

## 1.0 General Technical Requirements

### 1.1 General

Conduct all Work necessary to meet the requirements of this Section and to satisfy all functional needs of the Project, including design and construction of the Project.

All references to alignment information and stationing in this Section shall be to the alignment information and stationing as shown in the Reference Documents.

The Eisenhower/Johnson Memorial Tunnel (EJMT) Drainage, Plumbing, Heat Trace (DPHT) Basin Configuration is described in section 1.4:

### 1.2 Project Goals

The following goals have been established for the Project:

1. Provide an innovative solution for the project elements that is durable, historically proven, easily maintained, and compatible with current and future improvements in the EJMT within the project budget.
2. Minimize impacts to the traveling public, EJMT operations, and EJMT fire life safety systems during construction and for the lifecycle of the constructed improvements
3. Meet and exceed the project requirements
4. Minimize the project delivery time

### 1.3 Environmental Compliance

A Categorical Exclusion (CatEx) is being developed for the project. This Project and Work is provided for under the National Environmental Policy Act (NEPA) and, as such, shall not preclude anything required as part of the final CatEx decision documents.~~This Project and Work is provided for under the National Environmental Policy Act (NEPA).~~ Mitigation measures needed in response to Project impacts shall be implemented with the Work. No Project mitigation measure resulting from the Work shall be deferred to a future project.

### 1.4 Basic Configuration

The following describes the Basic Configuration for the Project:

~~The EJMT CDOT~~ has received ~~a grant~~funding to perform upgrades, enhancements, and maintenance to many of the systems that are vital to tunnel operations and in need of immediate attention. This project will address issues associated with freezing of existing water lines, seep lines and fire hydrant connections, replacing the emergency generators, rewinding the fan motors and ~~make~~making upgrades to the water treatment plant and piping system.

The following items are anticipated to be included in the project scope of work:

- New fire department hose connections in the north and south tunnels: Construct new fire department connections in north and south tunnel wall. Connect new piping and valves to the existing fixed fire suppression system in the plenum with approximately 30 feet of new vertical pipe to the roadway level. The connection to the existing system will maintain and extend the existing freeze protection system, including insulated enclosures for new valves and insulation of the piping in the plenum. This is anticipated to occur at approximately 360 locations along each tunnel. The new vertical pipe will require a hole to be sawcut or bored through the existing plenum floor. Sawcut the existing wall panel to allow for pipe installation and construct a new cover panel to hide the pipe. Abandon the existing waterline and hydrants in place under the roadway in the north tunnel and under the walkway in the south tunnel.
- New domestic water supply line to connect the west portal to the east portal in the north tunnel: Construct a new galvanized steel waterline to supply water to the east portal from the treatment facility in the west portal. This will include a new pipe in the plenum, pipe ~~insulation and heat tape freeze protection, and a booster pump or~~ other proposed alternative/ innovative solutions.
- 2-8 inch PVC seep mains in the north tunnel and 2-12 inch seep mains in the south tunnel: Develop a solution to prevent freezing of seep mains by replacing the heat tape or providing a proposed alternative/ innovative solution. ~~There is the possibility of replacing or installing new heat tape in 4-4 inch seep collector lines that are adjacent to the 8-inch seep mains in both tunnels.~~ At present, CDOT anticipates finding heat tape for the ~~1000 feet first half-mile~~ of seep lines from each tunnel entrance. Project to remove existing heat tape and replace with new throughout portion of piping requiring freeze protection. Also, replace branch circuiting from connection point back to point of power source.
- 1-6 inch ductile iron roadway drain collector in North tunnel and 1-6 inch ductile iron in South Tunnel: Develop a solution to prevent freezing of collector lines by replacing the heat tape or providing a proposed alternative/ innovative solution. ~~Potential to add heat tape or proposed alternative to prevent freeze of the current collection system.~~
- 1-18 inch ductile iron roadway drain collector in North tunnel and 1-12 inch ductile iron in South Tunnel: Develop a solution to prevent freezing of collector lines by replacing the heat tape or providing a proposed alternative/ innovative solution.
- Emergency generators: Provide a new Emergency Generator System consisting of one (1) Diesel Generator sized to handle existing peak demands and emergency demands in a Sound Attenuated Weatherproof Enclosure located at the west portal along with supporting infrastructure and electrical distribution equipment that shall replace the current emergency backup generators. Additional components of design include a ~~Fuel-fuel Tank-tank~~ to withstand a runtime of 108 hours, and a ~~Stepstep-up Transformer-transformer~~ to step-up 13.8kV to 24.9kV. New generator to be designed ~~at to accommodate the~~ project elevation. New generator enclosure shall meet the mountain corridor aesthetic guidelines along with outdoor rating guidelines.

- Exterior Roof drains: Project to replace existing heat tape with new heat tape on exterior roof drains and provide new heat tape on drains without heat tape. Identify, inspect, maintain, and label existing branch circuiting. Install new controls to interface with the new heat tape monitoring system.
- Water treatment: Water treatment plant upgrades consisting of installation of membrane filter system at each plant (2 total) and additional piping to increase chlorine contact time, a bag filter system and packaged treatment skid consisting of UV reactors and turbidity monitoring at the west plant. Water heading to the west tunnel facility will receive chlorine disinfection. A filtered water connection from the west plant to the east plant followed by chlorine disinfection at the east plant.
- Ventilation Fans: Air supply/exhaust fan motor rebuild consisting of rewinding/rebuilding for the existing 16 fans. Motors are rated at 600 H.P.
- Electrical: Remove all existing heat tape, controls, and branch circuiting, and replace with new heat tape in the north and south tunnel areas listed above to provide a safe and functional area for travelers along the I-70 corridor. Existing electrical panels, HOA switches, contactors, and controls should be removed and replaced with new distribution panels and controls in the East and West Main Electrical Rooms and Cross-Cut Electrical Rooms. Provide new monitoring and alarming of the entire new heat tape system. Currently there are existing conduits, junction boxes, and other infrastructure already in place that should be used if possible. Additionally, any heat tape circuits currently fed from existing LCPs in East and West Main Electric Rooms should be re-fed to new heat tape panels. Heat tape circuits currently fed from cross-connect electric room LCPs will be replaced with new circuiting and new monitoring but fed from same source. Electrical equipment should be placed in easily accessible range of the new heat tape connections for maintenance and operations purposes.

## 1.5 Additional Requested Elements

The following Additional Requested Elements (AREs) are identified as elements of the Project that may be incorporated into the Basic Configuration. The ARE technical requirements are provided in Exhibit 1-B.

### 1.5.1 ARE Descriptions

ARE #1 - Protection of Power for Edwards Fire Alarm and Aviglon CCTV systems - CDOT operations has had issues with power surges causing outages with the FFSS and CCTV systems. Power conditioners or another technical solution is needed 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 Power 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.

ARE #2 - Label manholes and walls for ease of maintenance access with signage - Locate all manholes along both tunnels. Prepare 100 - 6"x6" signs that meet the

traffic sign specifications for aluminum backing and retroreflective sheeting to identify the location of each manhole. These signs would be anchored to the existing wall panels immediately adjacent to the manholes. Any remaining signs would be given to CDOT maintenance as replacements.

ARE #3 - Provide programming to update the existing zone and device descriptions in the fixed fire suppression control equipment and graphical workstations to align with the current tunnel zone naming conventions used by CDOT. All graphical maps and descriptions in the workstations are to be updated. Upon completion of the programming, 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, etc. for each deluge zone.

ARE #4 - Electric System Analog to Digital Conversion

General scope of work includes but is not limited to:

Converting 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 projects. This project will complete the system conversion to be fully digital and capable of being monitored and controlled from the Tunnel Operators in the 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 Control Room. At project completion, the PCB shall no longer be required and / or used and shall be removed. Existing Power Control Board is shown in Reference Documents. Contractor shall repair area to match existing room finishes .

~~Specific scope of work includes but is not limited to:~~

- ~~1) Create a new communications tie between East and West Switchboards through SCADA system~~
- ~~2) The SCADA system shall display status of breaker and give Open / Close commands.~~
- ~~3) Assign I.P. address 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 from DIGITrip 550 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 (16) sixteen circuit breakers from Eaton DIGITrip 550 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~~

## **1.6 Ultimate Configuration of EJMT**

Reserved

## **1.7 Exhibits**

Exhibit 1-A: Special Construction Requirements

Exhibit 1-B: Additional Requested Elements