

ADDENDUM NO. 2

TO: PLANS AND SPECIFICATIONS FOR STATE OF MISSOURI

Replace Emergency Generator, Infrastructure

St. Louis Forensic Treatment Center - South

St. Louis, Missouri

PROJECT NO.: M1908-01

Bid Opening Date: 1:30 PM, September 20, 2022 (Changed via Addendum 01)

Bidders are hereby informed that the construction Plans and/or Specifications are modified as follows:

SPECIFICATION CHANGES:

1. Section 000110 – Table of Contents

- a. ADD attached Section 260900 – Instrumentation and Control for Electrical Systems, 11 pages.

2. Section 004113 – Bid Form

- a. DELETE original Bid Form and REPLACE with the revised form included in the attachment. **USE ATTACHED BID FORM FOR BID SUBMITTAL**

3. Section 260519 – Low-Voltage Electrical Power Conductors and Cables

- b. ADD new Paragraph 1.4 A.5:
 5. 600-volt mineral-insulated multiconductor control cable and accessories
- c. CHANGE Paragraph 2.6 and 2.7 TO 2.7 and 2.8
- d. ADD new Paragraph 2.6 as follows:

2.6. 600-VOLT MINERAL-INSULATED MULTICONDUCTOR CONTROL CABLE

- A. Description: Solid copper conductors encased in compressed metal oxide with an outer metallic sheath, rated 600-volt.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide PYROTENAX, a brand of nVent; System 1850 MI cables (local sales representative David Reeb, Martin Electrical Sales, 314-280-4672) or comparable product by one of the following:
 1. MI Company
 2. Watlow Electric Manufacturing Company
- C. Standards:
 1. Listed and labeled as defined in NFPA 70/CSA 22 part 2, by a qualified testing agency, and marked for intended location and use.
 2. UL 2196/ULC S139 for fire resistance.
 3. Conductor and Cable Marking: Comply with wire and cable marking in accordance with UL's "Wire and Cable Marking and Application Guide".
- D. Properties:

1. Inorganic composition. Polymeric insulation not allowed. Cables that generate toxic or combustible gases when heated shall not be permitted.
 2. Insulation Voltage Rating: 600-volts
 3. Cable Temperature Rating: 482 deg F (250 deg C)
 4. Termination Temperature Rating: 392 deg F (200 deg C)
 5. Conduit not required
- E. Conductors: Copper, complying with ASTM B3 for bare annealed copper
- F. Insulation: Compressed magnesium oxide
- G. Sheath: Seamless soft-drawn copper
- H. Components:
1. Mineral-insulated cable components shall be cCSAus, ETL or UL certified.
 2. Splices, Field and Factory:
 - a. No MI cable to MI cable splices allowed.
 3. Terminations, Field and Factory:
 - a. Basis of Design Product: PYROTENAX, a brand of nVent; Pyropak termination kit for 3-conductor size 14 AWG 600-volt Type MI cable
- I. Type MI cable warranty:
1. Provide a thirty (30) year warranty from date of sale.
 2. Warranty information shall be published on the cable manufacturer's website.
 3. After installation contractor submits results of insulation resistance testing and post installation megger testing to cable manufacturer, cable manufacturer shall provide a written certificate of warranty that shall be included as part of the contract close-out documents.
- e. CHANGE Paragraph 3.4 and 3.5 TO 3.6 and 3.7.
- f. ADD new Paragraph 3.4 as follows:

3.4. MINERAL-INSULATED MULTICONDUCTOR CONTROL CABLE INSTALLATION

A. Examination:

1. Examine surfaces and substrates to receive Type MI cables for compliance with requirements for installation tolerances and other conditions affecting performance.
 - a. Prior to installation of Type MI cable system, verify that all mounting structures are suitably fire rated.
 - b. Ensure surfaces in contact with Type MI cables are free of burrs and sharp protrusions.
 - c. Ensure mounting structures are suitably spaced per the Type MI cable manufacturer's installation manual.

- d. Ensure system for pulling of Type MI cable into final locations is suitable per guidelines in the Type MI cable manufacturer's installation manual.

B. Preinstallation Testing:

1. Prior to pulling Type MI cable into place, an insulation resistance test shall be performed by installing contractor to ensure integrity of Type MI cable as described in the Type MI cable manufacturer's installation manual.
2. Proceed with installation only after any unsatisfactory conditions have been corrected.

C. Preparation:

1. Protect all Type MI cable ends from moisture ingress until cable is terminated with end seals.
2. Provide enough excess length in cables to allow cutting back to good, dry cable at each end.

D. Installation:

1. Comply with the Type MI cable manufacturer's written installation manual/instructions.
2. In the field, all Type MI cables shall be meggered with 500 VDC for 600-volt Type MI cables. The following field megger readings shall be taken on each cable.
 - a. Type MI cable shall be meggered when received at Project site before installation.
 - b. Type MI cable shall be meggered after sealing termination of the MI cable, prior to being attached to the equipment at on each end of the cable.
 - c. Insulation resistance must exceed 200 megohms at 500 VDC.
 - d. All results must meet manufacturer's specification. Cables that do not pass post installation field testing must be replaced.

- g. ADD new Paragraph 3.5 as follows:

**3.5. MINERAL-INSULATED MULTICONDUCTOR CONTROL CABLE
FIRESTOPPING**

- A. Apply firestopping at Type MI cable penetrations through walls to restore original fire-resistance rating of wall assembly.
- B. Fire-stopping materials shall be in accordance with Section 260533.13 - Conduit for Electrical Systems, Article 2.5 – Conduit Penetration Sealing Assemblies and Article 2.8 – Fire-Stopping Materials.

4. Section 260529 – Hangers and Supports for Electrical Equipment

- a. CHANGE Paragraph 3.2 B through G TO C through H.
- b. ADD new Paragraph 3.2 B as follows:
 - B. Anchor bolts for the new switchboard and automatic transfer switches are to be the maximum diameter that will fit through the factory provided holes in the equipment base with a minimum of 6" embedment in the concrete floor below the housekeeping pad. Provide Belleville washers or square U-channel support

washers per the equipment manufacturer's installation instructions for seismic restraint.

5. Section 260553 – Identification for Electrical Systems

- a. ADD the following note immediately after Paragraph 2.5 C.2:

NOTE: The protective device name shall use the designations of equipment on the Project Drawings rather than names assigned within the power system study software model.

6. Section 260573 – Protective Device Coordination Study and Arc Flash Risk Assessment

- a. ADD new Paragraph 1.14 F.3 as follows:

3. The source protective device name providing the protection (fed from) on each arc flash hazard warning label shall use the designations of equipment shown on the Project Drawings rather than names assigned within the power system study software model.

- b. Delete Article 1.16 and replace as follows:

1.16 ARC FLASH TRAINING

- A. The arc flash study provider shall train the Owner's personnel on the potential arc flash hazards associated with working on energized electrical equipment. The audience shall include employees who work on or near energized electrical equipment, who must be made aware of the associated electrical hazards. The training shall be conducted at the Owner's facility and shall be a minimum of 1 hour and a maximum of 2 hours in duration.
- B. The intent of this training is not to "certify" or "qualify" the Owner's maintenance personnel to work on energized electrical equipment or provide an adequate level of training for them to meet the NFPA 70E definition of a "qualified person" but rather to give them a broad understanding of the purpose of arc flash hazard warning labeling and an awareness of the dangers of working on or near energized electrical equipment.
- C. A key purpose of the training is to help the attendees become aware of potential shock and arc flash hazards associated with energized electrical equipment and ways to mitigate the risk of injury associated with these hazards.
- D. It is not the intent of this training to provide electrical equipment preventative maintenance training.

7. Section 260900 – Instrumentation and Control for Electrical Systems

- a. Add new specification section 260900, included in the attachment.

8. Section 262413 – Switchboards

- a. CHANGE Paragraph 3.1 E through H TO F through I.
b. ADD new Paragraph 3.1 E as follows:

E. Secure the top of the switchboard at all four (4) corners to the building structure (ceiling) with U-channel supports to limit movement during a seismic event.

9. Section 263213.13 – Diesel-Engine Driven Generator Set

- a. CHANGE Paragraph 2.5 Y through AA TO Z through BB.
b. ADD new Paragraph 2.5 Y as follows:

- Y. Provide a metal enclosed terminal compartment with accessible bolted covers for connecting the generator output leads to each generator circuit breaker.
 - 1. Provide tin- or silver-plated copper bus bars, sized per applicable codes and UL standards, for phase and neutral installed on insulated stand-offs.
 - 2. Provide copper equipment ground bus sized per applicable codes and UL standards.
 - 3. Bond the equipment ground bus to the metal enclosure with an ultra-flexible stranded copper bonding jumper sized per applicable codes and UL standards.
 - 4. Bond the neutral bus to the equipment ground bus with an ultra-flexible stranded copper system bonding jumper sized per applicable codes and UL standards.
- c. Delete Paragraph 2.6 K and replace as follows:
 - K. All generator output circuit breakers shall be provided with two (2) Form C normally open/normally closed sets of auxiliary contacts to indicate circuit breaker open/closed position. Contacts shall be rated 10A @ 125-250 VAC.
- d. CHANGE Paragraph 2.6 L through N TO M through O.
- e. ADD new Paragraph 2.6 L as follows:
 - L. Conductors from generator terminal compartment bus bars to line side of all generator circuit breakers shall be ultra-flexible stranded copper sized per applicable codes and UL standards.
- f. ADD new Paragraph 2.7 I as follows:
 - I. Generator control panel shall be Caterpillar Model EMCP 4.3 or approved equal by Cummins or Kohler.
- g. Paragraph 2.8 A.4: CHANGE "Generator Breaker Open" TO "Generator Life Safety/Critical Breaker Open".
- h. ADD new Paragraphs 2.8 A.22 through 2.8 A.34 as follows:
 - 22. Generator Equipment Branch Breaker Open
 - 23. Generator Cottages Breaker Open
 - 24. Fire Pump Emerg Source Breaker Open
 - 25. High Intake Manifold Air Temperature Alarm
 - 26. High Intake Manifold Air Temperature Shutdown
 - 27. Lubrication Oil High Temperature Alarm
 - 28. Under Voltage Alarm
 - 29. Over Voltage Alarm
 - 30. Overcurrent Alarm
 - 31. Over Frequency Alarm
 - 32. Under Frequency Alarm
 - 33. Fuel Filter Restriction Alarm
 - 34. ERMS Mode Switch On
- i. Paragraph 2.11 R.1: CHANGE "27'-0" TO 27'-5"
- j. CHANGE Paragraph 3.4 I through K TO J through L.
- k. ADD new Paragraph 3.4 I as follows:
 - I. Coordinate load bank testing with Construction Representative at least 2 weeks in advance so Owner can make arrangements to infrared scan the power terminations in all new equipment. Provide access to terminations in all new equipment for Owner's IR scan technician.

10. Section 263623 – Automatic Transfer Switches, Open Transition

- a. Paragraph 2.10 A: CHANGE “Modbus TCP/IP or BACnet IP” TO “Modbus TCP/IP or Modbus RTU”.
- b. Paragraph 2.12 A: CHANGE “closed-transition” TO “open-transition” in two locations.

11. Section 263623.13 – Automatic Transfer Switches, Closed Transition

- a. Paragraph 2.10 A: CHANGE “Modbus TCP/IP or BACnet IP” TO “Modbus TCP/IP or Modbus RTU”.
- b. CHANGE Paragraph 2.10 I TO 2.10 H.9.

DRAWING CHANGES:

1. G-003 – Construction Limits, Schedule & Phasing

- a. CHANGE “10 WORKING DAYS” in two locations in Note 9 to “15 WORKING DAYS”.

2. ED-401 – Enlarged Electrical Demolition Plans – Demolition

- a. ADD a Key Note 2 callout next to the “1”C-8#16 CNTRL” callout on the conduit between existing ATS-1 and the junction box on the south side of the Column Line 4 wall.

3. ES-102 – Electrical Site Plan – New Work and E-601 & E-602 One-Line Diagram

- a. CHANGE “4#14” TO “4#12” in Key Note 4.
- b. CHANGE “(2/C#16)” TO “(2/C#18)” in Key Note 10.
- c. CHANGE “1”C – 1 CABLE (CAT 6) ETHERNET” TO “1”C – 1 RS-485 CABLE (2/C #22 SHLD)” in Key Note 15.

4. E-101 – Electrical Plan – First Floor – Area C

- a. CHANGE Key Note 3 to read as follows:
 3. RUN CONDUITS THRU ABAND 8”ID VENT PIPE. REMOVE A PORTION OF THE VENT PIPE EVERY 10’ TO ALLOW FOR SUPPORTING CONDUITS TO THE BUILDING STRUCTURE.
- b. CHANGE the drawing reference in the leader note pointing to the abandoned 8”ID vent pipe for Feeder 16 in Room C139 from “E-102” TO “E-103”.

5. E-102 – Electrical Plan – First Floor – Area B

- a. CHANGE “4#14” TO “4#12” in Key Note 1.

6. E-103 – Electrical Plan – Second Floor

- a. CHANGE Key Note 5 to read as follows:
 5. PROVIDE WEATHERTIGHT FLASHING FOR TOP OF EXIST ABAND 8”ID VENT PIPE AT INTERFACE WITH NEW PULL BOX. SUPPORT CONDUITS TO THE BUILDING STRUCTURE WITHIN 3’ OF CONNECTION TO PULL BOX.

7. E-401 – Enlarged Electrical Plans – First Floor

- a. REVISE Key Note 2 to read as follows:
 2. MODIFY EXIST EQUIP PER DWG E-602 & PROVIDE ¾”C-1 CABLE (2/C#16 FROM ATS-1 CB AUX CONTACT TO GCP TO INDICATE WHEN THE ATS-1 CB IS OPEN OR TRIPPED.

- b. CHANGE "CAT 6 ETHERNET" TO "RS-485 (2/C#22 SHLD)" in Key Note 8.
- c. REVISE Key Note 13 to read as follows:
 - 13. PROVIDE 1"C-2 CABLES (2/C#14) BETWEEN EACH ATS AND OUT TO GCP FOR AUTO START & INDICATION THAT ATS IS CONNECTED TO EM SOURCE.
- d. ADD Key Note 15 callout next to the "ATS-5 TEST PNL" callout in Elec Rm C122 and revised wording of note as follows:
 - 15. ¾"C-8#16 TO BAS CNTRL PNL IN RM C123.
- e. REVISE Key Note 17 to read as follows:
 - 17. EXTEND EXIST 1" CNTRL CONDUIT INTO BOTTOM OF NEW ATS-1 & PROVIDE 1 CABLE (2/C#14 TO GCP FOR INDICATION THAT ATS-1 IS CONNECTED TO THE EM SOURCE.
- f. REVISE Key Note 19 to read as follows:
 - 19. PROVIDE 3/C#14 TYPE MI CNTRL CABLE OUT TO GCP FOR AUTO START. SUPPORT CABLE FROM GENERATOR SCREEN WALL NEXT TO FDR 34. SEE DWG ES-102. PROGRAM GCP TO BLOCK STARTING OF THE ENGINE IF THE ATS-1 CB IS OPEN OR TRIPPED. SEE KEY NOTE 2.

8. E-602 – One-Line Diagram

- a. CHANGE the first sentence of Key Note 5 to read: "PROVIDE NEW 35kA CB W/ ELECTRONIC TRIP UNIT & KIRK KEY INTERLOCK, KEYED TO THE KIRK KEY LOCK ON THE 1200A CB ON THE GENERATOR, AND NEW 120VAC SHUNT TRIP UNITS FOR EXIST GE TYPE SFHA & SGHA CBs AS SHOWN."
- b. DELETE "WITH RED LED ALARM PILOT LIGHT TO INDICATE WHEN THE CB IS TRIPPED OR OPEN (OFF)" from Key Note 7.

9. E-603 – Panelboard Schedules – Life Safety Branch

- a. ADD new Key Note 5 callout at new panelboards 1HE1, GEN and 1LE4 with wording as follows:
 - 5. PROVIDE ¾"C-1 CABLE (2/C#16) TO BAS CNTRL PNL IN RM C123 FOR SPD STATUS CONTACT.

GENERAL COMMENTS:

(none)

ATTACHMENTS:

- 1. 004113 - Bid Form Add. 02 Revision (5 pages) – **USE THIS FORM FOR BID SUBMITTAL**
- 2. Section 260900 – Instrumentation and Control for Electrical Systems (11 pages)

END ADDENDUM NO. 2

Bid Time: 1:30 PM

Bid Date: _____

SECTION 004113 - BID FORM

1.0 BID

A. From:

(Bidder's Name)

herein after called the "**Bidder**".

B. To:

Director, Division of Facilities Management, Design and Construction
Room 730, Harry S Truman State Office Building
301 West High Street
Jefferson City, Missouri 65101

herein after called the "**Owner**."

C. For:

Replace Emergency Generator, Infrastructure
St. Louis Forensic Treatment Center - South
St. Louis, Missouri

D. Project Number:

M1908-01

hereinafter called the "**Work**."

E. Documents:

The undersigned, having examined and being familiar with the local conditions affecting the work and with the complete set of contract documents, including the Drawings, the Invitation For Bid, Instructions To Bidders, Statement of Bidders Qualifications, General Conditions, Supplement to General Conditions, and the technical specifications, including: addenda number _____ through _____ hereby proposes to perform the Work for the following:

F. Bid Amount:

Dollars (\$ _____)

H. Alternates:

Alternate No. 1: New automatic transfer switches ATS-2, ATS-3, ATS-6, ATS-7, ATS-8, ATS-9, ATS-10 and ATS-11 are to be closed transition type and ATS-4 is to be closed transition type with bypass in accordance with Specification Section 263623.13 – Automatic Transfer Switches, Closed Transition in lieu of open transition type and open transition type with bypass in accordance with Specification Section 263623 – Automatic Transfer Switches, Open Transition.

Dollars (\$ _____)

Alternate No. 2: Provide a factory installed, radiator mounted automatic resistive load bank on the diesel-engine-generator set in accordance with Specification Section 263236 – Resistive Load Bank.

Dollars (\$ _____)

Alternate No. 3: Perform preventative maintenance and cleaning services on the outdoor 4.16 kV main switchgear and outdoor metal-enclosed 4.16 kV automatic transfer switchgear in accordance with Specification Section 260115 - Preventative Maintenance for 4.16kV Electrical Equipment.

Dollars (\$ _____)

2.0 MBE/WBE/SDVE PERCENTAGE OF PARTICIPATION PROJECT GOALS

A. This project’s specific goals are: **MBE 10%, WBE 10%, and SDVE 3%**. NOTE: Only MBE/WBE firms certified by the State of Missouri Office of Equal Opportunity, and SDVE(s) meeting the requirements of Section 34.074, RSMo, and 1 CSR 30-5.010, as of the date of bid opening can be used to satisfy the MBE/WBE/SDVE participation goals for this project.

3.0 BID BOND

A. Accompanying the bid is: ___ 5% Bid Bond or ___ Cashier's Check/Bank Draft for 5% of base bid that is payable without condition to the Division of Facilities Management, Design and Construction, State of Missouri, as per Article 5 of "Instructions To Bidders".

4.0 CONTRACT COMPLETION TIME AND LIQUIDATED DAMAGES

A. The Bidder agrees to complete the work within 350 working days from the date the Notice of Intent to Award is issued as modified by additional days added by the Owner’s acceptance of alternates, if applicable. This includes ten (10) working days for document mailing and processing. The Bidder further agrees to pay to, or allow the State as liquidated damages the sum of \$1,000 for each working day thereafter that the entire work is not substantially complete.

5.0 ATTACHMENTS TO BID

- A. 004336 Proposed Subcontractors
- 004337 MBE/WBE/SDVE Compliance Form
- 004338 MBE/WBE/SDVE Joint Venture Form
- 004339 MBE/WBE/SDVE Waiver Form
- 004340 SDVE Business Form
- 004541 Affidavit of Work Authorization
- 004545 Anti-Discrimination Against Israel Act Certification form

6.0 BIDDER'S CERTIFICATIONS

By signing and submitting this bid form, the Bidder certifies as follows:

A. No Undisclosed Interests or Associations, Collusion, or Solicitation of Other Bidders

- 1. This bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm, or corporation, and is not submitted in conformity with any agreement or rules of any group, association or corporation.
- 2. The Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham proposal.
- 3. The Bidder has not solicited or induced any person, firm or corporation to refrain from submitting a bid.
- 4. The Bidder has not sought by collusion or otherwise to obtain any advantage over any other bidder or over the Owner.

B. Accuracy of Contract Documents

The Bidder has based this bid upon an official/complete set of contract documents, either obtained from the Owner or from a secondary source known to the Bidder to have provided a complete and accurate set of contract documents. If the Bidder received the contract documents from such a secondary source, any errors or omissions in the contract documents shall be interpreted and construed in favor of the Owner and against the Bidder. This bid is based upon the conditions within Article 1.2 of the General Conditions.

C. Non-Discrimination

The Bidder will not discriminate against any employee or applicant for employment because of race, creed, color or national origin in the performance of the Work.

D. Prevailing Wage

The Bidder agrees to pay not less than the hourly rate of wages as determined by the Department of Labor and Industrial Relations, State of Missouri, in accordance with Sections 290.210 to 290.340, RSMo.

E. Transient Employers

The Bidder will comply with the provisions of Sections 285.230-234, RSMo, regarding transient employers.

F. Federal Work Authorization Program

The Bidder has enrolled and is participating in, and will continue to participate in, a federal work authorization program in accordance with Sections 285.525 and 285.530, RSMo for the duration of any contract awarded because of this bid.

G. Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA)

1. If awarded contract for this project, the Bidder/Contractor shall only utilize personnel authorized to work in the United States in accordance with applicable federal, state and local laws. This includes, but is not limited to, the Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA) and INA Section 274A.
2. If found to be in violation of this requirement or any applicable laws, and if the State of Missouri has reasonable cause to believe that the Contractor has knowingly employed individuals who are not eligible to work in the United States, the state shall have the right to cancel the contract immediately without penalty or recourse and suspend or debar the contractor from doing business with the state.
3. The Contractor agrees to cooperate fully with any audit or investigation from federal, state or local law enforcement agencies.

H. Anti-Discrimination Against Israel Act

1. If the awarded Contractor meets the definition of a company as defined in section 34.600, RSMo, and has ten or more employees, the Contractor shall not engage in a boycott of goods or services from the State of Israel; from companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or from persons or entities doing business in the State of Israel as defined in section 34.600, RSMo.
2. If, at any time during the life of the contract, Contractor meets the definition of a company as defined in section 34.600, RSMo, and the company's employees increases to ten or more OR the contractor's business status changes to become a company as defined in section 34.600, RSMo, and the company has ten or more employees, then the Contractor shall submit to the Division of Facilities Management, Design and Construction a completed Box C of the exhibit titled "Anti-Discrimination Against Israel Act Certification, and shall comply with the requirements of Box C.

I. The Personal Privacy Protection Act

1. If the Bidder provides any "personal information" as defined in §105.1500, RSMo concerning an entity exempt from federal income tax under Section 501(c) of the Internal Revenue Code of 1986, as amended, the Bidder understands and agrees that it is voluntarily choosing to seek a state contract and providing such information for that purpose. The state will treat such personal information in accord with §105.1500, RSMo.

7.0 CONTACT INFORMATION (mandatory for all bidders)

Sole Proprietorship/General Partnership LLC Limited Partnership Corporation Joint Venture

Business Name: _____

Address: _____

Telephone: _____ Fax Number: _____

Federal ID Number: _____ or Social Security Number: _____

Missouri Business Charter Number: _____ (or provide the proper certificate from the Secretary of State)

Contact Name: _____ Contact email: _____

8.0 SIGNATURES

FOR SOLE PROPRIETORSHIPS/GENERAL PARTNERSHIPS ONLY

Sole Proprietor's Name (printed) Name each general partner: _____

Today's Date: _____

I, _____, being the sole proprietor/general partner of (name of business)
_____ (and if the name of said business is other than my legal name, having filed a
Registration of Fictitious Name with the Missouri Secretary of State in order to allow me to use such name in
connection with my business, as provided by Section 417.200, RSMo, et seq.), do hereby submit this bid and agree to be
bound unto the State of Missouri as herein provided (if a general partnership, all partners must sign below).

Signature: _____ Signature: _____

Signature: _____ Signature: _____

FOR LIMITED LIABILITY COMPANIES ONLY

_____ today's date _____ State(s) of organization: _____
Manager's (or Managing Member's) Name (printed)

I, _____, being the Manager (or Managing Member) of (full legal name of limited
liability company from Articles of Organization) _____, and being duly
authorized to act as herein provided on behalf of said limited liability company, do hereby submit this bid on behalf of
said limited liability company and agree that said limited liability company shall be bound unto the State of Missouri as
herein provided.

Signature: _____

FOR LIMITED PARTNERSHIPS/LIMITED LIABILITY PARTNERSHIPS/LIMITED LIABILITY LIMITED PARTNERSHIPS ONLY

_____ today's date: _____ State(s) of organization: _____
General/Managing Partner's Name (printed)

I, _____, being the General Partner/Managing Partner of (full legal name of limited partnership/limited liability partnership/limited liability limited partnership from partnership agreement or Certificate of Limited Partnership) _____, and being duly authorized to act as herein provided on behalf of said limited partnership/limited liability partnership/limited liability limited partnership, do hereby submit this bid on behalf of said limited partnership/limited liability partnership/limited liability limited partnership and agree that said limited partnership/limited liability partnership/limited liability limited partnership shall be bound unto the State of Missouri as herein provided.

Signature: _____

FOR CORPORATIONS ONLY

_____ President's Name (printed) _____ Secretary's Name (printed) _____ Today's date

State(s) of incorporation: _____

I, _____, being the (officer or title) _____ of (full legal name of corporation, from Articles of Incorporation) _____, and being duly authorized by the Board of Directors of said corporation to act as herein provided on behalf of said corporation, do hereby submit this bid on behalf of said corporation and agree that said corporation shall be bound unto the State of Missouri as herein provided.

Signature: _____ Attested by: _____
President Corporate Secretary

The President should sign as the bidder. If the signator is other than the corporate president, the bidder must provide satisfactory evidence that the signator has the legal authority to bind the corporation.

FOR ASSOCIATIONS/JOINT VENTURES

If multiple business entities/individuals are bidding collectively as an association or joint venture, each business entity/individual bidding as part of the association or joint venture shall sign this bid in the above sections relevant to the form that such business entity or individual does business, and the bidder shall duplicate the necessary number of signature pages so that all members of the association or joint venture shall sign this bid. If a name is adopted for use by the association or joint venture, the association or joint venture shall file a Registration of Fictitious Name with the Missouri Secretary of State in order to use such name in connection with the association or joint venture, as provided by Section 417.200, RSMo, *et seq.*

SECTION 230900 – INSTRUMENTATION AND CONTROL FOR ELECTRICAL SYSTEMS

ADDENDUM NO. 2

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. This Section includes the requirements for interfacing new electrical equipment to the existing building automation system (BAS).

1.3 RELATED SECTIONS

- A. Section 260500 – Common Work Results for Electrical
- B. Section 262416 – Panelboards
- C. Section 263213.13 – Diesel-Engine-Driven Generator Set
- D. Section 263623 – Automatic Transfer Switches, Open Transition
- E. Section 263623.13 – Automatic Transfer Switches, Closed Transition (Alternate Bid No. 1)
- F. Section 263623.16 – Automatic Transfer Switch for Fire Pump

1.4 GENERAL

- A. Control systems shall be fully coordinated and integrated with associated electrical equipment and systems that are to be controlled and/or monitored.
- B. Obtain all field information (dimensions, clearances, sizes, quantities, construction details, etc.) as required to properly complete the Work.
- C. Control system subcontractor shall complete site visits as required to coordinate control system design with existing conditions and the new electrical equipment to be monitored.
- D. Submittals shall include control plans indicating the proposed location of all control panels to receive modification and/or where new cables are to be connected.

1.5 DEFINITIONS

- A. Algorithm:
 - 1. A logical procedure for solving a recurrent mathematical problem.
 - 2. A prescribed set of well-defined rules or processes for solving a problem in a finite number of steps.

- B. Analog: A continuously varying signal value that represents control influences such as current, flow, level, moisture, pressure, and temperature.
 - 1. AI: Analog Input
 - 2. AO: Analog Output
- C. BAS: Building Automation System
- D. Binary: Two-state signal where a high signal level represents an “ON” or “OPEN” condition and a low signal level represents an “OFF” or “CLOSED” condition. Binary signals convert electronic signals to digital pulses (values) and generally represent two-position operating and alarm status. “Digital” is sometimes used interchangeably with “Binary” to indicate a two-state signal.
- E. Controller: Generic term for any stand-alone, microprocessor-based, digital controller residing on a network, used for local or global control. Three types of controllers are indicated: Network Controller, Programmable Application Controller, and Application Specific Controller.
- F. Control System Integrator: An entity that assists in expansion of existing enterprise system and support of additional operator interfaces to I/O being added to existing enterprise system.
- G. DDC: Direct digital control
- H. BAS Provider: Authorized representative of, and trained by, BAS manufacturer and responsible for execution of BAS modifications indicated.
- I. Distributed Control: Processing of system data is decentralized and control decisions are made at subsystem level. System operational programs and information are provided to remote subsystems and status is reported back. On loss of communication, subsystems shall be capable of operating in a standalone mode using the last best available data.
- J. Digital: See “Binary”
 - 1. DI: Digital Input
 - 2. DO: Digital Output
- K. Gateway: Bidirectional protocol transfer that connects control systems that use different communication protocols
- L. HVAC: Heating, ventilation and air conditioning
- M. I/O: Input/Output – System through which information is received and transmitted.
 - 1. AI: Analog input
 - 2. BI: Binary input, sometimes used interchangeably with DI
 - 3. DI: Digital input, sometimes called “discrete input” and sometimes used interchangeably with BI
 - 4. AO: Analog output
 - 5. BO: Binary output, sometimes used interchangeably with DO

- 6. DO: Digital output, sometimes called “discrete output” and sometimes used interchangeably with BO
- N. LAN: Local area network
- O. Low Voltage: As defined in NFPA 70 (National Electrical Code) for circuits and equipment operating at less than 50-volts or for remote-control, signaling power-limited circuits.
- P. Modbus TCP/IP: An open protocol for exchange of process data.
- Q. Modbus RTU: RS-485 serial “remote terminal unit” protocol for exchange of data
- R. MS/TP: Master slave/token passing, IEEE 8802-3. Datalink protocol LAN option that uses twisted-pair wire for low-speed communication.
- S. Network Controller: Digital controller which supports a family of programmable application controllers and application-specific controllers, that communicates on peer-to-peer network for transmission of global data.
- T. Network Repeater: Device that receives data packet from one network and rebroadcasts it to another network. No routing information is added to protocol.
- U. PC: Personal computer
- V. Peer to Peer: Networking architecture that treats all network stations as equal partners.
- W. PID: Proportional plus integral plus derivative
- X. POT: Portable operator’s terminal
- Y. PUE: Performance usage effectiveness
- Z. RAM: Random access memory
- AA. RF: Radio frequency
- BB. Router: Device connecting two or more networks at network layer
- CC. Server: Computer used to maintain system configuration, historical and programming database.
- DD. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows
- EE. USB: Universal serial bus
- FF. User Datagram Protocol (UDP): Protocol that assumes that the IP is used as the underlying protocol.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product include the following:

Replace Emergency Generator, Infrastructure
 St. Louis Forensic Treatment Center - South, St. Louis, Missouri

M1908-01

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 2. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
 3. Product description with complete technical data, performance curves, and product specification sheets.
 4. Installation, operation and maintenance instructions including factors effecting performance.
 5. Bill of materials indicating quantity, manufacturer, and extended model number for each unique product, including but not limited to:
 - a. I/O expanders
 - b. Modbus RTU communication port expanders
 - c. Modbus RTU communication driver
 6. When manufacturer's product datasheets apply to a product series rather than a specific product model, clearly indicate and highlight only applicable information.
 7. Each submitted piece of product literature shall clearly cross reference specification and drawings that submittal is to cover.
- B. Control Plans: Control plans indicating the proposed location of all control panels to receive modifications and/or where new cables are to be connected.
- C. Coordination Plan: For each control system, list critical coordination activities to be completed with electrical equipment service representatives.
- D. Shop Drawings:
1. General Requirements:
 - a. Include cover drawing with Project name, location, Owner, Designer, Contractor and issue date with each Shop Drawings submission.
 - b. Include a drawing index sheet listing each drawing number and title that matches information in each title block.
 - c. Prepare Drawings using CAD.
 - d. Drawings Size: 11"x17", 22"x34" or 24"x36".
 2. Include plans, elevations, sections, and mounting details where applicable.
 3. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 4. Plan Drawings indicating the following:
 - a. Screened backgrounds of walls with structural grid lines showing all electrical equipment that have connections to the BAS for monitoring.
 - b. Room names and numbers with coordinated placement to avoid interference with control products indicated.

- c. Network communication cable and raceway routing.
 - d. Information, drawn to scale.
 - e. Proposed routing of wiring, cabling, and conduit, coordinated with building services for review before installation.
5. Schematic drawings for each electrical equipment item that is monitored indicating the following:
- a. I/O points labeled with point names shown. Indicate alarm set points.
 - b. I/O listed in table format showing point name, type of device, manufacturer, model number, and cross-reference to product data sheet number.
 - c. A graphic showing location of I/O in proper relationship to electrical equipment.
 - d. Wiring diagram with each I/O point having a unique identification and indicating labels for all wiring terminals.
 - e. Unique identification of each I/O that shall be consistently used between different drawings showing same point.
 - f. Elementary wiring diagrams of monitored points for electrical equipment including dry contacts and Modbus RTU communications interfaces.
6. Monitoring signal diagrams indicating the following:
- a. Wiring between monitored electrical equipment and BAS equipment.
 - b. Point-to-point schematic wiring diagrams for each product.
7. Color graphics indicating the following:
- a. Itemized list of color graphic displays to be provided indicating monitored systems, data point addresses, output schedule, and operator notations.
 - b. For each display screen to be provided, a true color copy showing layout of pictures, graphics and data displayed.
 - c. Intended operator access between related hierarchical display screens.
- E. System Description:
- 1. Complete listing and description of each report, log and trend for format and timing and events which initiate generation.
 - 2. Complete bibliography of documentation and media to be delivered to Owner.
 - 3. Description of testing plans and procedures.
 - 4. Description of Owner training.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For system modifications designer, programmer and installer.
- B. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.
- C. Field quality-control, calibration, testing, and adjusting reports.

1.8 CLOSEOUT SUBMITTALS

- A. As-built shop drawings, final system programming, and final system graphics.
- B. Operation and Maintenance Data: For all modification to the existing BAS to include in emergency, operation, and maintenance manuals. Data shall include, but not be limited to, the following:
 - 1. Maintenance instructions and lists of spare parts for each type of control device.
 - 2. Interconnection wiring diagrams with identified and numbered system components and devices.
 - 3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
 - 4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
 - 5. Calibration records and list of set points.
- C. Software and Firmware Operational Documentation: Include the following:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On a compact disc, DVD or USB thumb drive complete with data files.
 - a. Backup shall completely restore the system in the event of a computer malfunction.
 - 3. Device address list
 - 4. Printout of software application and graphic screens.
 - 5. Software license required by and installed for BAS workstations and control systems.
- D. Warranty Certificates

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish recommended spare parts and price list.

1.10 QUALITY ASSURANCE

- A. BAS Provider/Installer Qualifications:
 - 1. Authorized representative of, and trained by BAS manufacturer, Tridium, Inc.
 - 2. In-place facility located within 60 miles of Project location.
 - 3. Demonstrated past experience with installation of BAS products being installed for period within 10 consecutive years before time of bid.
 - 4. Demonstrated past experience on five projects of similar complexity, scope and value.
 - 5. Service and maintenance staff assigned to support Project during warranty period.
 - 6. Product parts inventory to support on-going DDC system operation for a period of not less than 5 years after Substantial Completion.

- B. 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.

1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace products that fail in materials or workmanship within specified warranty period.
 - 1. Failures shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner.
 - 2. Include updates or upgrades to software, firmware and drivers if necessary to resolve deficiencies.
 - a. Install updates only after receiving Owner's written authorization.
 - 3. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner upon failure notification. The maximum acceptable response time to provide this service at the site shall be 24 hours, Monday through Friday and 24 hours on Saturday and Sunday.
- B. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from date of substantial completion and formal system acceptance by Construction Representative in writing.
- C. The warranty shall apply equally to both hardware and software.

1.12 COORDINATION

- A. Coordinate with control components included with equipment furnished by others.
- B. Coordinate with emergency system panelboards, diesel-engine-driven generator set, resistive load bank, generator connection cabinet, automatic transfer switches, and motor control centers to achieve compatibility control and/or monitoring interfaces.

PART 2 - PRODUCTS

2.1 BUILDING AUTOMATION CONTROL SYSTEM

- A. Existing Equipment: Niagara Series 4
- B. Installer/Service Provider: The present service provider for the existing Niagara 4 BAS is:
 - Dynamic Controls Inc.
 - 2320 Ball Drive
 - St. Louis, MO 63146
 - Jimmy Gericke
 - 314-925-4809
 - Jimmy.Gericke@dciusa.com
- C. The existing Niagara 4 BAS consists of operator interface equipment, communication systems, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control HVAC equipment and monitor electrical equipment.

2.2 CONTROL SYSTEM DESCRIPTION

- A. Integration of new electrical equipment with existing facility BAS for monitoring, annunciating and alarming as follows:
 - 1. New emergency generator control panel via Modbus RTU
 - 2. New automatic transfer switch ATS-1 for fire pump via Modbus RTU
 - 3. New automatic transfer switches ATS-2, ATS-3, ATS-4 and ATS-6 through ATS-11
 - 4. Monitoring of four (4) dry contacts on existing ATS-5 to indicate source availability (normal and emergency) and source connection (normal and emergency).
 - 5. Monitoring and remote alarming as required of a Form C auxiliary dry contact on the 1200A circuit breaker on the generator.
 - 6. Monitoring and remote alarming as required of a Form C status contact on the surge protective device for the following three (3) new panelboards:
 - a. Panelboard “GEN” located within the new diesel-engine-driven generator outdoor enclosure.
 - b. Panelboard “1HE1” located in Mechanical Room C123.
 - c. Panelboard “1LE4” located in Mechanical Room C123.

2.3 SOFTWARE AND DRIVERS

- A. Provide new/updated software and/or drivers for operator stations and/or Niagara 4 JACE-8000 control panel as required to implement the scope of work for this project.
- B. Provide new graphical representations in the Niagara 4 BAS of all monitored data described herein including individual graphics, summary screens as well as virtual remote annunciator graphics simulating a traditional, physical remote annunciator.
- C. As a minimum provide the following screens:
 - 1. Overall emergency power system screen showing a graphical representation of the emergency generator, all eleven (11) automatic transfer switches (ATS) and the three (3) panelboard surge protectors.
 - 2. Provide a screen for each individual ATS that displays the monitor data with a virtual remote annunciator including alarms and trends.
 - 3. Provide a screen for the emergency generator that shows all monitored data with a virtual remote annunciator including alarms and trends.
- D. Review all available data points with Designer and Construction Representative before finalizing BAS graphics screen layouts and to determine required BAS alarms, trends, etc.

2.4 BAS CONTROLLER

- A. Niagara 4 JACE-8000 is existing to remain.

- B. Provide I/O expander(s) and RS-485 communication port expanders if/as required to execute the scope of work for this project.

2.5 DESKTOP OPERATOR WORKSTATIONS

- A. Desktop workstations are existing to remain.

2.6 SERVERS

- A. Servers are existing to remain.

2.7 SWITCH

- A. Network switches are existing to remain. If Contractor deems it necessary to add a network switch(es) to execute the Work, the new network switch shall be provided by the Owner. Contractor shall identify the number and location of all necessary network switches and allow 8 weeks for the Owner to furnish the switch(es) as requested.

2.8 CONTROL WIRE AND CABLE

- A. Single conductor control wiring and I/O cable:
 - 1. Comply with Section 260519 – Low-Voltage Electrical Power Conductors and Cables
 - 2. Single conductor wire size shall be at least No. 16 AWG.
 - 3. Non-shielded I/O cable shall be 18 AWG twisted pair, bare copper, non-plenum rated, UL listed.
- B. RS-485 Serial Communication Cable:
 - 1. Cable shall comply with NFPA 70.
 - 2. Minimum No. 22 AWG tinned copper, non-plenum rated, low-cap (12.5 pF/ft nominal)

2.9 CONTROL WIRING RACEWAYS AND BOXES

- A. All control wiring and cables shall be installed in a raceway meeting the requirements of Section 260533.13 – Conduit for Electrical Systems.
- B. Comply with requirements in Section 260533.16 – Boxes for Electrical Systems for electrical boxes.

2.10 IDENTIFICATION

- A. Control Equipment and Control Devices:
 - 1. Engraved tag bearing unique identification.
 - 2. Letter size shall be as follows:
 - a. DDC Controllers: Minimum of 0.5 inch high.
 - b. Enclosures: Minimum of 0.5 inch high.
 - 3. Tag shall consist of black lettering on a white background.

4. Tag shall be engraved phenolic consisting of three layers of rigid laminate. Top and bottom layers are color-coded white with contrasting black center exposed by engraving through outer layer.
 5. Tag shall be fastened with drive pins.
- B. Raceway and Boxes:
1. Comply with requirements for identification specified in Section 260553 – Identification for Electrical Systems.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify new control equipment and devices are suitable for existing control system.
- B. Verify that existing control systems, equipment, devices, etc., which are to remain, are operational.
 1. Check calibration and function on existing equipment and devices. Recalibrate as required.
 2. Submit calibration and test reports.
- C. Advise Construction Representative and Designer of any issues with existing equipment or controls that are to remain in service.

3.2 INSTALLATION

- A. Comply with equipment/device manufacturers' instructions.
- B. Install software in control units and operator interfaces.
- C. Implement all features of programs to specified requirements and connect and configure equipment and software to achieve proper monitoring, annunciation and alarming.
- D. Install labels and nameplates to identify control components.

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

- A. Bundle and harness multiconductor control cables in place of single cables where several cables follow a common path.
- B. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
- C. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
- D. Install wire and cable with sufficient slack and flexible connectors to allow for vibration of equipment.
- E. All wiring shall be installed in raceway according to Section 260533.13 – Conduit for Electrical Systems.

- F. Raceways: Raceways are to be installed in accordance with the National Electric Code. Use of liquidtight flexible conduit (LFMC) is limited to 36” to connect from EMT to devices subject to movement. LFMC is not to be used to compensate for misalignment of raceway during installation.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Test software and hardware for proper operation and prepare test reports.
- C. Remove and replace malfunctioning units and retest.
- D. Verify that wires/cables at control panels are tagged with their service designation and approved tagging system.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain electrical instrumentation and controls.
- B. Provide a minimum of one (1) hour of instructions to Owner's personnel (4 to 8 people) in the operation and maintenance of the modifications to the control system.
- C. The training shall be scheduled with the Construction Representative to accommodate Owner's schedule but will be performed during normal business hours.
- D. Provide training after the system has been installed and checked out.

END OF SECTION 260900