

ADDENDUM II

May 14,2014

NOTICE TO BIDDERS

- A. This Addendum is issued to all registered plan holders pursuant to the Instructions to Bidders and Conditions of the Contract. This Addendum serves to clarify, revise, and supersede information in the Project Manual, Drawings, and previously issued Addenda. Portions of the Addendum affecting the Contract Documents will be incorporated into the Contract by enumeration of the Addendum in the Owner/Contractor Agreement.
- B. The Bidder shall acknowledge receipt of this Addendum in the appropriate space on the Bid Form.
- C. The date for receipt of bids is unchanged by this Addendum, at same time and location.

REVISIONS TO SPECIFICATIONS

Section 26 32 13 “Engine Generator” dated 4/8/2014 shall be replaced in its entirety with attached revised section dated 5/14/2014.

Section 16231 shall be revised as follows:

The section number in the first line shall be changed from “16231” to “26 32 14”.

In the fourth sentence of paragraph 1.2 insert “redundant” between the words “of” “diesel”. The generator backups for both the upper electrical room and the datacenter shall consist of two generators each paralleled for redundancy.

Change the first sentence of paragraph 1.2 a) to: “The first **redundant generator connection** shall be provided to power data center electronic equipment **and panel 1EPP1** and shall be located on the south side of the datacenter.

Add “Panelboard 1EPP1” to the list of loads at the bottom of page one.

On page 2 in paragraph 1.2 b) begin the sentence with “The second **redundant** generator **connection** ...”

In the second paragraph of 1.4 change “six (6)” to “**seven (7)**”

REVISIONS TO DRAWING SHEETS

Sheet E-2. In the note to the right of the aluminum stairs to the generator change “BREAKERS (2)” to “**Breaker**”.

In the reference above the double door to the electrical room add “**or annunciator panel**” after “Generator control panel”

Sheet E-4. On the block in the center of the elevation of the generator delete “two” and change “breakers” to “**breaker**”.

Delete the grounding system symbol below that block. Extend the arrow that previously pointed to that ground symbol to the conduit below that block and change the reference to “**provide equipment ground in each raceway and bond generator per note 4 on this sheet.**”

On the elevation of the ATS in detail 1 add “Note 11”

In the notes block in note 4 delete “two” and change “breakers” to “**breaker**”.

In note 4 A) delete “breaker #1.”

Delete existing note 4 B) in its entirety.

Add the following note 11: “At contractor’s option an enclosed 3000 amp main breaker and bypass isolation ATS may be provided in lieu of a service entrance rated ATS. If that main is provided feed the ATS with 4 sets of ID #4 feeders as scheduled on the Wire and raceway schedule on this sheet.

END OF ADDENDUM II

SECTION 26 32 13

ENGINE GENERATOR

PART 1 GENERAL **The originally advertised specification dated 4/8/2014 is herein revised. Changes are included in bold underlined font. This font change was not done to identify comments of higher importance but rather to identify input on 5/14/2014.**

1.1 SUMMARY

- A. Section includes engine generator set, heat exchanger, exhaust silencer and fittings, transfer switch, fuel fittings, control panel, **remote annunciation panels**, battery, and charger.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
 - 3. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment.
 - 4. NEMA MG 1 - Motors and Generators.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 30 - Flammable and Combustible Liquids Code.

1.3 SYSTEM DESCRIPTION

- A. Description: Engine generator assembly and accessories to provide source of power for computer facility backup.
- B. Capacity: 750 kW, 937.5 kVA at elevation of 248 feet above sea level, standby rating using specified engine cooling scheme.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate electrical characteristics and connection requirements. Include plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, electrical diagrams including schematic and interconnection diagrams.
- B. Product Data: Submit data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, transfer switch, battery, battery rack, battery charger, exhaust silencer and vibration isolators.

- C. Test Reports: Indicate results of performance testing.
- D. Manufacturer's Field Reports: Indicate inspections, findings, and recommendations.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit instructions and service manuals for normal operation, routine maintenance, oil sampling and analysis for engine wear, and emergency maintenance procedures.
- B. **Submit certification that engine-generator set, batteries, battery racks, accessories, and components shall withstand seismic forces. Indicate whether certification is based on actual test of assembled components or an calculation. The term ‘withstand’ shall be defined as meaning the unit shall remain in place without separation of any parts from the device when subjected to the seismic forces and shall be fully operational after the seismic event.**

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum **twenty five** years experience.
- B. Supplier: Authorized distributor of specified manufacturer with minimum **ten** years experience.

1.7 WARRANTY

- A. Furnish five year manufacturer warranty. **Warranty shall be extendable to 20 years from the date of substantial completion at owners’ option.**
- B. **Warranty coverage shall include provision of 100 % of parts and labor costs for failures due to defects in materials and workmanship excluding filters, fluids, belts, hoses, paint and batteries. Warranty shall include provision of a rental unit if failed components or workmanship defects result in a lack of generator power availability in excess of 48 hours from the time of problem diagnosis.**
- C. **All repairs shall be performed by factory trained dealer service personnel. Warranty shall include time and mileage.**

1.8 MAINTENANCE SERVICE

- A. **The authorized dealer shall provide a preventive maintenance agreement using qualified factory trained service personnel for a period of one year from the date of substantial completion. Genuine parts, filters, fluids, and labor shall be provided per the preventive maintenance definitions in the manufacturer’s Operation and Maintenance Manual.**

1.9 MAINTENANCE MATERIALS

- A. Furnish one set of tools required for preventative maintenance of engine generator system. Package tools in adequately sized metal tool box.
- B. Furnish two of each fuel, oil and air filter element.

PART 2 PRODUCTS

2.1 ENGINE

- A. Product Description: Diesel internal combustion engine.
- B. Rating: Sufficient to operate under 10 percent overload for one hour in ambient of 90 degrees F, 33 degrees C) at elevation of 250 feet.
- C. Fuel System: No. 2 fuel oil.
- D. Engine speed: 1800 rpm.
- E. Safety Devices: Engine shutdown on high water temperature, low oil pressure, overspeed, and engine overcrank. Limits as selected by manufacturer. Remote emergency stop pushbutton, red large mushroom head, full shroud, lexan hinged cover.
- F. Engine Starting: DC starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Furnish remote starting control circuit, with MANUAL-OFF-REMOTE selector switch on engine-generator control panel.
- G. Engine Jacket Heater: Thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F (32 degrees C), and suitable for operation on 120 volts AC.
- H. Radiator: Radiator using glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 110 degrees F (43 degrees C). Radiator air flow restriction 0.5 inches of water (1.25 Pa) maximum.
- I. Engine Accessories: Fuel filter, lube oil filter, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, gear-driven water pump. Furnish fuel pressure gage, water temperature gage, and lube oil pressure gage on engine/generator control panel.
- J. Mounting: Furnish unit with suitable spring-type vibration isolators and mount on structural steel base with base mounted fuel tank capable of running engine at **75% of** full load for 48 hours.

2.2 GENERATOR

- A. Manufacturers:

1. Caterpillar.
 2. Cummins/Onan.
 3. Kohler
- B. Product Description: NEMA MG1, three phase, six pole, reconnectable brushless synchronous generator with brushless exciter.
- C. Rating: 750 kW, 937.5 kVA, at 0.8 power factor, 208/120 volts three phase four wire, 60 Hz at 1800 rpm.
- D. Insulation Class: **H**.
- E. Temperature Rise: 130 degrees C Standby.
- F. Enclosure: Sound attenuated weatherproof **rated 85dBA at 7 M**.
- G. Voltage Regulation: Furnish generator mounted volts per hertz exciter-regulator to match engine and generator characteristics, with voltage regulation plus or minus 1 percent from no load to full load. Furnish manual controls to adjust voltage droop, voltage level (plus or minus 5 percent) and voltage gain.

2.3 GOVERNOR

- A. Product Description: Electronic governor to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes. Equip governor with means for manual operation and adjustment.

2.4 AUTOMATIC TRANSFER SWITCH

- A. Manufacturers: Match article 2.2 A in this specification.
- B. Product Description: Service entrance type, automatic transfer switch with full bypass isolation, non-load break type. **At contractor's option, in lieu of a service entrance type ATS a separate 3000 amp enclosed main breaker may be provided with conduit and cable 3000 amp feeders to a non-service entrance rated ATS.**
- C. Configuration: Electrically operated, mechanically held transfer switch with main service disconnect.
- D. Interrupting Capacity: 100 percent of continuous rating.
- E. Control Features and Functions:
1. Indicating Lights: Mount in cover of enclosure to indicate NORMAL SOURCE AVAILABLE, ALTERNATE SOURCE AVAILABLE, BYPASS SOURCE AVAILABLE, switch position.
 2. Test Switch: Mount in cover of enclosure to simulate failure of normal source.
 3. Return to Normal Switch: Mount in cover of enclosure to initiate manual transfer from alternate source to normal source.

4. Transfer Switch Auxiliary Contacts: 1 normally open; 1 normally closed.
 5. Normal Source Monitor: Monitor each line of normal source voltage and frequency; initiate transfer when voltage drops below 85 percent or frequency varies more than 3percent from rated nominal value.
 6. Alternate Source Monitor: Monitor alternate source voltage and frequency; inhibit transfer when voltage is below 85 percent or frequency varies more than 3 percent from rated nominal value.
 7. Solid Neutral.
- F. Automatic Sequence of Operation:
1. Initiate Time Delay to Start Alternate Source Engine Generator: Upon initiation by normal source monitor.
 2. Time Delay To Start Alternate Source Engine Generator: 0 to 180 seconds, adjustable.
 3. Initiate Transfer Load to Alternate Source: Upon initiation by normal source monitor and permission by alternate source monitor.
 4. Time Delay Before Transfer to Alternate Power Source: 0 to 180 seconds, adjustable.
 5. Initiate Retransfer Load to Normal Source: Upon permission by normal source monitor.
 6. Time Delay Before Transfer to Normal Power: 0 to 180 seconds, adjustable; bypass time delay in event of alternate source failure.
- G. Time Delay Before Engine Shut Down: 0 to 30 minutes, adjustable, of unloaded operation.
- H. Enclosure:
1. Finish: Manufacturer's standard enamel.

2.5 ACCESSORIES

- A. Skid-Mounted Fuel Tank: Steel tank, sized to allow 48 hrs at 75% load, double wall with leak detection, with fill and vent.
- B. Exhaust Silencer: Critical type silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions.
- C. Batteries: Heavy duty, diesel starting type lead-acid storage batteries, 170 ampere-hours minimum capacity. Match battery voltage to starting system. Furnish cables and clamps.
- D. Battery Tray: Treated for electrolyte resistance, constructed to contain spillage.
- E. Battery Charger: Current limiting type designed to float at 2.17 volts for each cell and equalize at 2.33 volts for each cell. Furnish overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Furnish wall mounted enclosure to meet NEMA 250, Type 1 requirements.

- F. **Line Circuit Breaker: NEMA AB 1, molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole. Furnish battery voltage operated shunt trip, connected to open circuit breaker on engine failure. Unit mount to meet NEMA 250, Type 1 requirements. Rating - 3000 Amp.**
As indicated on the drawings the trip settings shall be set per the results of a coordination study.
- G. **Load Bank connectivity: Provide capability to connect load bank cables to the genset without disconnection of any cabling.**
- H. **Engine-Generator Control: Provide a fully solid-state microprocessor based generator set control. The control panel shall be designed and built by the engine manufacturer. The control shall provide all operating, monitoring and control functions for the generator set. The control panel shall provide real time digital communications to all engine and regulator controls via SAE J1939. The control panel may be mounted on the generator or in the electrical room.**
- a. **Environmental**
- 1) **The generator set control shall be tested and certified to the following environmental conditions:**
- a) **-40°C to +70°C Operating Range**
- b) **100% condensing humidity, 30°C to 60°C**
- c) **IP22 protection for rear of controller; IP55 when installed in control panel**
- d) **5% salt spray, 48 hours, +38°C, 36.8V system voltage**
- e) **Sinusoidal vibration 4.3G's RMS, 24-1000Hz**
- f) **Electromagnetic Capability (89/336/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC, BS EN 50081-2, 50082-2)**
- g) **Shock: withstand 15G**
- b. **Functional Requirements**
- 1) **The following functionality shall be integral to the control panel.**
- a) **The control shall include a minimum 33 x 132 pixel, 24mm x 95mm, positive image, display with text based alarm/event descriptions.**
- b) **The control shall include a minimum of 3-line data display**
- c) **Audible horn for alarm and shutdown with horn silence switch**
- d) **Standard ISO labeling**
- e) **Multiple language capability**
- f) **Remote start/stop control**
- g) **Local run/off/auto control integral to system microprocessor**
- h) **Cooldown timer**
- i) **Speed adjust**
- j) **Lamp test**
- k) **Emergency stop push button**

- l) Voltage adjust
- m) Voltage regulator V/Hz slope - adjustable
- n) Password protected system programming
- c. Digital Monitoring Capability
 - 1) The controls shall provide the following digital readouts for the engine and generator. All readings shall be indicated in either metric or English units
 - a) Engine
 - Engine oil pressure
 - Engine oil temperature
 - Engine coolant temperature
 - Engine RPM
 - Battery volts
 - Engine hours
 - Engine crank attempt counter
 - Engine successful start counter
 - Service maintenance interval
 - Real time clock
 - Engine exhaust stack temperature
 - Engine main bearing temperature
 - b) Generator
 - Generator AC volts (Line to Line, Line to Neutral and Average)
 - Generator AC current (Avg and Per Phase)
 - Generator AC Frequency
 - Generator kW (Total and Per Phase)
 - Generator kVA (Total and Per Phase)
 - Generator kVAR (Total and Per Phase)
 - Power Factor (Avg and Per Phase)
 - Total kW-hr
 - Total kVAR-hr
 - % kW
 - % kVA
 - % kVAR
 - Generator bearing temperature
 - Generator stator winding temperature
 - c) Voltage Regulation
 - Excitation voltage
 - Excitation current
 - d. Alarms and Shutdowns
 - 1) The control shall monitor and provide alarm indication and subsequent shutdown for the following conditions. All alarms and shutdowns are accompanied by a time, date, and

engine hour stamp that are stored by the control panel for first and last occurrence:

- a) **Engine Alarm/Shutdown**
 - Low oil pressure alarm/shutdown**
 - High coolant temperature alarm/shutdown**
 - Loss of coolant shutdown**
 - Overspeed shutdown**
 - Overcrank shutdown**
 - Emergency stop shutdown**
 - Low coolant temperature alarm**
 - Low battery voltage alarm**
 - High battery voltage alarm**
 - Control switch not in auto position alarm**
 - Battery charger failure alarm**

- b) **Generator Alarm/Shutdown**
 - Generator phase sequence**
 - Generator over voltage**
 - Generator under voltage**
 - Generator over frequency**
 - Generator under frequency**
 - Generator reverse power (real and reactive)**
 - Generator overcurrent**

- c) **Voltage Regulator Alarm/Shutdown**
 - Loss of excitation alarm/shutdown**
 - Instantaneous over excitation alarm/shutdown**
 - Time over excitation alarm/shutdown**
 - Rotating diode failure**
 - Loss of sensing**
 - Loss of PMG**

- e. **Inputs and Outputs**
 - 1) **Programmable Digital Inputs**
 - a) **The Controller shall include the ability to accept programmable digital input signals. The signals may be programmed for either high or low activation using programmable Normally Open or Normally Closed contacts.**
 - 2) **Programmable Relay Outputs**
 - a) **The control shall include the ability to operate programmable relay output signals, integral to the controller. The output relays shall be rated for 2A @ 30VDC and consist of six (6) Form A (Normally Open) contacts and two (2) Form C (Normally Open & Normally Closed) contacts.**
 - 3) **Programmable Discrete Outputs**

- a) The control shall include the ability to operate two (2) discrete outputs, integral to the controller, which are capable of sinking up to 300mA.
- f. Maintenance
 - 1) All engine, voltage regulator, control panel and accessory units shall be accessible through a single electronic service tool. The following maintenance functionality shall be integral to the generator set control
 - a) Engine running hours display
 - b) Service maintenance interval (running hours or calendar days)
 - c) Engine crank attempt counter
 - d) Engine successful starts counter
 - e) 40 events are stored in control panel memory
 - f) Programmable cycle timer that starts and runs the generator for a predetermined time. The timer shall use 7 user-programmable sequences that are repeated in a 7-day cycle. Each sequence shall have the following programmable set points:
 - Day of week
 - Time of day to start
 - Duration of cycle
- g. Remote Communications
 - 1) The control shall include Modbus RTU communications as standard via RS-485 half duplex with configurable baud rates from 2.4k to 57.6k.
- h. Remote Monitoring Software
 - 1) The control shall provide Monitoring Software with the following functionality
 - a) Monitor up to eight (8) generator sets, plus ATS and UPS.
 - b) Provide access to all date and events on generator set communications network
 - c) Provide remote control capability for the generator set(s)
 - d) Ability to communicate via Modbus RTU or remote modem
- i. Local Annunciator (NFPA 99/110, CSA 282)
 - 1) Provide a local, control panel mounted, annunciator to meet the requirements of NFPA 110, Level 1.
 - a) Annunciators shall be networked directly to the generator set control
 - b) Local Annunciator shall include a lamp test pushbutton, alarm horn and alarm acknowledge pushbutton
 - c) Provide the following individual light indications for protection and diagnostics
 - Overcrank

Low coolant temperature
High coolant temperature warning
High coolant temperature shutdown
Low oil pressure warning
Low oil pressure shutdown
Overspeed
Low coolant level
EPS supplying load
Control switch not in auto
High battery voltage
Low battery voltage
Battery charger AC failure
Emergency stop
Spare

- j. **Remote Annunciator (NFPA 99/110, CSA 282)**
- 1) **Provide a remote annunciator to meet the requirements of NFPA 110, Level 1.**
 - a) **The annunciator shall provide remote annunciation of all points stated above and shall incorporate ring-back capability so that after silencing the initial alarm, any subsequent alarms will sound the horn.**
 - b) **Locate the annunciator in the upper electrical room: Surface; wall mounted, Push button shall be protected from accidental operation.**

- I. Weather-protective Enclosure: Reinforced steel housing allowing access to control panel and service points, with lockable doors and panels. Furnish fixed louvers, battery rack, and silencer.
- J. Datacenter remote annunciation panel: In the datacenter provide a panel that includes indication of power availability. Provide one two lamp indicating light for utility power available/connected, one for generator power available/connected and a lamp test switch.

2.6 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of completed assembly.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install engraved plastic nameplates.
- B. Ground and bond generator and other electrical system components.
- C. Provide remote emergency off switch mounted in an accessible location. Provide hinged lexan cover over shrouded mushroom head switch.

3.2 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start up engine-generator assembly.
- B. Provide 4 hour load bank test at full rated load.

3.3 ADJUSTING

- A. Adjust generator output voltage and engine speed to meet specified ratings.

3.4 **FUEL**

- A. **Provide fuel filling the tank to 100% prior to testing, demonstration and training. Refill the tank to 100% full after substantial completion acceptance.**

3.5 CLEANING

- A. Clean engine and generator surfaces. Replace oil and fuel filters with new.

3.6 DEMONSTRATION AND TRAINING

- A. Furnish 4 hours of instruction for two-five persons simultaneously, to be conducted at project site with manufacturer's representative.
- B. Describe loads connected to standby system and restrictions for future load additions.
- C. Simulate power outage by interrupting normal source, and demonstrate system operates to provide standby power.
- D. Instruct owner as to procedures required for future load bank testing.

END OF SECTION