Alabama Port Authority
Specification Booklet

Project Name **McDuffie Main 25 kV Switchgear Upgrade**

Location Mobile, AL

Project # 11712 **TASK#** 2 November 2026

SPECIFICATIONS AND CONTRACT DOCUMENTS

ALABAMA PORT AUTHORITY

Doug Otto, Director & CEO

Kay Ivey, Governor of Alabama

ISSUED BY

Engineering Services Department

BID

DOCUMENTS

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MEDIUM VOLTAGE SWITCHGEAR SPECIFICATION - REV B

PROTECTION, AUTOMATION, AND PROGRAMMING SPECIFICATION
250525-EL-SPEC-002 is attached for reference only

Project Name **McDuffie Main 25 kV Switchgear Upgrade**

Location Mobile, AL

Project # 11712 **TASK#** 2 November 2026

INVITATION TO BID

Sealed bid proposals will be received via courier to the Alabama Port Authority, 1400 Alabama State Docks Blvd., Room 216, Administration Building, Mobile, AL 36602 no later than **1:30 P.M., on Thursday, December 3, 2026**. Sealed bid proposals can also be hand delivered from **1:45 P.M. to 2:00 P.M., on Thursday, December 3, 2026** to the Alabama Port Authority International Trade Center Lobby, 250 North Water Street, Mobile, AL. Faxed or electronic submitted bids will not be accepted.

McDuffie Main 25 kV Switchgear Upgrade

Mobile, Alabama

This Requisition solicits proposals for the replacement of the existing 25 kV main switchgear lineup at the McDuffie Coal Terminal in Mobile, Alabama for the Alabama Port Authority (APA) as shown in the attached Medium Voltage Switchgear Specification, Revision B. Work will be in accordance with the requirements stated herein, all referenced documents, and applicable State of Alabama Laws. The Contractor will be required to supply a delivery schedule with their bid and associated liquidated damages will be applied based on the provided schedule. APA will select the bidder whose proposal is the best value based on a combination of cost, value of proposed solution, and delivery schedule. The project specifications represent the minimum requirements each solution must meet. However, APA may determine that a proposal that exceeds the specifications may be a better value than the least costly or shortest lead time. Elements that exceed the specification may be offered as an alternate or included in the base bid. Proposals shall be valid for 60 calendar days.

Specifications, proposal forms, bond forms, and plans are available on the Alabama Port Authority website at www.alports.com. For additional project and contractual information, please contact the APA Project Manager, Pete Olivero at (251) 622-2688 (email to pete.olivero@alports.com). For technical information, please contact Taylor Williams at Taylor.Williams@AllianceEngr.com c.c. pete.olivero@alports.com

Each Bidder shall satisfy oneself as to the character, quality, and quantities of work to be performed, and as to the requirements of the proposed contract. The submission of a proposal shall be proof that the bidding Contractor has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed Contract.

APA will utilize its sales tax exemption status on this project. The Contractor will be responsible for the purchase of all materials and will be required to apply for sales and use tax certificate of exemption upon contract award.

In order to allow for APA to evaluate the proposals and determine the best value bids will **NOT** be publicly opened. We intend to make Notice of Intent to Award (NOITA) within 10 days of receipt of the receiving the bids. The right is reserved, as the interest of APA may require, to reject any and all bids and to waive informalities in bids received. In the event no bid represents a viable combination of cost, value, and schedule, APA reserves the right to solicit submission of a best and final offer from the pool of existing bidders.

Alabama Port Authority
Specification Booklet

Project Name **McDuffie Main 25 kV Switchgear Upgrade**

Location Mobile, AL

Additional Bidding requirements:

1. This project is procurement only. Aside from 40 hours of on-site support during installation/commissioning, the bidder will manufacture and deliver the specified equipment to McDuffie. Bidder will not be responsible for installation.
2. Bidder shall be responsible for liquidated damages. Statements to the contrary should be scrubbed from any documents submitted with the bid.
3. The Performance Bond and Contract forms will be provided to the successful bidder with the Notice of Intent to Award. The performance bond shall be 100% of the contract value.
4. All bidders shall breakout the drawing lead time, the manufacturing lead time (including factory acceptance testing), and the estimated shipping time. These times combined shall constitute the lead time entered in the schedule of prices.
5. All bidders shall clearly state whether or not they are performing factory acceptance testing prior to shipping to facilitate a technical compliance and best value review.
6. All bidders shall clearly state if their switchgear is one continuous line-up or two (2) line-ups. Preference shall be given to single line-ups under 35' in length or dual line-ups with both line-ups under 35' in length.
7. All bidders shall provide a complete Bill of Material (BOM) to facilitate a technical compliance and best value review.
8. All bidders shall clearly state whether or not they have included all material and components (PTs, CTs, etc.) in the bus tie section to allow for programming (by vendor or others) of an automatic bus tie transfer scheme.
9. All bidders shall provide a list of spares to facilitate a technical compliance and best value review.
10. All bidders shall clearly state whether their control power is 125VDC, 48VDC, or a combination thereof to facilitate a technical compliance and best value review.
11. All bidders shall clearly state whether or not they meet the station battery requirement of 10-hour full-load reserve to facilitate a technical compliance and best value review.

IMPORTANT NOTICE TO CONTRACTORS REGARDING EMPLOYMENT PRACTICES: Effective October 1, 2011, the Beason-Hammon Alabama Taxpayer and Citizen Protection Act ("the Act") requires that any business entity contracting with or providing any grant or incentives to the state, including the Alabama Port Authority, certify compliance with the Act. All Contractors must certify such compliance by executing the enclosed "Certificate of Compliance" and returning it to the Alabama Port Authority with your proposal. In addition, the company shall submit with their proposal evidence that the company is enrolled in the E-Verify system. The following E-Verify website link is provided for convenience: http://www.dhs.gov/files/programs/gc_1185221678150.shtm.

IMPORTANT NOTICE TO CONTRACTORS REGARDING ACCESS TO ASPA RESTRICTED FACILITIES:

All individuals performing any work in McDuffie Terminal must have a valid Transportation Worker Identification Credential (TWIC) card, APA badge and an APA vehicle decal with no exceptions. Information regarding APA's access policy is provided on the APA website at the link below.

https://www.alports.com/port-access

Time is an essential element in the Contract. Therefore, for each day the equipment delivery is delayed beyond the delivery date specified in the schedule provided by the bidder with their bid, $1,200.00 shall be paid by the Contractor to APA as liquidated damages for the loss sustained by the State because of failure of the Contractor to complete the work within the specified time.

Subsequent to the final acceptance of this project by the APA project manager, the following requirements must be satisfied by the Contractor before final payment can be made.

The Contractor must execute copies of CONTRACTOR'S AFFIDAVIT OF PAYMENT OF CLAIMS AND DEBTS on the form furnished by the Engineer.

a) The Contractor must furnish a letter on his letterhead acknowledging that acceptance of final payment by the Contractor constitutes a waiver of all claims, present or future, in connection with this project.

b) The Contractor must furnish a written guarantee on his letterhead covering all defects in material and workmanship for a period of not less than two (2) years commencing on the date of final acceptance.

c) If any purchased items have been incorporated in the work, the Contractor must furnish a letter on his letterhead assigning those warranties to the OWNER. Copies of said warranties shall be bound in one binder and submitted along with the letter assignment.

INSTRUCTIONS TO BIDDERS

1.0 ADDENDA AND INTERPRETATIONS

All questions about the meaning or intent of the Contract Documents shall be submitted to the Engineer in writing. Replies will be issued by Addenda emailed to all parties recorded as having received the bidding documents. All addenda so issued shall become part of the Contract Documents. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Deadline for submitting questions is Wednesday, November 25, 2026 at 4pm CST.

2.0 SUBMISSION OF PROPOSALS

Before submitting their proposal, the Contractor shall comply with the following:

(a) The Proposals, including the acknowledgement of addenda, shall be filled in ink on the form provided herein and all blank spaces in the form shall be fully filled. The signature shall be in long hand and the complete form shall be without interlineations, alteration or erasure.

(b) Attach a certified check or Bid Bond in the amount of 5% of the Proposal, but not more than $10,000 made payable to the Alabama Port Authority.

(c) Certificate of Compliance with the Beason-Hammon Alabama Taxpayer and Citizen Protection Act (see page I-9)

(d) Delivery schedule

One copy of Item (a) through (d) should be placed in a sealed envelope with the bidder's name, the project name and number, and the time and date of bid opening shown on the outside.

All submissions, including hand-delivered packages, US Postal Service express mail, or private delivery service must be delivered to the following individual at the following address in accordance with the Invitation to Bid. Bids will not be publicly opened.

Alabama Port Authority
Pete Olivero, P.E., Sr. Facilities Engineer
1400 Alabama State Docks Boulevard,
Administration Building, Suite 216
Mobile, AL 36602
(251) 622-2688

Neither fax nor email submissions will be accepted. Respondents are responsible for effective delivery by the above deadline, and late submissions will be rejected without opening and returned to the sender. APA accepts no responsibility for misdirected or lost proposals.

Proposal of:

Address:

Date:

To: STATE OF ALABAMA, Alabama Port Authority, Mobile, Alabama

Gentlemen:

The undersigned, as Bidder, hereby declares that he has examined the plans and specifications for the work and contractual documents relative thereto, and has read all Specifications furnished; and that he has satisfied himself relative to all aspects of the work to be performed and especially to those factors affecting cost, progress, or performance.

The Bidder proposes and agrees, if this bid is accepted, to contract with the Owner in the form of contract specified, to furnish all necessary materials, equipment, tools, apparatus, means of transportation, labor and incidentals to perform in a satisfactory manner, the work described in the Contract Specifications and Drawings for the Alabama Port Authority, for the prices listed below to complete:

McDuffie Main 25 kV Switchgear Upgrade
Mobile, Alabama

In full and complete accordance with the shown, noted, described and reasonable intended requirements of the plans, specifications and contract documents to the full and entire satisfaction of the Owner with a definite understanding that no money will be allowed for extra work except as set forth in the attached contract documents.

It is agreed that the description under each item, being briefly stated, implies, although it does not mention, all incidentals and that the prices stated are intended to cover all such work materials and incidentals as constitute Bidder's obligation as described in the specifications and any details not specifically mentioned, but evidently included in the contract shall be compensated for the item which most logically includes it.

Bidder agrees that he will commence the work within the time allotted by the Contract Documents with adequate force, plant, and equipment and that the work will be completed within the time schedule which the Bidder provides. Bidder accepts the provisions of the Contract Documents as to liquidated damages in the event of failure to complete the work on time.

The Bidder further agrees that, in case of failure on his part to execute the Contract and required bonds within ten (10) calendar days from the date written notice of intent to award if mailed or otherwise delivered to the Bidder, the certified check or bid bond accompanying this bid and the monies payable thereon shall be paid into the funds of the Owner not as penalty, but as a liquidation of a reasonable portion of the damages incurred by the Owner due to the Bidder's failure to execute the Contract.

Each of the following items within the Schedule of Prices shall be completed in accordance with this Specification Booklet. **Items not specifically noted in the schedule of prices shall be considered ancillary to the project and be absorbed in the bid items.**

SCHEDULE OF PRICES

ITEM	DESCRIPTION	QTY	UNIT PRICE	LEAD TIME (weeks)	VALUE
1	Bonds	L.S.	Lump Sum	n/a	$
2	25kV Main Switchgear	L.S	Lump Sum		$
3	Factory Testing and Delivery	L.S.	Lump Sum	n/a	$
4	On-site Commissioning Assistance	40 hr.	$_____/hr.	n/a	$
				TOTAL	**$**

I, the undersigned bidder, hereby acknowledge receipt of the following addenda:

ADDENDUM NO._____

ADDENDUM NO._____

ADDENDUM NO._____

ADDENDUM NO._____

Contractor's Signature: _____

Company _____

Name (print)	**Title**	**Date**

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, undersigned, _____

_____as Principal, and _____

as Surety, are hereby held and bound unto The Alabama Port Authority as **OWNER** in the Penal sum of _____for the payment of which will and truly be made, we hereby jointly and severally bind ourselves, successors and assigns. Signed, the_____day of_____, 2026.

The Condition of the above obligation is such that whereas the Principal has submitted to the Alabama Port Authority a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the **McDuffie Main 25 kV Switchgear Upgrade**, Project 11712, Task # 2.

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the form of Contract attached hereto (Properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the panel amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its **BOND** shall in no way be impaired or affected by any extension of time within which the **OWNER** may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal	
By	
Surety	
By	

State of _____

County of _____

CERTIFICATE OF COMPLIANCE WITH THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535, as amended by Act 2012-491)

DATE: _____

RE Contract/Grant/Incentive (describe by number or subject):
_____by and between
_____ (Contractor/Grantee) and
_____ (State Agency, Department or Public

Entity) The undersigned hereby certifies to the State of Alabama as follows:

1. The undersigned holds the position of_____with the Contractor/Grantee named above, and is authorized to provide representations set out in this Certificate as the official and binding act of that entity, and has knowledge of the provisions of THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535 of the Alabama Legislature, as amended by Act 2012-491) which is described herein as "the Act".
2. Using the following definitions from Section 3 of the Act, select and initial either (a) or (b), below, to describe the Contractor/Grantee's business structure.

   BUSINESS ENTITY. Any person or group of persons employing one or more persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood, whether for profit or not for profit. "Business entity" shall include, but not be limited to the following:

   a. Self-employed individuals, business entities filing articles of incorporation, partnerships, limited partnerships, limited liability companies, foreign corporations, foreign limited partnerships, foreign limited liability companies authorized to transact business in this state, business trusts, and any business entity that registers with the Secretary of State.

   b. Any business entity that possesses a business license, permit, certificate, approval, registration, charter, or similar form of authorization issued by the state, any business entity that is exempt by law from obtaining such a business license and any business entity that is operating unlawfully without a business license.

   EMPLOYER. Any person, firm, corporation, partnership, joint stock association, agent, manager, representative, foreman, or other person having control or custody of any employment, place of employment, or of any employee, including any person or entity employing any person for hire within the State of Alabama, including a public employer. This term shall not include the occupant of a household contracting with another person to perform casual domestic labor within the household.

   ____ *(a)* The Contractor/Grantee is a business entity or employer as those terms are defined in Section 3 of the Act.

   ____ *(b)* The Contractor/Grantee is not a business entity or employer as those terms are defined in Section 3 of the Act.

3. As of the date of this Certificate, Contractor/Grantee does not knowingly employ an unauthorized alien within the State of Alabama and hereafter it will not knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama;

4. Contractor/Grantee is enrolled in E-Verify unless it is not eligible to enroll because of the rules of that program or other factors beyond its control.

Certified this_____day of_____20 _____

_____
Name of Contractor/Grantee/Recipient

By:_____

Its _____

The above Certification was signed in my presence by the person whose name appears above,

on this____day of_____20_____.

WITNESS:

_____

_____
Printed Name of Witness

250525.01-EL-SPEC-001
Prepared For: Chris Phillips
Revision: B

Date: 10/5/2026

McDuffie Coal Terminal
1901 Ezra Trice Blvd
Mobile, AL 36603
Project: Main 25 kV Switchgear Upgrade

Medium Voltage Switchgear Specification

Rev	Reason	Date	By	Chk'd	App'd
A	Issued for Bid	8/25/2026	MMS	TW	
B	Re-Issued for Bid	10/5/2026	MMS	TW	

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1. General

Alliance Engineering has prepared this medium-voltage switchgear specification on behalf of McDuffie Coal Terminal to solicit competitive quotations from qualified equipment manufacturers for the replacement of the existing 25 kV switchgear lineup at the Mobile, Alabama facility. The design basis reflects a double-main, single-tie bus arrangement serving eight (8) fused feeder positions and one (1) spare position, as shown on the project single-line diagram (250525-EL-OL-0001A).

This specification has been developed by Alliance Engineering based on project-specific requirements, applicable codes and standards, and accepted industry practice for industrial power distribution systems. The system configuration and equipment requirements defined herein represent the design intent for the lineup and serve as the vendor's sole basis for equipment selection, configuration, and pricing.

The specification package includes, but is not limited to, the following Alliance Engineering–developed reference documents:

- Single-line diagram(s)
- Medium-voltage switchgear equipment specification sheet(s)
- Equipment ratings, protective device requirements, and functional descriptions
- Grounding and bonding requirements
- Applicable testing, documentation, and submittal requirements

All equipment furnished under this specification shall be fully compliant with the requirements contained herein and shall be complete in all respects for proper installation, operation, and long-term service.

2. Scope of Supply

The vendor's scope of supply centers on a complete, factory-assembled 25 kV switchgear lineup arranged in a split, rear accessible configuration 25 kV outdoor metal-clad and / or metal enclosed switchgear on a common platform (Platform By Others): two (2) incoming main vacuum circuit breaker, one (1) tie vacuum circuit breaker, eight (8) fused feeder compartments, and one (1) spare compartment, as shown on the revised project single-line diagram (250525-EL-OL-0001A, Rev A). The lineup shall be furnished complete with protective relaying, dedicated power quality metering on each fused feeder, control power equipment, grounding provisions, and all interconnections necessary to deliver a fully functional system — whether or not each individual component is explicitly itemized in this document.

The scope of supply also includes a dedicated Network Section and a dedicated Battery Section, integrated into the switchgear lineup per Section 5.2. The Network Section houses the equipment specified in Section 5.3 of this specification and is electrically and physically isolated from the medium-voltage compartments as described in Section 5.9.1, Arc-Flash Isolation.

Vendor proposals shall address all items necessary to meet the performance and functional requirements shown on the single-line diagram and described in the equipment specification sheets, including coordination with the SEL protective relays, and dedicated feeder power meters defined under the companion programming specification.

3. Applicable Codes and Standards

The switchgear and associated equipment shall be designed, manufactured, tested, and labeled in accordance with the latest adopted editions of the following codes and standards:

- ANSI – American National Standards Institute
- IEEE – Institute of Electrical and Electronics Engineers
- ICEA – Insulated Cable Engineers Association
- NFPA 70 – National Electrical Code (NEC)
- NEMA – National Electrical Manufacturers Association
- OSHA – Occupational Safety and Health Administration
- FM – Factory Mutual

Where conflicts exist between referenced standards, drawings, and this specification, the more stringent requirement shall govern. Requests for clarification shall be submitted prior to quotation.

4. Basis of Design and Intent

The design basis for this lineup is a single utility source feeding the bus through two main breaker, with a tie breaker providing a bridge to a second bus section, eight fused feeder positions serving downstream loads, and one spare position reserved for future load additions. This arrangement was selected to give the Owner the ability to sectionalize the bus and maintain feeder availability during maintenance or fault conditions on either bus section, without the added cost and complexity of a second incoming source.

To reduce the overall installed footprint at the McDuffie site, the Owner has selected a split switchgear configuration in which the lineup is arranged in two sections positioned on a common platform /foundation (By Others). The two sections shall share a common rear structure while each retains full front and, where applicable, rear accessibility for operation, testing, and maintenance. The vendor's general arrangement drawings shall demonstrate that the required maintenance/working aisle is maintained on the accessible face of each section in accordance with the manufacturer's instructions, NFPA 70E, and OSHA requirements, and shall identify the physical assignment of the two mains, tie, fused feeder, and spare compartments between the two sections. Refer to drawing 250525-EL-LAY-0002 for split switchgear orientation.

Consistent with this intent, the switchgear shall be designed to provide:

- Safe and reliable operation under continuous industrial duty
- Maintainability and accessibility for testing and servicing, including the required aisle clearance between the back-to-back sections
- Compatibility with existing and future electrical systems, including future feeder additions via the spare compartment
- Compliance with grounding, bonding, and safety requirements

Vendors shall not deviate from the requirements of this specification without written approval from Alliance Engineering.

5. Equipment Features

The switchgear lineup(s) shall be furnished as a complete, manufactured system consisting of one or more shipping sections configured as either a single integrated lineup or multiple separate lineups, as required by the project design and available space. The Supplier shall provide all equipment, devices, controls, wiring, protective relays, instrumentation, accessories, hardware, interconnections, and miscellaneous materials required for a complete, fully functional, and operational installation. All shipping sections shall be factory assembled, inspected, and tested prior to shipment to ensure proper fit, alignment, and electrical performance following field installation in accordance with the manufacturer's recommendations.

5.1 Ratings

The switchgear assembly shall be rated in accordance with Data Sheet 250525.01-EL-DS-001 and the associated single-line diagram, and shall be suitable for continuous, unattended operation in the coastal industrial environment (galvanized or stainless are acceptable) at the McDuffie site.

- Surface temperature on any external part of the switchgear shall not exceed 50°C at a 40°C ambient temperature while carrying rated continuous current.
- Hottest-spot temperature rise for buses and primary connections shall not exceed 65°C above ambient, with a hottest total temperature not to exceed 105°C at rated continuous current.
- Equipment shall be suitable for continuous operation under the environmental conditions specified for the project site.

5.2 Basic Construction

The lineup is designed around a main-tie-main bus arrangement: two (2) main incoming breakers energizes the bus from the utility source, a tie breaker allows either bus section to be fed from the other, and eight fused feeder compartments distribute power to downstream loads, with one spare compartment reserved for future use. This main-tie-main approach keeps the protection and control scheme straightforward — one incoming source, one bus, one point of sectionalizing — while still giving Operations a path to isolate and restore feeder sections.

- The switchgear shall consist of a factory-assembled, metal-enclosed medium-voltage switchgear lineup arranged in a Main-Tie-Main configuration — two (2) main vacuum circuit breaker, one (1) tie vacuum circuit breaker, eight (8) fused feeder compartments, and one (1) spare compartment — as shown on the project single-line diagram.
- The switchgear shall be arranged in a split configuration on a common platform/foundation to reduce the overall footprint while maintaining rear accessibility for each switchgear section. The common platform/foundation shall be custom designed By Others, to facilitate the final configuration and shop drawings from the Switchgear Vendor. Each section shall include provisions for personnel access to the rear of the equipment for maintenance, inspection, cable termination, and servicing. Adequate manufacturer-required working and maintenance clearances shall be provided at the front and rear of each section.
- The lineup shall include two main vacuum circuit breaker sections, tie vacuum circuit breaker section, eight fused feeder compartment sections, one spare compartment, a Battery and Network Section, power buses, ground buses, protective relaying, dedicated feeder metering, control equipment, and all auxiliary devices required for complete operation.
- The switchgear shall be rated 25-kV class, outdoor installation, NEMA 3R.
- The assembly shall be designed, manufactured, and tested in accordance with ANSI, IEEE, NEMA, and applicable NEC requirements.
- The spare compartment shall be fully equipped with bus connections and cable termination provisions to accommodate a future fused feeder assembly, and dedicated meter without modification to adjacent sections.
- The lineup shall include a dedicated Power Monitoring and Controls Section Battery housing the 48 VDC station battery system, charger, and associated control power distribution equipment specified in Section 5.9 The Battery Section shall be a low-voltage compartment only, isolated from all medium-voltage compartments by a solid, grounded metal barrier, with its own access door(s). The lineup shall also include a (managed Ethernet switch, fiber distribution panel, and associated metering/communications equipment). The Network Section shall be integrated into the switchgear lineup as a dedicated vertical section — not a separate, free-standing enclosure — and shall be electrically and physically isolated from all medium-voltage compartments per Section 5.9.1 (Arc-Flash Isolation).
- High-voltage compartments shall be isolated from low-voltage control compartments, including the Battery and Network Section.
- A continuous copper ground bus shall extend throughout the entire lineup, including across both back-to-back sections and the Battery and Network Section.
- Viewing windows shall be provided where necessary to permit visual verification of switch position indicators without opening energized compartments.
- The switchgear lineup shall include an integral 120 VAC distribution panelboard complete with branch circuit breakers for supplying auxiliary loads, including but not limited to interior lighting, space heaters, ventilation fans, convenience receptacles, emergency lighting, fire alarm equipment, battery charger/48 VDC control power system, motor

charging circuits for vacuum circuit breakers, fused switch control power, and other miscellaneous auxiliary equipment required for proper operation of the switchgear.

5.3 Switchgear Enclosure Requirements

The medium-voltage switchgear shall consist of factory-assembled, metal-clad and/ or metal enclosed, dead-front, metal-enclosed switchgear designed, manufactured, and tested in accordance with ANSI C37 and IEEE standards. The enclosure shall be suitable for continuous outdoor operation in a coal terminal environment and shall provide protection against coal dust, moisture, corrosion, marine environment, and ultraviolet exposure.

The switchgear enclosure shall meet the following minimum requirements:

- ANSI/IEEE C37.20.2 Metal-Clad, C37.20.3 Metal Enclosed, or a Combination of both.
- NEMA 3R outdoor enclosure
- Corrosion-resistant hardware and exterior finish
- Dead-front construction with grounded metal barriers between compartments
- Arc Mitigation designs are acceptable
- Outdoor roof with drip shields and weather seals
- Stainless steel door hinges and latching hardware
- Lockable compartment doors with provisions for padlocking
- Viewing windows where required for relay and meter displays
- 120 VAC duplex convenience receptacle
- Space heaters with thermostat and humidity control in each applicable compartment
- Copper ground bus extending the entire length of the switchgear lineup
- Lifting provisions for shipping and installation
- Removable gland plates and cable entrance provisions for bottom cable entry (open bottom channel base frame acceptable)
- Suitable for seismic anchoring where required

The enclosure shall be suitable for operation under the following environmental conditions:

- Ambient temperature: 14°F to 104°F (-10°C to 40°C)
- Relative humidity: up to 100%, non-condensing
- Outdoor coastal environment (galvanized or stainless steel are acceptable)
- Coal dust exposure
- Non-hazardous (unclassified) location
- Elevation: Up to 3,300 feet above sea level unless otherwise specified

5.3.1 Low Voltage Power Monitoring and Controls Section Enclosure Requirements

Each switchgear vertical section containing protection, metering, or control equipment shall include a dedicated low-voltage control compartment physically isolated from all medium-voltage compartments.

The control compartment shall meet the following minimum requirements:

- Completely isolated from medium-voltage compartments by grounded metal barriers
- Lockable hinged door
- Minimum 42U rack or panel mounting space as required for installed equipment
- Equipment mounting panel(s) for relays, meters, communications devices, and terminal blocks
- Internal wireways and cable management
- Engraved device identification nameplates
- Terminal blocks for all field wiring
- Shorting-type CT terminal blocks
- Fused PT/CPT terminal blocks where applicable
- Copper control ground bus
- 48 VDC control power distribution
- 120 VAC auxiliary power distribution
- Door-mounted document holder
- Spare DIN rail and terminal space for future expansion
- Ethernet patch panel or industrial switch mounting provisions where required
- Fiber optic cable management hardware
- Separate AC and DC wiring raceways
- Minimum 20% spare terminal block capacity
- Minimum 20% spare panel mounting space for future devices

The control compartment shall be capable of housing equipment including, but not limited to:

- SEL-735 Power Quality Meter
- Control switches
- Indicating lights
- Annunciators
- Test switches
- Ethernet switches
- Fiber optic termination panels
- Terminal blocks and associated wiring

5.4 Power Cable Terminations

Cable termination space shall accommodate all incoming and outgoing feeders shown on the one-line diagram, with sufficient compartment depth and clearance to properly terminate shielded medium-voltage cable without stressing the connections.

- Cable termination space shall be provided for all incoming and outgoing feeders shown on the one-line diagram.
- The switchgear shall accommodate top or bottom cable entry.

- Sufficient cable compartment depth shall be provided to permit bending and termination of shielded medium-voltage cables.
- The distance from cable entrance location to termination pads shall be not less than 36 inches.
- Non-metallic cable supports shall be provided to prevent cable weight from being imposed on terminations.
- Termination pads shall utilize standard NEMA two-hole bolt patterns.
- Phase-to-phase and phase-to-ground barriers shall be provided at all customer cable termination locations.

5.5 Bus System

The bus system is sized so that, in the event the main source is out of service, the tie breaker can carry the full connected load of both bus sections without exceeding the continuous rating of the bus — this is the operational flexibility the single main-tie arrangement is intended to provide. The bus shall be continuous across both back-to-back switchgear sections as required to maintain this operational flexibility.

- The main bus and tie bus shall be rated 1200 amperes continuous and shall be capable of carrying the full rated load of either bus section when operated through the tie breaker.
- Main buses shall be tin-plated aluminum in accordance with the manufacturer's standard construction and shall be fully rated for the specified continuous current and available fault duty.
- The switchgear shall be designed such that each main source can supply the entire lineup through the tie breaker without exceeding the continuous rating of the bus system.
- Bus joints shall be bolted utilizing corrosion-resistant hardware and shall be factory assembled and tested.
- Bus insulation shall be epoxy-coated or equivalent factory-applied insulation system suitable for 27-kV class service.
- Bus supports shall be track-resistant epoxy, cycloaliphatic epoxy, or equivalent insulating material suitable for medium-voltage applications.
- All bus bars shall be braced to withstand the available short-circuit current indicated on the project data sheet.
- A continuous copper ground bus shall extend the full length of the switchgear lineup, including across both back-to-back sections.
- The ground bus shall be sized to withstand the available fault current for a minimum of two (2) seconds and shall include provisions for connection of the facility grounding electrode system at both ends of the lineup.
- The switchgear shall be designed to permit future extension at either end without requiring replacement of existing bus sections.

5.6 Main Incoming Vacuum Circuit Breakers

The two main vacuum circuit breakers serves as two independent incoming source connections, protected and controlled by a dedicated SEL-351S relay on each main breaker consistent with the protection scheme established for this project. The breakers shall be:

- Drawout vacuum circuit breaker
- 25-kV class
- 1200A frame
- 1200A continuous current rating
- Electrically operated stored-energy mechanism
- Anti-pump protection
- Mechanical open/closed indication
- Mechanical spring-charged indication
- Local and remote operation capability
- Padlocking provisions
- Suitable for integration with SEL protective relays

5.6.1 Two Main and Tie Breaker Ratings and Protection Assignment

Each main and tie vacuum circuit breakers shall be electrically operated, drawout-type, ANSI-rated vacuum circuit breakers rated 1200A continuous, with interrupting ratings as indicated on the project data sheet. Protection and control for both breakers is assigned to SEL-351S relays, consistent with the device list established for this project.

5.7 Fused Feeder Compartments

Eight (8) fused feeder compartments shall be furnished as shown on the project single-line diagram. Each feeder compartment shall consist of a fixed-mounted, three-phase load-interrupter switch equipped with current-limiting power fuses and shall additionally be equipped with a dedicated SEL-735 Power Quality Meter, providing metering independent of the protective relay. Each fused feeder compartment shall be:

- Metal-enclosed, factory-assembled compartment per the manufacturer's standard fused-feeder construction
- 25-kV class
- Current-limiting power fuses, sized and coordinated per the project coordination study and one-line diagram
- Fuse/switch assembly fault-current rated in accordance with the available fault current indicated on the project data sheet
- Load-interrupter switch or fuse truck assembly, electrically and manually operated, with stored-energy mechanism where furnished as drawout construction

- Anti-pump protection (for electrically operated switch)
- Mechanical open/closed and blown-fuse indication
- Local and remote operation capability (for the associated switch, where applicable)
- Padlocking provisions
- Suitable for integration with SEL protective relays and dedicated feeder metering

Where furnished with drawout construction, each fused feeder assembly shall be capable of being racked between Connected, Test, and Disconnected positions, and grounded metal shutters shall automatically cover primary disconnects when withdrawn.

Current transformers and voltage transformers shall be provided in each fused feeder compartment as required to support the dedicated SEL-735 power meter, sized in accordance with the project one-line diagram, and metering accuracy requirements.

Each feeder fuse compartment shall be provided with instrument transformers as required for protection and metering. Current transformer (CT) and potential transformer (PT) accuracy classes shall be selected to meet the intended application and specified metering requirements. Unless revenue or billing metering is required, metering CTs shall be IEEE C57.13 Accuracy Class **0.3 B-0.2**, and PTs shall be IEEE C57.13 Accuracy Class **0.3**. Where revenue metering is specified, the Supplier shall furnish instrument transformers with the accuracy class required to satisfy the applicable utility or Owner metering requirements.

5.8 Spare Compartment

One (1) spare compartment shall be furnished complete with bus connections and cable termination provisions, fully equipped to accept a future vacuum circuit breaker feeder assembly, dedicated SEL-351S protective relay, and dedicated SEL-735 feeder power meter without modification to adjacent sections.

5.9 Power Monitoring and Controls Section

The vendor shall furnish one (1) Power Monitoring and Controls Section as an integral, low-voltage compartment within the switchgear lineup, for installation at the McDuffie Coal Terminal facility. The Network Compartment shall house all communications, metering integration, protection integration, and fiber optic networking equipment associated with the medium-voltage electrical distribution system defined in Sections 1 through 5 of this specification

5.9.1 Arc-Flash Isolation

The Power Monitoring and Controls Section shall be furnished as an integral low-voltage compartment within the medium-voltage switchgear lineup. The section shall be specifically designed to provide safe access to communications, automation, protection, and metering equipment without exposing personnel to medium-voltage components or energized primary conductors.

The Power Monitoring and Controls Section shall be electrically isolated from all medium-voltage compartments by grounded metallic barriers and shall contain only low-voltage control, communications, instrumentation, and secondary wiring associated with the protection and control system. Under no circumstances shall medium-voltage bus, primary conductors, cable terminations, or other energized primary components be accessible from within the Controls Section.

The Power Monitoring and Controls Section shall include dedicated front access independent of all medium-voltage breaker, tie, and fused feeder compartments. Routine inspection, maintenance, programming, testing, or replacement of communications equipment shall not require opening any medium-voltage compartment or disturbing energized primary equipment.

The switchgear manufacturer shall design the Power Monitoring and Controls Section to minimize arc-flash exposure for personnel accessing communications, control, and monitoring equipment. The compartment shall be physically and electrically isolated from adjacent medium-voltage compartments to the greatest extent practical through the use of barriers, compartmentalization, and equipment arrangement.

Arc-flash PPE requirements shall be based on the calculated incident energy at the specified working distance in accordance with NFPA 70E and IEEE 1584. The design objective shall be to limit the calculated incident energy within the Power Monitoring and Controls Section to **8 cal/cm² or less** under normal operating conditions. Where the calculated incident energy does not exceed **8 cal/cm²**, personnel shall wear arc-rated PPE with a minimum arc rating of **8 cal/cm²**. If the calculated incident energy exceeds this value, the Supplier shall identify the calculated incident energy and the corresponding minimum arc rating required for personnel protective equipment.

The Supplier shall identify the location and arrangement of the integrated communications compartment on the switchgear general arrangement drawings and demonstrate compliance with the separation, accessibility, and arc-flash requirements specified herein.

5.9.2 Environmental Control

The enclosure shall be equipped with a thermostatically controlled, filtered ventilation system. System can include but is not limited to the following equipment:

- Redundant filtered intake fans and/or Louvers
- Filtered exhaust fans
- Washable or replaceable industrial dust filters
- Thermostatic fan controls
- Humidity-controlled anti-condensation heater
- Corrosion-resistant fan assemblies

The ventilation system shall maintain positive internal pressure to minimize the ingress of coal dust, moisture, and airborne contaminants. An external stainless steel sun shield shall be provided to minimize solar heat gain.

Air conditioning units shall not be required unless the vendor demonstrates, through thermal calculations, that the proposed equipment load will exceed the manufacturer's maximum allowable operating temperature under the specified environmental conditions. Where furnished, closed-loop air conditioning, a thermostatically controlled heater, humidity control, and condensation prevention shall be provided, and environmental equipment shall maintain internal cabinet temperatures within manufacturer recommendations for all installed devices.

The vendor shall provide thermal calculations demonstrating compliance with equipment operating temperature requirements. All environmental control components shall be serviceable from the front of the enclosure without removal of communications equipment.

Compartment internal temperature shall not exceed 95°F under maximum design ambient conditions with all installed communications equipment operating at full load.

5.9.3 Communications and Protection-Integration Equipment

The Network Communications Compartment shall contain, at a minimum:

- One (1) SEL-735 Power Quality Meter located in the Power Monitoring and Controls Section. The meter shall be connected to instrument transformers arranged to provide aggregate metering of the entire switchgear lineup. The meter shall provide centralized monitoring of three-phase voltage, current, real and reactive power, apparent power, energy, demand, frequency, power factor, and power quality data for the complete switchgear lineup and shall communicate these values to the plant SCADA/HMI system.
- One (1) Fiber Optic Patch Panel / Fiber Distribution Unit
- One (1) Managed Industrial Ethernet Switch

Each main incoming breaker meter, tie and two main breaker relays (SEL-351S), and dedicated SEL-735 power meter shall remain field-mounted within their respective switchgear compartments per Section 5.11 and shall communicate to the Network Communications Compartment via fiber optic and/or hardwired serial/Ethernet connections as defined under the companion programming specification. The Network Communications Compartment shall not be relied upon to house medium-voltage protective relays or feeder metering devices.

Acceptable managed Ethernet switches:

- Cisco Industrial Ethernet IE-3300
- Cisco Industrial Ethernet IE-3400
- Approved equal

The managed Ethernet switch shall support:

- Managed Layer 2/Layer 3 Ethernet
- Fiber optic uplinks
- RSTP
- VLAN segmentation
- IGMP snooping
- SNTP time synchronization
- IEC 61850 communications
- Modbus TCP
- DNP3 Ethernet

5.9.4 Fiber Optic System

A rack-mounted Fiber Distribution Panel shall be provided within the Network Communications Compartment. The panel shall include:

- LC duplex connectors
- Minimum 24-fiber capacity
- Fiber splice tray
- Cable management hardware
- Factory identification labels

All fiber shall be terminated and tested.

5.10 Tie Device

The tie section consists of one (1) drawout vacuum circuit breaker, giving the lineup its bus-sectionalizing capability. Minimum requirements:

- 25-kV class
- 1200A frame
- 1200A continuous rating
- Stored-energy operating mechanism
- Electrically operated
- Anti-pump feature
- Mechanical position indication
- Local and remote operation
- Drawout construction
- Protective relay tripping
- Padlocking provisions

The tie breaker shall be fully rated to carry the combined load of either bus section as required by the one-line diagram.

5.11 Protection, Relaying, and Metering

The switchgear shall be furnished with all current transformers, voltage transformers, metering devices, communications equipment, protective relays, wiring, and accessories required for a complete and fully functional protection and metering system. All protective relays shall be microprocessor-based, multifunction SEL relays or approved equal, and shall be coordinated with Ethernet communications scope defined under the companion Protection, Automation, and Communications Programming Specification (250525-EL-SPEC-002). All feeder power meters shall be SEL-735 and shall likewise be coordinated with that scope. The supplier shall furnish complete relay settings files, meter configuration data, and coordination documentation.

Device	Rating	Protection / Power Quality Monitoring
Main Breakers (2)	1200AF Vacuum Circuit Breaker	**SEL-351S** – Main breaker protection, control, and automation. **SEL-735** – power quality monitoring.
Tie Breaker (1)	1200AF Vacuum Circuit Breaker	**SEL-351S** – Tie breaker protection, control, automation, and system coordination. **SEL-735** – power quality monitoring.
Fused Feeder (8)	Fused feeder compartment per Data Sheet 250525.01-EL-DS-001	**SEL-735** – Dedicated power quality monitoring, load monitoring, and communications for each fused feeder.
Spare (1)	Spare compartment, fully equipped for future feeder	None furnished; provisions only

- Continuous current sensor ratios (CTs) as shown on the one-line diagram.
- SEL-351S for each main breaker (2) protection, control integration, and ATS function.
- SEL-351S for tie breaker control, tie logic, ATS function, and system coordination functions.
- SEL-735 for power quality metering at the main incoming breaker.
- SEL-735 for power quality metering at the tie breaker.
- SEL-735 for dedicated power quality metering on each of the eight (8) fused feeder compartments.

5.11.1 Main Breakers and Tie Breaker Protection

One SEL-351S or approved equal shall be provided for each main incoming breaker and Tie Breaker. Functions shall include the following ANSI Functions: (ANSI Device Number)

- Phase overcurrent (50/51)
- Ground overcurrent (50G/51G)
- Breaker control and monitoring
- Breaker failure protection (50BF)
- Event Recording
- Over-frequency (81O)
- Negative Sequence (46)
- Trip Circuit Monitor (74TC)

• Automatic transfer scheme utilizing SEL relays/controllers for ATS logic and breaker coordination for the complete main-tie-main configuration, including both main breakers and the tie breaker. No separate ATS controller shall be provided unless specifically required to meet these specifications.

Voltage functions shall include:

- 27 (Utility Loss), 59 (Over Voltage Alarm)
- Undervoltage (27)

Breaker monitoring shall include:

- Trip Counter, Close Counter, Contact Wear, Operations Counter

Communications

- Ethernet communications shall be provided for integration with the plant control system. The relay shall support IEC 61850 MMS, Modbus TCP, DNP3 Ethernet, and SNTP time synchronization. Ethernet ports shall be fiber optic or copper as required by the communications network architecture.

Digital Inputs

- IN101 (Breaker position status (52a/52b) and TOC (Truck Operated Contact)
- IN103 (Local / Remote)
- IN104 (86 Lockout)
- IN105 (Spring Charged)
- IN106 (Trip Circuit Healthy)

Digital Outputs

- OUT101 (Trip)
- OUT102 (Close)
- OUT103 (Alarm)
- OUT104 (Breaker Failure)

- OUT105 (Lockout)
- OUT106 (Relay Failure)

SEL-351 Industrial Configuration

Setting	Typical Value
System Voltage	23.0 kV
Frequency	60 Hz
CT Secondary	5 A
PT Secondary	120 V Wye
Phase Rotation	ABC
Time Synchronization	SNTP
Event Reports	Enabled
Oscillography	Enabled
SER	Enabled

Current transformers and voltage transformers shall be provided and sized in accordance with the project one-line diagram (250525-EL-OL-0001A, Rev A), coordination study requirements, and metering accuracy requirements.

5.11.2 Power Monitoring Metering

One SEL-735 shall be provided at each main incoming breaker and tie breaker. In addition, one dedicated quality power meter — SEL-735 shall be provided on each of the eight (8) fused feeder compartments. Each meter shall provide, at a minimum:

Power Quality Recording

- Voltage Sags
- Voltage Swells
- Interruptions
- Harmonics
- Flicker
- THD
- K-Factor
- Power Factor
- Frequency Deviations

Demand Calculations

- kW ; kW-h
- kVAR

- kVA
- Current Demand

Communications

- EtherNet/IP

Event Recording

- Oscillography enabled
- Sag/Swell recorder enabled
- Waveform recording
- Sequence of Events
- Trigger on: Overvoltage, Undervoltage, Frequency Deviation THD Limits Digital Inputs

Digital Outputs

- High Demand Alarm
- Voltage Alarm
- Frequency Alarm
- Power Factor Alarm
- Communications Failure

Alarm Threshold

Alarm	Typical Value
Overvoltage	110%
Undervoltage	90%
Overcurrent	User defined
Frequency High	60.5 Hz
Frequency Low	59.5 Hz
THD Voltage	5%
THD Current	8–10%

Voltage Configuration

Parameter	Setting
System Type	3-Phase
Voltage	23kV
PT Ratio	23,000:120
PT Secondary	120V

Current Configuration

CT Secondary	5A

CT Ratio	600:5

Dedicated feeder metering shall provide, power quality data on each feeder that is isolated from protection settings, logic, and relay configuration changes. Each feeder meter shall record energy and demand parameters at a user-configurable interval of 1 to 15 minutes. The default logging interval shall be 15 minutes unless otherwise specified. Each feeder meter shall maintain historical energy and demand data with a minimum storage capacity of 12 months. Meter records shall be time-stamped and accessible through the facility SCADA system.

5.12 Grounding and Surge Protection

- A continuous copper ground bus shall be provided throughout the lineup, including across both back-to-back sections.
- Grounding provisions shall be provided within each compartment to permit temporary protective grounding during maintenance. (Ground ball studs are acceptable)

5.13 Control Power and Indication

Control power for the switchgear lineup shall be provided by a 48 VDC battery system sized to keep every relay, meter, breaker/switch trip-close circuit, and control function operational through an extended loss of AC input — this is a coal-terminal environment where AC service interruptions are not unusual, so the battery reserve is sized well beyond a momentary ride-through.

- Control power shall be 48 VDC unless otherwise noted.
- The station battery system shall provide a minimum of ten (10) hours of reserve capacity at full relay, metering, control, and indication load — including the added dedicated feeder meters — with all protective relays, feeder meters, breaker/switch trip-close circuits, and control functions fully operational throughout the reserve period.
- The battery system shall include a charger sized to restore full charge within the manufacturer's recommended recharge time following a discharge event and shall provide low-voltage and charger-fail alarm contacts for annunciation.
- The supplier shall furnish battery sizing calculations demonstrating compliance with the 10-hour minimum reserve requirement, based on the actual connected relay, meter, and control load for this revised lineup.
- LED indicating lights shall be provided for equipment status and alarm indication.
- Control wiring shall be stranded copper with 600-volt insulation rating.
- Terminal blocks shall be provided for all field control and monitoring connections.
- All devices, terminal blocks, relays, meters, and compartments shall be permanently identified with engraved nameplates.

6. Testing, Inspection, and Factory Acceptance Test

The supplier shall perform routine factory testing in accordance with applicable IEEE standards, with certified test reports furnished at shipment. The supplier shall provide:

- General arrangement drawings, including the rear accessible, split configuration and required maintenance aisles
- One-line diagrams
- Elementary and wiring diagrams
- Equipment data sheets
- Relay and meter documentation
- Battery sizing calculations
- Installation and maintenance manuals
- Recommended spare parts lists
- Verification of all equipment nameplates and model numbers
- Verification of enclosure construction, environmental controls, and power distribution components
- Point-to-point wiring continuity testing
- Fiber optic termination inspection and testing (basic equipment functionality shall be demonstrated prior to shipping with detail performance testing done by others during site commissioning)
- Ethernet network verification (basic equipment functionality shall be demonstrated prior to shipping with detail performance testing done by others during site commissioning)
- Managed switch configuration verification (basic equipment functionality shall be demonstrated prior to shipping with detail performance testing done by others during site commissioning)
- Verification of DNP3, Modbus TCP, IEC 61850, or other specified communication protocols (performed by others during commissioning)
- Verification of alarm and status point mapping
- Power supply and control power verification
- Grounding and bonding inspection
- Verification of cabinet lighting, receptacles, heaters, and air conditioning equipment (where furnished)
- Verification of the arc-flash isolation requirements of Section 6.2, including confirmation that the cabinet doors are independent of medium-voltage compartment interlocks

A complete Factory Acceptance Test (FAT) procedure shall be submitted for purchaser review prior to testing. Pricing for a witnessed FAT, with all communications equipment energized and operational, shall be included as a separate line item on the proposal. The FAT shall include demonstration of:

- Communications with the main and tie SEL-351S relays and all associated SEL-735 feeder, mains, and tie meters. (basic equipment functionality shall be demonstrated prior to shipping with detail performance programming and testing done by others during site commissioning)
- Ethernet switch functionality (basic equipment functionality shall be demonstrated prior to shipping with detail performance programming and testing done by others during site commissioning)
- Fiber optic communications (basic equipment functionality shall be demonstrated prior to shipping with detail performance testing done by others during site commissioning)
- Alarm and status indication functionality

Upon completion of testing, the vendor shall provide a complete FAT report including test procedures, test results, equipment configuration files, network architecture drawings, relay and meter communication settings, switch configurations, and fiber optic test results.

Switchgear vendor to power-up during FAT Test and ensure that equipment is working properly.

7. Spare Parts

The Supplier shall furnish a spare parts package for the complete **23 kV switchgear lineup**. Spare parts shall include components considered necessary to support operation, maintenance, troubleshooting, and repair of the switchgear throughout its service life.

At a minimum, the Supplier shall furnish the following spare parts:

- **Three (3) spare medium-voltage fuses for each fuse type and rating furnished as part of the switchgear lineup.** Spare fuses shall be identical to the installed fuses with respect to manufacturer, type, voltage class, current rating, interrupting rating, and applicable fuse characteristics.
- Spare control power fuses for the switchgear control circuits.
- Spare indicating lights and control switches.
- Spare auxiliary contacts and control relays, as applicable.
- Spare trip and close coils for circuit breakers, where applicable.
- Spare control components and other manufacturer-specific components identified by the Supplier as critical to switchgear operation and maintenance.

The Supplier shall identify the manufacturer part number, description, and applicable switchgear location for each furnished spare part. All spare parts shall be new, unused, and suitable for installation in the furnished switchgear.

Spare medium-voltage fuses shall be individually packaged and clearly identified by fuse type and rating and shall be suitable for long-term storage under the environmental conditions at the project site.

The cost of all required spare parts, including the minimum three (3) spare fuses for each installed fuse type and rating, shall be included in the Supplier's base bid.

8. Documents and Attachments

In addition to the documentation required under Section 5.11, the vendor shall furnish, specific to the Network Communications Compartment:

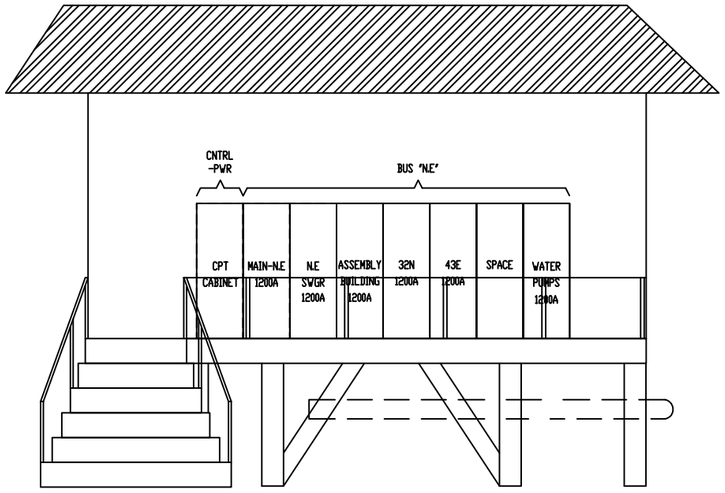
- General layout of equipment showing all dimensions, weights, location, and outline drawings showing the final assembled configuration
- Network architecture drawings and/or comm interconnection drawings
- Schematic and wiring diagrams
- Installation, operation, and maintenance instructions covering all cabinet equipment, including protective relays, meters, and similar components
- As-built drawings within two (2) weeks following shipment

The following reference documents are attached to this specification:

- New Switchgear Substation Layout Drawing: 250525-EL-LAY-0001
- New Switchgear Substation Layout Drawing: 250525-EL-LAY-0002
- New Switchgear Substation Layout Drawing: 250525-EL-LAY-0003
- McDuffie Coal Terminal Single Line Diagram: 250525-EL-OL-0001A
- 25 kV Medium Voltage Switchgear Data Sheet: 250525.01-EL-DS-001

The Network Communications Compartment shall be guaranteed by the vendor against fault in design, defective or improper materials, poor workmanship, and failure from normal usage for twelve (12) months after being placed in the specified service, consistent with the warranty terms applicable to the remainder of the switchgear lineup.

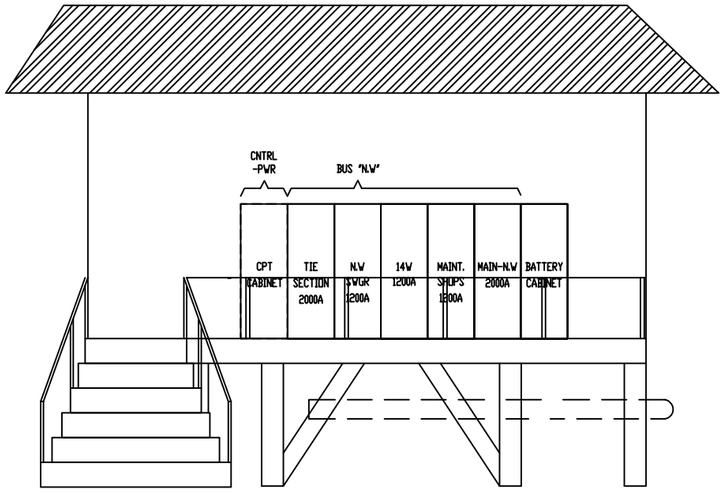
FRONT VIEW



NOTES

1. FOR VISUAL REPRESENTATION ONLY

BACK VIEW



NOTES

1. FOR VISUAL REPRESENTATION ONLY

NOT FOR CONSTRUCTION

REVISION HISTORY

NO.	DETAILS	MADE	CKD.	DATE
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A	ISSUED FOR FOR BID	KWS	MMS	08/13/26

NO.	DETAILS	MADE	CKD.	DATE
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SCALE:	NONE	DATE
DESIGN BY:	MMS	05/27/26
DRAWN BY:	KWS	05/27/26
CHECKED BY:	TSW	05/27/26

ALABAMA PORT AUTHORITY
PORT OF MOBILE

ALLIANCE ENGINEERING
1142 MONTLIMAR DRIVE
MOBILE AL 36609

ALLIANCE ENGINEERING

250525 MCDUFFIE COAL TERMINAL
LAYOUT DRAWING
NEW SWGR SUB-STATION

DRAWING NUMBER: 250525-EL-LAY-0001

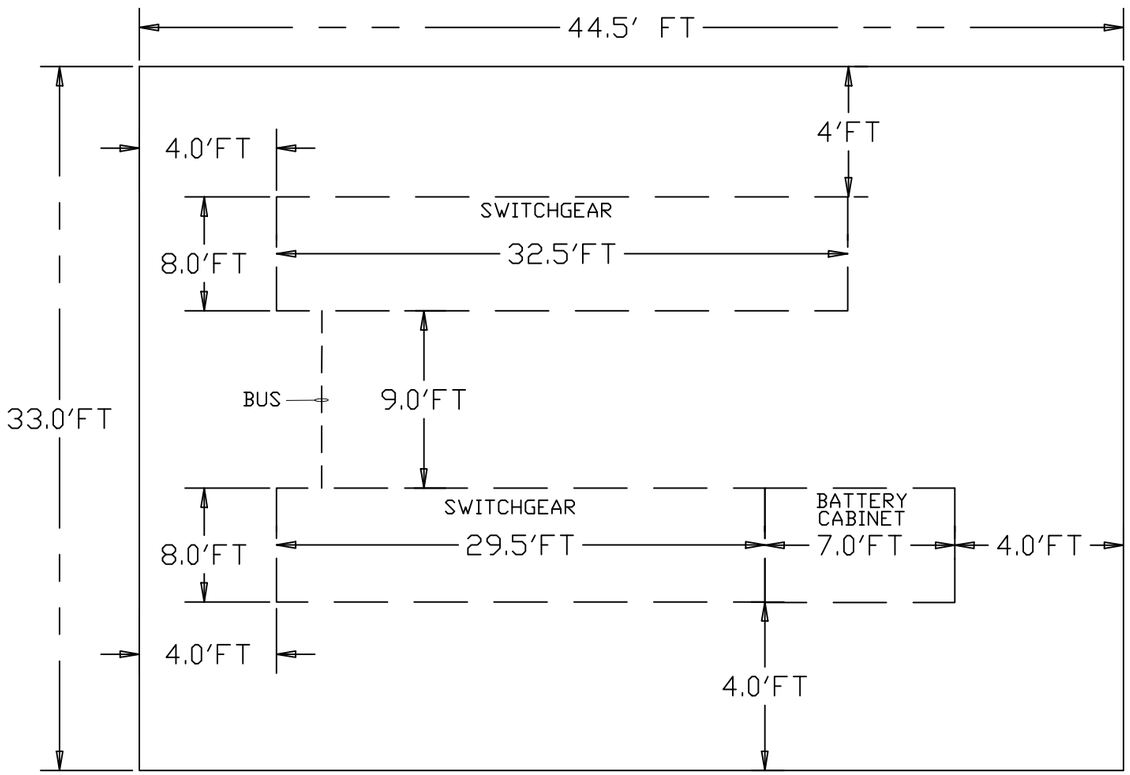
REV. NO.: A

ALLIANCE PROJECT NUMBER: 250525.01

NOTES

1. STRUCTURAL DESIGN SHOULD MAINTAIN 4.0' FT AROUND ALL SIDES TO MAINTAIN PROPER WORKSPACE CLEARANCE.
2. 6.0'FT WORKSPACE CLEARANCE SHALL BE MAINTAINED BETWEEN EACH SWITCHGEAR.

TOP VIEW



NOT FOR CONSTRUCTION

REVISION HISTORY

NO.	DETAILS	MADE	CKD.	DATE
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B	RE-ISSUED FOR BID	KWS	MMS	10/05/26
A	ISSUED FOR FOR BID	KWS	MMS	08/13/26

SCALE:	NONE	DATE	
DESIGN BY:	MMS	05/27/26	
DRAWN BY:	KWS	05/27/26	
CHECKED BY:	TSW	05/27/26	

ALABAMA PORT AUTHORITY
PORT OF MOBILE

ALLIANCE ENGINEERING
1142 MONTLIMAR DRIVE
MOBILE AL 36609

ALLIANCE ENGINEERING

250525 MCDUFFIE COAL TERMINAL
LAYOUT DRAWING
NEW SWGR SUB-STATION

DRAWING NUMBER: 250525-EL-LAY-0002

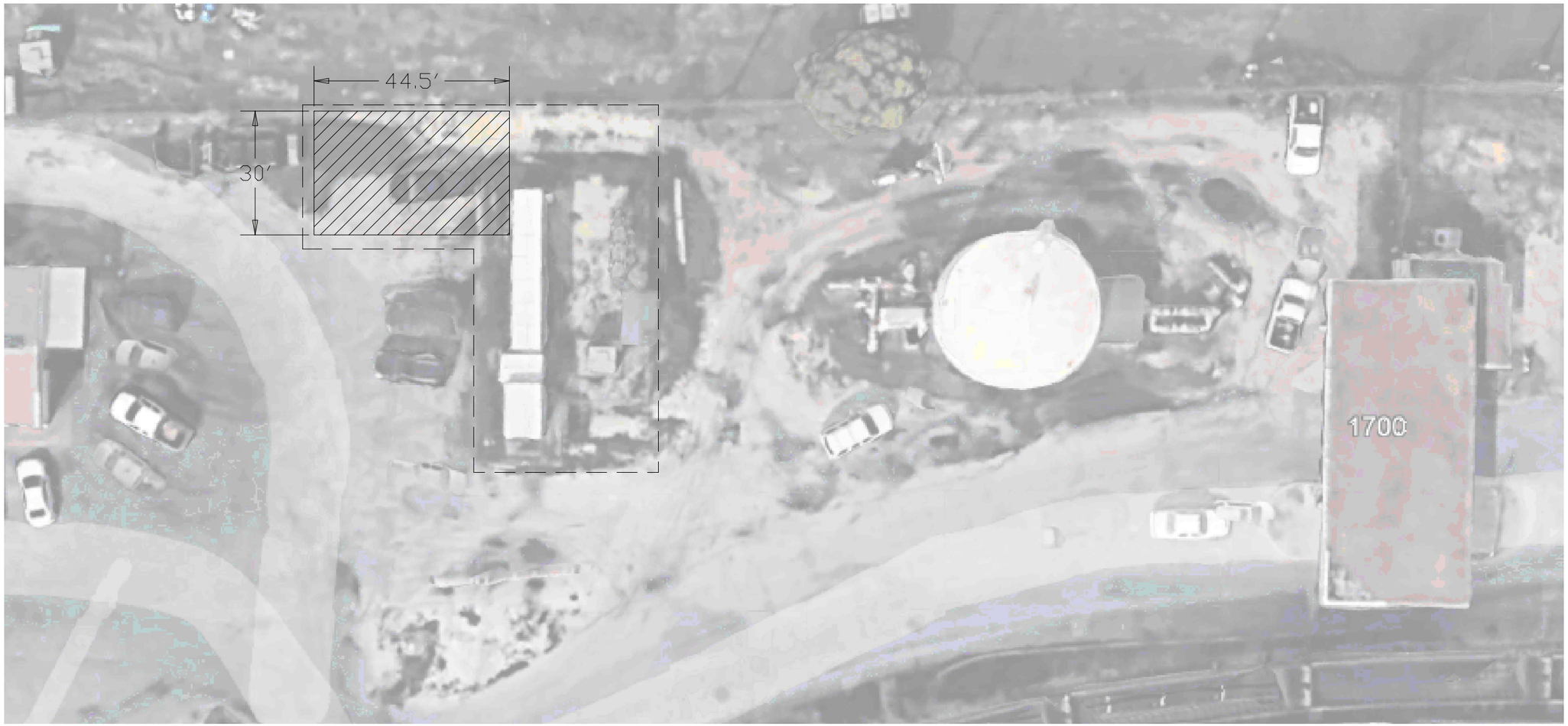
REV. NO.: B

ALLIANCE PROJECT NUMBER: 250525.01

LEGEND:

— — — — FENCE

——————— NEW SWGR SUB STATION STRUCTURE



NOT FOR CONSTRUCTION

REVISION HISTORY

NO.	DETAILS	MADE	CKD.	DATE
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A	ISSUED FOR FOR BID	KWS	MMS	08/13/26

SCALE:	NONE	DATE
DESIGN BY:	MMS	05/27/26
DRAWN BY:	KWS	05/27/26
CHECKED BY:	TSW	05/27/26

ALABAMA PORT AUTHORITY PORT OF MOBILE

ALLIANCE ENGINEERING
1142 MONTLIMAR DRIVE
MOBILE AL 36609

ALLIANCE ENGINEERING

250525 MCDUFFIE COAL TERMINAL
LAYOUT DRAWING
NEW SWGR SUB-STATION

DRAWING NUMBER 250525-EL-LAY-0003

REV. NO. A

ALLIANCE PROJECT NUMBER: 250525.01

LEGEND:

- NEW SWITCHGEAR
- EXISTING GEAR / CABLE
- CABLE
- NEW MEDIUM VOLTAGE SPLICE ENCLOSURE

1. SPLICE FEEDER FOR N.E PAD MOUNT SWITCHGEAR
2. SPLICE FEEDER FOR XFMR TO NEW ASSEMBLY BUILDING
3. SPLICE FEEDER FOR XFMRS TO 32NORTH BUILDING
4. SPLICE FEEDER FOR 43EAST PAD MOUNT SWITCHGEAR
5. SPLICE FEEDER FOR XFMR TO PLANT WATER PUMPS
6. SPLICE FEEDER FOR N.W PAD MOUNT SWITCHGEAR
7. SPLICE FEEDER FOR XFMR TO 14WEST BUILDING
8. SPLICE FEEDER FOR XFMR TO MAINTENANCE SHOPS

23 KV
371.5 MVAsc
A.P.C
1200/5
CB-UTILITY

2A
23 KV
240/120V
1 PH, 25KVA

POTENTIAL FUTURE SECONDARY FEEDER

EXISTING 240/120V,24 CIRCUIT PANEL BOARD ON DEAD END STRUCTURE WITH SPD

MAIN CB
125 AMP,
2 POLES

CB 100 AMP
2 POLES

TO ENTRANCE

1200A SW.

P-000A
(3)-1/C #500MCM/PH
1/C 4/0 GND
75FT

MAIN SUBSTATION SWITCHGEAR 23KV

UTILITY GRADE MALFUNCTION PROTECTIVE RELAY SEL351S

UTILITY GRADE POWER METERING SEL735

1200AF

1200/5

UTILITY GRADE POWER METERING MONITOR SEL735

200E SLOW
600/5

20E SLOW
600/5

250E SLOW
600/5

250E SLOW
600/5

30E SLOW
600/5

UTILITY GRADE MALFUNCTION PROTECTIVE RELAY SEL351S

UTILITY GRADE POWER METERING SEL735

1200AF

1200/5

PREPARED SPACE

UTILITY GRADE MALFUNCTION PROTECTIVE RELAY SEL351S

UTILITY GRADE POWER METERING SEL735

1200AF
1200/5

UTILITY GRADE POWER METERING MONITOR SEL735

200E SLOW
600/5

100E SLOW
600/5

20E SLOW
600/5

P-0001
1/C #500MCM/PH
1/C 4/0 GND
200FT

P-0002
1/C #500MCM/PH
1/C 4/0 GND
200FT

P-0003
1/C #500MCM/PH
1/C 4/0 GND
200FT

P-0004
1/C #500MCM/PH
1/C 4/0 GND
200FT

P-0005
1/C #1 AWG/PH
1/C 4/0 GND
200FT

P-0006
1/C #500MCM/PH
1/C 4/0 GND
200FT

P-0007
1/C 500#MCM/PH
1/C 4/0 GND
200FT

P-0008
1/C 350#MCM/PH
1/C 4/0 GND
200FT

1 MV SPLICE ENCLOSURE

N.E PAD MOUNT SWITCHGEAR

600A SW. 23KV

150E SLOW EMS1

200E SLOW ETS1

N.E ELEC BLDNG SWGR

TO ETS1 FOR NEW DOCK #1

2 MV SPLICE ENCLOSURE

23KV-480V
500 KVA
Z=5.0%

NEW ASSEMBLY BUILDING

3 MV SPLICE ENCLOSURE

23KV
480V
2500KVA
Z=6.37%

200E SLOW

TO 32N 480V SWBRD

23KV
4160V
5000KVA
Z=6.8%

200E SLOW

TO 32N 4160V SWGR

4 MV SPLICE ENCLOSURE

43E PAD MOUNT SWITCH

CLS 100E

CLS 125E

TO 3750 KVA XFMR FOR 43E 480V SWBRD

TO 3500 KVA XFMR FOR 43E 13.2KV SWGR

5 MV SPLICE ENCLOSURE

23KV-480V
1000 KVA
Z=5.7%

TO BREAKER PANEL FOR PLANT WATER PUMPS

6 MV SPLICE ENCLOSURE

N.W PAD MOUNT SWITCHGEAR

600A SW. 23KV

150E SLOW NWMT

200E SLOW SRDT

FEEDS 23KV-4.16KV XFMR FOR N.W BLDG SWGR

TO RAIL ROAD BUILDING

7 MV SPLICE ENCLOSURE

23KV-480V
3750 KVA
Z=5.8%

TO 14W 480V WEST SWBRD

8 MV SPLICE ENCLOSURE

23KV-480V
750 KVA
Z=5.0%

TO MAINTENANCE SHOPS

NOT FOR CONSTRUCTION

REVISION HISTORY

NO.	DETAILS	MADE	CKD.	DATE
-				
A	ISSUED FOR BID	KWS	MMS	08/10/26

SCALE:	NONE	DATE
DESIGN BY:	MMS	03/15/26
DRAWN BY:	KWS	03/15/26
CHECKED BY:	TSW	03/15/26

ALLIANCE ENGINEERING
1142 MONTLIMAR DRIVE
MOBILE AL 36609

ALLIANCE ENGINEERING

250525 MCDUFFIE COAL TERMINAL SINGLE LINE DIAGRAM MAIN SWGR MAIN TIE MAIN

DRAWING NUMBER: 250525-EL-OL-0001A

REV. NO.: A

ALLIANCE PROJECT NUMBER: 250525.01

ALLIANCE ENGINEERING

25 KV SWITCHGEAR	Medium Voltage Switchgear Data Sheet	Rev. B 10/5/2026 Issued for Bid

1	**Owner Name:**	**McDuffie Coal Terminal**	**Equipment Name:** 25 KV SWITCHGEAR	**REV**
2	**Project Name:**	**Main 25 kV Switchgear Upgrade**	**Item No. 1** **Qty: 1 Sections**	**B**
3	**Location:**	**Mobile, AL**	**Sheet No.: 1 of 1**	**B**
4	**Capital Proj. No.:**	**250525.01**	**One Line Dwg. No.: 250525.01-EL-0001A**	**B**

OPERATING CONDITIONS

5	Area Classification ☒ General Purpose ☐ Haz. Class____ Div. ____ Group ____ Equipment Location ☐ Indoor ☒ Outdoor	☐ Conditioned Areas - 70°F to 80°F and 50% humidity ☒ Non-Conditioned Area - 0°F to 104°F	**B**

CODES AND STANDARDS

6	☒ ANSI American National Standards Institute ☒ IEEE Institute of Electrical and Electronic Engineers ☐ ICEA Insulated Cable Engineers Association ☒ NFPA 70 National Electric Code ☒ NEMA - National Elec. Manufacturer's Association	☐ NESC National Electric Safety Code ☒ OSHA Occupational Safety and Health Admin. ☒ UL Underwriter's Laboratories (Certifications As Applicable) ☒ FM Factory Mutual (Design Guidance As Applicable) ☐	**B**

DOCUMENTATION

7	☒ Vendor Drawings Required Prior to Bid ☒ Refer to Specification for requirements	☒ Single Line Diagram Included ☒ Attachments Included ☒ As-Built Drawings Required After Mfg ☐	**B**

GENERAL DESCRIPTION

8	**General Description** Voltage - ☐ 5 kV ☐ 15kV ☒ 27kV ☐ 38kV BIL: 125kV Symm Short Circuit: 25kA 3 Phase 60 Hertz Available Fault Current ~ (9.3kA Bracing at source) Impedance: ☐ Wye ☒ Delta ☐ Other_____ **Enclosure** ☐ Nema 1 ☐ Nema 1A Gasketed ☒ Nema 3R Non-Walkin__ ☒ Standard Finish ☐ Custom Finish **Incoming Power Feeder** **Line Enters** ☐ Top ☒ Bottom ☐ Left ☒ Right ☐ Top Hat ☐ 18" ☐ ☐ Main Lugs ☒ Main Breaker ☐ Main Fused Disconnect ☒ Cable Feeder Lugs by Supplier ☐ By Others	**Branch Feeder Units** ☐ Thermal Magnetic - 3 Pole ☒ 600A loadbreak switch with grounding jaw and operating handle Interrupting Capacity ☒ 42000 RMS ☐ 65000 RMS ☐ 100000 RMS **Insulation** ☒ All Wiring rated 600 volts ☒ All wiring Copper ☒ Conductive Parts Copper **Bus Plating** ☒ Tin ☐ Silver **Overload Relays** ☒ Electronic ☐ Three Bimetallic Ambient Compensated ☐ Door mounted Reset Button **(CT) Wire Color** ☐ Black ☐ Gray ☒ Vendor Standard Communication Options ☒ EtherNet I/P ☐ DeviceNet	**B**
9	**Main Bus** ☒ Copper ☐ Aluminum ☐ 600A ☐ 800A ☒ 1200A ☐ 1600A ☐ 2000A ☐ XXXX **Bus Barrier** ☒ Isolated (Std.) ☐ Labyrinth (insulated & Isolated) ☐ With Shutters ☐ No Shutters **Ground Bus** ☒ Copper ☐ Aluminum ☒ Vertical Copper Ground Bus ☐ Horizontal Copper Ground Bus ☐ Top ☐ Bottom ☒ #4/0 Ground Lug Both ends of Bus	**Single Phase Protection** ☐ Solid State Line current monitor **Barriers** ☐ Yes ☐ No **Indicating light LED** ☒ Yes ☐ No	**B**

10	**Not Used**	**Name Plates** ☒ Equipment No. Nameplate - Lamacoid-black letters on white background (See Attachments) ☐ **Testing and Inspection** ☒ Factory Inspection **Options:** ☒ Thermostatically Controlled Space Heaters ☐ Ground Fault Detection Lights ☒ Ethernet Communications ☐ Provision for Future Expansion ☐ _____ ☐ Empty Unit Insert (1 Full Height Space) ☐ Empty Unit Insert (2 Full Height Spaces) ☐ Incoming Unit Painted Yellow ☐ Grace Voltage Indicator on Incoming Section ☐ Surge Suppression on Incoming Section ☒ IR Window - ALL Sections	**B**

NOTES:

1. Reference specifications and attachments for additional requirements.
2. Switchgear shall be configured in a Main-Tie-Main lineup consisting of two (2) vacuum circuit breaker mains, one (1) vacuum circuit breaker tie, and fused load-interrupter switch feeder sections.
3. 2 Main incoming devices shall be drawout vacuum circuit breakers rated 1200AF
4. Tie breaker shall be drawout vacuum circuit breaker rated 1200AF.
5. Total 13 sections in total see single line 250525.01-EL-OL-0001A for details.
6. SEL-351S shall be included on all vacuum breakers.
7. SEL-735 shall be included on all vacuum breakers and Fused branch feeder units.

250525.01-EL-SPEC-002 **Revision: A**

Prepared For: Chris Phillips Date: 08/13/2026

McDuffie Coal Terminal
1901 Ezra Trice Blvd
Mobile, AL 36603

Project: Main 25 kV Switchgear Upgrade

Protection, Automation, and Communications Programming Specification

Written By: MMS
Checked By: TSW
Approved By: TSW

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1. Scope

1.1 General

This specification defines the minimum requirements for engineering, programming, configuration, testing, commissioning support, and documentation associated with the Protection, Automation, and Communications System for the new 25 kV Medium Voltage Switchgear at the McDuffie Coal Terminal in Mobile, Alabama.

The new switchgear lineup consists of two (2) Main vacuum circuit breakers, one (1) Tie vacuum circuit breaker, and eight (8) fixed-mounted, three-phase load-interrupter switch equipped with current-limiting power fuses, arranged in a main-tie-main configuration as shown on the Contract single-line diagram (Drawing 250525-EL-OL-0001A).

The Supplier shall provide all engineering services required to configure, test, and commission the protection, automation, and communications system associated with this equipment.

This specification establishes the minimum programming and integration requirements. The Supplier shall furnish all engineering labor, software, licenses, configuration files, documentation, and testing necessary to provide a complete and operational system.

The Supplier shall identify any exceptions or deviations in writing with their proposal.

1.2 Exceptions

The Supplier's programming and engineering services shall conform to this specification unless written approval is obtained from the Purchaser for exceptions. Exceptions shall be itemized on a separate sheet entitled “Exceptions” and submitted with the proposal. No exceptions are allowed unless specifically granted by the Purchaser in writing.

1.3 Conflict

In the case of any conflict between this specification, the Medium Voltage Switchgear specification (250525-EL-SPEC-001), the Contract drawings, and other procurement documents, the Purchaser shall resolve the conflict.

2. Applicable Standards

Programming and configuration shall comply with the latest applicable editions of:

- ANSI
- IEEE
- NEC (NFPA 70)
- NFPA 70B
- IEC 61850
- DNP3
- Modbus TCP
- Ethernet/IP (where applicable)
- NERC CIP (where applicable)
- SEL Application Guides and Best Practices

3. Furnished System

The project consists of a new outdoor 25 kV metal-clad switchgear lineup utilizing Schweitzer Engineering Laboratories (SEL) protective relays and automation equipment, in a main-tie-main arrangement with eight (8) feeder positions. The Supplier shall configure and integrate the following devices:

Qty	Device / Function
3	SEL-351S Protection Relay (2 – Main VCB, 1 – Tie VCB)
11	SEL-735 Revenue / Power Quality Meter
1	Managed Industrial Ethernet Switch
1	Fiber Distribution Panel

The Managed Industrial Ethernet Switch, and Fiber Distribution Panel are housed within the outdoor Network Communications Cabinet section furnished under a separate specification (250525-EL-SPEC-001, “Medium Voltage Switchgear Specification”). The Supplier shall coordinate all programming and communications configuration described herein with the physical equipment furnished under that specification.

4. Engineering Services

4.1 Relay Programming

The Supplier shall develop, configure, document, and verify complete protection, monitoring, metering, and communications settings for all Intelligent Electronic Devices (IEDs) furnished as part of the Medium Voltage Switchgear specified under Specification **250525-EL-SPEC-001**.

Programming shall include the following devices:

- Three (3) SEL-351S Protection Relays associated with the two Main and Tie vacuum circuit breakers.
- Eleven (11) SEL-735 Power Quality and Revenue Meters associated with the fused feeder compartments, Main, and Tie circuit breakers.

Relay programming shall include all protection functions, communications parameters, metering functions, event reporting, and supervisory monitoring functions required for proper operation of the 25-kV switchgear lineup. Programming shall include all logic required to support the Main-Tie-Main operating philosophy, including breaker interlocking, permissive functions, and transfer logic required between the two Mains and Tie protective relays.

Protection settings shall be developed using the final approved one-line diagrams, protection coordination study, utility requirements, equipment nameplate information, manufacturer recommendations, and Owner operational requirements. The Supplier shall be responsible for coordinating all protective functions with the serving utility and downstream feeder protection devices.

Programming shall include configuration of all protection elements, SELogic® control equations, programmable labels, front-panel displays, programmable pushbuttons, target logic, oscillography, Sequence of Events (SOE) recording, breaker monitoring, communications parameters, cybersecurity settings, user account management, event retrieval, and disturbance recording.

All relay databases shall be developed using the current version of SEL AcSELerator® software. Draft settings shall be submitted to the Purchaser for review prior to Factory Acceptance Testing (FAT). Final relay setting files shall be provided in their native editable format as part of the project closeout documentation.

4.2 Communication Integration

The Supplier shall provide complete engineering, configuration, testing, and commissioning of the communications system required to integrate all protective relays, power meters, and network equipment within the Medium Voltage Switchgear.

Communications shall be established through a managed industrial Ethernet switch installed within the dedicated communications section of the switchgear lineup. The Ethernet switch shall serve as the communications aggregation point for all Intelligent Electronic Devices (IEDs).

At a minimum, the communications system shall integrate:

- Two (3) SEL-351S Protection Relays
- Ten (11) SEL-735 Power Quality and Revenue Meters
- One (1) Managed Industrial Ethernet Switch
- One (1) Fiber Distribution / Fiber Junction Panel
- Owner's Distributed Control System (DCS)
- Future SCADA interfaces

All communications between the relays, power meters, and the Owner's DCS shall be routed through the managed Ethernet switch. The Ethernet switch shall provide a fiber-optic uplink to the Owner's communications network through the integrated fiber distribution panel.

The communications network shall support, at a minimum, the following protocols:

- IEC 61850 MMS
- Modbus TCP/IP
- DNP3 over Ethernet
- SNTP for network time synchronization
- SFTP or FTP for engineering access and event retrieval, where required

The Supplier shall configure all network parameters including IP addressing, subnet masks, VLAN assignments, gateway configuration, managed switch security, port configuration, and time synchronization. Communications shall be verified during Factory Acceptance Testing (FAT) and Site Acceptance Testing (SAT).

4.3 Ethernet Network Configuration

The Supplier shall provide complete engineering, programming, configuration, and testing of the managed industrial Ethernet switch required to support all protection, metering, and supervisory communications associated with the Medium Voltage Switchgear.

Configuration shall include VLAN implementation where required, Rapid Spanning Tree Protocol (RSTP), IGMP Snooping, Quality of Service (QoS), multicast management, port security, diagnostics, and fiber-optic communications.

The Supplier shall configure all copper Ethernet ports, fiber-optic interfaces, communications parameters, and device addressing required to establish reliable communications between all Intelligent Electronic Devices and the Owner's communications network.

Upon completion of configuration, the Supplier shall provide complete network documentation including managed switch configuration files, network topology drawings, IP address schedules, VLAN assignments, fiber-optic port schedules, communications architecture drawings, and all information necessary to support future maintenance and expansion.

4.5 HMI / SCADA Integration

The Supplier shall develop and configure all Human-Machine Interface (HMI), SCADA, and DCS communications required to provide complete monitoring and control of the Medium Voltage Electrical Distribution System, including breaker status indications, remote breaker control points for the three Main, Tie, and eight (8) Feeder positions, protective relay alarms, relay target information, sequence-of-events records, analog metering values, power quality measurements, communications diagnostics, and network health indications.

All data shall be properly scaled, labeled, and documented in accordance with the Owner's naming conventions and control philosophy. Communications point names, alarm descriptions, engineering units, scaling factors, and quality indicators shall be coordinated with the Owner prior to final implementation.

Upon completion of the project, the Supplier shall furnish a comprehensive communications point list identifying each point name, device source, communication protocol, register address or object reference, engineering units, scaling information, alarm classification, and associated HMI or SCADA function.

5. Factory Acceptance Testing (FAT)

The Supplier shall develop, document, and execute a comprehensive Factory Acceptance Test (FAT) to demonstrate that the protection, automation, communications, and networking systems have been completely assembled, configured, integrated, and tested prior to shipment.

A detailed FAT procedure shall be submitted to the Purchaser for review and approval a minimum of three (3) weeks prior to the scheduled FAT. No FAT shall commence until the Purchaser has reviewed the proposed procedure.

At a minimum, the FAT shall verify:

- Proper operation of all communications between the three (3) SEL-351S, eleven (11) SEL-735, and Managed Ethernet Switch
- Successful communications utilizing IEC 61850 MMS, Modbus TCP/IP, DNP3 over Ethernet, and any additional project-specific protocols
- Managed Ethernet network configuration, including addressing, VLANs, RSTP, redundancy, multicast management, and fiber optic communications
- Main-Tie transfer/interlock logic and breaker control functions
- All relay-to ethernet switch communications, protocol conversions, alarm processing, and sequence-of-events recording
- Point-to-point verification of all status, alarm, analog, control, and diagnostic indications within the database
- System diagnostics, communications health monitoring, network failover functionality, and time synchronization across all devices

Upon successful completion of FAT, the Supplier shall submit a comprehensive FAT Report documenting all testing performed, test results, corrective actions, final acceptance status, relay configuration files, managed Ethernet switch configuration files, communications point database, and network topology drawings.

6. Site Acceptance Testing and Commissioning

The Supplier shall provide qualified engineering personnel to perform onsite commissioning, startup support, and Site Acceptance Testing (SAT) for the protection, automation, communications, and networking systems furnished under this Contract.

The Supplier shall develop and submit a detailed SAT procedure for Purchaser review prior to mobilization, identifying the sequence of testing, required test equipment, acceptance criteria, communications verification methods, and documentation requirements.

Commissioning shall include complete point-to-point verification of all digital status indications, analog measurements, control commands, alarms, sequence-of-events records, and communications diagnostics exchanged between the protective relays, managed Ethernet network, and Plant DCS. Any discrepancies identified shall be documented, corrected, and successfully retested prior to final system acceptance.

The Supplier shall provide onsite engineering support during initial system energization and startup and shall remain available throughout commissioning until the protection and automation system has been accepted by the Purchaser.

Upon completion of SAT and commissioning, the Supplier shall submit a comprehensive Commissioning Report documenting all testing performed, results, deficiencies, corrective actions, final communications verification, and system acceptance, including updated configuration files reflecting the final as-commissioned system.

7. Deliverables

The Supplier shall furnish complete engineering documentation for all programming, configuration, testing, and commissioning activities performed under this Contract, submitted in both electronic and PDF formats unless otherwise approved by the Purchaser. All deliverables shall become the property of the Owner upon completion of the project.

Deliverables shall include, but not be limited to:

- Complete relay settings files for each of the three (3) SEL-351S and ten (11) SEL-735 meter
- Managed Ethernet switch configuration files
- Communications point database, network architecture drawings, and IP address schedules
- Control logic, alarm, and sequence-of-events documentation
- Completed FAT and SAT procedures, test reports, deficiency logs, and corrective action records
- Operation and Maintenance manuals covering all hardware and software furnished under this Contract
- Complete electronic backup of all programming files in native, editable formats

8. Proposal Requirements

The Supplier's proposal shall include a complete description of the engineering services, programming activities, testing, documentation, commissioning support, and deliverables proposed for the project, and shall clearly identify all assumptions, exclusions, deviations, and exceptions taken to this specification. Failure to identify exceptions shall constitute acceptance of the requirements contained herein.

The proposal shall include the Supplier's engineering approach, software packages to be utilized, proposed communications architecture, testing philosophy, and qualifications of key personnel assigned to the project, along with a detailed project execution schedule.

Pricing shall be itemized to allow the Purchaser to evaluate individual components of the proposed work, at minimum as separate line items for:

- Relay engineering and settings development (Main/Tie SEL-351S, SEL-735 and Feeders SEL-735)
- Managed Ethernet switch configuration
- Communications integration
- Factory Acceptance Testing
- Site Acceptance Testing, startup, and commissioning support
- Operator and maintenance training
- Hourly rates for additional engineering services

The Supplier shall identify all software licenses required for programming, configuration, maintenance, and future modifications of the system. Unless otherwise noted, all software licenses necessary for Owner operation and maintenance shall be included within the proposal.

9. Warranty

The Supplier shall warrant that all engineering services, programming, configuration, testing, documentation, and commissioning activities furnished under this Contract are free from defects in workmanship and comply with the requirements of the Contract Documents.

The warranty period shall extend for a minimum of twelve (12) months following successful completion of SAT and final system commissioning, or eighteen (18) months following shipment, whichever occurs first, unless otherwise specified in the Purchase Order.

During the warranty period, the Supplier shall promptly investigate and correct, at no additional cost to the Purchaser, any deficiencies in software configuration, communications integration, relay programming, RTAC programming, network configuration, control logic, alarm processing, or communications databases resulting from errors or omissions in the Supplier's work.

Completion of the warranty period shall not relieve the Supplier of responsibility for correcting latent defects resulting from negligent engineering, improper programming, or failure to comply with the requirements of this specification.

10. Bidders Questions

Questions of an engineering or technical nature should be directed to: taylor.williams@allianceengr.com.

11. Attachments

- Single Line Diagram: 250525-EL-OL-0001A
- Medium Voltage Switchgear Specification: 250525-EL-SPEC-001