

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.. 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:

CDOT has received 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 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

pipng 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 36 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.

Description of the SHPO approved pipe configuration as discussed in Book 2, Section 5:

- The existing lights in the tunnel will be modified to create a gap for the new pipe to come down through the plenum floor. At each fire department connection location, one existing eight-foot-long light will be removed. The electrical lines connecting the lights will remain in place.
- The new pipe will come down through the tunnel ceiling between the remaining lights and not in front of them.
- The new pipe will follow along the ceiling and down the wall of the tunnel and be located at the center of the joint between the tunnel wall panels.
- The pipe will be placed in front of the porcelain enamel coated metal panels in the north tunnel. These panels will not be cut. These panels do not exist in the south tunnel and the pipe will be fixed directly to the tunnel wall.
- A gap will be sawcut between the wall panels and the front of the new pipe will be flush with the face of the wall panels. Where the pipe can be recessed further in between the wall panels, a new metal plate will be added to cover the pipe. The new plate shall be flush with the front of the wall panels. If there is room behind the wall panel to contain the entire pipe, pipe fittings and wall connections without cutting the wall panel, this is an acceptable change that will not require any additional SHPO consultation. Space behind the panel may vary by location.
- A new fire department connection will be added to the end of the pipe that will not extend out beyond the toe of the roadside concrete barrier.
- All new pipe, pipe fittings and cover plates will be painted to match the existing wall panels.
- 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 freeze protection 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. At present, CDOT anticipates finding heat tape for the 1000 feet 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.
- 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 tank to withstand a runtime of 10 hours, and a step-up transformer to step-up 13.8kV to 24.9kV. New generator to be designed to accommodate the project elevation. New generator enclosure shall meet the mountain corridor aesthetic guidelines along with outdoor rating guidelines.
- Roof drains: Project to replace existing heat tape with new heat tape on 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 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 refed 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 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 .

1.6 Ultimate Configuration of EJMT

Reserved

1.7 Exhibits

Exhibit 1-A: Special Construction Requirements

Exhibit 1-B: Additional Requested Elements