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Flex your power!
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February 17, 2010

04-SF-101-8.2/9.2
 04-163744
 SARRA-Q101(153)N

Addendum No. 6

Dear Contractor:

This addendum is being issued to the contract for CONSTRUCTION ON STATE HIGHWAY IN THE CITY AND COUNTY OF SAN FRANCISCO FROM 1.3 MILE TO 0.3 MILE SOUTH OF THE ROUTE 101/1 SEPARATION.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on Friday, February 26, 2010.

This addendum is being issued to revise the Project Plans, the Notice to Bidders and Special Provisions, the Bid book, the Federal Minimum Wages with Modification Number 48 dated 2/12/10, and provide a copy of a document added to the Information Handout.

Project Plan Sheets 510, 519, 521, 522, 523, 524, 527, 529 and 532 are revised. Copies of the revised sheets are attached for substitution for the like-numbered sheets.

In the Special Provisions, Section 5-1.15, "SUPPLEMENTAL PROJECT INFORMATION," the following entry is added to the table:

Included in the Information Handout	Temporary Construction Easement Agreement between the United States Department of Veterans Affairs and the State of California, Department of Transportation dated February 2, 2010
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In the Special Provisions, Section 10-1.80, "PILING," subsection "STEEL PIPE PILING," sub-subsection "GENERAL," sub-sub-subsection "Submittals," the first paragraph is deleted.

In the Special Provisions, Section 10-1.91, "STEEL STRUCTURES," subsection "GENERAL," the following paragraph is added after the first paragraph:

"Structural steel components that are no longer needed after tunnel construction and will not be incorporated into the work need not comply with the requirements specified for steel and iron components in "Buy America" of these special provisions."

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In the Special Provisions, Section 10-1.112, "METAL RAILING," the following paragraph is added after the third paragraph:

"Safety railing (Type C) will be measured and paid for as safety railing (Type B)."

In the Special Provisions, Section 10-3.02, "COST BREAK-DOWN," is revised as attached.

In the Special Provisions, Section 10-3.33, "FIBER OPTIC CABLE AND EQUIPMENT," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for fiber optic cable and equipment shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

In the Special Provisions, Section 10-3.34, "FIRE ALARMS," subsection "FIRE ALARM CABLE," is revised as attached.

In the Special Provisions, Section 10-3.34, "FIRE ALARMS," subsection "LINEAR HEAT DETECTOR," is revised as attached.

In the Special Provisions, Section 10-3.34, "FIRE ALARMS," subsection "SIGNALING LINE CIRCUIT (SLC) CABLE," is added after subsection "SETTINGS," as attached.

In the Special Provisions, Section 10-3.34, "FIRE ALARMS," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for fire alarms shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

In the Special Provisions, Section 10-3.35, "SCADA EQUIPMENT," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for SCADA equipment shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

In the Special Provisions, Section 10-3.36, "CARBON MONOXIDE MONITORING," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for carbon monoxide monitoring shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

In the Special Provisions, Section 10-3.37, "SECONDARY UNIT SUBSTATION," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for secondary unit substation shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

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In the Special Provisions, Section 10-3.38, "RELAYS," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for relays shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

In the Special Provisions, Section 10-3.39, "POWER DISTRIBUTION EQUIPMENT," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for power distribution equipment shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

In the Special Provisions, Section 10-3.40, "NETWORK COMMUNICATION SYSTEM," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for network communication system shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

In the Special Provisions, Section 10-3.41, "MISCELLANEOUS," subsection "LOOP ISOLATOR," is added after subsection "RS-485 ISOLATOR," as attached.

In the Special Provisions, Section 10-3.41, "MISCELLANEOUS," subsection "PAYMENT," is added as follows:

"PAYMENT

Full compensation for miscellaneous work shall be considered as included in the contract lump sum price paid for Battery substation and tunnel work and no separate payment will be made therefor."

In the Special Provisions, Section 10-3.46, "SERIAL COMMUNICATION SYSTEM," is added as attached.

In the Amendments to the Standard Specifications Dated May 2006, Section 2-1.12, "BID DOCUMENT COMPLETION," subsection 2-1.12A, "General," is revised as follows:

"2-1.12A General

Complete forms in the Bid book.

On the Subcontractor List you may either submit each subcontracted bid item number and corresponding percentage with your bid or fax this information to (916) 227-6282 within 24 hours after bid opening. If you fail to submit this information within the time specified, your bid is nonresponsive.

Except for the bid item number and the percentage of each item subcontracted, do not fax submittals."

In the Bid book, the "SUBCONTRACTOR LIST" form is revised as attached.

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To Bid book holders:

Attached is a copy of the Information Handout document, "Temporary Construction Easement Agreement between the United States Department of Veterans Affairs and the State of California, Department of Transportation dated February 2, 2010.

Inquiries or questions in regard to this addendum must be communicated as a bidder inquiry and must be made as noted in the Notice to Bidders section of the Notice to Bidders and Special Provisions.

Indicate receipt of this addendum by filling in the number of this addendum in the space provided on the signature page of the Bid book.

Submit bids in the Bid book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

Inform subcontractors and suppliers as necessary.

This addendum, attachments and the modified wage rates are available for the Contractors' download on the Web site:

http://www.dot.ca.gov/hq/esc/oe/project_ads_addenda/04/04-163744

If you are not a Bid book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,

ORIGINAL SIGNED BY

REBECCA D. HARNAGEL
Chief, Office of Plans, Specifications & Estimates
Office Engineer
Division of Engineering Services

Attachments

10-3.02 COST BREAK-DOWN

Cost break-downs shall conform to the provisions in Section 86-1.03, "Cost Break-Down," of the Standard Specifications and these special provisions.

The Engineer shall be furnished a cost break-down for each contract lump sum item of work described in this Section 10-3.

The cost break-down shall be submitted to the Engineer for approval within 30 days after the contract has been approved. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

The cost break-down shall include the following items in addition to those listed in the Standard Specifications:

- A. Stainless steel continuous hinge NEMA type 4X junction box
- B. Stainless steel NEMA type 4X junction box
- C. Medium voltage power cable
- D. Ground well
- E. Grounding electrode
- F. Grounding electrode system testing
- G. Conductive cement
- H. Power control relays
- I. SCADA control and indication relays
- J. Transfer relays
- K. Protective relays
- L. Back up protective relay
- M. Breaker interface module
- N. Feeder circuit breaker
- O. Power meter
- P. Tunnel systems and equipment studies and commissioning
- Q. Power supply and battery charger
- R. Transient voltage surge suppression (TVSS)
- S. Secondary unit substation
- T. Supervisory control and data acquisition (SCADA) System
- U. Utility pull box
- W. Junction box cooling fan
- X. Wire trough
- Y. Hydrogen gas detector
- Z. Fiber optic cable and equipment
- AA. Fire alarms
- AB. Carbon monoxide monitoring
- AC. Power distribution equipment
- AD. Network communication system

FIRE ALARM CABLE

The fire alarm cable shall be a multi-conductor 300 volts power-limited fire alarm cable use indoor applications that shall meet the following specifications:

DESCRIPTION

- A. ASTM Bare Copper
- B. Ceramifiable Silicon Rubber (CSR)
- C. Twisted pair
- D. Overall Flame Retardant Polyethylene (FRPE) Low Smoke, Non-Halogen Jacket

CABLE SPECIFICATIONS

- A. Number of Conductors: 1 twisted pair (Two conductors)
- B. Conductor type: 14 AWG solid conductor
- C. Insulation Type and Thickness: CSR 0.035"
- D. Jacket Type and Thickness: FRPE Low Smoke, Non-Halogen Jacket 0.056"
- E. Nominal Outside Diameter: 0.380"
- F. Nominal Capacitance: 17 pf/ft between conductors

RATING

- A. NEC Type Fire Power-Limited Riser Rated –Circuit Integrity in Conduit (CIC)
- B. UL Listed
- C. Meet 300V requirements as specified in the NEC-105C
- D. Flame Rating UL1685

LINEAR HEAT DETECTOR

The linear heat detector shall consist of the linear heat detector interface module, the linear heat detector sensor cable and the end-of-line junction box. Also, the linear heat detector shall include a 12"L x 12"W x 4"D concrete niche on the ceiling with a 12"L x 12"W insulated fire rated ceiling access door covering the niche and an 1" conduit for the linear heat detector sensor cable (LHD) Cable. Bolts and mounting brackets shall be inside the niche to house the linear heat detector interface module. The linear heat detector shall include 1-1/2" conduit with hangers or channel struts, nylon cable ties and nylon cable clamps that shall be use for the mounting of the LHD Cable. The linear heat detector shall meet the following specifications:

LINEAR HEAT DETECTOR INTERFACE MODULE

- A. The linear heat detector interface module shall be a microprocessor-based initiating device that communicates with the Tunnel Fire Alarm Control Panel via the Signaling Line Circuit (SLC) Cable in these special provisions. The linear heat detector interface module shall be a low-profile-type, intelligent device that monitors one zone of up to 3,200 feet of Linear Heat Detector Sensor Cable. The Tunnel Fire Alarm Control Panel shall be capable of supporting up to 255 linear heat detector interface module on its SLC Cable.
- B. The linear heat detector interface module shall monitor its linear heat detector zone shown on the plans for over-temperature fire signatures as well as both open and short circuit conditions. Non-fire related short circuit conditions should not cause a false alarm condition.
- C. The linear heat detector interface module shall be addressable and fully field-programmable to issue pre-alarm, alarm and trouble signals directly via the SLC Cable to the Tunnel Fire Alarm Control Panel. The linear heat detector interface module functionality and address shall be stored in its non-volatile memory. Tunnel Fire Alarm Control Panel and linear heat detector type systems that store linear heat detector interface module functionality in the Tunnel Fire Alarm Control Panel shall not be considered as equivalent. The linear heat detector interface module shall be reset through the Tunnel Fire Alarm Control Panel, through the Annunciator Driver or through the Remote Display and Control Module (RDCM) specified in these special provisions.
- D. The Contractor shall install a 12"L x 12"W x 4"D concrete niche on the ceiling. The Contractor shall provide and install a 12"L x 12"W insulated fire rated ceiling access door covering the niche. The Contractor shall provide and install a 1" conduit for the LHD Cable from the niche to less than 2" from the height of the ceiling for the mounting of the LHD Cable shown on the plans. The Contractor shall install the linear heat detector interface module with the bolts and mounting bracket inside the niche and connect the SLC Cable from the Tunnel Fire Alarm Control Panel and the Linear Heat Detector Sensor Cable to the linear heat detector interface module as required for proper operation.
- E. The Contractor shall provide and install Loop Isolators specified in these special provisions inside the niches for Zones 2, 4, 6, 8 and 10 Linear Heat Detectors; and connect the SLC Cable from the Linear Heat Detectors from Zone 1, 3,5,7 and 9 to the Loop Isolators in Zones 2, 4, 6, 8 and 10 respectively. The Contractor shall connect the SLC Cable from the Loop Isolators in Zones 2, 4, 6, 8 and 10 to the Linear Heat Detector Interface Modules of Zones 2,4,6,8 and 10 respectfully as required for proper operation.
- F. The Contractor shall provide a Weather-tight Connector for the Linear Heat Detector Sensor Cable. The Contractor shall install the Weather-tight Connector where the Linear Heat Detector Sensor Cable enters the 1" conduit for the LHD Cable from the niche. The Contractor shall fireproof the niche to prevent fire from entering the niche through the conduits connected to the niche.
- G. The linear heat detector interface module shall meet the following additional specifications:
 1. Supply Voltage: From the Tunnel Fire Alarm Control Panel via the Signaling Line Circuit (SLC) Cable, 16.5 V(dc) to 27.5 V(dc)
 2. Current Consumption, Standby: 425 uAmps or less
 3. Current Consumption, Alarm: 440 uAmps or less
 4. Current Consumption, Fault: 425uAmps or less
 5. Noise Performance: Withstands 5% RMS 60 Hz supply noise or 1 Vrms, 60 Hz sensor noise with negligible performance range. RFI immunity at 10V/meter field strength over the band of 20 MHz to 900 MHz

6. LED Pulse Modes:
 - a. Normal: Slow flash GREEN every nine seconds
 - b. Pre-Alarm: Slow flash RED every nine seconds
 - c. Alarm: Fast flash RED every two seconds
 - d. Trouble: Off
7. Operating Temperature Range: -40 F to 140F
8. Approvals: Factory Mutual Research Center (FM) Approved Underwriters Laboratories (UL) Listed California State Fire Marshall (CSFM)

LINEAR HEAT DETECTOR SENSOR CABLE

- A. The Linear Heat Detector Sensor Cable shall be an integrating or averaging type detector cable that detects a localized hot spot or a low-level temperature increase over its entire length. Fixed temperature sensor cable shall not be acceptable.
- B. Changes in temperature shall produce a change in resistance between the Linear Heat Detector Sensor Cable conductors. This resistance change shall be monitored by the Linear Heat Detector Interface Module to detect an alarm condition. Such a change in resistance beyond the alarm set point shall be communicated to the Tunnel Fire Alarm Control Panel.
- C. The Linear Heat Detector Sensor Cable shall be capable of self-restoration when temperature drops below its set point, provided it has not been heated above 257° F.
- D. The Linear Heat Detector Sensor Cable shall consist of four 26 AWG solid copper conductors each insulated with a negative temperature coefficient material. The conductors shall be twisted at a rate of approximately thirty (30) turns per foot to cancel out potentially high voltage inductance. The conductor insulation shall be color coded for ease of installation.
- E. Linear heat detector sensor cable shall be design for wet, oily or corrosive or outdoors, and shall be design for an ambient temperature expected to be in the range of -40° to 212° F, the linear heat detector sensor cable shall have an additional outer extrusion of nylon.
- F. The Contractor shall install the length as shown on the plans of LHD Cable through the 1" conduit for the LHD Cable from the niche.
- G. The Contractor shall provide the length of 1-1/2" Conduit with hangers or channel struts supports equal to the length of the linear heat detector sensor cable to be installed. The Contractor shall install the 1-1/2" Conduit with hangers or channel struts supports equal to the length of the linear heat detector sensor cable to be installed on the ceiling and the linear heat detector sensor cable shall be mounted on the 1-1/2" Conduit as specified under "LINEAR HEAT DETECTOR SENSOR CABLE MOUNTING".
- H. The Contractor shall provide nylon cable ties and nylon cable clamps required to mounted the linear heat detector sensor cable on the 1-1/2" Conduit as specified under "LINEAR HEAT DETECTOR SENSOR CABLE MOUNTING". The Contractor shall install the linear heat detector sensor cable on the 1-1/2" Conduit as specified under "LINEAR HEAT DETECTOR SENSOR CABLE MOUNTING".
- I. The Contractor shall install the linear heat detector sensor cable run as a continuous loop with no T-taps allowed.
- J. The linear heat detector sensor cable shall meet the following additional specifications:
 1. Tensile Strength: 445 lbf
 2. Dielectric Material: Specially Doped Polymer
 3. Standard Outer Jacket Material: High Temperature PVC
 4. Voltage Proof Between PVC Jacket and a conductor: 10 kV
 5. Service Life: Up to 212 F shall be 30 years or longer At 257 F shall be 24 hours or longer Shall be self-restored below 257 F or higher.
 6. Max Approved Spacing (between parallel runs): 30 ft

LINEAR HEAT DETECTOR SENSOR CABLE MOUNTING

- A. The linear heat detector sensor cable shall be mounted in a professional manner, in accordance with applicable codes and requirements.
- B. The linear heat detector sensor cable using the items specified in section C shall be attached to a 1-1/2" conduit with hangers or channel struts that shall allow minimal movement.

- C. The linear heat detector sensor cable shall be installed with nylon cable ties to the 1-1/2" Conduit with hangers or channel struts at an interval of every 3 feet per tie to ensure proper support and adequate distance away from metal surfaces. The nylon cable ties that are attached to the 1-1/2" conduit with hangers or channel struts shall use nylon cable clamps to fasten the linear heat detector sensor cable to the nylon cable ties and the 1-1/2" conduit with hangers or channel struts at an interval of every 3 feet.
- D. The distance from the ceiling of the linear heat detector sensor cable and the 1-1/2" Conduit with hangers or channel struts with nylon cable ties and nylon cable clamps shall be as shown on the plans for the LHD Cable.

MOUNTING MATERIAL

- A. The 1-1/2" conduit shall be Type 1 conduit with one end capped facing traffic.
- B. The hangers and channel struts shall be stainless steel.
- C. The screws and bolts shall be stainless steel.
- D. The nylon cable ties and nylon cable clamps shall be designed to be use with the linear heat detector sensor cable and the 1-1/2" conduit.
- E. The 1" conduit shall be Type 1 conduit.

END-OF-LINE (EOL) JUNCTION BOX

- A. The end-of-line (EOL) junction box shall be a two gang outlet box. The EOL junction box shall have the following specifications:
 - 1. Type of Box: Double gang
 - 2. Capacity (Cu.-in.): 32.0
 - 3. Dimensions (L x W x D): 4.56" L x 4.58"W x 2.0"D
 - 4. Description: Standard
 - 5. Enclosure: NEMA type 4, UL 508 Type 4, Flammability rating UL 94-5V, Flammability rating UL 94HB, ANSI/IEC 60529, IP66
- B. Additional Equipment
 - 1. The Contractor shall provide a cover with screws and assembly each EOL junction box.
 - 2. The Contractor shall provide a Weather-tight Connector for the Linear Heat Detector Sensor Cable. The Contractor shall install the Weather-tight Connector where the linear heat detector sensor cable enters the eEOL junction box.
 - 3. The Contractor shall provide a linear heat detector sensor cable heat pad as a test point at the end of each linear heat detector sensor cable zone. The Contractor shall install the linear heat detector sensor cable heat pad inside the EOL junction box.
 - 4. The Contractor shall provide and install if required an end-of-line resistor inside the EOL junction box.

INSULATED FIRE RATED CEILING ACCESS DOOR

The insulated fire rated ceiling access door shall be fabricated from 16 gage bonderized steel with a prime coat finish and the Contractor shall provide and install the stainless steel masonry anchors and bolt holes for mounting the insulated fire rated ceiling access door. The insulated fire rated ceiling access door panel shall be fabricated from 20 gage bonderized steel with a prime coat finish. The insulated fire rated ceiling access door shall be filled with 2" thick, fire rated insulation, and be welded pan type. The insulated fire rated ceiling access door shall have automatic closer, shall be self-latching and shall contain interior latch releases. Exterior latching shall be recessed and shall be universal self-latching bolts and shall operate by knurled knob. The insulated fire rated ceiling access door finish shall be a prime coat suitable for painting. The insulated fire rated ceiling access door shall be rated by Underwriters Laboratories for 1.5 Hours, "B" Label and the insulated fire rated ceiling access door shall be by Warnock Hershey for 3 hours in ceilings. The insulated fire rated ceiling access door dimensions shall be a 12"L x 12"W fire-rated access door.

SETTINGS

The linear heat detector shall be set to a maximum ambient temperature of 115 F for the length shown on the plans of the LHD Cable for that linear heat detector.

SIGNALING LINE CIRCUIT (SLC) CABLE

The Signaling Line Circuit (SLC) Cable shall be a indoor/outdoor multi-conductor 300 volts power-limited fire alarm cable use for addressable systems that shall meet the following specifications:

DESCRIPTION

- A. ASTM Bare Copper
- B. PVC insulation with nylon
- C. Twisted pair cabled construction
- D. Water blocked Construction
- E. Overall Sunlight/Moisture Resistant PVC Jacket

CABLE SPECIFICATIONS

- A. Number of Conductors: 1 twisted pair (Two conductors)
- B. Conductor type: 18 AWG
- C. Insulation Type and Thickness: PVC at 0.015" and Nylon at 0.005"
- D. Jacket Type and Thickness: Overall Sunlight/Moisture Resistant PVC Jacket at 0.035"
- E. Nominal Outside Diameter: 0.270"
- F. Nominal Capacitance: 25 pf/ft between conductors or less

COMPLIANCES

- A. NEC Article 760
- B. UL Listed Type Fire Power-Limited (FPL) (UL: 75C, 300V)
- C. Direct Burial
- D. Flame Rating: UL 1685

LOOP ISOLATOR

The Loop Isolator shall meet the following specifications:

DESCRIPTION

The Loop Isolator shall be an automatic switch that shall open a segment of the signaling line circuit when a short-circuit fault is detected in that segment. The Loop Isolator shall provide the ability for the remainder of the signaling line circuit to continue to function normally and shall be unaffected by the short-circuit fault. The Loop Isolator shall automatically close and resume normal operation when the short-circuit fault is removed.

LOOP ISOLATOR RESISTANCE

The Loop Isolator shall have a typical In-line resistance of 0.12 ohms or less.

WIRING STYLES

The loop Isolator shall be able to use the following wiring styles:

- A. Class B, Style 4
- B. Class A, Style 6
- C. Class A, Style 7

ADDITIONAL EQUIPMENT AND CONNECTIONS

The Contractor shall provide One (1) SingleGang Outlet box with a plastic cover plate for mounting to the Outlet box and Two (2) screws. The Contractor shall house the Loop Isolator in the Outlet Box and mounted the plastic cover plate to the Outlet box with the Two (2) screws.

The Contractor shall connect as shown on the plans and as required for proper operation.

10-3.46 SERIAL COMMUNICATION SYSTEM

The serial communication system shall perform the communications topology and operation specified, and the Contractor shall perform the required work for, and on the following components of the serial communication system specified below:

COMMUNICATION TOPOLOGY

- A. PAC#1 and PAC#2
 - 1. PAC#1 and PAC#2 shall communicate with their field control stations in the tunnel connected through the Self-healing multi-drop fiber optic modems on channel 1 to PAC#1 and PAC#2 using Modbus RTU protocol.
 - 2. PAC#1 and PAC#2 shall communicate with field control station #1 connected directly to PAC#1 and PAC#2 using Modbus RTU protocol.
 - 3. PAC#1 and PAC#2 shall communicate with the CO Monitors and the CO Monitor Controller connected directly to PAC#1 and PAC#2 using Modbus RTU protocol.
 - 4. Attention is directed to the "Network Communication System" specifications as specified in these special provisions for additional communication requirements of PAC#1 and PAC#2.
- B. Field Control Station (FCS)
 - 1. The field control station shall communicate with PAC#1 and PAC#2 using Modbus RTU protocol.
- C. CO Monitor Calibrator
 - 1. The CO Monitor Calibrator shall communicate with the CO Monitors connected through the Self-healing multi-drop fiber optic modems on channel 2 to the CO Monitor Calibrator using Modbus RTU protocol.
- D. CO Monitors and the CO Monitor Controller
 - 1. The CO Monitors and the CO Monitor Controller shall communicate with PAC#1 and PAC#2 connected directly to the CO Monitors and the CO Monitor Controller using Modbus RTU protocol.
 - 2. The CO Monitors shall communicate with the CO Monitor Calibrator connected through the Self-healing multi-drop fiber optic modems on channel 2 to the CO Monitors using Modbus RTU protocol..

OPERATION

- A. PAC#1 and PAC#2
 - 1. PAC#1 and PAC#2 shall operate as a redundant pair. PAC#1 shall operate the output points and read the input status points of the field control station (FCS), CO Monitor and CO Monitor Controller as shown on the plans. When PAC#1 become unavailable to operate the output points and read the input status points of the field control station (FCS) as shown on the plans; PAC#2 shall operate the output points and read the input status points of the field control station (FCS) as shown on the plans until PAC#1 becomes available again.
 - 2. PAC#1 and PAC#2 shall remotely operate (turn on the callbox flasher) and read the status of the callboxes connected to that field control station (FCS). PAC#1 and PAC#2 shall also automatically operate (turn on the callbox flasher) all the callboxes connected to other field control stations (FCSs), when a field control station indicates that an operator has activated a callbox.
 - 3. PAC#1 and PAC#2 shall collect data from the CO Monitor Controller such as events and pass it on the SCADA submaster server and the CO Levels of the CO monitors connected to the CO Monitor Controller.
 - 4. PAC#1 and PAC#2 shall collect the CO Levels data of the CO monitors directly.
 - 5. Attention is directed to the "Network Communication System" specifications as specified in these special provisions for additional operational requirements of PAC#1 and PAC#2.
- B. Field Control Station (FCS)
 - 1. The Field Control Station (FCS) shall operate the output points (from control messages of PAC#1 and PAC#2) and read the input status points (and passing those messages to PAC#1 and PAC#2) of the input point and output point modules connected to that Field Control Station (FCS) as shown on the plans.
 - 2. The Field Control Stations (FCSs) in the tunnel shall automatically operate (turn on the callbox flasher) all the callboxes connected to the field control stations (FCSs) in the tunnel, when a field control station indicates that an operator has activated a callbox.
 - 3. The Field Control Station in FCS#1 Junction Box shall automatically operate the exterior lights (energize the contactor coil "WL" as shown on the plans), when control messages of PAC#1 and PAC#2 indicates when the PEU is on or the PEU contact is closed.

4. The Field Control Station in FCS#1 Junction Box shall automatically operate the substation room fans (energize the relay coil "RC" as shown on the plans), when control messages of PAC#1 and PAC#2 indicate when any or all of the Jet Fans are on or any or all of the "ON" contacts from the Motor Control Centers are closed.
 5. The Field Control Stations in the FCS#3 and FCS#4 Junction Boxes shall automatically operate the Fire Alarm JET FAN indication relay (energize the relay coil "JET1 to JET4" as shown on the plans), when control messages of PAC#1 and PAC#2 indicate when a given Jet Fan is on or a given "ON" contact from the Motor Control Centers is closed.
- C. CO Monitor Calibrator
1. The CO Monitor Calibrator shall remotely calibrate, perform instrument testing and diagnostics on the CO Monitors.
 2. Attention is directed to the "CO Monitor Calibrator" specifications as specified in these special provisions for additional operational requirements of the CO Monitor Calibrator.
- D. CO Monitors and the CO Monitor Controller
1. Attention is directed to the "CO Monitor" specifications as specified in these special provisions for additional operational requirements of the CO Monitor.
 2. Attention is directed to the "CO Monitor Controller" specifications as specified in these special provisions for additional operational requirements of the CO Monitor Controller.

WORK PERFORMED

- A. The work to be performed by the Contractor on the components of the serial communication system covered in these special provisions shall be all the work required to meet the communication topology and operation specified in the topology section and the operation section of these special provisions, and as shown on the plans. The work shall finally include but not be limited to the debugging, and fine-tuning of all the components of the serial communication system.

QUALIFICATIONS, TESTING AND DOCUMENTATION

- A. The Contractor shall test the system and verify its topology, and its operation to the Engineer such that it shall meet the topology and operation specified in the communication topology section and the operation section of these special provisions, and as shown on the plans. The Contractor (verifying the results to the engineer) shall simulate each condition in which all the components of the system shall be required to operate using each topology as specified above, for a minimum of 24 hours per operational condition for each component.
- B. The Contractor shall provide all documentation for the system to the Engineer for review and approval.
- C. The Contractor shall be a registered member of the Control and Information System Integrators Association and (CsiA) Certified.

Full compensation for serial communications system shall be considered as included in the contract lump sum price paid for battery substation and tunnel work and no separate payment will be made therefor.

Bidder Name: _____

The bidder must identify each subcontractor performing work in an amount in excess of 1/2 of 1 percent of the total bid or \$10,000, whichever is greater (Pub Cont Code § 4100 et seq.). Complete columns 1 and 4 and submit with the bid. Complete columns 2 and 3 and submit with the bid or fax to (916) 227-6282 within 24 hours after the bid opening. Failure to provide complete information in columns 1 through 4 within the time specified will result in a non-responsive bid.

Column 1: Business Name and Location	Column 2: Bid Item No.(s)	Column 3: Percent of Bid Item Subcontracted	Column 4: Description of Subcontracted Work

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814.