Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

September 3, 2020

SUBJECT: FAP Route 346 (US 41)
Section (21&21S)-I
Lake County
Contract No. 62B65
Item No.38 September, 18 2020 Letting
Addendum B

NOTICE TO PROSPECTIVE BIDDERS:

Attached is an addendum to the plans or proposal. This addendum involves revised and/or added material.

1. Added page v of the Table of Contents to the Special Provisions
2. Added pages 841-847 to the Special Provisions

Prime contractors must utilize the enclosed material when preparing their bid and must include any changes to the Schedule of Prices in their bid.

Very truly yours,

Jack A. Elston, P.E.
Bureau Chief, Design and Environment

MTS

Addedd 9/3/2020

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY
SECTION 28 35 10 – COMBUSTIBLE GAS DETECTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the Combustible Gas Detection System described herein.

B. Related Requirements

1. Section 270526 – Grounding and Bonding for Communications Systems.
2. Section 270553 – Identification for Communications Systems
3. Section 284621.11 FL – Addressable Fire-Alarm Systems
4. Section 409423 – SCADA System

1.3 SCOPE OF SERVICES

A. The proposed Pump Station Combustible Gas Detection System shall be monitored by the SCADA system.

B. The work under this section includes the software, hardware, installation, integration and testing of the Combustible Gas Detection System for the proposed pump station.

C. Contractor is responsible for all necessary coordination with the owner required for ensuring the proper functioning of the system.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: provide maintenance manuals. Refer to Division 1, Section 2.3 for requirements.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to replace or replace the Master Gas Controller or Sensors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion or one year from the date of final acceptance of the pump station, whichever is longer

Added 9/3/2020

1.7 BASIS OF PAYMENT

A. Payment for the work specified under this Section and as required shall be included in the Contract lump sum price for the Item, GAS DETECTION PANEL.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Master Gas Controller:

1. Enclosure Type – NEMA 4X Metal Enclosure with Glass window for read-out viewing.
2. Six (6) input analog sensor channels minimum.
3. Operating Temperature range: -10° to +40°C (14° to 104°F).
4. Operating Humidity range 0-90% RH, non-condensing.
5. Power: 115 / 230 VAC 15% 50/60 Hz.
6. The system shall have the ability to operate with 1 or 2 channel controller boards.
7. Each module shall have two (SPDT) relays with change-over contacts for verification of Warning and Alarm conditions.
8. Shall be a large 4-digit 7-segment back lit Liquid Crystal Display and bright LED‘s to provide ease of reading and alarm notification.
9. The Display provides information on the gas concentration, alarm status, measurement units, flags indicating status and settings such as calibration interval, time-out function, alarm ON delay and alarm inhibit.
10. Ability to choose from LEL, LELm. PPM, % Vol, g/m3 or blank.
11. Controller shall have user defined access codes to prevent accidental or undesired tampering.
12. Audible Alarm push-button reset switch shall silence the Audible Alarm when alarm points are exceeded. The TFD visual alarms will remain on as long as alarm levels are exceeded. This push-button will reset latched alarms if normal gas conditions exist.
13. The alarm reset can also be provided by the Fire Alarm Control Panel.
14. Warning and Alarm Relay Set Points shall be customer selectable between 1-100% of the measuring range.
15. Failure mode shall utilize two SPST relays in series and shall be normally energized. 5A / 24VDC and 250VAC - resistive load.
16. Shall be high brightness LED's to provide ease of reading and alarm / failure notification.
17. Each unit shall have two, SPDT relays.

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18. Complies with UL / CSA 61010-1 per MET.
19. Instruments shall have one year parts and labor standard warranty with extended warranty available. Warranty shall commence from the Final Acceptance of the Pump Station.
20. The Controller shall not require periodic maintenance other than verifying the Sensor Transmitter inputs are responding to the target gases.
21. Provide relay contacts for remote monitoring alarming as shown on Drawings.
22. Provide reset pushbutton integral to front of Master Gas Controller.

B. Sensor Requirements:
   1. Infrared (IR) Combustible Sensor shall detect 0-100% LEL of combustible gas.
   2. Sensor module shall store all calibration data so that module may be calibrated off-site and field-installed without necessity of recalibration.
   3. Heated optics prevent to condensation buildup.
   4. 4-20 mA analog output.
   5. Complete product shall have minimum useful life of three (3) years.
   6. IR source within infrared sensor will have minimum useful life often (10) years.
   7. Sensor / transmitter will be contained within a 316 stainless steel enclosure suitable for location in Class I. Division 1 & 2, Groups A, B, C & D, Class II, Division 1, Groups E & F. Class III classified areas.
   8. Optional junction box enclosure shall have minimum of three entries, allowing for mounting options for sensor, power and signal, and should be constructed with 316 stainless steel.

C. Hydrocarbon combustible gasses to be detected include:
   1. Octane
   2. Ethane
   3. Ethanol
   4. Propane
   5. Butane

D. Provide permanently installed remote test gas applicator and tubing for all combustible gas detectors that are not easily accessed without the use of tools, ladders, or other means.

E. The gas detection system shall measure and display gas concentration. The system shall alarm when preset limits are exceeded. Relays and timers for different alarm set-point levels shall be provided as additional contacts for alarms and ventilation controls. Relays shall be located in SCADA Panel.

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F. The system shall consist of two (2) dual-channel monitor / readout units, one (1) relay programmer module, one (1) power supply unit, four (4) alarm relays, a horn relay for outputting to the fire detection system, a buzzer and four (4) remotely mounted gas sensor transmitter units. Hardwired signals include:

   1. Gas Monitor Alarm Relay to Fire Alarm Control Panel
   2. Analog signal from Gas Sensor / Transmitter (one analog per Gas Sensor installed)
   3. Trouble Signal to station PLC
   4. Warning signal to station PLC
   5. Alarm signal to station PLC
   6. Gas Alarm (based on alarm relay) to station applicable ventilation fans.

G. The system shall be supplied with the necessary output relays, plus 2 spares, to the SCADA panel, MCC and FACP per provided plans

H. An independent monitoring channel shall be provided with each sensor / transmitter having a full scale range as specified. The sensor units shall be capable of being located remote from the monitor / readout unit by up to 5,000 feet. Sensor unit shall receive power from and send signals corresponding to gas values to the monitor / readout unit. Each sensor unit shall be mounted in an enclosure suitable for NEC Class I, Division 1, Group C & D hazardous locations. The sensor units shall have provisions for mounting to a wall or similar structure. Each sensor unit shall be mounted in an enclosure suitable for the environment it is located.

I. The combustible gas detection system shall be housed in its own panel in the Electrical Control Room. The gas monitor / readout unit shall be panel mounted type suitable for flush mounting in the door of the panel. A door with a polycarbonate window shall be provided over the Combustible Gas monitor opening on the outside of the panel. All wiring connections shall be marked with functional designations such that connections can be made without the use of diagrams or tables. All wiring connections shall be easily accessible from the front of the unit. The system shall provide identifiable audible and visual alarms when preset limits are exceeded. Relays for different alarm set point levels shall be provided for alarms and ventilation controls. An external sealed switch shall be provided to allow for alarm reset and audible alarm silencing without opening the enclosure. All unused channel spaces shall be neatly blanked off.

J. Alarms and relays at the monitoring / readout unit shall be set for the following levels of gas concentration:

   1. “WARNING" 5% LEL
   2. "ALARM" 10"% LEL
   3. “TROUBLE” Failure of sensor or master controller.

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K. The combustible gas sensor / transmitter shall be of the infrared type sensing element with 3-wire loop detector lead-in (LDL) signal transmitting electronic circuit designed to monitor the presence of petroleum (complex hydrocarbon) vapor in the ambient air. The transmitter circuit shall produce a 4-20 mA output signal proportional to 0 to 100% LDL and shall be mounted in an explosion proof enclosure with a 3-1/2 digit LCD display. The transmitter circuit shall have real time clock and internal memory for day stamping and logging minimum and maximum gas concentrations.

L. In response to a WARNING or ALARM signal from the gas detection system, due to a high concentration of explosive vapor in the monitored space, an explosion-proof horn and alarm strobe beacon shall be energized at all levels of the Pump Station via the Fire Alarm Control Panel's horns and strobes. The ventilation system for the monitored space shall be activated when the ventilation fan control switch is in the AUTO position.

M. A calibration test kit for field checking the calibration of the gas detection system shall be furnished. The kit shall be complete, including a light weight carrying case, dispensing valve, regulator assembly and hose, test coils and necessary cylinder for type of calibrating gas. The test kit shall be stored in an approved cabinet adjacent to and match the air monitor panel. Test kit shall include detailed instructions on carrying out calibration including programmed offsets for included test gas.

N. Spare parts shall he provided for the air monitoring equipment as follows:

1. One set of fuses, one sensor head assembly and one sensor.

O. The services of a qualified representative of the manufacturer shall be provided to inspect the installation, make any adjustments, test the equipment, field calibrate the air monitoring equipment upon completion of the installation; after 24 hours of operation and again after one week; and instruct the operating personnel in the operation, calibration and maintenance of the equipment.

P. The Combustible Gas Detection System and Fire Alarm System share common strobes and horn annunciators. Reset of system is accomplished at respective system responsible for alarming.

2.2 GAS DETECTION PANEL

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. MSA
2. General Monitors "Smart Sensor" Series
3. Honeywell

B. The manufacturer must be capable of supplying all equipment used to check or calibrate the sensor / transmitter units.

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2.3 SYSTEM INTEGRATION

A. Integrate the Gas Detection Panel with the following systems and equipment:

Fire Alarm Control Panel

Applicable fans in Motor Control Center MCC P-38

SCADA Panel SP-38

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount to Electrical Control Room wall per plans.

3.2 GROUNDING

A. Ground the unit and associated circuits; comply with IEEE 1100.

B. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

C. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5-ohm ground. Measure, record, and report ground resistance.

D. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Section 270526 "Grounding and Bonding for Communications Systems."

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with identification requirements in Section 270553 "Identification for Communications Systems."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections by a factory-authorized service representative.

1. Compare equipment nameplate data for compliance with Drawings and Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Complete startup checks according to manufacturer's written instructions.

Added 9/3/2020

3.6 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's authorized service representative. Include required periodic preventive maintenance and exercising to check for proper operation. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Parts shall be manufacturer's authorized replacement parts and supplies.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the gas detection system. The representative must be capable of providing on-site services with factory trained personnel.

B. The manufacturer must be capable of providing on-site training for the Department.

END OF SECTION

Added 9/3/2020