



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNRB12095

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
FRANK WHITTAKER 304-558-2316

RFQ COPY

TYPE NAME/ADDRESS HERE

VENDOR

SHIP TO

DIVISION OF NATURAL RESOURCES
 PARKS & RECREATION SECTION
 324 4TH AVENUE
 SOUTH CHARLESTON, WV
 25303-1228 304-558-3397

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
01/31/2012				

BID OPENING DATE: 02/14/2012 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
***** ADDENDUM NO 3 *****						
THIS ADDENDUM IS ISSUED TO PROVIDE THE ATTACHED ITEMS, TECHNICAL QUESTIONS & ANSWERS AND SPECIFICATION SECTION 26 3213 ENGINE GENERATORS-NATURAL GAS.						
THE BID OPENING DATE AND TIME HAVE NOT CHANGED.						
***** END ADDENDUM NO. 3 *****						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
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TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE
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WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

GENERAL TERMS & CONDITIONS REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.
 2. The State may accept or reject in part, or in whole, any bid.
 3. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
 4. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods this Purchase Order/Contract becomes void and of no effect after June 30.
 5. Payment may only be made after the delivery and acceptance of goods or services.
 6. Interest may be paid for late payment in accordance with the *West Virginia Code*.
 7. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
 8. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
 9. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
 10. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern the purchasing process.
 11. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
 12. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.
 13. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at www.state.wv.us/admin/purchase/vrc/hipaa.html and is hereby made part of the agreement provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
 14. **CONFIDENTIALITY:** The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf>.
 15. **LICENSING:** Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, and the West Virginia Insurance Commission. The vendor must provide all necessary releases to obtain information to enable the director or spending unit to verify that the vendor is licensed and in good standing with the above entities.
 16. **ANTITRUST:** In submitting a bid to any agency for the State of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the State of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.
- I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, or person or entity submitting a bid for the same material, supplies, equipment or services and is in all respects fair and without collusion or fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division. Complete all sections of the quotation form.
2. Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as EQUAL to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Unit prices shall prevail in case of discrepancy. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
4. All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130
5. Communication during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited (W.Va. C.S.R. §148-1-6.6).

ADDENDUM NUMBER 3

Dated: January 27, 2012

Re: Canaan Valley Resort Renovations & Additions
 Division of Natural Resources
 Davis, WV
 RFQ# DNRB12095

From: Paradigm Architecture
 2223 Cheat Road
 Suite 300
 Morgantown, WV 26508
 (304) 284-5015

This Addendum forms a part of the Contract Documents and modifies the original bidding Documents dated December 19, 2011, as noted below.

This Addendum consists of:

Items and Questions	three (3) pages
Specification Section 26 3213 Engine Generators – Natural Gas	eight (8) pages

The above will be available on the architect's FTP site – see link below.

To open the shared files, click or copy the link below:

<http://www.filesanywhere.com/fs/v.aspx?v=8a6e67895e6474a970a0>

Item 1: The bid date is unchanged and remains Tuesday, February 14, 2012. The time and location remain unchanged.

Item 2: The time period for questions and request for Product Substitutions was closed effective end of day January 26, 2012.

Item 3: Contractors shall replace the cost of all Light Fixtures as defined on E5.02 with a Lump Sum Allowance of \$300,000.00. This allowance will be included under provisions of Section 01 2100 Allowances and shall include the cost of purchase and delivery of the fixtures. Labor for installation shall be included in the bid. The quantity of fixtures as represented on the drawing is not changed.

Item 4: Specification Section 01 2100 – Allowances:
 Under Paragraph C, Change the Lump Sum FF&E Allowance to \$1,700,000.00. This quantity is modified to include all Lodge Renovation/Addition FF&E items.

- Item 5:** Specification Section 08 3513.23 – Folding Fire Doors:
Substitution: Tranzform Fire Horizontal Sliding, Accordion Folding Fire & Smoke Rated Doors manufactured by Cornell Iron Works is approved for use at Door Opening 159.
- Item 6:** Drawing ID-1.0, Finish Schedule, 100 Elevator Lobby. Delete comments in the Remarks Column.
- Item 7:** Drawing ID-1.1, Add ACT-2 Armstrong, Cortega Angled Tegular No. 704, 24"x24".
- Item 8:** Drawing ID-4.0, Transition Strip Detail is required at all locations where tile transitions to different floor material.
- Item 9:** The following are corrections to detail references on the Interior Design Drawings. Drawing ID-8.2, Detail 11/ID-8.2, Elevation Reference should read 14/ID-8.2. Detail 14/ID-8.2, Section Reference at upper cabinets should read 12/ID-8.2. Detail 14/ID-8.2, Section Reference at Trash cabinet should read 15/ID-8.2. Detail 13/ID-8.2, Elevation Reference should read 16/ID-8.2. Detail 1/ID-8.3, Elevation Reference should read 10/ID-8.3. Detail 7/ID-8.3, Section Reference should read 8/ID-8.3. Detail 11/ID-8.4, Add Section Reference for wainscot 10/ID-8.0 and Add Section Reference for Door Casing 12/ID-8.4. Detail 10/ID-13.0, Section Reference should read 11/ID-13.0. Detail 14/ID-13.0, Elevation reference should read 17/ID-13.0 & 18/ID-13.0. Detail 17/ID-13.0, Section Reference should read 15/16/ID-13.0. Detail 18/ID-13.0, Section Reference should read 15/16/ID-13.0. Detail 7/ID-13.1, Section References should read 15/16/ID-13.0. Detail 11/ID-13.1, Section Reference should read 15/16/ID-13.0.
- Item 10:** Specification Section 23 7313 - Modular Indoor, Central-Station Air-Handling Units:
Substitution: McQuay is an acceptable manufacturer.

The following requests for information have been received from contractors. Answers are provided.

Question 1: Drawing E5.01- states to provide a Natural Gas fueled Emergency Generator; Section 26 3213 of the specifications states to provide a Diesel Generator. Which one is correct?

Answer: *See attached Specification Section 26 3213 – Engine Generators – Natural Gas.*

Question 2: Drawing E5.01- states to provide an 85kW 480/277 volt Generator; Section 26 3212 of the specifications states to provide a 350kW 480/277 volt Generator. Which one is correct?

Answer: *See attached Specification Section 26 3213 – Engine Generators – Natural Gas.*

Question 3: Section 26 3213, 2.02C - states to provide a 150 gallon day tank and section D states to provide a dual wall 24 hour sub-base fuel tank. Which one is correct or are both needed?

Answer: *See attached Specification Section 26 3213 – Engine Generators – Natural Gas.*

Question 4: Section 26 3600, 1.04D1 - states to provide close on and withstand ratings as shown on the plans; would you please provide these ratings, did not see it on the plans.

Answer: *Withstand ratings for ATS's: 42,000A, 3-cycle.*

Question 5: Section 26 3600, 1.04D 2&3 – 2 states to provide 3 cycle ratings and 3 states to provide 30 cycle ratings, which is correct?

Answer: *3 cycle.*

Question 6: Section 26 3600, 2.01 – Can Caterpillar and/or ASCO be acceptable ATS manufacturers?

Answer: *Yes, Cat and ASCO are acceptable manufacturers.*

Question 7: Section 26 3600, 2.03 – Specs call for bypass isolation switches; drawing E5.01 do not have the bypass isolation symbol shown; are we to provide bypass isolation switches or non-bypass isolation?

Answer: *Bypass isolation is not required.*

End of Addendum

SECTION 263213

ENGINE GENERATORS - NATURAL GAS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Requirements of the following Division 26 Sections apply to this section:
 - 1. 260100: Basic Electrical Requirements
 - 2. 260500: Common Work Results for Electrical

1.02 DESCRIPTION OF WORK

- A. Provide a natural gas generator set.
- B. Provide an insulated, weatherproof enclosure.

1.03 SUMMARY

- A. Extent of natural gas generator set work is indicated by drawings and schedules, and is hereby defined to include, but not by way of limitation, natural gas engine, electrical generator, engine starting system including batteries, instrument control panel, transfer switches, exhaust silencer, wall thimble, and accessories.
- B. Types of standby generator system equipment required for project include the following:
 - 1. Natural gas engine-driven generator.
- C. Concrete and grout for engine-driven generator pads, foundations, frames and bedplates are specified in Division 3 CONCRETE sections and shall be provided by the Electrical Contractor.
- D. Vibration control for natural gas engine-driven generator units including, pads, springs, rails, bases, hangers, and connectors are specified in Division-15 section pertaining to vibration control and isolation.
- E. Piping and associated accessories required for installation of natural gas engine-driven generator units are specified in Division-15 section pertaining to fuel oil systems.
- F. Refer to other Division 26 sections for wires/cables, electrical boxes and fittings, and wiring devices that are required in conjunction with natural gas engine-generator work.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's data on natural gas engine-driven generator sets and components. This shall include the operating characteristic curves showing percent voltage dip versus locked rotor KVA and percent efficiency versus KVA.

- B. Provide manufacturer's standard product warranty, for duration of not less than five years, for replacement of materials and equipment used in natural gas generator systems. Warranty shall include all parts and labor.
- C. Shop Drawings: Submit layout drawings of natural gas engine-driven generator units and accessories including, but not limited to fuel piping, remote start-stop stations, and instrumentation. In addition, show natural gas generator set units and their spatial relationship to associated equipment. Allow adequate clearance space for removal of natural gas engine generator elements for maintenance purposes.
- D. Wiring Diagrams: Submit wiring diagrams for natural gas engine-driven generator units showing connections to electrical power panels, feeders and ancillary equipment. Differentiate between portions of wiring that are manufacturer-installed and portions that are field-installed.
- E. Agreement to Maintain: Prior to time of final acceptance, the Installer shall submit 4 copies of an agreement for continued service and maintenance of natural gas engine-driven generator sets, for Owner's possible acceptance. Offer terms and conditions for furnishing parts and providing continued testing and servicing, including replacement of materials and equipment, for one-year period with option for renewal of Agreement by Owner.
- F. Certifications: Provide natural gas engine-driven generator sets certified test record of the following final production testing:
 1. Single-step load pickup.
 2. Transient and steady-state governing.
 3. Safety shutdown device testing.
 4. Voltage regulation.
 5. Rated power.
 6. Maximum power.
- G. Provide certified test record prior to engine-driven generator set being shipped from factory to project location.

1.05 WARRANTY

- A. The complete standby electric power system (equipped with set exerciser and running time meter) shall be warranted for a period of five (5) years or fifteen hundred operating hours, whichever occurs first, from the date of initial start-up. The warranty must be provided by the system manufacturer. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided. Warranty shall include all parts and labor.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of natural gas engine-driven generator units and ancillary equipment, of types, ratings and characteristics required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Installer's Qualifications: Firm with at least 5 years of successful installation experience on projects with natural gas engine-driven generator units similar to those required for this project.
 1. Agreement to Maintain: Engage Installer who is willing to execute with the Owner, required agreement for continued maintenance of natural gas engine-driven generator sets.
- C. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC Articles 230, 240, 250, 445, 517, 620, 695, 700, 701, 702, and 705 pertaining to construction and installation of emergency and standby systems.
 2. NFPA Compliance: Comply with applicable requirements of NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines", NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures", and NFPA 110, "Standard for Emergency and Standby Power Systems".
 3. UL Compliance: UL 486A, "Wire connectors and Soldering Lugs for Use with Copper Conductors", and UL2200, "Stationary Generators".
 4. ANSI/NEMA Compliance: Comply with applicable requirements of ANSI/NEMA MG 1, "Motors and Generators", and MG 2, "Safety and Use of Electric Motors and Generators".
 5. NEMA Compliance: Comply with applicable requirements NBMA's Stds Pub No. 250, "Enclosures for Electrical Equipment (1000-Volts Maximum)".
 6. EPA Compliance: Engine-driven generator shall meet all applicable EPA requirements and shall be certified as meeting all emissions requirements.
- D. IEEE Compliance: Comply with applicable portions of IEEE Std 446, "IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications".

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver natural gas engine-driven generators properly packaged and mounted on pallets, or skids to facilitate handling of heavy items. Utilize factory-fabricated type of containers or wrappings for engine-generator and components that protect equipment from damage.
- B. Store natural gas engine-driven generator equipment in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. Handle natural gas engine-driven generator equipment carefully to prevent physical damage to equipment and components. Do not install damaged equipment; remove from site and replace damaged equipment with new.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The catalog numbers herein specified are those of the Onan Corporation and constitute the type and quality of equipment to be furnished. Substitution of alternate manufacturers, other than those indicated, is not acceptable. The emergency generator system shall be complete in every respect including all necessary equipment shown or not shown on the drawings to perform the functions relative to the system operation. All published specifications of the above manufacturers shall be considered as part of this specification even though they may not be shown in complete detail.
- B. Manufacturer: Subject to compliance with requirements, provide natural gas generator sets of one of the following (for each type of generator set):
 1. Onan Corporation
 2. Caterpillar Inc.
- C. Natural gas Generator Set:

1. General: Except as otherwise indicated, provide manufacturer's standard natural gas engine-driven generator set and auxiliary equipment as indicated by published product information, and as required for a complete installation.

D. Natural gas Engine-Driven Generator

1. Provide a packaged standby power natural gas engine-driven generator assembly unit as indicated, rated 85KW, 106.25KVA, at a governed speed of 1800 RPM, and rated 80 percent power factor for continuous operation, 480/277-volt, 3-phase, 4-wire, 60 Hz.
2. Provide generator with 4-cycle, 4 cylinder, 1800 RPM, liquid cooled natural gas engine, and fueled with natural gas. Full pressure lubrication shall be supplied by a positive displacement lube oil pump. The engine shall have coolant and oil filters with replaceable elements, and lube oil cooler. Engine speed shall be governed by an electronic governor to maintain isochronous alternator frequency from no-load to full-load alternator output. The engine shall have a 24 Volt DC battery charging alternator with a transistorized voltage regulator. Remote, 2-Wire starting shall be by a 24 Volt, solenoid shift, electric starter.
3. Provide unit-mounted blower fan, thermostat, and radiator duct flange capable of cooling engine to a maximum 122 Degrees F ambient temperature.
4. Provide associated control equipment to automatically start engine, transfer load to standby power upon failure of normal power source, transfer load back to normal power upon its restoration, and stop engine.
5. Mount engine-generator on heavy steel base with vibration spring isolators to reduce possibility of torsional vibration. Number of isolators to be determined by the engine-generator supplier.
6. Provide engine with low-oil pressure, and automatic over-speed safety shutdown devices.
7. Provide generator with PMG exciter and voltage regulator to maintain voltage regulator within 0.5 percent of rated value.
8. Starting System: Provide engine-generator unit with 24-volt, 2-wire, negative ground, starting system including, 12-volt positive engagement solenoid shift-starting motor, batteries and 45-ampere, or greater, automatic battery charging alternator with solid-state voltage regulation, and disconnect relay to disconnect battery charger during engine starting and running.
9. The fuel system shall include a gas strainer and a secondary gas solenoid valve.
10. Two-stroke natural gas engines shall not be acceptable.

E. Instrument Control Panel:

1. Provide engine-generator control panel with the following:
 - a. Voltmeter, 3.5", 2% accuracy
 - b. Ammeter, 3.5", 2% accuracy
 - c. Voltmeter/ammeter phase selector and OFF switch
 - d. Engine oil pressure
 - e. Engine coolant temperature gage
 - f. Battery charge-rate ammeter
 - g. START - STOP switch for manual operation of unit
 - h. Reset main circuit breaker
 - i. Static voltage regulator
 - j. Voltage-adjusting rheostat for plus or minus 5% voltage adjustment
 - k. Running time indicator
 - l. Frequency meter, 3.5" dial type
 - m. Panel illumination lights and switch
 - 1) Solid State 12 Light Engine Monitoring System to include the following:
 - a) Run (green light)
 - b) Overcrank Shutdown (red)
 - c) Overspeed Shutdown (red)

- d) High Coolant Temperature Shutdown (red)
- e) Low Oil Pressure Shutdown (red)
- f) Pre-warning for High Coolant Temperature (yellow)
- g) Pre-warning for Low Oil Pressure (yellow)
- h) Low Coolant Temperature (yellow light indicated inoperative coolant heater)
- i) Switch Off (flashing red indicates genset not in automatic start mode)
- j) Low Fuel Day Tank (yellow)
- k) Low Fuel Main Tank (yellow)
- l) One customer selected fault (red)

2. Instrument panel shall meet annunciation requirements of NFPA 110 for a Level 1 system.

F. Alternator:

1. Brushless Alternator: The alternator shall be a 4-pole, revolving field design with temperature compensated solid state voltage regulator and brushless rotating rectifier exciter system. No brushes shall be allowed. The stator shall be directly connected to the engine flywheel housing, and the rotor shall be driven through a semiflexible driving flange to insure permanent alignment. The insulation system shall be class H as defined by NEMA MG1-1.65. The three phase, brushless, broad range, reconnectible alternators shall have be twelve leads reconnectible. The minimum motor-starting capability shall be 497 sKVA, with a maximum voltage drop of 12%. Maximum alternator temperature rise shall not exceed 105 degrees C above a 40 degrees C ambient.
2. Alternator shall have field connections to allow for 480Y/277V or 208Y/120V operation.
3. Entrance Boxes: Provide factory installed entrance box extensions as an integral part of the generator set. The boxes shall be provided as necessary to allow for right or left, and top or bottom connections. Verify box requirements for cable entrances and conduit sizes and types prior to ordering of generator.

2.02 ENGINE-GENERATOR SET ACCESSORIES

A. Mainline Circuit Breaker(s)

1. Provide a factory installed mainline circuit breaker(s) as an integral part of the generator set as indicated on the drawings. The mainline circuit breaker shall be sized in accordance with the manufacturer's recommendations and shall be 100% rated with electronic trip units. Breakers and trip units shall meet requirements of NEC 2005, Article 240.6.C.

B. Insulated, Weatherproof Enclosure

1. Provide an insulated, weatherproof enclosure for outdoor installation of generator. Enclosure shall be as manufactured by the generator manufacturer, and shall have proper amount of access panel to allow for proper maintenance of the generator.
2. Enclosure shall be insulated and provided with all necessary dampers, heaters, etc., to maintain a minimum of 40 degrees F ambient as required by NFPA 110. Enclosure shall maintain 40 degrees ambient at an external temperature of -20 degrees F.
3. Muffler shall be located within enclosure.
4. Provide two stage sound attenuated enclosure. Enclosure shall provide noise reduction to a level of 69 dBA at 7 meters at any point around the generator. Provide factory testing information to verify sound levels.

C. Exhaust Silencer and Piping

1. Provide insulated super critical grade exhaust silencer with drain, drain cock, and flexible connector, of types and sizes recommended by the generator manufacturer. Exhaust silencer shall be as manufactured by Nelson.
 2. Provide schedule 40 black iron exhaust pipe. All connections shall be threaded.
- D. Battery/Starting System:
1. Provide lead acid batteries, battery charger, battery rack, and battery cables as necessary for a complete battery/starting system.
 2. Batteries shall be sized to allow for a minimum of four 30 second cranking periods without recharging.
 3. For exterior applications, provide battery blanket/heater capable of maintaining a battery temperature of 65 degrees F.
 4. Provide battery cabling as required by manufacturer to limit voltage drop to an acceptable level. Locate batteries as close as practical to starting motor. Batteries shall be mounted on a nonconductive support/rack and in a location that permits ready access and maintenance.
 5. Provide a float-equalize charger for battery charging system. Provide normal/emergency circuit in EMT conduit to battery charger.
 6. Provide battery monitoring system to continually monitor and test batteries. System shall load test batteries each time engine starts, and shall indicate if batteries are weakened.
- E. Anchors:
1. Provide anchor bolts of galvanized steel, of types and sizes recommended by the generator manufacturer.
 2. Furnish anchor bolts to concrete formwork installer with generator manufacturer's installation drawings and instructions.
- F. Provide remote annunciator panel(s) for generator. Locate where indicated on drawings. Provide all wiring necessary from generator to remote annunciator panel(s) as required by generator manufacturer. All wiring shall be in conduit. Remote annunciator(s) shall not require a separate power connection, but shall be powered through the generator battery system. Communication to remote annunciator panel(s) shall be through networked communication cabling and not through the use of contact closures on wire pairs. Annunciator(s) shall operate up to 2000 feet from generator. Annunciator panel(s) shall meet annunciation requirements of NFPA 110 for a Level 1 system.
- G. Provide exerciser clock to set the day, time, and duration of generator exercise period; also include "with/without load switch."
- H. Provide an AC Voltmeter, an Ammeter, and a Frequency meter. Meters to be 2.5 inch, analog with 2% accuracy. Provide a phase selector switch to allow reading voltage and current line-to-line or three phase.
- I. Provide engine generator emergency shutdown push button with guard and reset.
- J. Miscellaneous Accessories: All accessories needed for the proper operation of the generating set shall be furnished. These shall include a super critical muffler as detailed, 30" OAL stainless steel flexible exhaust connection with flange kits, 120 Volt Single Phase Jacket Water Heaters, and 5 sets of detailed operation and maintenance manuals with parts list.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which the engine-driven generator unit is to be installed and notify the Architect in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 GENERATOR BASE

- A. Provide a 6" concrete pad for the generator as follows:
 1. Coordinate size of generator pad with actual unit sizes provided. Construct base 4-inches larger in both directions than the overall dimensions of the supported unit.
 2. Form concrete pads with framing lumber with form release compounds. Chamfer top edge and corners of pad, 1" at a 45 degree angle.
 3. Install reinforcing bars, tied to frame, and place anchor bolts and sleeves to facilitate securing units.
 4. Place concrete and allow to cure before installation of units. Use Portland Cement conforming to ASTM C 150, 3,000 psi compressive strength, and normal weight aggregate.

3.03 INSTALLATION OF NATURAL GAS ENGINE-GENERATOR SETS

- A. Install the natural gas engine-generator unit as indicated, in accordance with the equipment manufacturer's written instructions, and with recognized industry practices, to ensure that engine-generator units fulfill requirements. Comply with NFPA and NEMA standards pertaining to installation of engine-generator sets and accessories.
- B. During installation, adjusting and testing of the standby emergency power system at construction site, retain and pay for the services of an approved, factory trained engineer or technician employed by the manufacturer of the engine generator set to technically supervise and participate during all adjustments and tests for the set and major auxiliaries in the presence of the Owner's representative.
- C. Coordinate with other work, including raceways, electrical boxes and fittings, piping and accessories, as necessary to interface installation of engine-generator equipment work with other work. Provide strain relief/expansion fittings and flexible connections to generator for all wiring and conduit connections to generator. All wiring shall be stranded.
- D. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A, B and the National Electrical Code.
- E. Install units on spring vibration isolators in accordance with the manufacturer's recommendations.
- F. Align shafts of engine and generator within tolerances recommended by engine-generator unit manufacturer.
- G. Provide a laminated or mounted under plexiglass set of approved operating instructions for the system. Install these instructions under a neat frame on the wall adjacent to the generator.
- H. Provide a sign at the service entrance equipment indicating type and location of emergency generator.
- I. Contractor shall provide lubricating oil, lubrication, coolant water treatment and anti-freeze solution, Prestone or as approved, to -30 degree Fahrenheit, in accordance with the manufacturer's instructions. Provide coolant additives to help protect the engine from corrosion. Use demineralized water in coolant mixture to help reduce corrosion in generator.

3.04 GROUNDING

- A. Provide equipment grounding connections for natural gas engine-driven generator units as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounding.

3.05 FIELD QUALITY CONTROL

- A. Start-Up Testing: Engage local equipment manufacturer's representative to perform start-up and building load tests upon completion of installation, with the Architect/Engineer in attendance; provide certified test record. Tests are to include the following:
 1. Check fuel and lubricating oil for conformity to the manufacturer's recommendations under environmental conditions present.
 2. Test prior to cranking engine for proper operation, accessories that normally function while the set is in a standby mode. Accessories include: engine heaters, battery charger, remote annunciator.
 3. Check, during start-up test mode, for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and phase rotation.
 4. Test, by means of simulated power outage, automatic start-up by remote-automatic starting, transfer of load, and automatic shut-down. Prior to this test adjust, for proper system coordination, transfer switch timers. Monitor throughout the test, engine temperature, oil pressure, battery charge level, generator voltage, amperes, and frequency.
- B. Final site testing of the engine generator set and accessories shall not be less than four hours while carrying all available building loads supplemented by resistive load bank to achieve 100% of set's rating. Generator supplier shall supply load bank and cables as required to complete the above-mentioned test. Test shall simulate a full power outage to the building (i.e., shutting down of building utility source). All arrangements for final test shall be verified with the Owner prior to scheduling final testing.
- C. Upon completion of installation demonstrate capability and compliance of system with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting. Initial testing and retesting to be at no cost to Owner.
- D. Building Operating Personnel Training: Train Owner's building personnel in procedures for starting-up, testing and operating of diesel engine-driven generator sets. In addition, train Owner's personnel in periodic maintenance of batteries. Provide 16 hours of on-site training for Owner's personnel. Training shall be scheduled with Owner and shall be performed during off hours or weekends if requested by Owner.

PART 4 END OF SECTION 263213