project and deliver to Engineer with copy of transmittal letter to Owner's representative as identified in Section 01040 - PROJECT COORDINATION. Coordinate submission of related items.

E. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed Work.

F. Provide space for Contractor and Engineer review stamps.

G. Revise and resubmit submittals as required, identify all changes made since previous submittal.

1.04 SUBMITTAL SCHEDULE

A. Provide a submittal schedule indicating review dates and return dates required to maintain project schedule.

1.05 SUBMITTAL MATRIX

A. The following matrix shows the types of submittals required under each section of the technical specifications. Details can be found in the appropriate technical sections.

Section Number	Bill of Materials	Shop Drawings	Product Data	Calculations	Certifications	MIX Design	Test Reports	O&M Manuals
16162	X	X	X	X	X		X	X
16332		X	X				X	X
16345	X	X	X				X	X

END OF SECTION

SECTION 01341
SHOP DRAWINGS

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Shop Drawing submittals

B. Final/Record/As-Built Drawings are specified in Section 01721 - PROJECT RECORD DOCUMENTS

1.02 RELATED SECTIONS

A. DIVISIONS 0 and 1 - CONTRACT DOCUMENTS, and GENERAL REQUIREMENTS: These shall apply to all work included in this section.

B. Section 01301 - SUBMITTALS

C. Section 01721 - PROJECT RECORD DOCUMENTS

1.03 SHOP DRAWINGS

A. Shop drawings shall include fabrication, erection, layout, and setting drawings; material lists; manufacturer's catalog sheets and/or descriptive data for materials and equipment showing dimensions, performance characteristics, and capacities; wiring and control diagrams; electrical characteristics, and capacities; and other pertinent information as required to obtain approval of the items involved.

B. Drawings shall be presented in a clear and thorough manner.

1. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings and Specification Sections.

C. Minimum sheet size: 8½" x 11".

D. Maximum sheet size: 22" x 34"

1.04 PRODUCT DATA

A. Preparation:

1. Clearly mark each copy to identify pertinent products or models.

2. Show performance characteristics and capacities.

3. Show dimensions and clearances required.

B. Manufacturer's standard schematic drawings and diagrams:

1. Modify drawings and diagrams to delete information which is not applicable to the Work.

2. Supplement standard information to provide information specifically applicable to the Work.

1.05 MATERIALMAN RESPONSIBILITIES

A. Designate in the submittal schedules, the dates for submission and the dates that reviewed Shop Drawings and product data will be required to maintain delivery schedule.

B. Review Shop Drawings and Product Data prior to submission. Materialman shall allocate 10 business days (excluding holidays) in the project schedule for the Engineer's initial review. Additional time may be necessary for resubmissions.

C. Determine and verify:

1. Catalog numbers and similar data

2. Conformance with specifications

D. Coordinate each submittal with requirements of the Work and of Contract Documents.

E. Notify the Engineer in writing (include e-mail), in advance of submission, of any deviations in the submittals from requirements of the Contract Documents. Materialman requested deviations may require additional supporting documentation before the Engineer acts on the request.

F. Begin no fabrication or work which required submittals until return of submittals with satisfactory review.

1.06 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule.

B. Number of submittals required:

1. Shop Drawings: Submit one (1) copy of electronic data files of all drawings prepared for the project. Electronic data files shall be either a Design Web Format (.DWF) or a Portable Document Format (PDF) format. Raster based scans (.TIF, .PCX, or .GIF) files of manual drawings are not acceptable.

2. Product Data: Submit one electronic (1) copy of product data of all items for which

product data is specified in other sections. Electronic data files shall be in a PDF format.

3. Shop Drawings and Product Data can be provided on a USB Flash Drive or via e-mail. When submittal data is delivered via e-mail, it is the Materialman's responsibility to verify receipt by the Engineer.

C. Submittals shall contain:

1. Submittal identification number. Submittals shall be numbered consecutively. Re-submittals shall use the same submittal number with an alphabetic suffix added.

2. The date of submission and the dates of any previous submissions.

3. The Owner's name, project title and number.

4. Contract identification.

5. Identification of the project, with the specification section number.

6. Relation to adjacent or critical features of the work or materials.

7. Applicable standards, such as ASTM or Federal Specification numbers.

8. Identification of deviations from Contract Documents.

9. Identification of revisions on resubmittals.

10. A 3"x 3" blank space for Materialman and Engineer stamps.

1.07 RETURN FOR RESUBMISSION

A. The Engineer will return for resubmission all shop drawings submitted without the above specified approval and certification which in the Engineers opinion contain numerous discrepancies, have not been checked, or do not meet the requirements for submission.

1.08 REVIEW OF SUBMITTALS

A. The Engineer will review, mark and date all submitted shop drawings. One (1) **electronic** set will be returned to the Materialman. **When submittal data is returned via e-mail, it is the Engineer's responsibility to verify receipt by the Materialman**. Materialman shall make corrections and changes as indicated.

B. Resubmit shop drawings as specified above, until satisfactory review has been obtained. Corrections and/or changes indicated on shop drawings by Engineer/Owner shall not be considered as an extra work order.

C. After satisfactory "Review" or "Furnish as Corrected" has been obtained for all shop drawings, a set of shop drawings marked "FOR CONSTRUCTION" shall be furnished to the

D. Engineer in the format specified in Article 1.06 above. Materialman shall provide "FOR CONSTRUCTION" drawings within 21 days of receipt of the Engineer's satisfactory review of all shop drawings.

E. Review of shop drawings by the Engineer will be general only, and such review will not relieve the Materialman of responsibility for accuracy of such shop drawings, proper fitting, coordination, construction of work, and furnishing materials required by the Specifications but not indicated on shop drawings. Review of shop drawings shall not be construed as approving departures from the Specifications.

1.09 ENGINEER DUTIES

A. Review submittals with reasonable promptness and in accordance with schedule.

B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or satisfactory review of submittal.

C. Return submittals to Materialman for distribution, or for resubmission.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

(NOT USED)

END OF SECTION

SECTION 01721
PROJECT RECORD DOCUMENTS

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Final "As-Built" record drawings

B. Factory test results

C. Operation/Maintenance manuals

1.02 RELATED SECTIONS

A. DIVISIONS 0 and 1 - CONTRACT DOCUMENTS, and GENERAL REQUIREMENTS: These shall apply to all work included in this document.

B. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these Specifications.

1.03 SUBMITTALS

A. Comply with pertinent provisions of GENERAL CONDITIONS and Section 01301 - SUBMITTALS.

B. Prior to submitting request for final payment, submit the final Project Record Documents to the Engineer/Architect for approval.

1.04 MATERIALMAN RESPONSIBILITIES

A. The Materialman shall provide final "As-Built" record drawings of the work with all revisions in incorporated.

B. The Materialman shall provide factory test results, as applicable, for all material furnished.

C. The Materialman shall provide complete operation and maintenance manuals for all equipment furnished.

PART 2. PRODUCTS

(NOT USED)

PART 3. EXECUTION

3.01 FINAL DRAWINGS

A. At completion of project, the Materialman shall incorporate all revisions into the shop drawings to provide a complete set of final drawings. The drawings shall be marked as "Final-As Constructed".

B. One (1) copy of electronic data files of all drawings prepared for the project. Format shall be AutoCAD 2000 or later or MicroStation 2004 or later, vector based (.DWG, .DXF, or DGN) files. Raster based scans (e.g., .TIF, .PCX, or .GIF) files of manual drawings are not acceptable. Media shall be USB Flash Drive or via e-mail.

3.02 FACTORY TEST RESULTS

A. The Materialman shall provide, as a minimum, results for all routine or production tests required by the industry standards referenced in the technical sections.

B. The Materialman shall also provide results for any non-routine tests specified in the technical sections.

C. When required in the technical sections, required test results shall be forwarded to the Engineer prior to shipping.

D. Engineer shall have two (2) weeks to review factory test results before shipping.

3.03 OPERATION AND MAINTENANCE MANUALS

A. The Materialman shall provide **three (3)** complete sets of Operations, Maintenance and Instruction Manuals covering all equipment furnished for the project.

B. Contents of Manuals

1. Table of Contents and index tabs.

2. Description of the equipment.

3. Operating instructions.

4. Installation instructions including rigging and lifting details.

5. Maintenance instructions.

6. Instruction manuals for installation, operation and maintenance of each accessory device, including oil filling procedures.

7. Assembly drawings.

8. Parts lists.

9. List of recommended spare parts.

10. List of maintenance tools furnished with the equipment.

11. Nameplate information and shop order numbers for each item of equipment and component part.

12. Final As-Constructed shop drawings.

13. Photographs (if required in specifications).

14. Certified factory test results.

C. Format

1. All Manuals shall be bound in a three-ring binder of suitable size (maximum 2") for the material to be inserted.

2. Binders shall be white in color with clear jacket for the insertion of printed cover and edge identification sheets.

3. Instruction manuals for microprocessor-based relays shall be provided in the manufacturers' original binding or in a separate three-ring binder produced by the Materialman with dividers identical to the relay manufacturers' manual.

4. All information bound shall be 8½" x 11" or accordion folded to this size.

5. Page dividers with plastic reinforced holes and tabs shall be used to organize Operations and Maintenance Manuals.

6. Binder cover and edge inserts shall contain Owner's name, project title, date and subject matter of the manual.

D. Organization

1. Table of Contents shall list all information contained.

2. Contact information for all major equipment suppliers, Materialman, and subcontractors.

3. Organize manual by equipment item. Contents as specified above.

3.04 FINAL SUBMITTAL

A. All Record Documents, including final drawings and Operation, Maintenance and Instruction Manuals shall be submitted to Engineer prior to submitting final payment request.

3.05 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The Materialman has no responsibility for recording changes in the Work subsequent to Final Completion, except for changes resulting from work performed under Warranty.

END OF SECTION

SECTION 16162
SUBSTATION CONTROL HOUSING

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Substation Control Housing (SCH) for protective relaying, metering, and all auxiliary equipment as indicated on the contract drawings.

B. The Substation Control Housing Contractor shall serve as the single point of responsibility for field service as well as warranty for all component systems installed within the SCH. The Contractor shall provide all interconnecting wiring between component systems mounted within the SCH and shall furnish functional testing of these systems. The Owner is responsible for all cable connections to equipment located external to the SCH.

1.02 DEFINITIONS

A. Contractor: The entity responsible for the manufacture, shipping, and installation of the specified Substation Control Housing.

B. Project Construction Contractor: The entity responsible for the connection of all external devices, power system equipment, AC power supply, and associated facilities to the Substation Control Housing.

1.03 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

A. None

1.04 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

A. None

1.05 RELATED SECTIONS

A. DIVISIONS 0 and 1 - PROPOSAL DOCUMENTS, CONTRACT DOCUMENTS AND GENERAL REQUIREMENTS: These shall apply to all work included in this section.

B. Section 16345 - SUBSTATION RELAY AND CONTROL PANEL(S) AND ASSOCIATED EQUIPMENT

C. **[**Section 16632 – CENTRAL NICKEL CADMIUM BATTERY SYSTEM**]**

1.06 REFERENCE STANDARDS

A. The latest revision of Published Specifications, standards, tests, or recommended methods of trades, industry, or governmental organizations apply to work in this section where cited in Section 01090 - REFERENCE STANDARDS and in the listing below.

1. International Building Code (IBC)
2. International Mechanical Code (IMC)
3. American National Standards Institute (ANSI)
4. American Society of Civil Engineers (ASCE)
5. National Electric Manufacturers Association (NEMA)
6. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHREA)

1.07 SERVICE CONDITIONS

A. The Control Housing will be for housing relay/control panels and associated equipment.

B. The Control Housing will be installed outdoors at an elevation of less than 3,000 ft. above mean sea level.

C. Foundation type and general design (Owner furnished) for the Control Housing will be as shown on the Contract Drawings.

1.08 UNUSUAL SERVICE CONDITIONS

A. None

1.09 DESIGN REQUIREMENTS

A. The equipment requirements and specifications for the Control Housing are as shown in these Contract Documents and Drawings.

B. Contractor shall be responsible for the detail design of the Control Housing, shop drawings and addition of pin numbers of relay/control devices, terminal blocks, and associated equipment to the Engineer provided schematics/elementary diagrams. The Contractor is also responsible for modifying the schematic/elementary diagrams as-built and shipped. This includes design changes and/or revisions due to testing of the SCH. This information shall be added to a separate layer on the Engineer furnished AutoCAD drawings.

C. Contractor shall be responsible for the detail design of the physical point-to-point wiring of the SCH equipment.

D. Contractor shall be responsible for construction detail and shop drawings required for fabrication of the SCH.

1.10 SUBMITTALS

A. General
   1. Shop drawings shall be submitted for approval in accordance with Section 01301 - SUBMITTALS and Section 01341 - SHOP DRAWINGS as listed in the TABLE OF CONTENTS of these Contract Documents.

   2. Submittal information shall include dimension data and other information in the English foot/pound/inch system of units.

B. Proposal/Bidding/Quotation Submittals

1. Bill of Material
2. Enclosure Outline & Details
3. Installed weight
4. Proposed shipping weight, size, and shipping split information

C. Shop Drawings
1. Bill of Material
2. Enclosure Outline & Details
3. Installed weight
4. Shipping size, shipping split information
5. Enclosure Anchorage Design
   a. Foundation reactions for the specified loadings
   b. Anchor rod specifications
6. Enclosure Schematics & Wiring Diagrams (with shipping split information)
7. HVAC Calculations

D. Certifications

1. Certification Letter/Statement of certification of compliance with the latest revision of the International Building Code (IBC) seismic requirements shall be submitted with shop drawings for review. Certificate of Compliance shall be sealed by a sealed by a Professional Engineer licensed by the state where the Control Housing is to be located. This certificate is required by Federal Law 7 CFR1792, Subpart C.

2. Certification sealed by a Professional Engineer verifying that proposed structure meets the loading requirements and codes listed in this specification.

3. Certification that the proposed building meets all State requirements and is approved for sale and installation at the Project Location.

Tennessee: Tennessee Modular Building ACT - TCA 68-126-301

E. Contract Closeout Documents

1. Closeout Submittals shall be provided before shipment of the SCH in accordance with Section 01721 - PROJECT RECORD DOCUMENTS as listed in the TABLE OF CONTENTS of these Contract Documents.

2. Closeout Submittals shall include, but not limited to:
   a. Final Drawings (As-Built, Record Drawings)
   b. Manuals
   c. Recommended Spare Parts List
   d. Certified Test Reports

1.11 DELIVERY, STORAGE, AND HANDLING

A. The Control Housing shall be shipped as one unit when possible. Should transportation require shipping splits, each open area shall be sealed with temporary 2 inch (nominal) thick wooden framing and plywood cover for protection during transportation and storage

at the job site. Seams in the temporary cover shall be liberally caulked on the exterior.

B. Transportation of Control Housing shall be in compliance with all state and federal regulations with respect to highway permits, battery systems, and safety requirements. Contractor is responsible for all necessary permits.

1.12 WARRANTY

A. All materials and equipment supplied under this specification shall be warranted as outlined in Document 00711 - GENERAL CONDITIONS.

B. Items to include in statement of warranty:

1. Assignments of warranties of any systems, materials or components that exceed the one (1) year shelter warranty period
2. Instruction on activating warranty
3. Instructions on submitting claims for service under warranty

PART 2. PRODUCT

2.01 PREAPPROVED MANUFACTURERS

A. VFP, Inc.
B. Trachte

2.02 MATERIALS

A. General

1. Enclosure NEMA classification: NEMA 3R

2. The Contractor shall check the dimensions of the proposed equipment for required electrical and safety clearances front and back of the equipment within the SCH, space for interconnection, and confirm that the overall shipping dimensions meet all interstate shipping requirements to transport the SCH from the factory to the final destination.

3. Nominal dimensions of the SCH shall be as indicated on the Contract Drawings. These dimensions are considered as guideline dimensions. Actual dimensions will be determined by the physical size of the electrical components proposed. Construction of SCH, installation of equipment, and foundation anchor methods shall withstand the vertical and horizontal forces associated with the wind, seismic, and operational loads.

B. Structural Requirements

1. Design Loads Definitions:

a. Dead Load: The Control Housing "shell" and all installed equipment including relay panels, breakers, cubicles, battery systems, HVAC, or any other equipment installed within the SCH by the Contractor.

b. Live Load: Includes all loads associated with personnel, maintenance activities, test equipment, and equipment to be installed within the SCH by the OWNER. Live Load specification applies only to accessible floor areas of the SCH.

c. Floor Concentrated Load: This is a concentrated load applied within any 6 inch by 6 inch area within the accessible floor boundaries of the SCH.

d. Cable Tray Live Load: Loading, per linear foot of the cable tray that may be applied by the Owner. This load is transferred to the SCH structure and/or roof.

e. Accessible Floor Area: Floor space that is accessible for personnel, maintenance activities, and installation of equipment by the OWNER.

2. Design Loads:

a. Floor live load (uniform per ASCE 7)
   i) On foundation 125 psf
   ii) During lifting and transport 125 psf

b. Floor Concentrated Load: 500 lbs

c. Roof live load (uniform per ASCE 7) 35 psf

d. Cable Tray Live Load: 75 pounds per Linear Foot.

e. Wind load (per ASCE 7) 110 mph, Exposure C

f. Seismic Loading:
   i) Structure, equipment mounting for listed systems, and structure anchorage to the foundation shall meet the seismic requirements of the latest revision of the International Building Code (IBC).

Occupancy Category: I

Maximum Considered Earthquake Ground Motion of 0.2 second Spectral Response Acceleration

$S_S =$ 0.3

Maximum Considered Earthquake Ground Motion of 1.0 second Spectral Response Acceleration

$S_1 =$ 0.148

Spectral response coefficients:

S_{MS}: 0.468
S_{M1}: 0.34
S_{DS}: 0.312

S_{D1}: 0.227

Site Class: D

Importance Factors:

Structure	1.5
Structure anchorage	2.0
Relay/Control Panels	1.5
Battery and Charger System	1.5
All other electrical and mechanical systems	1.0

3. Anchorage to foundation:

   a. The Owner will furnish monolithic concrete foundation, or as shown on the Contract Drawings.

   b. The Contractor shall provide the anchorage design required to anchor the SCH to the specified Owner furnished foundation to meet the wind, seismic, and operational design loading. Design shall incorporate anchor rod attachment – welded designs are not acceptable.

   c. SCH will be placed on the top of concrete. Leveling nuts will not be used.

   d. Anchorage design shall solidly anchor SCH to the foundation to eliminate horizontal and vertical movement. Designs that control horizontal movement only are not acceptable.

   e. The Contractor shall supply and identify all attachment points on the SCH and all shims, tie down materials, clamping plates, and all associated hardware required by the Contractor's anchorage design. Contractor shall identify anchor rod size and quantity required to meet design requirements.

      i) Anchor Rods and anchor rod installation shall be provided by the Owner. Installation will be either cast-in-place/embedded in concrete or epoxy installation with the Hilti Epoxy system or approved equal

      ii) Anchor Rods will be manufactured anchor rods or deformed rebar (ASTM A615). Cast-in-place/embedded anchor rods will be threaded with nut and washer. Anchor rods for epoxy will be suitable for the purpose. Anchor Rod steel will be ASTM A36, F1554, or A307 with an ultimate tension of less than 140,000 ksi or yield tension of less than 94,250 ksi.

4. Fire Ratings: 2 hour fire resistance per ASTM E119 on exterior wall or walls as identified on the Contract Drawings.

5. Level 4 high rifle bullet resistance when tested in accordance with UL 752

C. Structural Components – Steel Construction

1. Wall panels, roof panels, and equipment access doors shall be formed in an interlocking, self-framing design. All permanent structural primary and secondary members shall consist of non-combustible materials Use of wood or other materials, which support combustion, shall not be allowed as permanent members.

2. Base members shall be ASTM A36 channel, wide flange and/or angle sections forming a rigid square and level foundation for the enclosure, and sized to meet or exceed the static and dynamic loading requirements. Removable lifting lugs are to be supplied for each shipping split, placed in a position to provide uniform lifting load at each lifting lug location. The base shall have adequate strength so that when the enclosure is lifted at the lifting points there will be a deflection no greater than 1/360th of the unsupported span between and on either side of each lifting point.

3. The floor shall be constructed of 1/4 inch minimum, steel floor welded to the base framework. Adequate stiffening members to support the specified load with a deflection of no greater than 1/360th of the distance between the floor stiffener members, when the SCH is in the normal operating position.

4. All exterior wall panels shall be fabricated using 11 gauge galvanized steel conforming to ASTM-A569, and be gasketed and bolted together on the inside of the enclosure. All wall panels are to be provided with stiffeners and adequate flanges to support roof loads, wind loads, and equipment hanging from such panels.

5. Interior walls shall be 14-gauge minimum, galvanized sheet steel firmly attached to interlocking ribs of exterior wall panels along all vertical seams. Each interior wall panel shall be formed to receive adjacent panels at each splice. Interior panels shall be designed to support all equipment mounted on wall panels.

6. The roof shall be supported by roof trusses bolted to the underside of the roof panels and to adjacent wall panels. All trusses are to be fabricated of 11 gauge galvanized steel (ASTM-A569) and are to be designed to support the specified roof loading plus loads due to all other equipment that may hang from the roof (lights, cable trays, etc.) or that may be mounted on the roof (bus duct, exhaust fans, hvac units, etc.). Roof panels shall be 11 gauge galvanized steel (ASTM-A569) and bolted to adjacent roof panels and bolted to the roof trusses and wall panels. Adequate stiffening must be provided to support all loads specified. All external bolted seams are to be gasketed, caulked, and completely covered by roof caps.

7. Ceiling shall be 16-gauge minimum galvanized sheet steel formed to create a tightly interlocking panel design. The used of a drop ceiling of non-metallic materials is not acceptable.

D. Structural Components – Reinforced Solid Concrete Construction

1. Floors, walls, and roof shall be constructed in pre-cast reinforced panels with a

minimum thickness of 6" on floors and 4" on roof and wall panels. Cast reinforced steel plates in floor, walls, and roof panels to provide for welded panel-to-panel connections.

2. Provide floor panel with integral and flush lifting provisions that permit crane lift without separate bolt on devices, but make use of readily available crane hardware including shackles, hooks, or D-rings. Tie-down hardware constructed into the wall construction for anchorage to foundation is not permitted. The base shall have adequate strength so that when the enclosure is lifted at the lifting points there will be a deflection no greater than 1/360th of the unsupported span between and on either side of each lifting point.

3. The roof shall be designed to support the specified roof loading plus loads due to all other equipment that may hang from the roof (lights, cable trays, etc.) or that may be mounted on the roof (bus duct, exhaust fans, hvac units, etc.).

E. Electrical Requirements:

1. General

   a. Electrical system design and material shall be in accordance with the Contract Drawings and the NEC.
   b. General Interior Lighting - 75 foot candles, 3 feet above floor.
   c. Alarms and controls for SCH Systems (Charger, ventilation, door, etc. alarms) shall be wired to terminal blocks located within the control panels or cubicles, logically grouped for Owner's use and connection to Owner supplied communications, except as may be indicated on the Contract Drawings.
   d. Alarms shall include (as applicable or as shown on Contract Drawings):
      i) Battery Charger operation
      ii) Battery Room ventilation equipment failure
      iii) Entrance door(s)
      iv) Smoke/fire detection
      v) Low (50°F) and high (95°F) temperature within SCH

2. Wiring of all AC and DC power shall be RHW, RHW-2, or other non-PVC insulated, NEC Code compliant, 600 volt insulation, 12 AWG minimum, or as shown on the Contract Drawings.

   a. Wiring between cubicles or panels and separately installed equipment cabinets such as SCADA and AMR cabinets shall use TC cables as indicated below. Conductors shall be AWG No. 14.

   b. Conductors used as AC and DC "supply bus" for inter-panel AC and DC supply; and conductors between the relay/control panels and the AC and DC breaker panels shall be AWG No. 10, minimum. Conductor color code shall meet National Electric Code requirements.

3. Tray Cables

a. When the use of multi-conductor cables is deemed appropriate for the function by the Contractor, type TC cable shall be used.

i) Cable conductor size shall be based on function, or as shown on Contract Drawings.

ii) Control and low voltage power cable insulation shall be Ethylene-Propylene Rubber (EPR) rated for 90°C/75°C wet conditions. Insulation shall be rated for 600 Volts AC, 250 Volts DC. Polyethylene jacket shall be provided for single conductor and multiple conductor cable.

iii) Circuits using single conductors or multiple conductor cables shall be identified in accordance with ICEA/NEMA Method 1. Color sequence E-1 shall be used for AC power circuits. Color sequence E-2 shall be used for all DC power, control, and instrument transformer secondary circuits. See Table below:

Conductor No.	**AC Power Circuits** (Method 1, E-1)		**DC Power, Control, & Instrument Transformer** (Method 1, E-2)	
	Base Color	Tracer	Base Color	Tracer
1	Black	--	Black	--
2	White	--	Red	--
3	Red	--	Blue	--
4	Green	--	Orange	--
5	Orange	--	Yellow	--
6	Blue	--	Brown	--
7	White	Black	Red	Black
8	Red	Black	Blue	Black
9	Green	Black	Orange	Black
10	Orange	Black	Yellow	Black
11	Blue	Black	Brown	Black
12			Black	Red
13			Blue	Red
14			Orange	Red
15			Yellow	Red
16			Brown	Red
17			Black	Blue
18			Red	Blue
19			Orange	Blue
21			Yellow	Blue
22			Black	Orange
23			Red	Orange
24			Blue	Orange

iv) Each individual cable shall contain a minimum of 20% spare conductors for Owner's use.

4. SCH Ground Bus

    a. SCH Ground Bus shall be as shown on the Contract Drawings.

5. Automatic Meter Reading – TBD by Springfield

6. Lighting and wiring devices- All wiring devices shall be UL Listed and recognized devices.

    a. Interior lights – 120 Vac, cold weather ballast, and fluorescent fixtures with tube guards or LED Equivalent. Lamps shall be standard wattage and types commercially available.
    b. Exterior lights - 50 W LED, 120 Vac, internal photocell, or as indicated on the Contract Drawings.
    c. Light switches shall be located at each entrance door to operate building lighting. When multiple switches are mounted vertically, switches shall be located as follows: Bottom switch- normal SCH lighting, Middle switch- exterior lighting, Top switch- SCH emergency lighting.
    d. Duplex receptacle(s) - specification grade 20 A, 125 Vac, GFCI duplex receptacle(s) shall be provided near entrance door(s) and can also be located on interior walls of the enclosure as shown on the Contract Drawings.
    e. Exterior receptacle(s) shall be equipped with weatherproof cover.
    f. Battery Room (when specified) Electrical Equipment shall be suitable for the application and in accordance with NEC, NESC, and other applicable codes. No wiring devices shall be located within the battery room unless rated for the purpose and application.

7. Emergency Lighting

    a. Emergency light – Dual-head, 100 W, 12 Vdc, self contained, continuously charged, 120 Vac supply as shown on the Contract Drawings.

8. AC Panel and Control Power/Station Service Transfer Switch.

    a. Substation AC Distribution Breaker Panel, General Electric 225 Amp, 120/240 Vac, 1Ø, 3W, 22,000 AIC, surface mount, Type AQ Panelboard with cover. Type THQD and Type THHQB safety breakers rated to match panel AIC. Main and Branch breakers sized as shown on the Contract Drawings.
    b. Relay House AC Panel – Size to accommodate the relay house loads (e.g. HVAC, Lighting, Outlets, etc.).
    c. Generator Plug In – Size to accommodate the Relay House and Substation AC Panel Loads. This would allow for a generator to provide the relay house emergency power.

d. Secondary Surge Arrester, Square D, SDSA1175 Series 001. Secondary surge arrester shall be externally attached to AC Distribution Breaker Panel in a manner to allow obvious visual inspection of Operational LED. Connect for 120/240 Vac operation as shown on the Contract Drawings.

e. Normal Station service Disconnect, 200 amp, 120/240 Vac, 3 wire, 2 Pole Open Transition, NEMA 1 enclosure.

f. Emergency Station service Disconnect, 200 amp, 120/240 Vac, 3 wire, 2 Pole Open Transition, NEMA 1 enclosure.

g. Automatic Transfer Switch, 200 amp, 120/240 Vac, 3 wire, 2-Pole Open Transition, NEMA 1 enclosure with controls for automatic transfer between Primary and Alternate control power/station service (Utility-Utility Operation). Primary and Alternate sources shall be selectable. Controls shall allow adjustment of transfer timing from Primary to Alternate and back to Primary source. Auxiliary switch contacts for status of ATS position shall be provided. Auxiliary switch contacts shall be wired to SCADA System RTU, when applicable. Primary and Alternate Sources shall be the specified CPT/Station Service Transformers or as indicated on the Contract Drawings.

Service Entrance Rated ATS:
Eaton, breaker based transfer switch, ATVIKDB20225WSU, rated for service entrance equipment, or Engineer approved equal.

9. DC System

a. DC Distribution Panel, General Electric Type AE Panelboard, 225 Amp main breaker, 250 Vdc, 2W, with copper bus bars, surface mount with cover door. Main Breaker, Type TFJ and Type TEY Branch breakers. Breakers sizes as shown on the Contract Drawings.

b. (2) DC Disconnect Switch, 250 volt, 225 amp, non-fusible, manual operated, for the connection of an external/emergency/testing battery system.

c. Station Battery System Conductors. Conductors connecting station battery to DC load center panel and charger shall be sized as shown below:

i) Conductor size:

Battery Charger Output to DC Load Center (branch breaker):

CHARGER DC RATED OUTPUT	CONDUCTOR SIZE
6 Amps	10 AWG
15	10
25	8
50	4

Station Battery to DC Load Center:

BATTERY AMPERE HOUR CAPACITY (8HR)	CONDUCTOR SIZE
Up to 100	4 AWG
101 to 200	1/0
201 to 300	2/0

ii) Positive and Negative conductors connecting the station battery to the DC load center panel shall be contained in separate non-metallic tubing.

iii) Conductors shall be color coded:

Positive	RED
Negative	BLACK

iv) Signage shall include color code description.

F. Mechanical Requirements

1. Design Loads

a. Ambient temperatures:
   i) Summer: 104 °F
   ii) Winter: -10 °F

b. Interior design temperature:
   i) Summer: 80 °F at maximum ambient
   ii) Winter: 60 °F at minimum ambient

c. Ambient Relative Humidity: 5% to 95%

2. Energy Conservation:

a. SCH shall be design to meet the environmental requirements specified in an energy efficient manner in accordance with ASHRAE Energy Standard 90.1.

b. Walls, ceiling, and floor shall be insulated to meet energy conservative standards and yield total shelter U_0 factor less than 0.09 btu/hr/ft^2/°F when calculated per ASHRAE 90.1.

c. SEER rating for HVAC equipment: 10 minimum

3. HVAC calculations shall be submitted with approval drawings showing required sizing for ventilation, heating/air conditioning loads, indicating ambient infiltration and internal equipment heat losses used as design parameters.

4. HVAC Equipment:

a. SCH Exhaust fan with aluminum shutter and appropriately sized air intake with mechanically operated damper, rain guard, and screen. Exhaust fan shall be equipped with thermostat and HOA switch. Exhaust fan shall also be equipped with a timer to provide 3 air changes per day.

b. HVAC – Combined Resistance Heat and Air Conditioning unit shall be installed and tested at the factory and may be removed to facilitate shipping. Thermostat with [manual] [auto] change-over from electric resistance heat to air condition cycle. Barometric fresh air damper. Corrosion resistance coating on coils.

c. Refrigerant for air conditioner equipment shall be R-410A.

d. HVAC Units shall be standard design wall-mounted package units, removable for shipping or replacement. Package units requiring roof mounting, separate foundations or ductwork to connect to SCH are not acceptable.

e. Ductwork contained within the SCH to provide the specified temperatures and equal heating/cooling within the structure is acceptable. When ductwork is required by the Contractor's HVAC design, it shall be incorporated into the overall design such that the installed ductwork will not interfere with any installation or maintenance activities of the SCH or equipment contained within the SCH.

G. Station Battery Enclosure / Room:

1. Battery System shall be as shown on the Contract Drawings.

a. Battery shall be separated from the relay and control sections of the SCH by enclosure or separate battery room as shown on the Contract Drawings.
b. Battery rack shall be connected to the SCH floor construction in a manner to meet the seismic requirements as stated in the Contract Documents.
c. Finished floor coating shall be Ni-Cd electrolyte resistant.
d. Spill containment shall be provided within the battery rack design.
e. Battery System Ventilation Fan shall be controlled by timer and HOA switch.
f. Battery System Ventilation Fan shall provide a minimum of **3 air changes per** day.
g. Ventilation equipment shall be suitable for the application and provide alarm contacts for monitoring operation (notification of failure).
h. Ventilation air source shall be:
   i) Filtered
   ii) The environmentally controlled SCH interior
i. Battery System Ventilation Fan exhaust shall be equipped with shutters, rain guard, and screen.
j. Heaters shall be provided to maintain the battery room temperature a minimum of 55 °F.

H. Telephone / Communications Equipment

1. None

I. Fire Protection System

1. Provide a hand held, wall mounted U.L. rated fire extinguisher near each of the main doors. Fire extinguisher - 20A:80B:C 20 LB.
2.
3. Smoke/fire detection system
   a. Provide smoke detectors with independent relay contacts for shutdown of all ventilation systems and system monitoring
   b. Smoke detectors shall be operated from station battery system or 120 Vac with continuously charged separate battery backup.

2.03 ACCESSORIES

A. Doors. The SCH shall be equipped with personnel/equipment entrance doors as indicated on the specification drawings to allow for the removal of equipment. Doors are to be fabricated from 11-gauge steel (ASTM-A569) and shall be equipped with panic hardware to allow exit during emergency conditions. All entrance doors shall be two wall construction with thermal insulation, 11 gauge exteriors, 16 gauge interiors, and gasketed with watertight seals. Hydraulic door closures shall be provided on the two main entrance doors. All doors shall be equipped with padlocking provisions and wire reinforced single pane window. When specified, double doors shall have one active and one inactive leaf to accommodate entry or exit of large equipment.

B. Equipment/cable termination access doors, as specified, shall be 11 gauge minimum equipped with stainless steel continuous hinge, bolted closed full gasketing and drip shield and hold open device. When insulation is specified, doors shall be equipped with sheet metal interior for insulation protection. Doors shall be equipped with the following:

1. "DANGER HIGH VOLTAGE" sign

C. Floor cutouts, if required, for cable entrance and exit below installed equipment shall be covered with 11 gauge galvanized steel cover plates with gaskets.

D. Cable Tray system shall be provided as indicated on the Contract Drawings. Factory made TEEs and other fittings shall be used for changes in direction and connection to other sections of the cable tray system.

E. Enclosure Ground Pads: Enclosures constructed with steel bases shall be equipped with corrosion resistant NEMA 2-hole pads for grounding of the enclosure and connection to the SCH Ground Bus.

F. Signage

1. All interior and exterior panels, panel boards, cabinets, switches, ‘connector’ plugs (generator, spare battery, etc.), and other control equipment and devices shall be identified with nameplates fabricated from black phenolic with white core. Nameplates shall be attached to the panels with screws suitable for the application or as approved by the Engineer. Lettering shall be 1/4 inch minimum.

2. Entrance doors shall be equipment with "Caution" – "Control and Battery Systems" signs in accordance with ANSI Z535.

3. Safety signs inside and outside of the Battery Room, or in the vicinity of the Battery Enclosure/Area prohibiting smoking, sparks, or flame shall be provided in accordance with ANSI Z535 and NESC Section 146.

G. Safety Equipment: Gloves, face shield, and apron approved for use with Lead Acid and/or Ni-Cd Battery System maintenance shall be provided.

H. Eye wash station provided and located in accordance with ANSI Z358.1-2004 or as shown on the Contract Drawings. When heater jacket is specified, the appropriate power supply/receptacle shall be provided.

1. Wall-mounted, self-contained, gravity fed. Drainage shall be provided external to the SCH.

PART 3. EXECUTION

3.01 FABRICATION APPLICABLE TO CONCRETE OR STEEL DESIGN

A. SCH Ground Bus:

1. A copper SCH Ground Bus shall be installed as indicated on the Contract Drawings.

2. SCH Ground Bus, when specified to be located within the cable tray/ladder system shall be soft drawn copper conductor of the size indicated on the Contract Drawings. Conductor shall have green insulation or be marked with green tape at 24 inch intervals along the length of the conductor.

3. SCH Ground Bus, when specified to be located external to the cable tray/ladder system (e.g. the perimeter of the interior walls) shall be flat copper bar a minimum of 3/16" x 2" on appropriate standoff assemblies. Ground Bus shall be routed over doors and other similar openings with flat bar. Copper conductor connected to the flat bar to go "under", over, or around doors and similar openings is not acceptable.

4. Ground busses for relay/control panels shall be established as per the appropriate specification section.

5. All grounding conductor connections to the SCH Ground Bus shall be color coded with green insulation.

6. All electrical equipment shall be connected to the SCH ground bus.

7. Telephone Board (when specified) Ground Block shall be connected to the SCH ground bus with a No.10 AWG minimum, copper grounding conductor.

B. All conductors for AC and DC circuits shall be sized and be color coded in accordance with all applicable codes as listed in Article 1.06 - REFERENCE STANDARDS unless otherwise noted in these specifications or Contract Documents.

C. All SCH wiring shall be run in exposed 1/2 inch EMT minimum or appropriately sized wireways. Wireways shall be sized to allow space for future Owner installed wiring. All utilities shall be functionally tested prior to completion.

D. All wiring between the control panels or associated equipment and Owner Furnished Equipment such as SCADA RTU, Automatic Meter Reading, and similar equipment to be installed in the SCH shall be Type TC cables, or as specified in Part 2 Products, routed through appropriate enclosed wireways or cable trays. Conductors shall be sequentially numbered as "spare" with a "to-from" format.

E. Terminal blocks and/or lug strips utilized for AC or DC supply buses shall be suitable for the required conductor sizes.

F. All circuits for connection to devices external to the SCH enclosure shall be terminated on 600 volt, 30 ampere, twelve point terminal blocks with washer head screws suitable for use with 12 AWG size ring type non-insulated conductor terminals.

G. Control cable/conductor wireways shall be sized to accommodate the Contractor's and or Owners' relay panel design requirements and shall provide an additional space of 25% for the Owner's use.

H. Removable covers/raceways shall be provided for cables between floor cable entrances and all AC & DC panels, transfer switches, raceways, and all other similar devices and fixtures as illustrated in the Contract Drawings.

I. Cable entrances into all AC & DC panels, transfer switches, raceways, and all other similar devices, cabinets and fixtures shall be provided for the installation of Owner's cables. Cable entrances shall be sized to accommodate anticipated cables and utilize grommets or other similar means to protect cables.

J. Control cable entrances (cables from external power system equipment) shall be consolidated in a reasonable and logical manner to aid in the relay panel installation.

K. Folding tabletops, when indicated on the Contract Drawings shall be furnished with appropriate latches to secure the top in the folded position.

L. Vermin control. Enclosure shall be designed to prevent the entrance of mice and other rodents. Design features may include sealers, gaskets, and screens.

3.02 FABRICATION APPLICABLE TO CONCRETE DESIGN

A. Mold or screed roof a minimum of ¼" per foot slope in two directions to provide proper water drainage.

B. Mold steel door and window frames into cast panel walls at locations indicated in the

attached drawings. Include step joint threshold in doorway to prevent water from entering the SCH.

C. Mold keyed or step-joint edges into fabricated panels to enhance moisture protection and water runoff. Roof/wall shall be molded so that joint is not exposed.

D. Install dust and water-proofing to fabricated concrete panels prior to assembly. Double seal all wall-to-wall and roof-to-wall joints with butyl sealant. Wall-to-floor joints shall not be waterproofed to permit interior water runoff. Seal exterior exposure of wall-to-wall and wall-to-floor joints with dust seal.

E. Wall panels shall be treated with retarders as required permitting exposure of coarse aggregate for exterior finish. "Seeding" of exterior surface with coarse aggregate shall not be permitted.

F. Install weatherproofing features as concrete panels are assembled. Weld finished panels together to form a rigid concrete shell.

3.03 FABRICATION APPLICABLE TO STEEL DESIGN

A. The outdoor equipment enclosure shall be fully assembled, inspected, and tested at the factory prior to shipment. Large enclosures shall be split to permit shipping to the project site.

B. Base: The underside of the structural steel base shall be undercoated for corrosion resistance purposes.

C. Floor:

1. The topside of the floor plates shall be coated with skid resistant paint.

2. When floor insulation is specified, thermal insulation shall be placed against the bottom of the floor plates and sub-flooring is to be welded onto the bottom of the base.

3.04 FACTORY FINISHING - CONCRETE DESIGN

A. Exterior roof shall be finished with white mastic coating made with UV resistant elastomeric acrylic.

B. Exterior walls shall be medium colored exposed aggregate concrete finished with clear, non-yellowing, UV resistant acrylic sealer.

C. Exterior concrete trim shall be finished with high-build, textured, water based, acrylic paint suitable for concrete and masonry.

D. Interior walls and ceiling shall be finished with white laminate sheathing board and vinyl trim. Interior floor shall be finished with light colored commercial-grade vinyl tile

3.05 FACTORY FINISHING – STEEL DESIGN

A. Adequacy of paint finish to inhibit the buildup of rust on ferrous metal materials shall be tested and evaluated per ANSI C37.20.2. Salt spray withstand tests in accordance with ASTM #D-1654 and #B-117 shall be performed on a periodic basis to provide conformance with the corrosion resistance standard of at least 2500 hours minimum.

1. Exterior Color: ANSI – 70 Light Gray
2. Interior Color: ANSI – 70 Light Gray
3. Floor Color: ANSI – 70 Light Gray with non-skid additive.

B. All steel parts, except galvanized (if used), shall be cleaned and a zinc-phosphate pre-treatment applied prior to finish application.

C. Primer shall be suitable for the finish to be applied. Primer shall be applied to a minimum thickness of 1 mil.

D. Contractor shall refer to Section 2.02, G for specialized paint/coating requirements for battery system area

E. Paint/coating shall be TGIC polyester powder, applied electrostatically through air. Following paint/coating application, parts shall be baked to produce a hard durable finish. The average thickness of the paint film shall be 3.0 mils. Paint film shall be uniform in color and free from blisters, sags, flaking and peeling.

1. Contractor may submit contractor's standard paint/coating materials and process for Engineer's review and approval decision.

3.06 FACTORY TESTING

A. Perform complete functional, continuity, and insulation resistance testing of all installed wiring and electrical equipment.

3.07 INSTALLATION

A. General

1. **Contractor is responsible for the delivery of the SCH onto the Owner furnished foundation**, any required enclosure assembly, field installation of equipment, field testing of assembled SCH, and certification to Owner that SCH is ready for connection to Owner's electric system.

2. The Owner will furnish and install Anchor Rods, install Contractor furnished anchorage hardware, and attach SCH to the foundation.

3. Install in accordance with Contractor's instructions, applicable requirements of the NEC and in accordance with recognized industry practices.

4. Inspect SCH for evidence of damage and verify that Owner furnished foundation pad surfaces are ready to receive Work.

5. Inspect to confirm that all items and accessories are in accordance with specifications and drawings.

6. Touch-up paint all chips and scratches with Contractor-supplied paint and leave remaining paint with Owner.

7. A silicone based sealer (30-year life rating) shall be used between the foundation pad and the control cable /duct entrance. Sealer may be applied to underside of base structure prior to installation on Owner's foundation pad or applied the inside of the duct entrance/floor cutout.

   Do NOT seal MV duct entrances at the SCH – foundation interface. This area must allow water to drain.

8. Clean all equipment, battery cells, and interior.

B. Assembly

1. Assembly includes the electrical and mechanical assembly of all SCH equipment, subassemblies, shipping splits, and all other materials required to provide a complete enclosure as specified in these Contract Documents.

2. Assembly includes installation and commissioning of the battery system when specified in the Contract Documents. This includes:

   a. Installation of the battery rack, spill containment, battery cells.
   b. Commissioning of the battery system per manufacturer's instructions:

      1) Cell fluid levels
      2) Inter-cell connections and charger connections
      3) Charger voltage settings - volts per cell charge levels
      4) Initial battery charging (commissioning battery charge)

   c. Battery system capacity testing is by Others and is NOT included in these Contract Documents.

3. Installation and connection of cables to power system equipment external to the SCH is not included in these Contract Documents.

C. Site Clean up

1. All shipping, installation and setup materials shall be removed from the site. Burning is not permitted.

3.08 FIELD INSTALLATION TESTING

A. Perform start-up/installation tests in accordance with Contractor's Instruction Manual.

1. Electrical Systems

a. AC Transfer Switch
b. Emergency Lighting

2. HVAC Systems

3. Battery System when specified to be included with the SCH

B. Testing and setting of protective relays, testing of cables and wiring connected to external power system equipment and testing of equipment furnished and installed by others is the responsibility of others.

C. Perform wiring continuity tests of all control wiring, CT current wiring, VT supply wiring, and AC/DC power supply wiring.

END OF SECTION

SECTION 16345
SUBSTATION RELAY/CONTROL PANELS AND ASSOCIATED EQUIPMENT

PART 1. GENERAL

1.01 SECTION INCLUDES

A. These specifications and drawings are for the detail design and fabrication of Relay/Control, Panel(s) and associated Equipment, as required to meet the Contractor's obligations, as stated in the proposal section of these specifications and attached data sheets. The Contractor shall be solely responsible for the detailed design as specified herein, and/or indicated on the drawings listed elsewhere in the specifications.

1.02 RELATED SECTIONS

A. DIVISIONS 0 and 1 – PROPOSAL DOCUMENTS, MATERIALS CONTRACT AND GENERAL REQUIREMENTS: These shall apply to all work included in this section.

B. Section 16345D – DATA SHEET – RELAY AND CONTROL PANEL.

C. Section 16162 - SUBSTATION CONTROL HOUSING

D. Section 16632 – NiCad CENTRAL BATTERY SYSTEM.

1.03 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

A. None

1.04 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

A. The Contractor shall install Owner furnished SCADA System RTU and associated equipment in accordance with these Contract Documents and the SCADA System RTU manufacturer's instructions and documentation.

1.05 REFERENCE STANDARDS

A. Published Specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to work in this section where cited in Section 01090 - REFERENCE STANDARDS and in the listing below.

1. ANSI/IEEE C37.21 – IEEE Standard for Control Switchboards.

2. NEC (National Electrical Code)

1.06 DESIGN REQUIREMENTS

A. The operation of the substation shall be controlled and protected as outlined by the RELAY SCHEME exhibited in attached drawings. Relay and control panels and equipment furnished by the Contractor shall provide this control and protection.

B. Contractor shall be responsible for the detail design and addition of pin numbers of relay/control devices, terminal blocks, and associated equipment to the Engineer provided schematics/elementary diagrams. The Contractor is also responsible for modifying the schematic/elementary diagrams as-built and shipped. This includes design changes and/or revisions due to testing of the relay/control panels. This information shall be added to a separate layer on the Engineer furnished AutoCAD drawings.

C. Contractor shall be responsible for the detail design of the physical point-to-point wiring of the relay/control panels.

D. Relay and control panels shall be of the stationary, open type construction. Construction shall be as outlined on attached data sheets and Contract Drawings.

E. Contractor shall be responsible for construction detail and shop drawings required for fabrication of the panel assemblies.

F. All relays and equipment shall be mounted on panels except as noted in equipment listing.

1.07 SUBMITTALS

A. Shop Drawings shall be submitted for approval in accordance with Section 01301 – SUBMITTALS and Section 01341 – SHOP DRAWINGS.

B. Submittals shall consist of, but not limited to, the following:

1. One Line/Protection Scheme

2. Three Line/Current Diagram(s)

3. Schematic Diagram(s)

4. Wiring Diagram(s)

5. Relay/Control Panel Detail and Elevations

6. Relay and Control equipment catalog numbers, rating data, and other information as may be required to describe the equipment.

MicroStation Schematic Drawing files will be provided to the Contractor by the Engineer. Contractor shall use these drawings, making appropriate revisions in electronic format for submittal drawings.

C. Final Drawings and Manuals shall be provided prior to shipment in accordance with Section 01721 – PROJECT RECORD DRAWINGS.

1.08 EQUIPMENT LISTING

A. The Equipment Listing in the DATA SHEET is an Engineer's estimate only. It is the responsibility of the Contractor to furnish exact quantities of materials to provide the Owner's beneficial use. All material is subject to Engineer's approval.

1.09 WARRANTY

A. All materials and equipment supplied as outlined in Document 00711 – GENERAL CONDITIONS.

B. Contractor will have five (5) business days after notification of defective wiring, materials, or equipment, furnished by the Contractor, to repair such defect. After the expiration of this defect repair period, the Owner may repair such defect in any manner Owner deems appropriate and deduct the cost of defect repair from the balance of monies due the Contractor.

C. Contractor is responsible for all field re-testing costs due to manufacturing defect or failed equipment/materials supplied by Contractor.

PART 2. PRODUCTS

2.01 MATERIALS

A. Relay and control equipment shall be shown on the attached Equipment Listing. Any deviation must be approved by the Engineer.

B. Relay and control panels shall be constructed of single sheet 11 gauge hot or cold rolled steel. Relay and control panels that have been patched, mis-punched, or that require the use of cover/trim plates to correct defects will not be accepted.

C. Cable Trough and Raceways

1. Steel cable troughs with detachable covers shall be utilized for entrance of cables from overhead cable tray system. Removal of covers shall not disturb any control wiring.

2. Plastic cable/conductor raceway shall be utilized for enclosing vertical runs of control wiring.

D. Relay and Control Panel Wiring

1. The relay and control panels shall be wired with X-Linked PE switchboard wire, 600 volt UL type SIS NEMA and IPCEA accepted. The wire shall be AWG No. 12, 65 strands.

2. Conductors used as AC and DC 'bus' for inter-panel AC and DC supply; and conductors between the relay/control panels and the AC and DC breaker panels shall be type TC cable, AWG No. 10.

3. Transducer output wiring shall be single pair type TC shielded instrumentation cable, 600 volt, AWG No. 16, stranded. Conductor terminations of appropriate size and type shall be used.

4. Single conductor type THHN, AWG No. 16 will be permitted for annunciator to external connection terminal block wiring. Conductor size designations shall be shown on schematics and wiring drawings.

5. Conductors for power and lighting circuits shall be copper with size, insulation and stranding suitable for the application.

6. Type TC cable shall be used when cables are routed through the cable tray system.

E. Connectors

1. **Uninsulated,** ring-tongue, pressure grip solderless lugs shall be used for all control, power, instrument transformer secondary, and instrumentation wiring. Spade lugs will not be permitted.

2. Appropriate connectors for the specific wire size and type shall be used.

F. Control Terminal Blocks shall be General Electric Type EB-25 or Marathon 1500 Series molded base terminal blocks. Blocks shall be rated 600 Volts AC, 30 Amps with barriers between terminals and terminal marking strips.

G. Current Transformer Terminal Blocks shall be either General Electric Type EB-27 or Marathon 1500 Series 6-pole, molded base terminal blocks with shorting strips. Blocks shall be rated 600 Volts AC, 30 Amps with barriers between terminals and terminal marking strips.

H. Nameplates shall be attached to the panels with screws suitable for the application or as approved by the Engineer. The nameplates shall be black phenolic with white core. The nameplate schedule is included elsewhere in these specifications.

I. Panelboard strip heaters shall be mounted at rear lower location of each panel to prevent condensation. Strip heaters shall be controlled by common thermostat and be provided with suitable protective covering to prevent mechanical damage or exposure of heating element or electrical connections. Wiring for the strip heaters shall have temperature rating suitable for the application.

2.02 FABRICATION

A. Wiring

1. All conductors for AC and DC circuits shall be sized in accordance with all applicable codes as listed in REFERENCE STANDARDS unless otherwise noted in this specification.

2. Panel wiring shall be labeled on both ends of the conductor. All relays and equipment shall be prewired to terminal blocks.

3. All PK-2 test blocks shall be mounted directly beneath the equipment with which they are associated or as may be located on attached drawings.

4. Test block wiring: All incoming (source) wiring to PK-2 test blocks or test switches shall be terminated on the bottom of the block and the outgoing (relay) wiring shall be terminated on the top of the block. A-phase shall be on left as viewed from front of panelboard, for current and potential circuits.

5. Terminal blocks and/or lug strips utilized for AC or DC supply buses shall be suitable for the required conductor sizes.

6. All circuits for connection to devices external to the control panel shall be terminated on 600 volt, 30 ampere, twelve point terminal blocks with washer head screws.

7. Terminal blocks shall be located in the relay/control panel subpan, mounted in a vertical fashion.

8. Spare terminal blocks shall be furnished and mounted. Spare terminal points shall comprise 20 percent of total required terminal points.

9. All terminal blocks shall be clearly identified for proper external connections.

10. Device wiring identification labels corresponding to identifications used on shop wiring drawings, shall be permanently affixed to rear of panel adjacent to or on device.

11. Suitable grommets and cable/conductor protection shall be used at locations of cable/conductor contact with edges, corners and openings of the relay panel(s).

12. Panel wiring terminations shall be logically grouped at terminal blocks for termination of external cables.

13. All AC circuits for meter and relay power supply shall be protected with separate 1 or 2 pole molded circuit breakers for 120 or 240 VAC circuits respectively. The breakers shall be located in a central AC distribution panel and wired to the appropriate relay/ control panel terminal blocks. Fuses shall be used for branch circuits only as indicated. One 2-pole block with Buss dummy fuse for the neutral is to be supplied for 120 volt applications. Two 2-pole blocks with the neutral dummy fuse are to be supplied for three-phase applications, such as metering potential circuits.

14. All DC circuits for relaying and controls shall be protected with a separate 2 pole molded circuit breaker located in a central DC distribution panel and wired to the appropriate relay/control panel terminal blocks. Fuses shall be used for branch circuits only as may be indicated on attached drawings. Fuses shall be Bussman type NON with appropriate fuse block. One 2-pole block with two fuses is to be supplied for each DC application or as indicated on Contract Drawings.

15. All D.C. circuits for power circuit breakers shall be protected with a separate two pole molded circuit breaker located in a central DC distribution panel.

16. Cables and conductors from sources exterior to the relay/control panel shall enter relay/control panel cable trough from overhead cable tray. Conductors will exit cable trough and terminate on specified terminal blocks. Panel wiring will exit terminal blocks and enter panduit cable raceway for vertical wiring runs to points of branching out for termination at relay/control equipment.

B. Panduit shall be sized to provide a maximum fill of 40% at any point.

C. No relay/control equipment or wiring shall be mounted on or interfere with removable panels.

D. Rear of panel auxiliary equipment mounting brackets or panel bracing shall not interfere with, or maintenance of, relay/control equipment.

E. Relay and control panel(s) shall be designed to allow panel front removal/replacement or as shown on the Contract Drawings. Provisions for installation of additional panels shall be provided.

F. Control and cutout switches shall be mounted no lower than 42 inches above the floor of enclosure or as may be indicated on the Contract Drawings.

G. Finishing

1. Paint type and color shall be as shown on attached DATA SHEET.

2. All welds and sharp edges shall be ground smooth.

3. Panel(s) shall be completely cleaned, treated, and painted after fabrication.

4. Assembly shall be cleaned with phosphatizing agent with hot water, high pressure washing system.

5. Paint finish shall conform to the ASTM Standard 250 hour, 5% salt spray withstand test for rust resistance.

6. Assembly shall receive a minimum thickness of 1.25 mil, non-sanding primer, Sherwin-Williams, Kem-Flash Gray Primer, or approved equal. Primer shall be compatible with final finish.

7. Final finish shall be two (2) coats of Sherwin-Williams Kem-Lustral enamel, or approved equal. Each coat shall be 1 mil thickness, minimum.

8. One (1) quart of touch up paint matching the finish of the relay and control panels shall be furnished with shipment.

2.03 TESTING

A. All testing shall be performed by the Contractor in accordance with applicable ANSI and NEMA standards. Test data shall be provided with Equipment Manuals.

B. Protective Relay Manufacturer's test reports shall be provided, but the **Relay equipment Manufacturer's tests and reports do not provide a substitute for the Contractor's testing responsibilities as stated in these specifications.**

C. The following tests shall be performed on the completed relay and control panels:

1. Wiring continuity - point to point check and verification with the wiring diagrams.

2. Power of proper amplitude and frequency shall be applied to all switchboard AC and DC circuitry. Potentials and currents of proper frequency shall be applied to all applicable AC connections of the panels. Power circuit breaker test simulators shall be used to verify correct operation of all control, indication, and protection circuits.

3. Polarity tests of all AC and DC circuitry. Proper AC power source and phase angle meter shall be used to make AC polarity test.

4. Functional tests shall be performed on each switchboard panel and/or group of panels, to indicate proper operation of all protection, metering, and control equipment.

5. The Owner may at his option provide specific relay and metering test forms to be complied with, otherwise the Contractor shall submit two (2) copies of Contractor's standard test forms for review by the Engineer.

6. All "as left" test values shall be recorded and shall be within manufacturer's tolerances. Manufacturer's tolerances shall be indicated on the test forms.

7. **All relays, meters, timers, control switches, and other panel mounted equipment shall be acceptance tested by the Contractor. Acceptance tests shall be as outlined in the manufacturer's instruction book.** If instruction book does not contain an acceptance test procedure, the Contractor shall request from the Engineer an acceptance test procedure to be used. The manufacturer's acceptance test shall be include, but not be limited to, the following:

   Microprocessor-based devices:
   a. Apply appropriate voltage to device's power supply. Verify that device has started without a self-test failure.

   Instantaneous units and voltage sensing relay units shall be tested at three points - low, middle and high end of range of the relays.

   For impedance type elements, the angle of maximum torque calibration shall be performed if other than manufacturer's nameplate.

8. The intent of the Contractor's acceptance testing of relay and control equipment is to determine that the meters and relays have not sustained damage during shipment from the relay/control equipment manufacturer to the Contractor and that the meters and relay calibrations have not been disturbed. If the examination or test indicates that re-adjustment is necessary, the relay shall be replaced, repaired and/or calibrated as per manufacturer's instructions.

9. All shorting devices internal to the relay case shall be checked. Each relay and case shall be checked against the instruction book for its appropriate shorting device.

10. The calibration of all indicating meters shall be verified.

11. All kilowatt hour (kWh), kilovar hour (KVARH), kilo "Q" hour (KQH) statistical or billing meters, and respective demand meters, shall be calibrated, tested, and certified.

D. If a functional or design error is discovered during factory testing, Contractor shall revise schematic and wiring diagrams, modify the equipment as approved by the Engineer and retest equipment for proper operation.

END OF SECTION

SECTION 16345D
RELAY AND CONTROL PANEL
DATA SHEET

PART 1. GENERAL

1.01 SECTION INCLUDES

A. This Data Sheet includes the equipment data information for the fabrication of the relay and control panels, as specified in Section 16345 – SUBSTATION RELAY/CONTOL PANELS AND ASSOCIATED EQUIPMENT.

1.02 RELATED SECTIONS

A. DIVISIONS 0 and 1 – PROPOSAL DOCUMENTS, CONTRACT DOCUMENTS AND GENERAL REQUIREMENTS: These shall apply to all work included in this section.

B. Section 16345 – SUBSTATION RELAY/CONTOL PANELS AND ASSOCIATED EQUIPMENT.

1.03 SERVICE CONDITION

A. The Relay and Control Panel(s) will be installed in a Controlled Climate House or Enclosure.

PART 2. PRODUCTS

2.01 PREAPPROVED CONTRACTORS

A. Panels fabricated by the following Contractors are approved for this Project:

1. Birmingham Control Systems.
2. KVA, Inc.
3. Kemco Industries.

2.02 EQUIPMENT REQUIREMENTS

A. Panel layout shall be as shown on the attached drawings.

B. Panel(s) shall be 92″ high **28" wide and 28″ deep.** Backs of relay panels shall have open.

C. Finish shall be ANSI No. 70 Light Gray **enamel.**

2.03 EQUIPMENT LISTING

A. The following **EQUIPMENT LISTING is the Engineer's Estimate only**. It is not intended as a comprehensive listing of all materials that must be supplied by the Contractor to fulfill Contractor's obligations to provide and install the equipment specified in these Contract Documents and Contract Drawings. The Contractor is responsible for a complete review of all Contract Documents and Drawings to develop a complete Bill of Materials necessary for the Project.

Part Number		**Relay Panel**					
	Description	A1	A2	A5	B1	B2	B5
751001A1A0X0X850211		X			X		
	Product SEL-751; Firmware: Standard; Chassis and Mounting: Vertical Panel Mount, User Interface: English; Power Supply: 110-250 Vdc or Vac; Communications Interface: (1)10/100Base-T; Communications Port: EIA-232; Secondary Input Current: 5 Amp Phase, 5 Amp Neutral; Secondary Input Voltage: Wye-Connected VTs; Control Input Voltage: 125 Vdc; Conformal Coat: None; Communications Protocols: Standard Protocols. Multimode Fiber ST Port: Yes. Slot C IO: Yes, 4 Input and 4 Output						
07872XE1A1A1A0X850201		X			X		
	Product SEL787-2; Firmware: Standard; Connection Type: Terminal Block; Conformal Coat: None; Power Supply: 110-250Vdc (110-240Vac); Control Input Voltage: 125 Vdc; Communications Protocol: Standard; Secondary Input Current 5 Amp Phase, 5 Amp Neutral; Chassis and Mounting: Vertical Communications Port: EIA-232; Multimode Fiber ST Port: Yes. Slot C IO: Yes, 4 Input and 4 Output						
0735BX00544CXXXXXX16101XX		X			X		
	Product SEL 735; Firmware: Standard; Chassis and Mounting: Vertical; Power Supply 110-250Vdc (110-240Vac); Secondary Input Voltage: Wye-Connected VTs (150 Vac Max), Secondary Input Current: 5 Amp Phase; Control Input Voltage: 125 Vdc; Communications Protocol: Standard						
24880RAX1281AX2XX							X
	Time Distribution Protocols: IRIG-B, NTP; Mounting: Horizontal Rack Mount; Power Supply: 125/250 Vdc or Vac; Ethernet Ports: (2) 10/100BASE-T, (2) 100BASE-FX (Multimode, LC Connector 2km); Holdover: TCXO; Antenna: None; Conformal Coat: None						
0487B1X6X52XXXXEH7PPXXX			X				
	Product: SEL-487B; Firmware: Standard; Chassis and Mounting: Horizontal Rack Mount, 7RU; Power Supply: 110-250Vdc (110-240Vac); Control Input Voltage: 125 Vdc; Communications Protocol: Standard; Conformal Coat: None; Secondary Input Current: 5 Amp Phase; Communications Port: EIA-232 Front and Rear Port.						

Part Number		**Relay Panel**					
	Description	A1	A2	A5	B1	B2	B5
252301H33A0A0XX							X
	Product: SEL-2523; Firmware: Standard; Power Supply: 125/250 Vdc or Vac; Hardware Mounting: Horizontal Rack Mount; Communication Options: 1 EIA-232 Rear Ports, 1 EIA-232 Front Port; Serial Communications Protocols: Standard - SEL ASCII, Fast Meter, Fast Operate, Modbus® RTU; Auxiliary Card: No Auxiliary Card; Control Input Voltage: 125 Vdc or Vac **Additional Configurable Labels**						
0351S5XHD4E54X1						X	
	. Product SEL-351S; Firmware: Basic; Chassis and Mounting: 3U Horizontal Mount; User Interface: Standard with USB; Power Supply: 125/250 Vdc or 120/230 Vac; Communications Interface: (2)10/100Base-T with EIA-485; Communications Port: EIA-232; Secondary Input Current: 5 Amp Phase, 5 Amp Neutral; Secondary Input Voltage: Wye-Connected VTs; Control Input Voltage: 125 Vdc; Conformal Coat: None; Communications Protocols: Standard Protocols.						
RDC6B72ST3				X			
COYOTE AXCESS SOLUTIONS Rack Mount Cabinet up to 72 fiber connections and splices. Black, 72 Adapter Ports, ST connector type, 3 meter pig tails.							
OrionLX+-A12HVHV-14-35-95-98-108							X
	Includes RS-232 Card with IRIG-B 12 Ports, HV - 125-250V dc / 100-240V ac Power Supply, HV - 125-250V dc / 100-240V ac Power Supply (Redundant), ASCII/Fast Messaging/Regex, LogicPak, Alarm Archive Retentive, Cascaded Orion Server, Tile Annunciator.						
FR3G073173036L		X			X	X	
	ABB FT-19 Test switches. 3RU height, fill clear cover. C-C C-C C-C C-C C-C C-C C-C C-C C-C P P P P P P P P P P P P						
FR3G173173173L			X				
	ABB FT-19 Test switches. 3RU height, fill clear cover. C-C C-C C-C C-C P P C-C C-C C-C C-C P P C-C C-C C-C C-C P P						
FR3G173173036L			X				
	ABB FT-19 Test switches. 3RU height, fill clear cover. C-C C-C C-C C-C P P C-C C-C C-C C-C P P P P P P P P P P P P						

Part Number		**Relay Panel**					
	Description	A1	A2	A5	B1	B2	B5
LC129A539G01							
	FT-1 test switch assembly with the following arrangement: P P P P P P P P P	X	X		X		
FT4A14T06LN4037		X			X		
	FT-14 test switch assembly, with the following arrangement: C-C C-C C-C C-C P P P P P P						
78PC05D		X	X		X		
	Electroswitch Lock-out relay (LOR) with three LEDs See Contract Drawings for details.						
24PC38D		X			X		
	Electroswitch Control Switch with Three LEDs. See Contract Drawings for details.						
ABB/Kuhlman							
	Phenolic fuse block, 2-pole, 250 Vac/125dc, 30 amp.	X	X	X	X	X	X
	30 Amp Fuses. Buss type LPN-RH.	X	X	X	X	X	X
	Manuals for each item ordered.	X	X	X	X	X	X
	Nameplates, black phenolic with white core. See Contract Drawings for details.	X	X	X	X	X	X
	24 Position Terminal Blocks	X	X		X	X	X
	Din Rail and Din Rail mounted terminal blocks (See Drawings, X TB)	X	X		X	X	X
	Ground Bus	X	X	X	X	X	X
	120V, 15A Outlet	X	X	X	X	X	X

2.04 NAMEPLATE SCHEDULE

A. See Drawings

PART 3. EXECUTION

(NOT USED)

END OF SECTION

SECTION 16632
CENTRAL NICKEL-CADMIUM BATTERY SYSTEM

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Central Nickel-Cadmium Battery System, Rack, and Charger.

1.02 RELATED SECTIONS

A. DIVISIONS 0 and 1 - CONTRACT DOCUMENTS AND GENERAL REQUIREMENTS: These shall apply to all work included in this section.

B. Section 16162 - SUBSTATION CONTROL HOUSING.

C. Section 16345 - SUBSTATION RELAY CONTROL PANELS AND ASSOCIATED EQUIPMENT.

1.03 REFERENCES

A. Published Specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to work in this section.

1.04 SUBMITTALS

A. Shop drawings shall be submitted for approval in accordance with Section 01301 - SUBMITTALS and Section 01341 - SHOP DRAWINGS.

B. Submittals shall consist of, but not limited, to the following:

1. Battery Outline
2. Battery Rack Outline
3. Battery Rack Mounting Detail
4. Battery Cell Data
5. Charger Outline
6. Charger Specifications
7. Charger Schematics (Including Alarm Relays)
8. Charger Wiring Details

C. Final drawings shall be provided prior to shipment in accordance with Section 01721 - PROJECT RECORD DOCUMENTS.

D. Operating and maintenance manuals, schematics, wiring diagrams and parts information, for battery and charger system shall be provided in accordance with Section 01721 - PROJECT RECORD DOCUMENTS.

1.05 WARRANTY

A. All materials and equipment supplied under this specification shall be warranted as

outlined in Document 00711 - GENERAL CONDITIONS.

PART 2. PRODUCTS

2.01 BATTERY SYSTEM

A. The battery shall be Alcad Type MC250P

B. Battery Cell Requirements:

1. Battery Cell Construction shall be of the Nickel Cadmium type.

2. The positive and negative plates shall be of the medium performance, pocket plate design.

3. Battery capacity as specified below based on the 5-hour rate of discharge to 1.0 V per cell at 25° C (77°F), in accordance with IEC 623.

4. Containers shall be manufactured from translucent, high impact resistant, polypropylene.

5. Separators will be of the pin type with edge insulation.

6. All interconnecting hardware shall be provided. Inter-cell connectors shall be nickel plated copper and inter-row connectors shall be flexible, insulated, compression lugged cable of sufficient rating to withstand the short circuit current of the battery at the rated voltage.

7. Flip top, flame arrester vents shall be provided for case of maintenance.

8. Number of Individual Cells: 94 Cells for 125 Vdc Systems.

9. Battery cell performance shall be as follows:

a.	Float Voltage:	1.40 - 1.47 V per cell
b.	Ampere-hour Capacity: (5-hour rate to 1.0 V per cell, 25° C)	250 Ah
c.	Discharge Rate Amperes: (to final 1.14 V per cell, 25° C)	4000 Amps - 1 second 29.9 Amps - 8 hours

2.02 BATTERY RACK

A. Battery Rack Construction:

1. Battery Rack and anchorage shall meet the Seismic Design Criteria as specified in Section 16162, SUBSTATION CONTROL HOUSING, 2.02,B.

2. Tiers: 2

3. Steps: 2

4. Approximate Dimensions: 96" L x 40" D x 30" H

5. Rack dimensions shall provide minimum 36 inches working space between front edge of rack and wall/barrier as provided in NEC 110.26.

B. Rack shall incorporate integral spill containment.

C. Provisions shall be provided to anchor each frame to the floor.

D. The racks shall be painted with a minimum of two coats of acid-resisting ANSI No. 61 gray paint.

2.03 BATTERY CHARGER

A. The battery charger shall be La Marche TPSD for NiCad Battery operation.

B. The charger shall automatically charge the battery supplied under these specifications. The charger shall maintain rated output voltage within ±1/2% from no load to full load with input variations of ±10% Vac.

C. Battery Charger Requirements:

1. Charger Input: 1ϕ, 240 Vac, 60 Hz.

2. Output-Voltage: 130 Vdc Nominal
   Current: 30 Amperes

3. Ripple (maximum): Less than 30 mV rms DC output ripple.

4. Range-Float: 127.88 – 133.40 Vdc
   Equalize: 138.00 – 147.20 Vdc

2.04 DESIGN FEATURES

A. The following design features shall be provided:

1. DC ammeter, 2% accuracy.

2. DC voltmeter, 2% accuracy.

3. Automatic AC line compensation.

4. Automatic overload protection (current, limiting) to 110% of rated output, adjustable.

5. AC and DC circuit surge suppressors.

6. Manual float/equalize switch, front panel mounting.

7. Adjustable float/equalize levels, front panel mounted controls.

8. Equalize timer, 0-72 hours.

9. AC input circuit breaker, 2-pole.

10. DC output circuit breaker, 2-pole.

11. C input pilot light.

12. Ground detection lights.

13. Ground detection alarm relay with isolated, Form C output contacts and front panel mounted indication light.

14. High and Low DC voltage alarm relays with isolated, Form C output contacts and front panel mounted indication lights.

15. AC input power failure alarm relay with 0-300 second adjustable time delay, isolated Form C output contacts and front panel mounted indication light.

16. Reverse battery protection.

17. DC output blocking, prevent discharge of battery system for charger failure or loss of AC input.

B. Alarm output contacts shall be wired to terminal blocks suitable for termination of #12 AWG conductors. Contacts shall be rated for resistive loads of 0.5 amp at 130 Vdc, minimum.

2.05 ACCESSORIES

A. The following accessories shall be provided for the battery system

1. Insulated terminal covers.

2. Cell number set, approximately 1/2" high.

3. Intercell and interstep connectors. All hardware including Intercell and inter-row connectors.

PART 3. EXECUTION

3.01 COMMISIONING

A. The following shall be performed by the Contractor upon delivery:

1. The batteries shall be removed from shipping containers and placed into the rack.

2. All inter-battery and battery-to-charger connections shall be completed per the Battery Manufacturer's specifications and recommended torques.

3. All necessary terminal lubrications shall be applied per the Battery Manufacturer's specifications.

4. Ensure liquid levels for all cells meet the Battery Manufacturer's Specifications.

5. Visually inspect all Cells, Connections, Charger, and all other battery system equipment for obvious flaws, warnings, insufficiencies.

B. Charging and testing requirements

1. A constant current charge shall be applied to the battery system for 10 hours at a constant current of 0.2 times the rated Ah of the battery system or as the Battery Manufacturer recommends. Follow all Battery Manufacturer's Instructions on how this is to be accomplished safely.

2. Measure battery system voltage at the battery terminals after charging has been completed.

3. Operation of forced ventilation per these specifications.

4. Upon completion of commissioning the Contractor shall notify the Owner.

3.02 TESTING

A. Additional testing will be performed by the Owner upon notification from the Contractor that the initial commission charging has been completed.

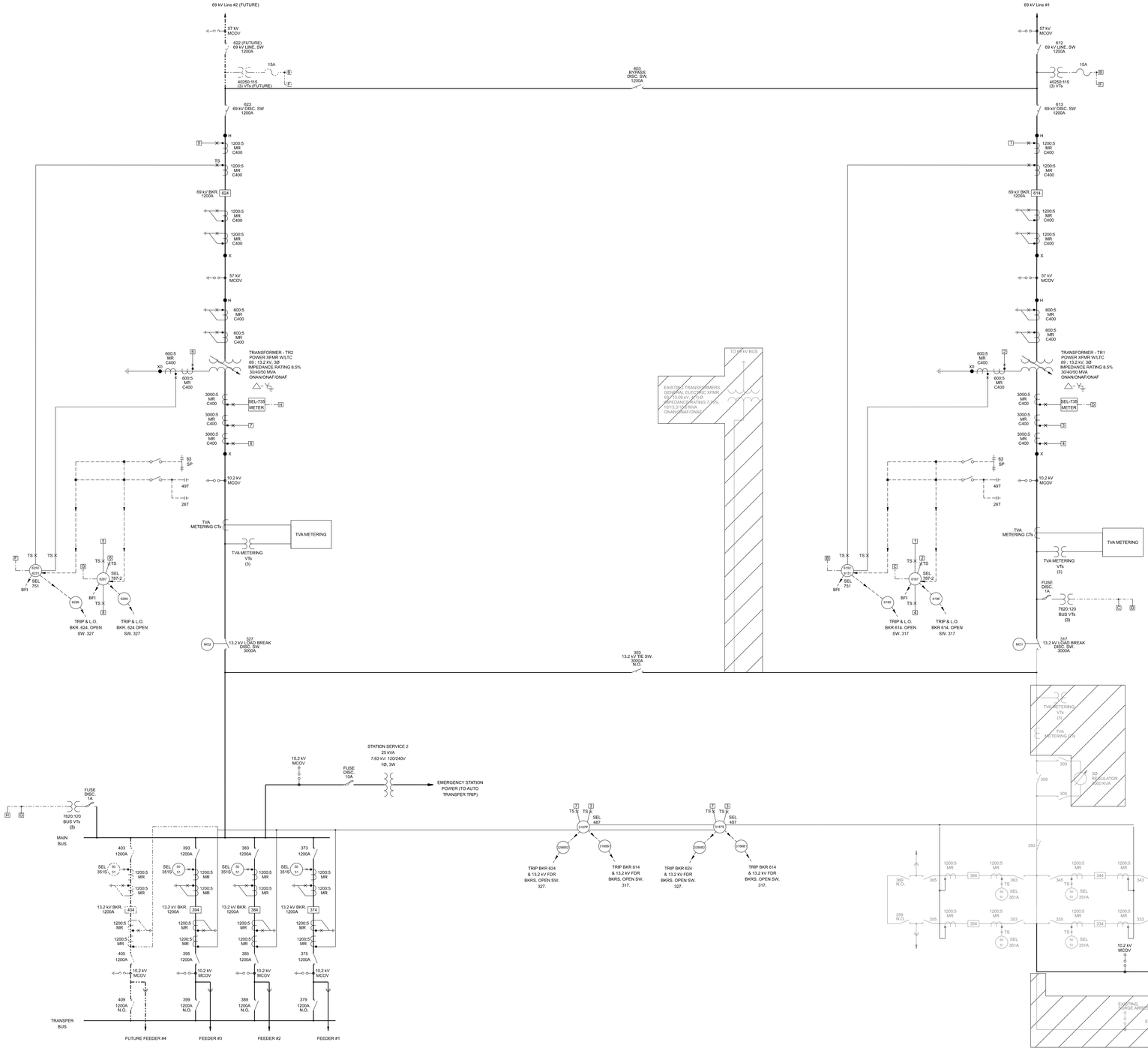
END OF SECTION

Appendix A
Prefabricated Relay House
Reference Drawings

Drawn By:

Checked By:

Approved By:



LEGEND

	EXISTING EQUIPMENT
	NEW EQUIPMENT
	FUTURE EQUIPMENT
	REMOVAL OF EXISTING EQUIPMENT
	COMMAND OR TRIP CIRCUIT (arrow indicates direction)
	VOLTAGE TRANSFORMER CIRCUIT
2-13.2 kV	ASSOCIATED OPERATION VOLTAGE (FEEDER)
3-13.2 kV	ASSOCIATED OPERATION VOLTAGE (MAIN & TIE)
5-69 kV	ASSOCIATED OPERATION VOLTAGE (TX HIGH SIDE)
6-69 kV	ASSOCIATED OPERATION VOLTAGE (LINE & BUS)
01	CONTROL SWITCH
26	THERMAL DEVICE (hot oil)
29D	DIFFERENTIAL CUTOUT
29P	SUDDEN PRESSURE TRANSFORMER CUTOUT
29R	RECLOSING CUTOUT
29T	HOT SPOT TRANSFORMER CUTOUT
30	ANNUNCIATOR RELAY
43	SELECTOR SWITCH
49	THERMAL RELAY (hot spot)
50	INSTANTANEOUS OVERCURRENT RELAY
51	TIME OVERCURRENT RELAY
63A	LOW AIR PRESSURE
63 HTP	HIGH TRANSFORMER NITROGEN PRESSURE
63 LCP	LOW NITROGEN CYLINDER PRESSURE
63 LTP	LOW TRANSFORMER NITROGEN PRESSURE
63 SP	RAPID PRESSURE RISE RELAY (sudden pressure)
64	GROUND OVERCURRENT RELAY
71	LIQUID LEVEL DEVICE
79	AC RECLOSING RELAY
86	LOCKOUT RELAY
87	DIFFERENTIAL CURRENT RELAY
MCT	METERING CURRENT TRANSFORMER
MVT	METERING VOLTAGE TRANSFORMER
N.C.	NORMALLY CLOSED (DISCONNECT)
N.O.	NORMALLY OPEN (DISCONNECT)
PTT	PRIMARY TRANSFER TRIP
S	SPRING TRIP, MANUAL RESET
STT	SECONDARY TRANSFER TRIP
	SHORTING BLOCK, PK-2
	TEST SWITCH (CURRENT)
	TEST SWITCH (VOLTAGE)
	FUSE IN CONTROL CIRCUIT
	FUSED DISCONNECT
	HOOKSTICK OPERATED DISCONNECT SWITCH
	GANG OPERATED DISCONNECT SWITCH WITH QUICK BREAK ARCING HORNS
	GANG OPERATED DISCONNECT SWITCH WITH STANDARD BREAK ARCING HORNS
MO	GANG OPERATED DISCONNECT SWITCH WITH LOAD BREAKS (VACUUM) & MOTOR OPERATOR
	PHASE REGULATOR
	SURGE ARRESTER
	RISER
	POWER TRANSFORMER WITH LOAD TAP CHANGER
SEL-735 METER	SEL-735 REVENUE METER

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SPRINGFIELD, TENNESSEE

DESIGN DEVELOPMENT

Preliminary

05/09/2024 12:34:23 PM

Revision

No.	Date	Description
A	05.06.24	RELAY VAULT BID

SPRINGFIELD DISTRICT DISTRIBUTION SUBSTATION ONE LINE DIAGRAM

300-EP02-01

45424.02
05.06.2024

This Line is 3 Inches When Printed Full Size

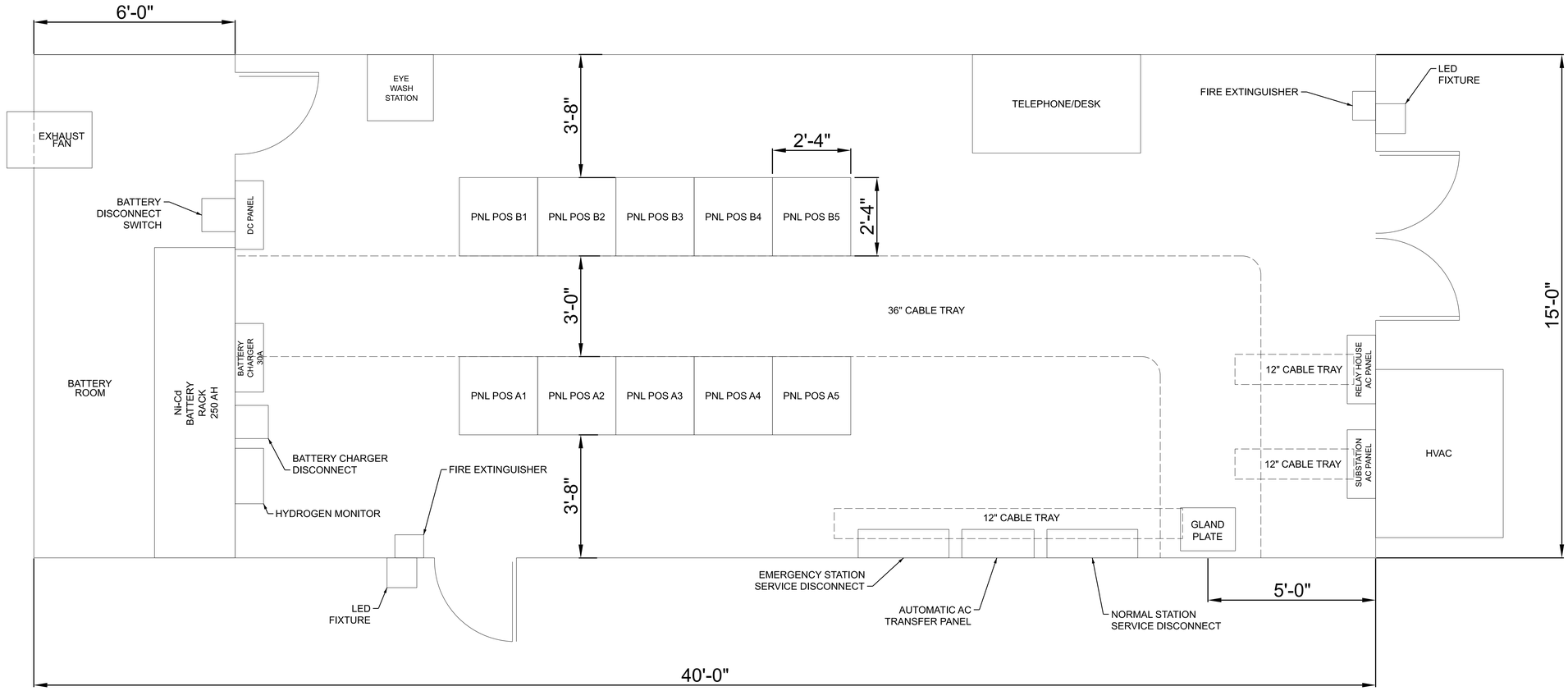
Drawn By:

Checked By:

Approved By:

SCALE: 1" = 1'-6"

PNL. POS	DESCRIPTION
A1	TX1
A2	BUS #1 & #2
A3	SPARE
A4	SPARE
A5	FIBER PATCH PANEL
B1	TX2
B2	FDR. BKR. 374, 384, & 394
B3	SPARE
B4	SPARE (FOR TVA)
B5	RELAY RACK



NOTES:

1. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED. THE BUILDING GROUND WILL BE CONNECTED TO THE SUBSTATION GROUND GRID.
2. THE RELAY VAULT SHOULD COMPLY WITH ALL LOCAL BUILDING AND ELECTRICAL CODES, AS WELL AS ANY APPLICABLE STANDARDS.
3. LABEL ALL EQUIPMENT AND CIRCUITS.

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05/09/2024 12:34:32 PM

Revision

No.	Date	Description
A	05.06.24	RELAY VAULT BID

SPRINGFIELD DISTRICT DISTRIBUTION SUBSTATION RELAY VAULT LAYOUT

300-EP03-01

45424.02
05.06.2024

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Drawn By:

Checked By:

Approved By:

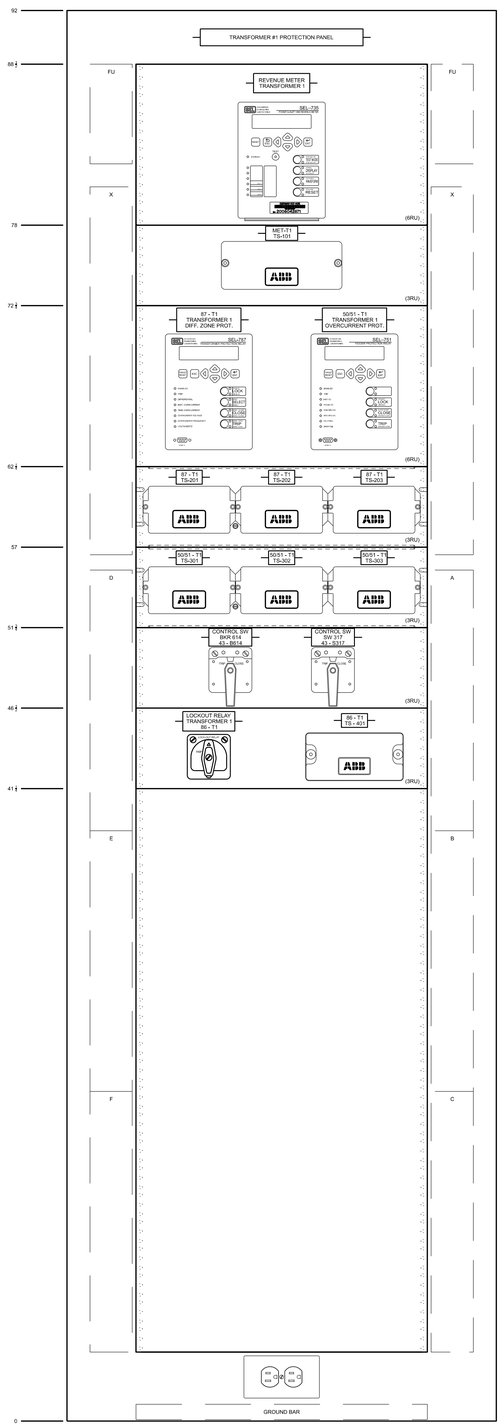
NOTES:

1. DASHED EQUIPMENT IS ON BACK OF PANELS.
2. ALL DIMENSIONS ARE IN INCHES.
3. RACK UNIT IS REPRESENTED BY "RU".

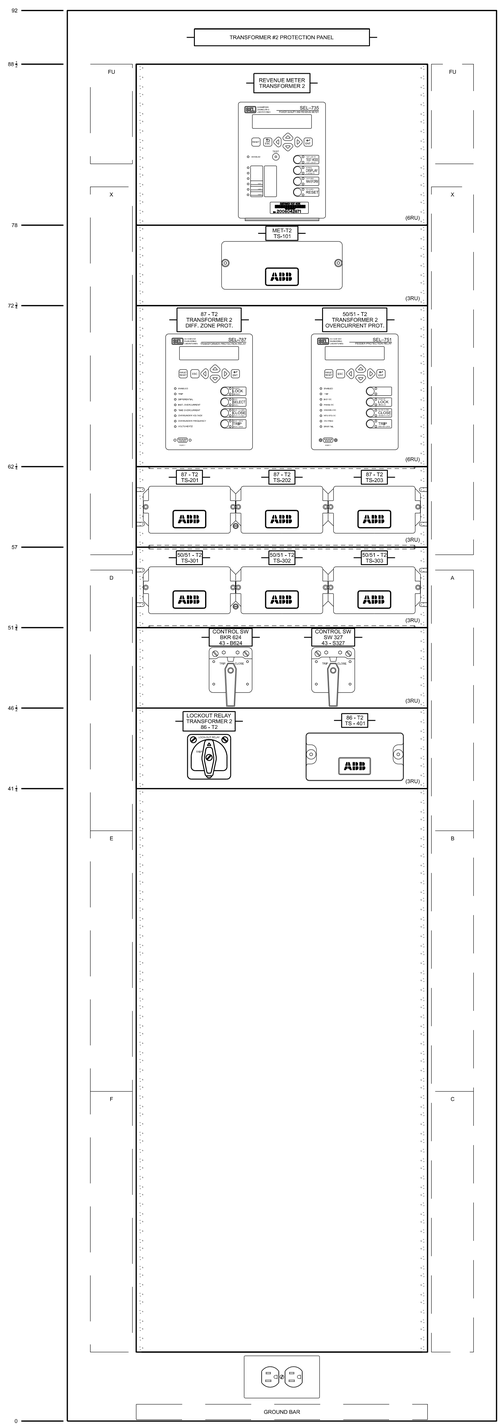
0 4" 8"

SCALE: 1" = 4"

PNL. POS. A1



PNL. POS. B1



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Revision

No.	Date	Description
A	05.06.24	RELAY VAULT BID

SPRINGFIELD DISTRICT
DISTRIBUTION
SUBSTATION
TRANSFORMER #1 AND #2
PANEL ARRANGEMENT

300-EP03-02

45424.02
05.06.2024

This Line is 3 Inches When Printed Full Size

Drawn By:

Checked By:

Approved By:

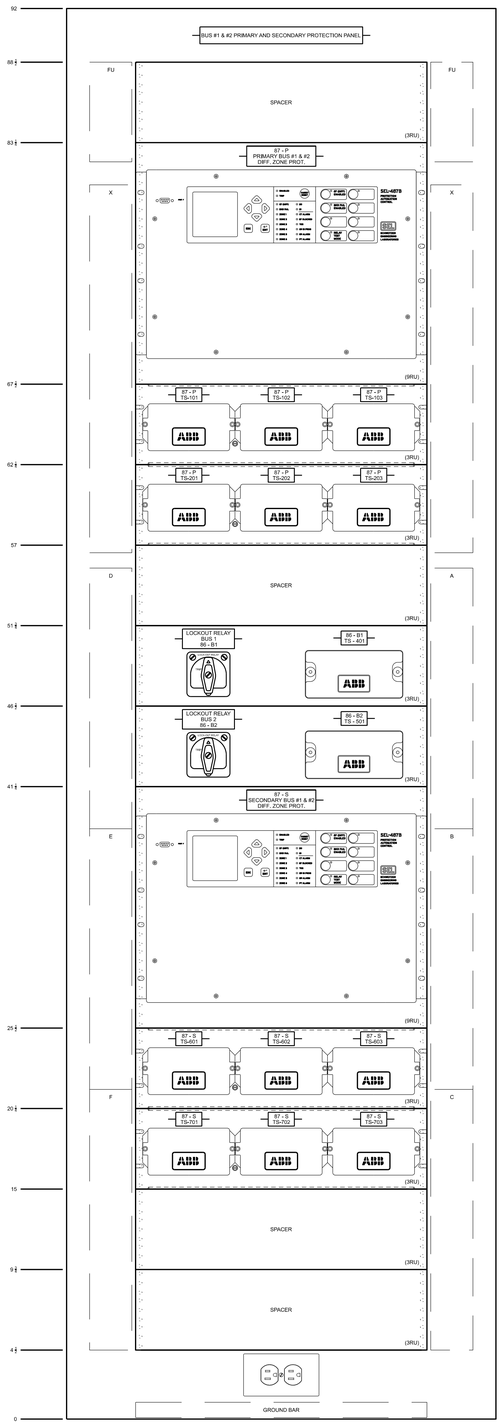
NOTES:

1. DASHED EQUIPMENT IS ON BACK OF PANELS.
2. ALL DIMENSIONS ARE IN INCHES.
3. RACK UNIT IS REPRESENTED BY "RU".

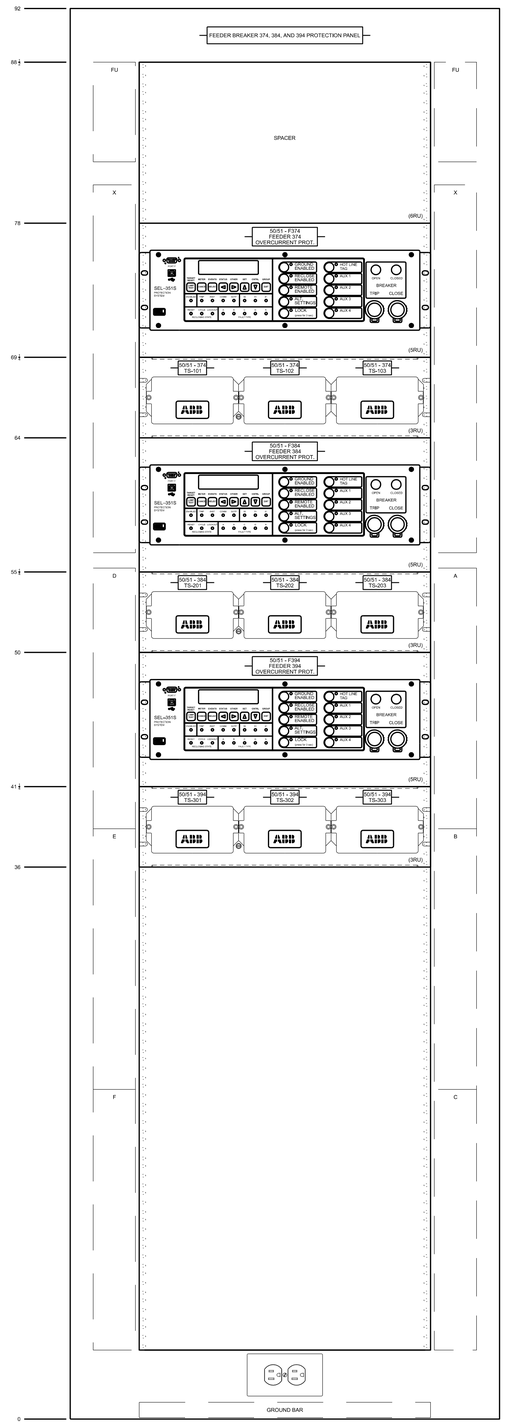
0 4" 8"

SCALE: 1" = 4"

PNL. POS. A2



PNL. POS. B2



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SPRINGFIELD ELECTRIC

SPRINGFIELD, TENNESSEE

DESIGN DEVELOPMENT

Preliminary

05/09/2024 12:34:50 PM

Revision

No.	Date	Description
A	05.06.24	RELAY VAULT BID

SPRINGFIELD DISTRICT
DISTRIBUTION
SUBSTATION FEEDER
BREAKER AND BUS 1 & 2
PANEL ARRANGEMENT

300-EP03-03

45424.02
05.06.2024

This Line is 3 Inches When Printed Full Size

Drawn By:

Checked By:

Approved By:

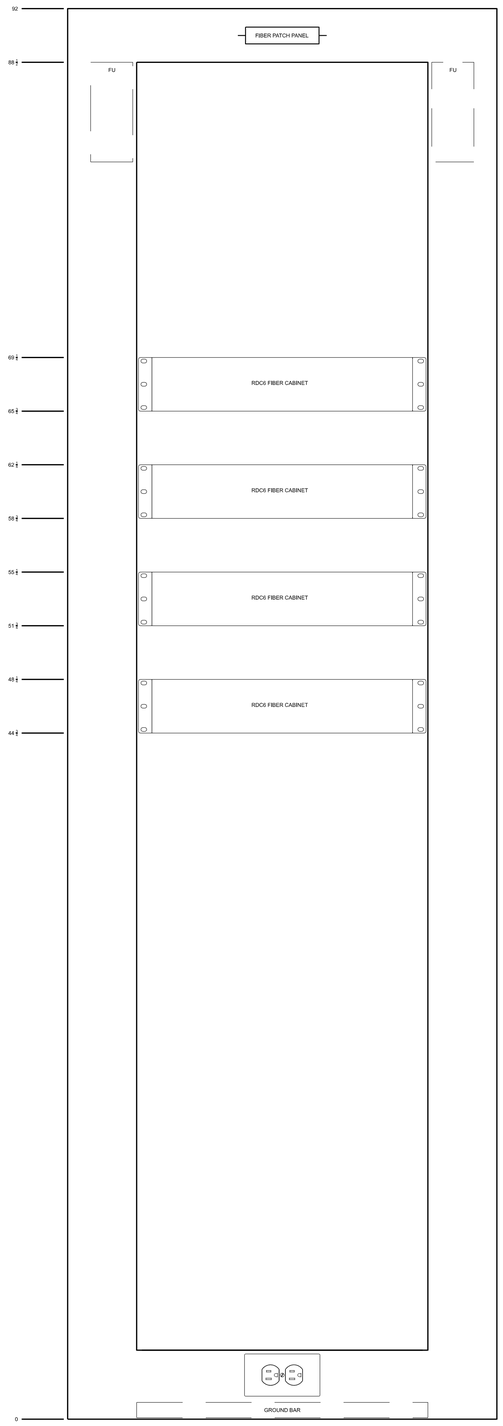
NOTES:

1. DASHED EQUIPMENT IS ON BACK OF PANELS.
2. ALL DIMENSIONS ARE IN INCHES.
3. RACK UNIT IS REPRESENTED BY "RU".

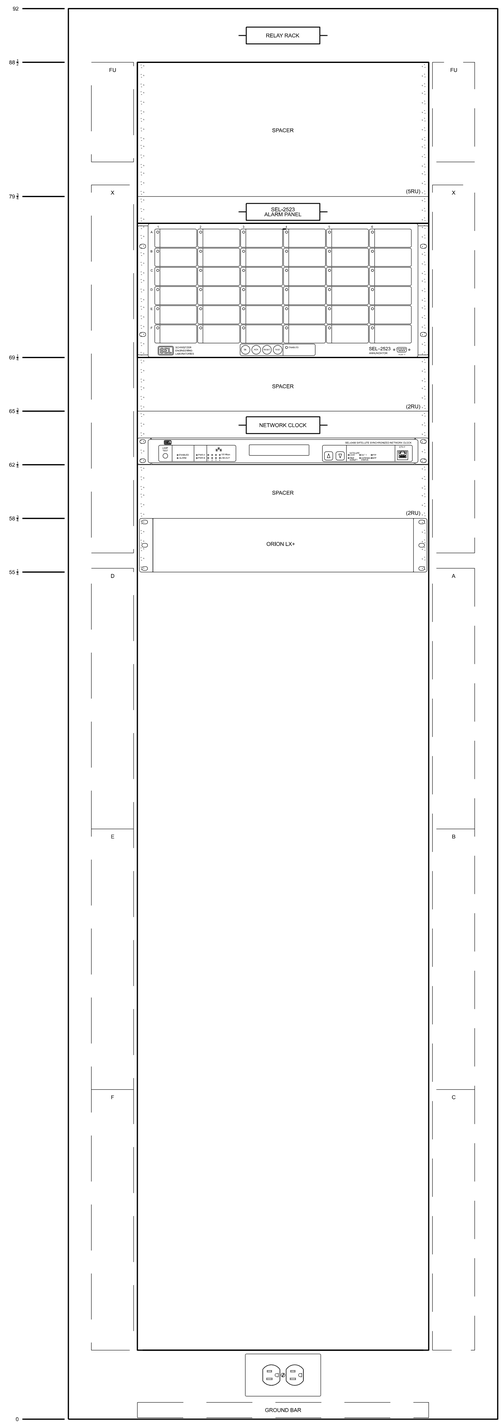
0 4" 8"

SCALE: 1" = 4"

PNL. POS. A5



PNL. POS. B5



Gresham Smith

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SPRINGFIELD ELECTRIC DEPARTMENT (SED)
www.springfieldtn.gov/176/Electric

1000 Central Ave
Springfield, TN 37172
615.382.2200

This document is an infrastructure record and includes trade secrets. The information herein is being voluntarily submitted to a public office in expectation of protection from disclosure as provided by Section 149.433 of the Revised Code

SPRINGFIELD ELECTRIC

SPRINGFIELD, TENNESSEE

DESIGN DEVELOPMENT

Preliminary

05/09/2024 12:34:07 PM

Revision

No.	Date	Description
A	05.06.24	RELAY VAULT BID

SPRINGFIELD
DISTRICT DISTRIBUTION
SUBSTATION RELAY RACK
AND FIBER PANEL
ARRANGEMENT

300-EP03-04

45424.02
05.06.2024

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IRAN DIVESTMENT ACT NOTICE

Tenn. Code Ann. § 12-12-106 requires the chief procurement officer to publish, using credible information freely available to the public, a list of persons it determines engage in investment activities in Iran, as described in § 12-12-105.

For these purposes, the State intends to use the attached list of "Entities determined to be non-responsive bidders/offerers pursuant to the New York State Iran Divestment Act of 2012."

While inclusion on this list would make a person ineligible to contract with the state of Tennessee, if a person ceases its engagement in investment activities in Iran, it may be removed from the list.

If you feel as though you have been erroneously included on this list please contact the Central Procurement Office at CPO.Website@tn.gov.

List Date: December 4, 2023
Source: https://www.ogs.ny.gov/iran-divestment-act-2012

1. Ak Makina, Ltd.
2. Amona
3. Bank Markazi Iran (Central Bank of Iran)
4. Bank Mellat
5. Bank Melli Iran
6. Bank Saderat Iran
7. Bank Sepah
8. Bank Tejarat
9. China Precision Machinery Import- Export Corporation (CPMIEC)
10. ChinaOil (China National United Oil Corporation)
11. China National Offshore Oil Corporation (CNOOC)
12. China National Petroleum Corporation (CNPC)
13. Indian Oil Corporation
14. Kingdream PLC
15. Naftiran Intertrade Co. (NICO)
16. National Iranian Tanker Co. (NITC)
17. Oil and Natural Gas Corporation (ONGC)
18. Oil India, Ltd.
19. Persia International Bank
20. Petroleos de Venezuela (PDVSA Petróleo, SA)
21. PetroChina Co., Ltd.
22. Petronet LNG, Ltd.
23. Sameh Afzar Tajak Co. (SATCO)
24. Shandong FIN CNC Machine Co., Ltd.
25. Sinohydro Co., Ltd.
26. Sinopec Corp. (China Petroleum & Chemical Corporation)
27. SKS Ventures
28. SK Energy Co., Ltd.
29. Som Petrol AS
30. Unipec (China International United Petroleum & Chemicals Co., Ltd.)
31. Zhuhai Zhenrong Co.

IRAN DIVESTMENT ACT

"By the submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not a person included within the list created pursuant to § 12-12-106."

Signature:_____

Date: _____

Title: _____