

ADDENDUM NO. 1

WL-100 AREA ELEVATED STORAGE TANK PROJECT

NORTHWESTERN WATER AND SEWER DISTRICT

DECEMBER 1, 2020

1. PLANS

a. Plan Sheet E2-Site Plan Electrical

- i. Under the heading "Site Plan/Detail/Riser Notes", delete note 16 related to propane connection for the generator. The generator is diesel powered as noted elsewhere in the plans.

2. SPECIFICATIONS

- a. Please find attached specification SECTION 26 3214—ENGINE GENERATOR-DIESEL for the proposed generator.

PLAN HOLDERS LIST

A plan holders list is available on the District's website: <https://www.nwwsd.org/working-with-us/rfp-rfq-bid-information/>

\*END OF ADDENDUM\*

## SECTION 26 3214 – ENGINE GENERATOR - DIESEL

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK

- A. Provide a new Kohler or Cummins only 80 kW/100 kVA diesel-driven, emergency engine-generator to serve the standby and emergency electrical system as shown on the plans, including all accessories, interconnecting wiring, etc., for a complete and operable installation. Contractor shall provide all electrical connections and place the unit in an operational condition.
- B. The generator shall be capable of providing emergency power at 10 percent of full load capacity, within 10 seconds, after loss of normal power.
- C. Provide on-site fuel tank pressure testings and obtain tank permits in the name of the owner. Fuel tank is part of generator unit, 24 hour fuel tank at full load.

#### 1.2 RELATED DOCUMENTS

- A. Refer to Section 26 0500 for general requirements for the electrical work.
- B. Refer to Section 26 3600 for work associated with transfer switches.

#### 1.3 QUALITY ASSURANCE

- A. Comply with the requirements of UL Standard 2200 for engine generators, 142 for fuel tanks, or 2085 for concrete lined fuel tanks, UL Standard 508 for control equipment and UL Standard 1449 for surge suppressors where specified, unless the requirements of these specifications is more stringent.
- B. Comply with NEMA Standards 250 and ICS 6 pertaining to controls and enclosures, and NEMA Standard MG1 pertaining to generator.
- C. Comply with the applicable portions of NFPA 30 and 37, regarding engines and fuel systems. Comply with the applicable portions of 110 - Level 1 Criteria, regarding emergency and standby power systems.
- D. Comply with the applicable requirement of IEEE Standard 446, regarding emergency and standby power systems for commercial and industrial facilities.
- E. Comply with the applicable requirements of ANSI/IEEE Standard C62.41 regarding design and testing of electronic components for surge handling capacity and protection.
- F. Generator set shall be built, tested and shipped by the manufacturer so that there is one source of supply and responsibility. The performance of the electric plant shall be certified by an independent testing laboratory as to the plant's full power rating and voltage and frequency regulation.
- G. The automatic transfer controls as specified in Section 263600, along with the engine generator, shall be coordinated and supplied as a single and complete package by the equipment vendor.

All replacement parts for the engine, generator and controls shall be available from the servicing agent within 24 hours. The servicing agent shall maintain a representative stock of replacement parts and a competent factory trained technician qualified to serve the entire generator system.

- H. All equipment described herein shall be the product of a single manufacturer and/or his agent of established national reputation and experience who shall have produced and installed similar apparatus for a period of at least 10 years and who shall be able to refer to similar installations now rendering satisfactory service. All materials and parts comprising this unit shall be new, unused, of current manufacture, and of highest quality. One of a kind packaged sets will not be considered. The manufacturer shall maintain ISO 9000 certification.
- I. Exhaust emissions shall comply with the applicable federal, state and local government requirements for standby generator installations. The engine generator shall be factory certified to be in compliance with the latest edition of EPA regulations. Tier 3 certified for emergency applications.

#### 1.4 SUBMITTALS

##### A. Approval Drawings Required:

1. General arrangement showing: floor plan, elevations, dimensions, weights, floor channel mountings, bill of materials, nameplate drawing, and accessories (i.e. radiator, batteries, rack, charger, muffler, day tank, sound attenuating or weather protecting outdoor housing (where applicable), etc.).
2. Electrical drawings showing: controller drawings and elementary wiring diagrams differentiating between factory and field installed wiring.
3. Product data showing all electrical and performance ratings of all components.
4. Recommended typical arrangement drawings for fuel system, exhaust system, exhaust ductwork.

- B. To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer shall be responsible for design prototype tests as described herein. Components of the standby system, such as the engine/generator set and accessories shall not be subject to prototype tests since the tests are potentially damaging. Rather, similar design prototypes and reliability reproduction models, which will not be sold, shall be used for these tests. The performance test of the generating set series shall be in accordance with procedures certified by an independent testing laboratory. The following certified test records shall be submitted along with computer runs of generator set sizing.

1. Maximum power (kW)
2. Maximum starting (kVA) at specified percent instantaneous voltage dip.
3. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40.
4. Governor speed regulation under steady-state transient conditions.
5. Voltage regulation and generator transient response.
6. Fuel consumption at no load, 1/4, 1/2, 3/4 and full load.
7. Harmonic analysis, voltage waveform deviation, and telephone influence factor.
8. Three phase line-to-line short circuit test.
9. Generator Set Cooling Data.
10. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.
11. Endurance Testing.
12. Noise Criteria.

- C. Final Production Tests: Each generator shall be factory tested under varying loads with guards and exhaust system in place. The performance testing of the generating set series shall be in accordance with procedures certified by an independent testing laboratory. A certified test record shall be sent prior to shipment. Test shall include:
  - 1. Single-step load pickup
  - 2. Transient and steady-state governing
  - 3. Voltage regulation
  - 4. Rated Power
  - 5. Maximum Power
  - 6. Exhaust Emissions Test Report
- D. Upon completion of manufacture, the supplier shall deliver four (4) sets of "As Shipped" prints revised as required to reflect manufacturing and shop changes, including all pertinent wiring, wire numbers, terminal strip interface data.
- E. Three (3) set of "As Built" prints shall be turned over to the Owner at project completion. Revisions to any project or shop drawings shall be neatly made, where any changes are discovered or ordered during the installation process.
- F. At project acceptance, the supplier shall provide the Owner with three (3) complete sets of installation, operation, and maintenance manuals, which shall include a complete parts list as well as the manufacturer's recommended list of spare parts. These manuals shall be in typewritten form, bound in a hard fiber three-ring binder. Material provided in the manual shall include, but not be limited to the following:
  - 1. Title of job, owner, address, date of submittal, name and address of engine-generator supplier complete with 24 hour emergency phone numbers. Also provide an index for entire manual.
  - 2. Written description of the operating instruction for each major equipment item provided.
  - 3. A copy of each shop drawing with as-built drawings and all catalog cuts, including a list of all equipment items used on the job, together with the manufacturer's names, addresses, part numbers, equipment quantities, serial numbers and an equipment description. The above shall include all accessories and non-standard options or features provided.
  - 4. Service parts list with drawings and service manuals.
  - 5. All test reports including: generator prototype tests, engine prototype tests, field test reports.
  - 6. All written guarantees, and equipment warranties on all equipment furnished.

#### 1.5 DESCRIPTION OF OPERATION

- A. Provide complete engine start control which operates on closing contact and stop control which operates on opening contact (located within the automatic transfer switch). A cranking cyclor shall be provided to initiate three (3) successive starts and a limiter shall be provided to halt the starting sequence in approximately ninety (90) seconds if the plant is not started within that time.
- B. Upon restoration of normal power and retransfer of loads thereto, generator will continue to operate unloaded for a five (5) minute cool down period, automatically stopping thereafter, ready for further usage.
- C. The engine safeties shall cause engine to shutdown, and annunciate all alarms. All safety shutdowns shall require a manual reset operation. All pre-shutdown alarms and other abnormal conditions including battery trouble and low fuel shall be annunciated at the engine-mounted controller and at a remote annunciator.

## 1.6 WARRANTY

- A. The complete emergency power system shall be warranted for a period of five (5) years or three thousand (3000) operating hours, whichever occurs first, from the date of initial start-up. The warranty shall include the cost of labor, materials, and travel during warranty period. It will include materials to replace items which fail or deteriorate more than in normal use and costs for removal and reinstallation of unit if it requires removal from the site. 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.
- B. Warranty shall include a service and maintenance agreement covering the first year, provided by a factory trained and authorized service technician, consisting of one semi-annual visit to exercise, check, transfer load and perform recommended routine maintenance, parts and supplies (other than fuel), and time to refresh training for Owner's personnel. All on-site maintenance shall be scheduled in advance with the Owner and performed during normal daytime working hours.

## 1.7 DELIVERY AND STORAGE

- A. Deliver generator and loosely shipped items to the site in protective wrappings, containers or other suitable protection which will exclude dirt and moisture. Properly protect all items from damage during construction. Replace items damaged during shipment, handling, storage, or construction.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLY

- A. Engine Generator shall be a completely pre-assembled, "packaged" type unit, including outdoor enclosure (where applicable) ready to set in place and make electrical connections. Fuel system, controller, starter, etc., shall be pre-wired and assembled ready to run. The assembly shall be mounted on and bolted to a welded steel base, suitable for mounting on a level surface. Unit shall be finished with the manufacturer's standard high temperature enamel paint over corrosion resistant pre-treatment and primer.
- B. Batteries, battery charger, blanket battery heater, water jacket heater, control solenoids, muffler, remote annunciator, day tank, etc., shall be provided for a complete and operable installation.
- C. The emergency generator set shall be rated continuous standby; defined as continuous for the duration of any power outage. Output shall be rated for 80 percent power factor, 60 hertz operation at voltage specified in Part 4 of this specification, with engine speed of 1800 RPM. Engine shall be capable of satisfactory operation on No. 2 diesel fuel, grade DF-2.
- D. Unit shall be capable of proper operation within the normal environment at the site: temperature range from -30° C to 40° C; humidity range 0 to 95 percent; altitude up to 1,000 feet above sea level.
- E. The total unit shall be capable of accepting full rated load in a one step application with full recovery to stable speed, voltage and frequency within 2 seconds.
- F. Generator set shall be rated as indicated in Part 4 of this Specification.

- G. The Generator Set sizing requirements shall be verified by a computerized performance analysis program. Results of analysis shall list the project data (name, location, etc.); the stepped loading categories indicated in Part 4 of this specification; the calculated required starting and running loads (kW and kVA), power factor and voltage dip for each step; and the proposed engine-generator specifications demonstrating compliance with the above specifications.
- H. It is the intent of this specification to permit the use of the manufacturer's standard design, except where otherwise noted. All equipment and the methods employed in its manufacture shall conform to these specifications as well as to all applicable standards of ANSI, NEC, IEEE, UL, and NEMA. Where standards of these various authorities or these specifications are at variance, the most rigid shall apply.
- I. Bidders whose standard equipment varies only slightly from that specified, may bid their manufacturer's standard. Such minor variances shall not revise the basic performance or minimum KW rating of the system specified or the intent of the specification.
- J. Bidders desiring consideration for the use of alternative material, equipment, etc., not named in these specifications may submit proposals for the substitution of same for standards as specified. Such manufacturer's/suppliers may receive approval to bid by submitting to the Electrical Engineer ten (10) working days in advance of the bid date two (2) copies of the proposed bill of materials, samples of the proposed equipment as required, company history, qualification information, references of similar projects with contact persons and phone numbers, verification of local sales representation and a permanent, fully assigned field service force. If approved, one (1) copy of the bill of materials will be returned with comments and must form the basis of the installed materials, if such supplier/manufacturer is successful.

## 2.2 GENERATOR SET

- A. The engine shall include, but not be limited to, the following equipment:
  - 1. Engine-driven fuel pump and parallel secondary fuel filters with an electric solenoid fuel shut-off valve. The main pump shall be capable of 6 feet vertical lift. Engine shall be provided with integral, camshaft driven, injection pumps, adjustable for timing and for balancing cylinder pressures. A built-in relief valve shall regulate fuel line pressure and return excess fuel to the fuel tank.
  - 2. The engine shall be provided with a complete self-contained electronic isochronous governor capable of holding the engine speed constant to within  $\pm 0.5$  percent between no load and full rated load. Steady-state frequency regulation shall be 0.25 percent over an operating temperature range of 40° C to  $\pm 85$ ° C. Electronic governors shall be by manufacturer, Woodward, American Bosch, Barber Coleman, or engineer approved equal.
  - 3. The engine shall be cooled by means of a unit mounted radiator. Radiator shall be complete with duct flange suitable for extension by others. The cooling system shall be of the pressure type and shall be of sufficient capacity for cooling the engine when delivering full rated load in the ambient temperatures specified. The engine shall be provided with thermostats. The system shall be capable of maintaining proper engine temperature regardless if the engine is turbocharged, intercooled or aftercooled. Engine water pump shall be gear-driven. Provide flexible hose connections from the engine to the radiator.
  - 4. Ethylene glycol antifreeze coolant shall be provided by the supplier, but mixed with water (50-50 mix) and installed by the Contractor for protection down to -20° F. Additionally, a unit mounted thermostatically controlled engine jacket water heater sized to maintain jacket water temperature of 70° F. Heater supplied shall be at voltage specified in Part 4 of this specification. Also provide a water jacket heater cut-off circuit to disconnect A.C.

power from water jacket heater when engine is running, and isolating valves on each end of the water heater.

5. The 4.5 liter, (276 cubic inch) engine shall be provided with a gear driven oil pump for supplying oil under pressure to main bearings, crank pin bearings and all points for maintaining engine oil pressure at constant value. The engine lubricating oil filter of the full flow design and of the size recommended by the engine manufacturer. The filters shall provide for filtration of the oil after leaving the oil pump and before entering the engine lubricating system. A spring loaded bypass valve shall be provided as insurance against stoppage of lubricating oil circulation in the event the filters become clogged. The full flow filter shall be readily accessible and contain a replaceable type element. All turbocharged engines shall be equipped with a thermostatically controlled oil cooler of the size recommended by the engine manufacturer. A lubricating oil that meets the manufacturer's specifications is to be provided for the initial fill with the unit. A tag indicating the lube oil type and manufacturer is to be provided with engine. Crankcase shall be arranged for gravity drainage without the disassembly of components or use of pumps. Provide extension from oil pan to generator frame for ease of draining oil.
6. Provide dry-type replaceable air cleaner elements of sufficient capacity to protect effectively the working parts of the engine from dirt and dust.
7. The turbocharged engine will be 4 cycle, 4 cylinders, 1800 RPM complete with unit mounted water pump and thermostat.
8. NOTE: Engines requiring glow lugs, pony starters or ether injection will not be acceptable; this system shall meet NFPA 110 for 10 second load assumption.

B. Generator/Alternator

1. The alternator shall be synchronous, salient pole, 10 lead, self-ventilated with drip-proof construction and amortisseur rotor windings and skewed stator for smooth voltage waveform. The electrical insulation shall be Nema MG1, Class H (suitable for a temperature rise of 130°C with an ambient of 40°C), and be vacuum impregnated with epoxy varnish to be fungus resistant per MIL E-497A. The excitation system shall be of brushless construction controlled by a solid state voltage regulator capable of maintaining voltage within  $\pm 1$  percent at any constant load from 0 to 100 percent of rating. The direct axle transient reactance shall not be greater than 20 percent. Waveform deviation factor is not to exceed 5 percent at no load, line-to-line, or line-to-neutral. The telephone influence factor shall be less than 50. The rotor shall be balanced and tested to 25 percent overspeed without damage. The generator shall have a single maintenance free bearing, additionally the generator shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and flywheel.
2. The generator, voltage regulator, and all sensors and electrical trips and controls shall be designed for operation with non-linear loads associated with electronic soft start motor controllers and VFDs brushless, permanent-magnet pilot exciter included.
3. The generator shall be capable of sustaining at least 250 percent of rated current for at least 10 seconds under a 3 phase symmetrical short by inherent design or by the addition of an optional current boost system.
4. On application of any load up to the rated load, the instantaneous voltage dip shall not exceed the specified percent and shall recover to  $\pm 2$  percent of rated voltage within 5 seconds.
5. The alternator output voltage termination shall be identified with permanent markers to indicate phases according to NEMA standards. The neutral shall NOT be grounded at the alternator. Also, alternator output shall be connected at each transfer switch to match the phase rotation as incoming utility power.
6. Provide alternator output bus bar kit in an extra large NEMA 3R enclosure with sufficient lugs of proper size for terminating output conductors and to meet NEC wire bending space. No field fabricated add on enclosure will be permitted. Provide isolated/insulated copper neutral bus and copper ground bus or lug, with neutral bonding jumper.
7. Voltage Regulator shall be capable of adjustment from  $\pm 10$  percent of rated voltage.

C. Controller

1. The controller shall be unit mounted with vibration isolators and shall be completely factory wired to terminal blocks and contain all relays, controls, barriers and cable ways. Provide adequate wire bending space for all conductors. The controller panel shall be complete with, but not limited to the following:
  - a. Fused DC Circuits.
  - b. Start/Stop Control.
  - c. Speed sensing and a second independent starter motor disengagement system shall protect against the starter engaging with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose.
  - d. Cranking cyler with three (3) 15 second on and 15 second off cranking periods.
  - e. Overcrank protection designed to open the cranking circuit after 90 seconds if the engine fails to start.
2. A remote automatic transfer switch as described in Specification 263600 and its associated circuitry shall automatically start and stop the set. The normal utility AC voltage sensing relay will be provided via the automatic transfer switch. A dry contact closure will be provided to signal the engine to start under AC failure. This closure will cause the engine to start and continue running until the contacts open. This signals the engine to shutdown. The engine will shutdown after its cool down time signals it to stop. The cool down timer shall have an adjustable 0-30 minute interval (set initially for 5 minutes).
3. The controller shall have a 3-position rotary selector switch marked, OFF, TEST/MANUAL, and AUTOMATIC. The Test/Manual position shall start the generator for running without load. It is essential that the switch be in the automatic position for normal operation. The panel shall include a timer to allow three (3) successive cranking cycles of equal duration. The controller shall also provide automatic stopping of the engine in the event of over-current, low oil pressure, high water temperature, low water level or loss of water flow, engine overspeed, engine overcrank and alternator overvoltage of 120 percent increase over the nominal voltage phase to neutral, with fault lights to individually indicate each of the above faults. The operation of a remote emergency stop switch shall also shutdown the engine. A manual reset device at the controller must be activated prior to the next attempt to start.
4. Controller shall include an engine monitor panel including indicator lights for engine shutdown conditions and pre-shutdown alarms. Pre-alarms shall include abnormally high and low coolant temperature, abnormal oil pressure, battery trouble, selector "not-in-auto" mode, ground fault alarm, low fuel and fuel tank leak.
5. Instrument Panel
  - a. AC voltmeter, 600 volt (maximum) movement, 2 percent accuracy with 7 position switch to measure standby voltage, phase to phase and phase to neutral via fused, internal voltage transformers.
  - b. AC ammeter, 2 percent accuracy. The scale shall be so arranged that the full load amperes of the generator is 2/3 of the full scale. Provide metering class current transformers, securely mounted within the generator housing or overcurrent relay cabinet.
  - c. Ammeter - 4 position selector switch.
  - d. Direct reading frequency meter, 2 percent accuracy (reed type not acceptable).
  - e. Kilowatt meter.
  - f. Hour meter.
  - g. Oil pressure and water temperature gauge.
  - h. Voltage adjust rheostat.
  - i. DC Lamps with switch to illuminate panel gauges and controls.
  - j. Push-To-Test button to verify that all indicating lamps are functional.



- k. Manual reset device for engine/alternator faults.

D. Additional Features of the Controller

1. In addition to the above engine control panel requirements, provide a generator run relay to operate when the engine is running in either the automatic, manual or test mode. Run relay shall be provided with dry Form "C", 10 ampere contacts, to actuate the ventilating system louvers (where applicable).
2. The controller shall also be equipped with functional dry Form "C" contacts and wiring to terminal board for external field wiring. Contacts shall be provided for "Engine Failure", "Engine Pre-Warning" and "Engine Running" alarms; selector switch "Not in Auto" position; Battery Trouble Alarm; Ground Fault Alarm; Low Day Tank Fuel and Day Tank Leak.
3. All control voltage in the generator controller for auxiliary relays, circuit breakers, and other automatic equipment shall be obtained from either the emergency generator or the engine starting batteries.
4. Controller shall include an integral audible alarm signal with silence switch, which is actuated upon shutdowns and pre-alarms per NFPA 110.

- E. Each generator shall be protected from internal and external electrical faults. Upon fault detection, the engine shutdown device shall be actuated, and a manual reset device at the controller, must be activated prior to the next attempt to start.

- F. Each generator shall be provided with a unit-mounted, three-pole, manually operated line circuit breaker with shunt trip (LSIG), 150 ampere rated at 125 percent of the generator's full output capacity, complete with adjustable trip settings and a ground fault alarm sensor with dry contact output prewired to controller annunciator.

- G. Each engine shall be equipped with an electric starting motor of sufficient capacity to crank the engine at a speed for full diesel start. The starting motor pinion shall be so arranged to disengage automatically when the engine starts. The engine starting system shall be 24 DC Volts. Starting batteries shall be lead acid with a cranking ampere rating for 90 seconds at 0°F, to exceed the generator requirements by at least 10 percent. The batteries shall be of the "Maintenance Free" type, Gould, Delco, or Exide, and shall be provided with a battery stand. This stand shall be so located as not to interfere with normal engine maintenance. The batteries shall be equipped with thermostatically controlled blanket heaters. These heaters shall maintain the batteries at a minimum of 50°F in the ambient temperatures specified and a maximum of 60°F to prevent overheating of the case.

- H. The supplier shall furnish a dual rate battery charger for float charging of the engine starting batteries. The battery charger is to employ a transistor controlled magnetic amplifier circuit to provide continuous taper charging. This charger is to maintain rated output voltage with AC line fluctuations of  $\pm 10$  percent. This charger shall have the following features:

1. Float at 2.17 Volts per cell and equalize at 2.33 V.P.C. for lead-acid batteries.
2. Automatic AC line compensation.
3. Automatic overload protection (current limiting).
4. Silicon diode full-wave rectifiers.
5. Automatic surge suppressors.
6. DC ammeter and voltmeter, flush mounted in unit cover.
7. Fused AC input and fused DC output.
8. Output current failure alarm.
9. Low Battery Voltage Alarm.

The charger shall be by Generator Manufacturer or LaMarche Mfg. Co., with accessories required, 120 volt AC input and shall be wall mounted adjacent to the generator for indoor

applications or within the outdoor housing for outdoor applications. This unit shall have a minimum DC output of 10 amps at 24 volts DC, but shall be sized to provide a full recharge within 24 hours. Electrical Contractor shall provide conduit and wire from charger to batteries and control panel as required.

I. Fuel System

1. Two (2) stainless steel flexible fuel lines rated 300°F and 100 psi ending in pipe thread shall be provided.
2. Provide a U.L. 142 listed double wall sub-base mounted steel fuel tank, sized per Part 4 of this specification, with integral electrical stub-up area and the following:
  - a. 2 inch locking fill cap with 2 inch riser.
  - b. Fuel level gauge.
  - c. Low level alarm contacts.
  - d. Leak alarm contact.
  - e. Leak alarm panel with light and horn for remote mounting.
  - f. Vent riser (5 inches) with 1 ½ inch mushroom vent cap.
  - g. Emergency pressure relief vent for inner tank.
  - h. Emergency pressure relief vent for outer tank.
  - i. As a minimum, the subbase tank shall be sized to safely dissipate any returned unused heated fuel.
  - j. Include fuel/water separator for diesel fuel.

The Contractor shall install the tank and properly mount the generator per the manufacturer's recommendations.

- J. Unit shall be complete with additional vibration isolators, sized by the generator supplier, located between the engine mounts and the steel base, to reduce vibration transmission to the building.

K. Block Heater

1. Block heater, 1500-Watt, 120 Volt AC. Thermostatically controlled and sized to maintain engine coolant at proper temperature to meet requirements of NFPA-110 regulation for 10 sec start-up.

- L. Exhaust System: Provide a critical type exhaust silencer for each generator set. The silencer shall be bottom inlet, end outlet type matched to the engine. The exhaust silencer shall be internally mounted within enclosure.

- M. Weather/Sound-Proof Enclosure: The sound values dB(A) specified in Part 4 of this specification, provide a steel weather protective enclosure with removable or hinged side panels to allow inspection and maintenance. The enclosure shall be coated with powder coated type manufacturer's standard color though an electrical bonding process. The specified exhaust silencer shall be vibra-mounted inside of the enclosure.

- N. All nameplates for the engine alternator set and controller shall be attached with screws or be permanently identified, shall not be painted over nor obliterated and shall not be blocked from view with filters, piping, etc. Identification numbers, model and part numbers, etc., on replaceable elements such as fuel filters, etc., shall remain visible and not be painted over or obliterated.

- O. The following accessories shall be shipped loose:
  - 1. Battery rack, battery cables, 12-volt battery capable of delivering the manufacturer's recommended minimum cold-cranking Amps required at 0°F.
  - 2. Provide remote annunciator to monitor all controller functions described in Paragraph 8.10 of the controller section, plus line power and generator power monitoring. An integral lamp test and horn silencer switch shall be included, as required to meet NFPA 110.
  
- P. The supplier shall provide the following spare parts for each generator, separately packaged and clearly labeled to allow convenient stocking by the Owner.
  - 1. Fuel Filter(s) - one (1) complete set.
  - 2. Air Filter(s) - one (1) complete set.
  - 3. Pilot Light Fuses - six (6) of each type supplied.
  - 4. Fuses - one (1) set of each size and type supplied.
  - 5. Battery Maintenance Kits/Tools

## 2.3 MANUFACTURERS

- A. Engine-generator set shall be as manufactured by manufacturers listed in Part 4 of this specification.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Set the generator in place atop the concrete pad; Neoprene type isolation pad located beneath enclosure.
  
- B. Provide power wiring and grounding to the alternator and connect thereto, insuring that the generator neutral is NOT bonded to the grounding system at the Generator location. Provide branch circuits as shown or required for the unit mounted accessories (i.e. battery charger, battery heater, jacket water heater, etc.) and complete all connections thereto.
  
- C. All necessary fuel piping, lines, connections, from the day tank to the Engine-Generator, shall be provided. Electrical Contractor shall provide the initial fuel fill and shall re-fill the fuel tanks after the on-site test requirements are successfully completed.

### 3.2 FIELD TESTING

- A. Contractor shall require the generator manufacturer or his authorized service agent, to provide the following services for each generator installation, in coordination with the Contractor.
  - 1. Provide any supervisory assistance required.
  - 2. Provide the services of a factory trained field service representative for testing and initial start-up. In addition, instruct the operating personnel in proper operation and maintenance procedures.
  - 3. Provide all parts and labor to fulfill the terms of the standard warranty.

- B. After completion of the installation at the site, the supplier shall provide the services of a qualified factory representative to check the installation. After the installation has been thoroughly checked, the acceptance tests may be scheduled.
- C. Acceptance tests of the generator shall be performed. The Owner and Engineer shall be notified a minimum of two (2) weeks in advance of on-site tests. Note that the generator must be temporarily connected to accommodate field load bank tests.
- D. The manufacturer shall test the alternator set under full rated load by load bank at unity power factor for two (2) continuous hours. Resistive load banks including all necessary cabling for test loading shall be provided and connected by the Contractor. Provisions for location and connection of load banks, shall be by this Contractor. Any and all equipment defects that become evident during the test shall be corrected to the Owners satisfaction before acceptance of the equipment shall be given. On-site tests shall also include the operation of all safeties and controls. On-site two (2) hour tests shall be witnessed by the Owner Representatives, and Engineer. The on site test may be terminated by the Owner or Engineer before the end of the four (4) hour period. Fuel for testing and final fuel fill up shall be provided by the Contractor.

### 3.3 ORIENTATION

- A. The manufacturer's representative shall also include adequate time, in addition to the above load bank testing, to explain the equipment and its operation and maintenance to the operating personnel. Instructions shall include a review of the information contained in the operating and maintenance manuals, recommended preventive maintenance procedures and trouble-shooting guidelines.

## PART 4 - APPLICATION

- 4.1 Generator set shall be manufactured by Kohler, Caterpillar, Cummins/Onan, Detroit Diesel, or engineer approved equal and rated.

- 4.2 80 KW minimum at 480/277 volts, 3-phase, 4-wire, 60 Hertz with 385 motor starting KVA (SKVA) minimum at a maximum instantaneous voltage drop of 35 percent or as required to serve the following stepped loads, when greater:

4.3	Step	Load Description	Load	Motor Control
	1	PP-1 Heater #1	7.5 kW	
		Lighting misc. loads RP-A	5.7 kW	
	2	Water Shed (Future)	9.6 kW	
		Ventilation Blower	4 HP	ATL
	3	PP-1 Heater #2	7.5 kW	
	4	Floating sprayer	15 HP	ATL
	5	Bulk Water Station (future)	10.6 kW	

- 4.4 Engine jacket water heating element lubrication heaters 120 volts, 1500 watts, 1 phase operation.

- 4.5 Fuel system shall be sub-base tank sized for min. 24 hours operation at full load.
- 4.6 Other Options Required
- A. The enclosure shall be outdoor weather sound attenuated (Level 1 83 dB(A) at 23 feet at all loads. Note: if the better sound version is needed, use 69 dB(A) vs 83 dB(A).
  - B. NOTE: Steps and platform not required as tank height is under 36 inches (actual 17 inch height).
  - C. Provide 120 volt, 20 amp duplex receptacle within enclosure near control panel.
  - D. Provide two (2) sets of the following Form-C contact outputs for connection to the owner's monitoring system.
    - 1. Generator Running
    - 2. Generator Failure Alarm
    - 3. Oil Leak Detected Alarm
    - 4. Oil Tank Low Level Alarm
  - E. Provide remote annunciator panel per NFPA 110.
  - F. Remote emergency power off Nema 4X with clear cover plate (Pilla or engineer approved equal).
  - G. State of Ohio fuel tank options: Include 12 feet above grade for normal vent, 5 gallon spill container with automatic shut off when fuel tank is 95% filled. Flammable and combustible liquid labels, high and low fuel switch- alarms at 90%, low fuel (50%), and for any leaks detected.
  - H. Installed shall provide permits for onsite tank testing and making proper arrangements for on-site state of Ohio fire marshal agent to conduct testing. Installer will be responsible for final fuel fill-up after all testing is completed.

END OF SECTION 26 3214