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**Exhibit 1-B  
Additional Requested Elements**

**B.1 ARE #1 - Protection of Power Circuits for Fire Alarm and CCTV**

**B.1.1 Related Documents**

ARE #1 shall be completed in accordance with the Contract Requirements.

**B.1.2 Scope of Work**

The Contractor shall complete all additional Work necessary to resolve the power surges causing outages with the existing FFSS and CCTV systems at the EJMT. The Contractor shall design and construct a way of eliminating this issue consisting of power conditioners or another technical solution to ensure better resiliency and reliability for power to the systems. All new equipment must be compatible with the existing equipment. It is recommended to provide a Programmable Logic Controller (PLC), manufactured by Stormin Protection Products, Inc., or approved equal, as well as replacement and upgrades to the existing Uninterruptible Power Supplies associated with the Fire Alarm and CCTV systems, including all workstations and power to all control equipment. See Fixed Fire Suppression System As-Built in Reference Documents for information on existing systems.

**B.1.3 Applicable Standards**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.
- C. Comply with NFPA 72.

**B.1.4 Submittals**

Submittals shall be prepared, Reviewed, and submitted in accordance with the requirements set forth in Book 2, Section 3. The Contractor shall submit the following items for ARE #1 to CDOT:

- A. Bill of Materials: A listing shall include all panels, racks, instruments, components, and devices provided under this section.
- B. Product Data: Drawings and descriptive (catalog) data and brochures of each item of equipment including technical data sheets for all equipment and components.
- C. ARE #1 SCADA Integration Plan and Report: Shall follow the requirements of Book 2 Section 14.

**B.1.5 Shop Drawings**

Shop Drawings shall be prepared, Reviewed, and submitted in accordance with the Contract Requirements. The Contractor shall submit the following items for ARE #1 to CDOT:

- A. Detail equipment assemblies, method of field assembly, components, and location and size of each field connection.
- B. Wiring Diagrams: Power, signal, and control wiring

**B.1.6 Training**

The Contractor shall provide training to CDOT maintenance personnel on the ARE #1 Work elements by an experienced system designer or installer. The training shall consist of two (2), four (4) hour trainings with CDOT’s maintenance and operations personnel at the EJMT or an alternate location Approved by CDOT. The training dates shall be coordinated with CDOT to occur after testing and commissioning of the systems is completed.

**B.1.7 Operation and Maintenance Manuals**

The Contractor shall provide two (2) hard copy sets and one (1) digital copy of operation and maintenance manuals and supporting documents. Include final as-built wiring interconnect diagrams, product data sheets, installation manuals, recommended spare parts list, and routine inspection, testing and maintenance procedures in the submittal.

**B.1.8 Deliverables**

At a minimum, the Contractor shall submit the following to CDOT for Review, Approval, or Acceptance:

**Table B.1 ARE #1 Deliverables by the Contractor**

<b>Deliverable</b>	<b>Review, Acceptance, or Approval</b>	<b>Schedule</b>
Submittals and Shop Drawings	Review	Prior to Construction
ARE #1 - SCADA Integration Plan	Approval	Within 90 days prior to integration
ARE #1 - SCADA Integration Report	Acceptance	Within 30 days after integration
Training materials	Review	At training sessions
Operation and Maintenance Manuals	Review	Prior to Substantial Project Completion

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**B.2 ARE #2 - Label Manholes and Walls for Ease of Maintenance Access with Signage**

**B.2.1 Related Documents**

ARE #2 shall be completed in accordance with the Contract Requirements.

**B.2.2 Scope of Work**

The Contractor shall perform all additional Work necessary to label the manholes and walls within the EJMT with signage for ease of CDOT maintenance access. The Contractor shall locate all manholes along both tunnels and prepare 100 - 6"x6" signs to identify the location of each manhole. Signage shall in be in accordance with the CDOT Standard Specifications for aluminum backing and retroreflective sheeting. These signs shall be anchored to the existing wall panels immediately adjacent to the manholes. Any remaining signs not installed in the tunnels shall be provided to CDOT for use as spares.

**B.2.3 Deliverables**

Reserved.

**B.3 ARE #3 - Update Fire Alarm System Custom Label Programming**

**B.3.1 Related Documents**

ARE #3 shall follow the requirements of the Contract.

**B.3.2 Applicable Standards**

- A. Comply with NFPA 72.

**B.3.3 Scope of Work**

The Contractor shall perform all additional Work necessary to provide programming to update the existing zone and device descriptions in the FFSS control equipment and graphical workstations to align with the current tunnel zone naming conventions provided by CDOT. All graphical maps and descriptions in the workstations are to be updated by the Contractor. Upon completion of the programming, the Contractor shall perform field verification testing of each zone and all associated devices by simulating alarm conditions through the LIOS linear heat detection system and operation of all valves, switches, and supporting infrastructure for each deluge zone.

**B.3.4 Submittals**

Submittals shall be prepared, Reviewed, and submitted in accordance with the requirements set forth in Book 2, Section 3. The Contractor shall submit the following items for ARE #3 to CDOT:

- A. Custom Point Description List: Provide a list showing the new custom descriptions with associated address prior to programming.

- B. Testing Plan and Schedule: Provide a schedule and method of testing the system after programming is complete.
- C. Provide electronic copy of fire alarm system program.
- D. Provide electronic and hard copy of fire alarm system points list.

**B.3.5 Shop Drawings**

Shop Drawings shall be prepared, Reviewed, and submitted in accordance with the Contract Requirements. The Contractor shall submit the following items for ARE #3 to CDOT:

- A. Provide drawings showing the correlation of the zones with the custom labels.

**B.3.6 Training**

The Contractor shall provide training to CDOT maintenance personnel on the ARE #3 Work elements by an experienced system designer or installer. The training shall include demonstrating the programming changes during testing with CDOT’s maintenance and operations personnel at the EJMT or an alternate location Approved by CDOT. The training dates shall be coordinated with CDOT.

**B.3.7 Deliverables**

At a minimum, the Contractor shall submit the following to CDOT for Review, Approval, or Acceptance:

**Table B.3 ARE #3 Deliverables by the Contractor**

Deliverable	Review, Acceptance, or Approval	Schedule
Submittals and Shop Drawings	Review	Prior to Construction
Custom Point Description List	Review	Prior to Construction
Testing Plan and Schedule	Review	30 Days prior to testing
Electronic Copy of Fire Alarm Programing	Review	Prior to Project Completion
Fire Alarm Points List	Review	Prior to Project Completion
Training documents	Review	At training session

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**B.4 ARE #4 - Electric System Analog to Digital Conversion**

**B.4.1 Related Documents**

ARE #4 shall follow the requirements of the Contract.

**B.4.2 Applicable Standards**

A. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications

B. National Fire Protection Association:

1. NFPA 502 - Standard for Road Tunnels, Bridges, and Other Limited Access Highways
2. NFPA 70 - National Electric Code

**B.4.3 Scope of Work**

The Contractor shall perform all additional Work necessary to convert the remaining electrical system analog monitoring and controls to digital on both west and east electrical 24.9kV, 2400V and 480V systems. Parts of the electric systems have been converted to or installed as digital on past CDOT projects. The Contractor will complete the system conversion to be fully digital and capable of being monitored and controlled by the CDOT operations and maintenance staff in the EJMT Control Room. The new digital system shall be fully integrated and compatible with the existing digital hardware, software, and firmware. The existing hardware, software and firmware shall be upgraded as required. The existing Power Control Board (PCB) is located in the East Ventilation Building EJMT Control Room. The existing PCB is shown in Reference Documents.

The additional Work shall include the following elements and any associated infrastructure required for the Work to perform as intended:

- 1) Create a new communications tie between East and West Switchboards through the SCADA system. Existing CDOT fiber is available for interconnection. Contractor shall submit a fiber allocation request to CDOT.
- 2) The SCADA system shall display/monitor status of breakers and give Open / Close commands.
- 3) Assign I.P. addresses to the PXG900 Gateway and test system functionality of breakers.
- 4) Check position signals on all breakers and Open / Close command to spare breakers.
- 5) West Electric Room - Convert remaining (8) eight 480V circuit breakers in 3000Amp Switchgear from DIGITrip 520 to model equal to DIGITrip 1150 units capable of digital control and monitoring.

- 6) East Electric Room - Install an EATON PXG900 Gateway device.
- 7) East Electric Room - Convert (21) twenty-one 480V circuit breakers in 300Amp Switchgear from Eaton DIGITrip 520 to model equal to DIGITrip 1150 units capable of digital control and monitoring.
- 8) East and West Electric Room - Remove retired-in-place MP3000 motor protection relays and all associated wiring and equipment. Provide and install new doors / front covers.
- 9) East and West Portal - Replace analog counters / timers on south tunnel fans with digital electronic timers to record motor run times. New timers shall be connected to existing SCADA system. Provide SCADA system upgrades as required.
- 10) West Electric Room - Existing 2400V Switchgear consist of (5) five breakers with Siemens Siprotec 4 relays. Breakers consist of (2) two mains, tie and (2) two feeder. Contractor shall integrate digital control and monitoring functions of each breaker into the SCADA system. Provide SCADA system upgrades as required. Remove existing analog controls.
- 11) East Electric Room - Existing 2400V Switchgear consist of (5) five breakers with Siemens Siprotec 4 relays. Breakers consist of (2) two mains, tie and (2) two feeder. Contractor shall integrate digital control and monitoring functions of each breaker into the SCADA system. Provide SCADA system upgrades as required. Remove existing analog controls.
- 12) Contractor shall provide and install a complete, fully functional new operator's SCADA workstation in east control room. Workstation shall be capable of running all SCADA programs as directed by CDOT Maintenance & Operations. Workstation shall include at minimum: CPU, keyboard, mouse, (4) Four 4K LED HD Monitors (32" min), adjustable monitor mounting brackets, UPS unit and adjustable height workstation desk. Equipment shall be compatible with existing CDOT hardware and software systems.

#### **B.4.4 Submittals**

Submittals shall be prepared, Reviewed, and submitted in accordance with the requirements set forth in Book 2, Section 3. The Contractor shall submit the following items for ARE #4 to CDOT:

- A. Bill of Materials: A listing shall include all panels, racks, instruments, components, and devices provided under this section.
- B. Product Data: Drawings and descriptive (catalog) data and brochures of each item of equipment including technical data sheets for all equipment and components.
- C. Digital Monitoring and Control System SCADA Integration Plan and Report shall follow the requirements of Book 2 Section 14.

**B.4.5 Shop Drawings**

Shop Drawings shall be prepared, Reviewed, and submitted in accordance with the Contract Requirements. The Contractor shall submit the following items for ARE #4 to CDOT:

- A. Detail equipment assemblies, method of field assembly, components, and location and size of each field connection.
- B. Wiring Diagrams: Power, signal, and control wiring.

**B.4.6 Training**

The Contractor shall provide training to CDOT maintenance personnel on the ARE #4 Work elements by an experienced integrator. The training shall consist of two (2), four (4) hour trainings with CDOT’s maintenance and operations personnel at the EJMT or an alternate location Approved by CDOT. The training dates shall be coordinated with CDOT.

**B.4.7 Operation and Maintenance Manuals**

The Contractor shall provide two (2) hard copy sets and one (1) electronic copy of the operation and maintenance documents. Include final as-built wiring interconnect diagrams, control logic, parameters, settings, I/O points, IP Addresses and schedules. This includes Software Overview, Maintenance, Troubleshooting, and Operation.

**Table B.4 ARE #4 Deliverables by the Contractor**

<b>Deliverable</b>	<b>Review, Acceptance, or Approval</b>	<b>Schedule</b>
Submittals and Shop Drawings	Review	Prior to Construction
Digital Monitoring and Control System - SCADA Integration Plan	Approval	Within 90 days prior to integration
Digital Monitoring and Control System - SCADA Integration Report	Acceptance	Within 30 days after integration
Digital Monitoring and Control System - Field Quality Control and System Start Up Plan	Approval	Per Construction Schedule
Digital Monitoring and Control System - Commissioning and Training Plan	Approval	Per Construction Schedule
Training documents	Review	At training session
Operation and Maintenance Manuals	Review	Prior to Project Completion