



Alabama Port Authority
Addendum to R&P or Specification Booklet

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

Project No. 11712 **Task No.** 2 **Addendum No.** 2

To: Prospective Bidders

Date: 10/5/2026

The bid documents for project 11712.02 – McDuffie Main 25 kV Switchgear Upgrade are hereby amended and modified as follows:

1. 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, October 22, 2026**. Sealed bid proposals can also be hand delivered from **1:45 P.M. to 2:00 P.M., on Thursday, October 22, 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.
2. The 28 page attachment *Medium Voltage Switchgear Specification, Rev A – dated 8/25/2026* is replaced in its entirety by *Medium Voltage Switchgear Specification, Rev B – dated 10/05/2026* attached herewith. Rev B addresses questions and comments. Yellow highlights indicate revised content.

Please indicate your receipt of this addendum by adding the addendum number in the appropriate place in your Requisition & Proposal.

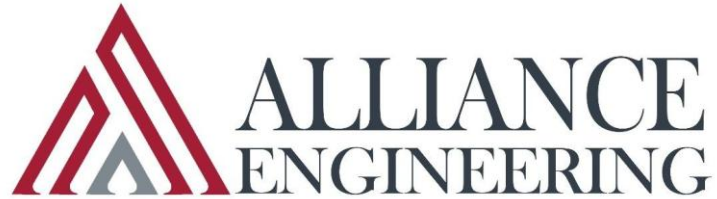
Project Manager:

A handwritten signature in black ink, appearing to read 'Pete Olivero', written over a horizontal line.

Date 10/5/2026

Pete Olivero, P.E.

Senior Facilities Engineer



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	

Table of Contents

1. General.....	3
2. Scope of Supply	3
3. Applicable Codes and Standards	4
4. Basis of Design and Intent.....	4
5. Equipment Features	5
5.1 Ratings	5
5.2 Basic Construction	5
5.3 Switchgear Enclosure Requirements	7
5.3.1 Low Voltage Power Monitoring and Controls Section Enclosure Requirements	8
5.4 Power Cable Terminations.....	8
5.5 Bus System	9
5.6 Main Incoming Vacuum Circuit Breaker.....	10
5.6.1 Main and Tie Breaker Ratings and Protection Assignment	10
5.7 Fused Feeder Compartment	10
5.8 Spare Compartment	11
5.9 Power Monitoring and Controls Section.....	11
5.9.1 Arc-Flash Isolation	11
5.9.2 Environmental Control.....	12
5.9.3 Communications and Protection-Integration Equipment.....	13
5.9.4 Fiber Optic System	14
5.10 Tie Device.....	14
5.11 Protection, Relaying, and Metering	15
5.11.1 Main Breaker and Tie Breaker Protection	16
5.11.2 Power Monitoring Metering.....	17
5.12 Grounding and Surge Protection.....	19
5.13 Control Power and Indication	19
6. Testing, Inspection, and Factory Acceptance Test.....	20
7. Recommended Spare Parts	21
8. Documentation and Attachments.....	22

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

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

Current Configuration

CT Secondary	5A
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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

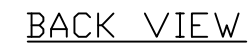
In addition to the documentation required under Section 5.11, the vendor shall furnish, specific to the Network Communications Compartment:

- 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.



1. FOR VISUAL REPRESENTATION ONLY

1. FOR VISUAL REPRESENTATION ONLY

NOT FOR
CONSTRUCTION

REVISION HISTORY

ALLIANCE ENGINEERING
1142 MONTIMAR DRIVE
MOBILE AL 36609

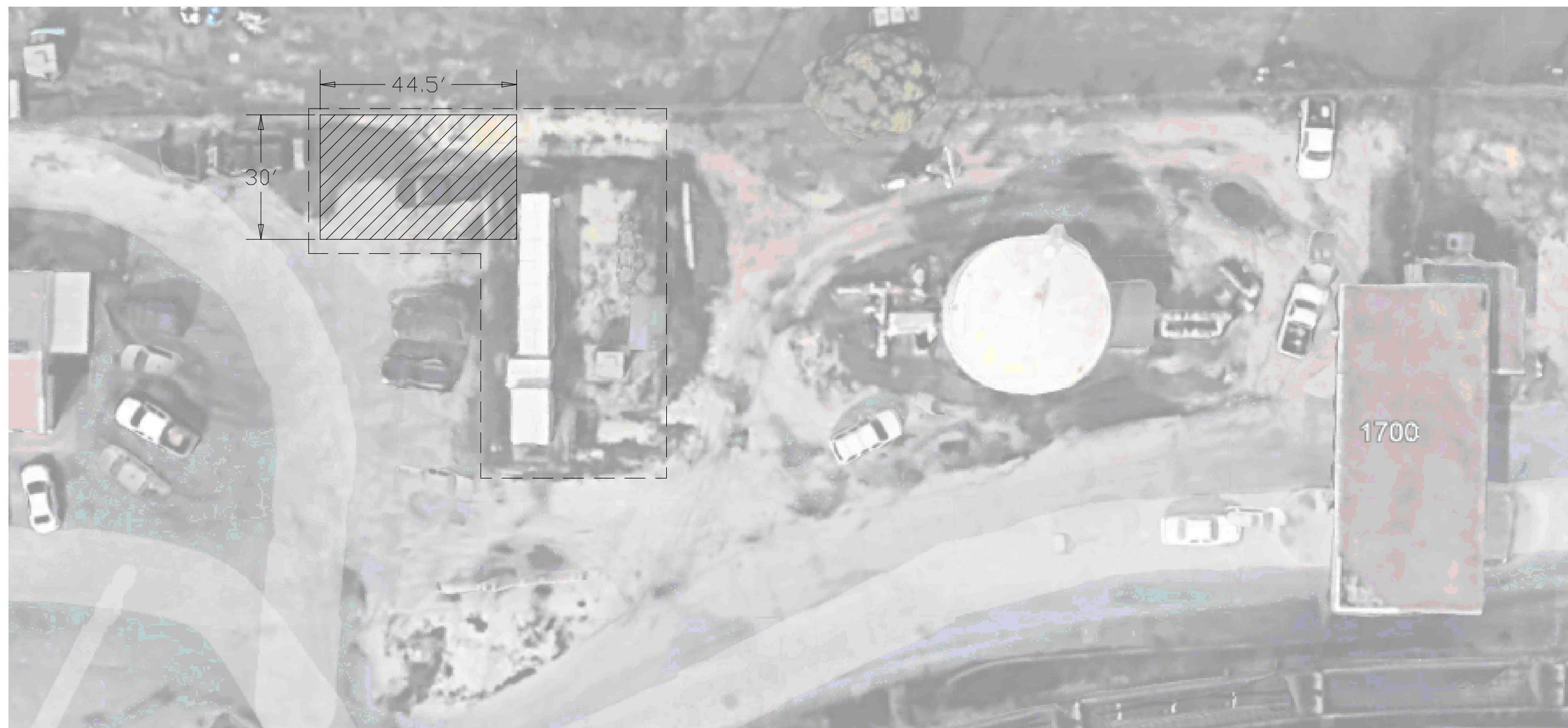


DRAWING NUMBER	250525-EL-LAY-0001
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REV. NO.
A

ALLIANCE PROJECT NUMBER: 250525.01

NEW SWGR SUB
STATION STRUCTURE



NOT FOR
CONSTRUCTION

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

SCALE:	NONE	DATE
DESIGN BY:	MMS	05/27/20
DRAWN BY:	KWS	05/27/20
CHECKED BY:	TSW	05/27/20



ALLIANCE ENGINEERING
1142 MONTIMAR DRIVE
MOBILE AL 36609

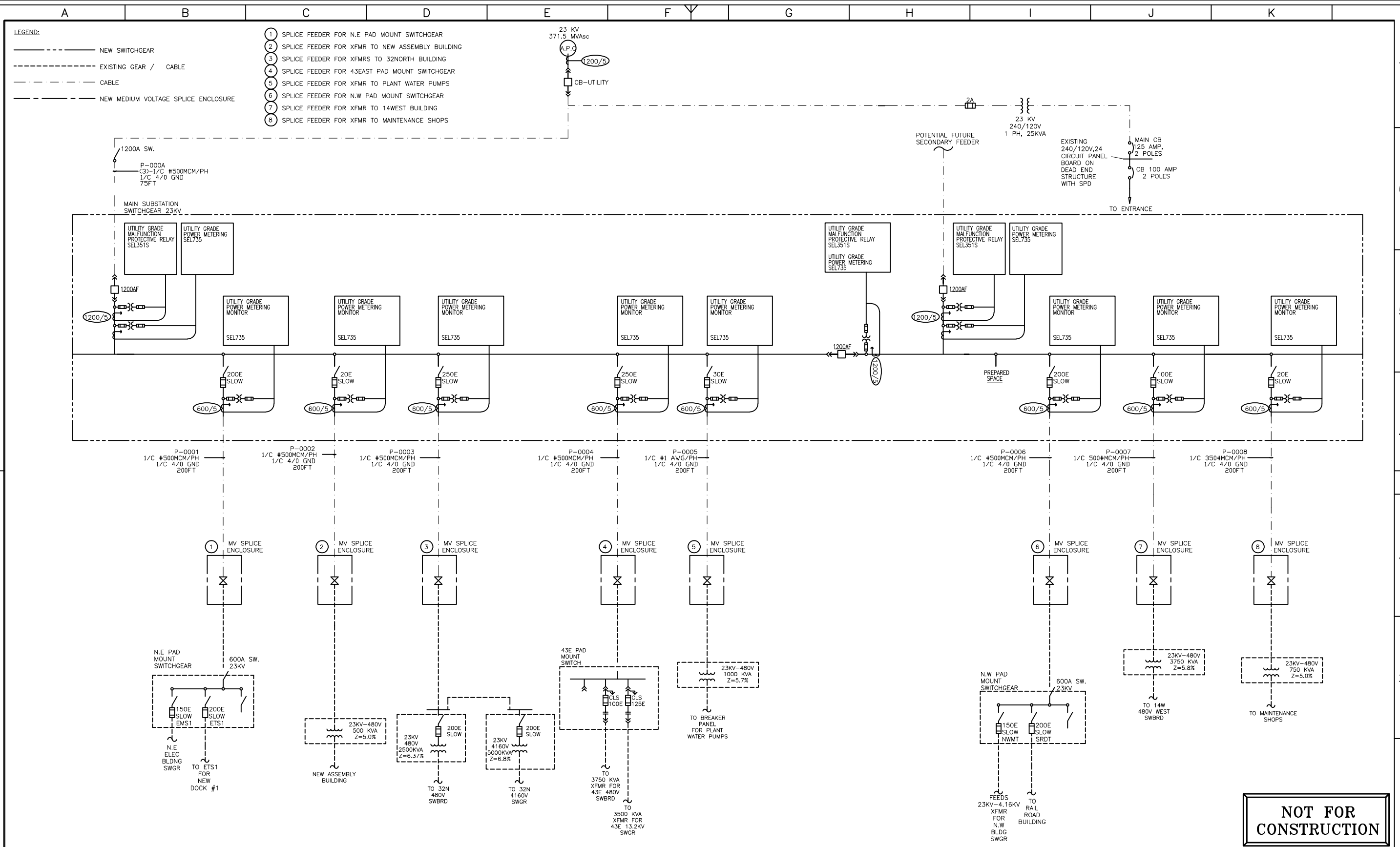


250525 MCDUFFIE COAL TERMINAL
LAYOUT DRAWING
NEW SWGR SUB-STATION

DRAWING
NUMBER 250525-EL-LAY-0003

REV. NO.	A
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ALLIANCE PROJECT NUMBER: 250525.01



REVISION HISTORY										SCALE: NONE		DATE		 ALLIANCE ENGINEERING		250525 MCDUFFIE COAL TERMINAL SINGLE LINE DIAGRAM MAIN SWGR MAIN TIE MAIN		DRAWING NUMBER		REV. NO.	
-										DESIGN BY:	MMS	03/15/26									
-										DRAWN BY:	KWS	03/15/26									
-										CHECKED BY:	TSW	03/15/26									
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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
2	Project Name:	Main 25 kV Switchgear Upgrade	Item No. 1	Qty: 1 Sections
3	Location:	Mobile, AL	Sheet No.: 1 of 1	B
4	Capital Proj. No.:	250525.01	One Line Dwg. No.:	250525.01-EL-0001A

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
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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
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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
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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
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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.