



ADDENDUM 4

Project: Agate Beach Water System Improvements Phase 3 – Booster Pump Equipment/HVAC/and Electrical

Date: 04/22/2024

To: Prospective Bidder

From: Mason County PUD 1

Cc: Kristin Masteller, MCPUD 1

ADDENDUM

Bidder shall sign and attach a copy of this Addendum with Bid Proposal.

Changes and clarifications to the Bid Documents and Plan-Set for the above-referenced project are as follows:

1. Generator is being changed from a Diesel to Liquid Propane. Refer to the Addendum 4 specs (Spec 16230-Generators Addendum 4.pdf and Sheet C-1 Site Plan Addendum 4.pdf) for changes to the Generator Specs and Plan Set.

Acknowledgement of receipt of Addendum: _____

SIGNATURE OF BIDDER

SECTION 16230

GENERATOR ASSEMBLIES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section consists of a packaged liquid propane fueled engine generator set [01 GEN 01] with accessories as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

<u>Section</u>	<u>Item</u>
01300	Submittals
16050	Basic Electrical Materials and Methods
16060	Grounding and Bonding
16410	Enclosed Switches and Circuit Breakers

1.3 DEFINITIONS

A. FULL LOAD

The generator delivering 100 percent of its rated output power.

B. MAXIMUM FREQUENCY DIP AND PEAK

The maximum allowable frequency deviation, in percent, below and above the generator’s specified output frequency during application-specific starting and stopping steps as specified in 1.5.

Example: A 10 percent MAXIMUM FREQUENCY DIP AND PEAK on a 480 Vac, 3 PH, 60 Hz generator equates to ±10 percent (±6 Hz) maximum deviation from 60 Hz, or 54 Hz absolute minimum to 66 Hz absolute maximum frequency limits during the worse-case specified step changes while either loading or unloading.

C. MAXIMUM FREQUENCY RECOVERY TIME PERIOD

The maximum period of time, in seconds, for the frequency to recover back to its specified steady-state operating band following load transitions from no load to full load or from full load no load.

Example: A 5 second MAXIMUM VOLTAGE RECOVERY TIME PERIOD requires that the generator repeatedly recover from full load added or removed load steps within 5 seconds maximum. This means that during a full load transition, in either direction, the generator frequency may deviate from its specified steady-state operating band for a maximum of 5 seconds before it has fully recovered back to its specified steady-state operating band.

D. MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND

The maximum allowable frequency deviation, in percent, below and above the generator's specified operating frequency during steady-state operating conditions at any load between no load and full load.

Example: 0.5 percent MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND on a 480 Vac, 3 PH, 60 Hz generator equates to ± 0.5 percent (± 0.3 Hz) maximum deviation from 60 Hz, or 59.7 Hz absolute minimum to 60.3 Hz absolute maximum frequency limits at any stable operating load from no load to full load.

E. MAXIMUM VOLTAGE DIP AND PEAK

The maximum allowable voltage deviation, in percent, below and above the generator's specified output voltage during application-specific starting and stopping steps as specified in 1.5.

Example: 25 percent MAXIMUM VOLTAGE DIP AND PEAK on a 480 Vac, 3 PH, 60 Hz generator equates to ± 25 percent (± 120 Vac) maximum deviation from 480 Vac, or 360 Vac absolute minimum to 600 Vac absolute maximum voltage limits during the worse-case specified step changes while either loading or unloading.

F. MAXIMUM VOLTAGE RECOVERY TIME PERIOD

The maximum period of time, in seconds, for the voltage to recover back to its specified steady-state operating band following load transitions from no load to full load or from full load no load.

Example: A 5 second MAXIMUM VOLTAGE RECOVERY TIME PERIOD requires that the generator repeatedly recover from full load added or removed load steps within 5 seconds

maximum. This means that during a full load transition, in either direction, the generator voltage may deviate from its specified steady-state operating band for a maximum of 5 seconds before it has fully recovered back to its specified steady-state operating band.

G. MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND

The maximum allowable voltage deviation, in percent, below and above the generator's specified operating voltage during steady-state operating conditions at any load between no load and full load.

Example: 2 percent MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND on a 480 Vac, 3 PH, 60 Hz generator equates to ± 2 percent (± 9.6 Vac) maximum deviation from 480 Vac, or 470.4 Vac absolute minimum to 489.6 Vac absolute maximum voltage limits at any stable operating load from no load and full load.

H. NO LOAD

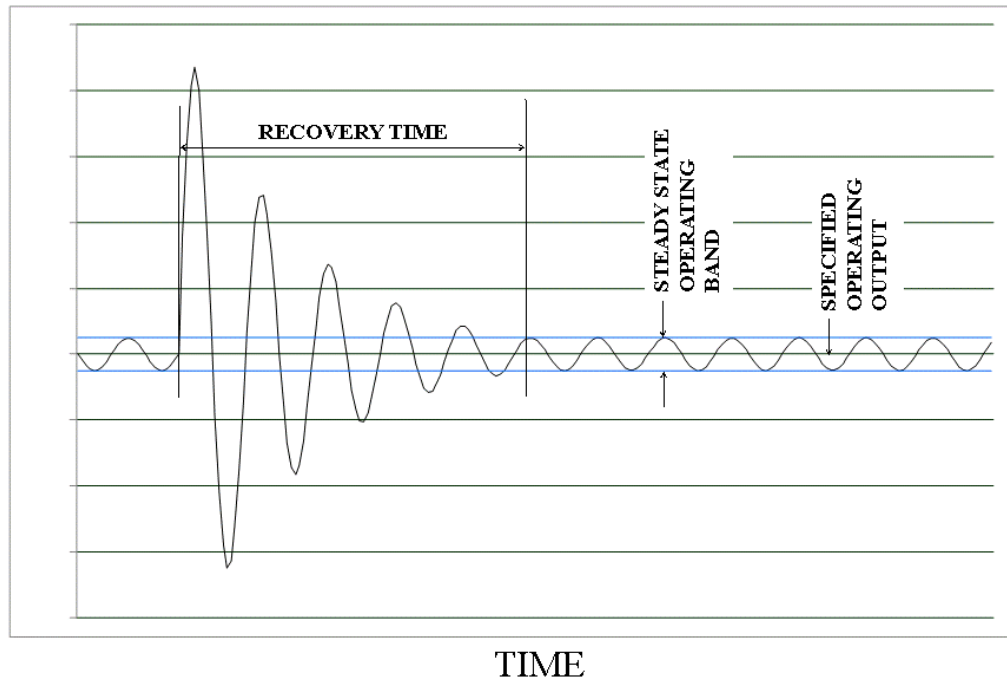
The generator delivering 0 percent of its rated output power.

I. STANDBY POWER OUTPUT RATING

The power output rating equal to the power the generator set delivers continuously under normally varying load factors for the duration of an electrical utility power outage. The power output rating is the gross electrical power output of the generator set minus the total power requirements of the electric motor driven cooling fan, water pump, and other auxiliary loads related to the generator set operations.

J. DEFINITIONS REFERENCE GRAPH

The following graph is a reference chart to better define the following terms "MAXIMUM VOLTAGE RECOVERY TIME PERIOD," "MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND", "MAXIMUM FREQUENCY RECOVERY TIME PERIOD," and "MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND." The Y axis can either be voltage or frequency and the X axis is time.



1.4 REFERENCES

- A. The latest Washington State adopted, published edition of a reference shall be applicable.
- B. All Washington State amendments adopted prior to the effective date of this Contract shall be applicable.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:
 - 1. National Fire Protection Association (NFPA)
 - a. NFPA 58 Liquid Petroleum Gas Code
 - b. NFPA 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
 - c. NFPA 70 National Electrical Code
 - 2. International Fire Code (IFC)
 - 3. International Building Code (IBC)

4. National Electrical Manufacturers Association (NEMA)
 - a. NEMA MG 1: Motors and Generators
5. International Mechanical Code (IMC)
6. Underwriters Laboratory (UL)
 - a. UL 2200 Generator Engine Generator Assemblies
 - b. UL 142 Steel Aboveground tanks for Flammable and combustible Liquids.

1.5 PERFORMANCE REQUIREMENTS

- A. Engineering calculations indicate a standby power output rating requirement of 40 kW at 80 percent power factor at 480/277 volts, 3 phase, 60 hertz while operating under the site conditions listed in Part 1.8 of this Section in an ambient temperature range of 0 to 104 degrees F at less than 95 percent rated capacity. The manufacturer shall calculate generator unit size according to the following bus rated loads and starting steps:

Step No./ Device No.	Device Description	Motor Code	Load Hp	Load kVA	Starter Type	No. of Pulses VFD only)
Step 1						
01 XFMR 01	Transformer, 480-208/120 V, 3 ph	-	-	6.0	-	-
01 XFMR 01	Transformer, 480-240/120 V, 3 ph			9.0		
01 PCP 01	Pump control panel, 1ph			1.0		
01 HT 01	Room heater			3.0		
01 MTR 01	Motor, booster pump no. 1		5.0		VFD	6
Step 2						
01 MTR 03	High flow booster	-	15.0	-	VFD	6

- B. The Generator shall be suitable for operation with pulse width modulated variable frequency drives (connected as loads as shown on the Plans and operating motors throughout a speed range of 6 to 60 hertz) without detrimental effects on voltage or frequency regulation and stability.

C. MAXIMUM VOLTAGE DIP AND PEAK

Shall not exceed 25 percent.

D. MAXIMUM FREQUENCY DIP AND PEAK

Shall not exceed 10 percent.

E. MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND

Shall not exceed 2 percent.

F. MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND

Shall not exceed 0.5 percent.

G. MAXIMUM VOLTAGE RECOVERY TIME PERIOD

Shall not exceed 5 seconds.

H. MAXIMUM FREQUENCY RECOVERY TIME PERIOD

Shall not exceed 5 seconds.

I. ALTERNATOR OUTPUT WAVEFORM

At no load, harmonic content measured line-to-line or line-to-neutral does not exceed 5 percent total and 3 percent for single harmonics. The telephone influence factor, determined according to NEMA MG 1, does not exceed 50.

J. SUSTAINED SHORT-CIRCUIT CURRENT

For a 3-phase, bolted short circuit at the system output terminals, the system will supply 300 percent of rated full load current for not less than 10 seconds to coordinate circuit breaker tripping. This system shall include over-voltage relay protection to preclude damage to any generator system component.

K. TEMPERATURE RISE OF GENERATOR

Within limits permitted by NEMA MG 1, when operating continuously at full nameplate rating, the temperature rise of the generator shall not exceed 250 degrees F over 100 degrees F ambient.

L. STARTING TIME

The maximum allowable time period to cold start the generator, while operating at the low end of the specified temperature range, and have its voltage and frequency sufficiently stable for a transfer switch to accept or automatically initiate a power transfer, shall be 10 seconds.

1.6 SUBMITTALS

For each generator set submit under provisions of Section 01300 and as specified herein.

A. PRODUCT DATA

Provide the manufacturer and a full description of the generator set and associated components. Include features, ratings, and performance including, but not limited to:

1. Engine including the following:
 - a. Horsepower at rated speed and load
 - b. Emission Ratings
 - c. Lubrication oil capacity
2. Overall dimensions of generator set system including the enclosure.
3. Fuel consumption for 1/4, 1/2, 3/4, and full load of generator set
4. Electrical governor
5. Coolant heater
6. Alternator
 - a. Electrical rating (kVA, reactance, time constants, temperature rise, etc.).
7. Voltage regulator type, make, model, and wiring diagram
8. Noise levels at twenty-three feet (7 meters) in a free field

9. Exhaust pipe and muffler sizing backpressure calculations
10. Warranty and Service Agreement documentation
11. Vibration isolation calculations, Plans and seismic certification from manufacturer per the seismic information listed in Part 1.8B of this Section.
12. Bill of Materials
13. Wiring Diagram

B. QUALITY ASSURANCE

Provide documentation showing all CD&Es (compliances, deviations, and exceptions) for this Specification.

C. GENERATOR SIZING CALCULATIONS

Submit calculations showing that the submitted generator's standby power output rating is capable of meeting the specified loads in the specified steps listed. The calculations shall show that the generator meets the specified performance requirements.

D. OPERATION AND MAINTENANCE MANUAL

1. Field Test Reports

Indicate and interpret test results for compliance with manufacturer's published standards for unit provided. Provide written approval of installation in accordance with all manufacturers' recommendations.

2. Operation and Maintenance Data

Provide information to be included in the operation and maintenance equipment manuals specified in Section 01300, Section 11000, and as specified herein.

3. Test Reports

The O&M manual shall include a copy of the factory test data and the field test report.

4. Service Agreement and Warranty

Include copies of the Service Agreement and Warranty in the Operation and Maintenance Manual.

1.7 QUALITY ASSURANCE

See Section 16050.

A. SOURCE LIMITATIONS

1. Obtain engine generator set from a single generator distributor with responsibility for the complete system. Furnish a new product built from components with proven reliability and compatibility. The generator set shall be coordinated to operate as a unit as evidenced by records of prototype testing by the OEM.
2. The warranty shall be supported by the original distributor, not offset to an engine manufacturer, an alternator manufacturer, or a new manufacturer's distributor.

B. Generator set to be UL 2200 listed "Stationary Engine Generator Assemblies."

C. EMISSIONS

EPA certified for all current EPA emissions requirements.

D. FACTORY TEST

Test assembled generator set at the factory prior to shipment to the job site. The power factor for the factory test shall be at 0.8 p.f.

1. Show the following conditions at load and no load on the Generator Set: Charging System Volts, Voltage Output, Frequency, Coolant Temperature, and Oil Pressure, and other pertinent information on the test report. Provide a plot of the transient voltage and a plot of the frequency response versus time as a result of a full load single step.
2. Perform manufacturer's standard factory tests.
3. Test for a minimum of 30 minutes at full load per NFPA 110.

1.8 PROJECT/SITE CONDITIONS

A. ENVIRONMENTAL REQUIREMENTS

Engine generator system is designed, engineered, and rated to withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: Minus 5 degrees F to 122 degrees F.
2. Relative Humidity: 0 to 95 percent.
3. Elevation: Sea level to 500 feet.

B. SEISMIC REQUIREMENTS

The entire generator package including all mounted accessories shall comply with the requirements of the 2018 IBC and ASCE 7-05 Minimum Design Loads for Building and Other Structures, Chapter 13 “Seismic Design for Nonstructural Components,” as referenced and amended by the IBC. Seismic design parameters are as follows:

1. Risk Category IV, Seismic Design Category D.
2. Component Importance Factor: $I_p = 1.5$.
3. Design response acceleration parameters:
 - a. $S_{DS} = 1.2g$.
 - b. $S_{D1} = 0.537g$.

1.9 WARRANTY AND MAINTENANCE

A. WARRANTY

1. The manufacturer shall warrant the materials and workmanship of the generator set for a minimum of 5 years, or 2,500 hours from the registered commissioning and startup.
2. The warranty shall be comprehensive and shall include all components included in the generator package. No deductibles

shall be allowed for travel time, service hours, repair part costs, etc., during the warranty period.

B. 2-YEAR MAINTENANCE SERVICE

Beginning at time of Substantial Completion, provide 24 months full maintenance service performed by qualified service technicians of the manufacturer's designated service organization. Include twice yearly inspections to check for defects and operational abnormalities. Include routine preventive maintenance (oil changes, filter changes, belt adjustments, etc.) as recommended by the manufacturer and perform adjustments as required to bring the generator performance back into compliance with the original specifications. Provide OEM parts and supplies to complete all service to support all factory warranty requirements with written reports to the Owner upon completion of visits. No deductibles shall be allowed for travel time, service hours, repair part costs, etc., during the warranty period.

Provide a 2-hour load bank test on the generator at 11 months and 23 months from the time of Substantial Completion.

1.10 EXTRA MATERIALS

Reference Specification Section 16050 for spare parts.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. APPROVED MANUFACTURERS

1. Kohler, as provided by Power Systems West. No other manufacturers and/or distributors shall be considered for this project.

2.2 ENGINE

A. FEATURES

1. Engine specifically designed for use with the specified fuel type.
2. Engine speed shall be governed by an electronic governor. Refer to frequency requirements specified earlier in this Specification.

B. COMPONENTS

1. Oil Pump

Gear type lubricating oil pump for supplying oil under pressure to main bearings, crankpin bearings, pistons, piston pins, timing gears, camshaft bearings, and valve rocker mechanism.

2. Oil Filters

Full flow oil filters conveniently located for servicing, with a spring-loaded bypass valve to ensure oil circulation.

3. Air Filter

Dry type air filter.

4. Cooling System

Sufficient to cool the engine when the generator set is delivering full rated load in an ambient temperature of 104 degrees F.

a. Engine-driven, centrifugal-type water circulating pump.

b. Thermostatic valve.

5. Coolant/ Jacket/ Block Heater

As described in Part 2.6-B of this Section.

6. Electrical starters sufficient to start the engine within 10 seconds of call to start.

7. Batteries

Lead acid batteries shall be of sufficient capacity to permit starting the generator engine a minimum of four times without recharging. Batteries are to be mounted in an earthquake- and drip-proof rack on the skid, frame, or other approved separate location with required connections provided.

8. Battery Charger
 - a. Silicone rectifier static type, self regulated with high current and full float operation with a filtered output.
 - b. The charger shall be capable of providing a 10 A DC high current charging rate when the battery voltage is below the “float voltage set point.” Full floating charging when voltage is above the set point.
 - c. Battery charger operates from 120 volts, single phase AC connected to Generator Auxiliary Device Panel (GADP) as per Section 2.6.A.
 - d. The charger shall be complete with voltmeter, ammeter, charging rheostat, automatic equalizing timer, and high/low battery voltage alarm.
 - e. The battery charger shall be factory mounted with vibration isolators to prolong service life.
 - f. Battery charger shall include standard NFPA outputs where generator is legally required for life safety.
9. Provide watertight flex connections for all conduits and piping attached to generator.
10. Secondary Gas Regulators: With atmospheric vents piped to the exterior.
11. Fuel-Shutoff Solenoid Valves: UL-listed, normally closed, safety shutoff valves.
12. Dry fuel filter.
13. Manual Fuel Shutoff Valves.
14. Flexible Fuel Connectors.
15. Manufacturer’s recommended cold weather fuel solenoids, match generator battery system voltage.

2.3 ALTERNATOR

- A. Four pole, 1,800 rpm revolving field generator.
- B. Enclosure shall be of drip-proof construction.
- C. Insulation Class H.
- D. Wiring shall be 12-lead, reconnectable, and configured for the specified voltage, phasing, neutral point, and frequency.
- E. ALTERNATOR HEATER

As described in Part 2.6-B of this Section.

2.4 VOLTAGE REGULATOR

An electronic voltage regulator shall be provided.

2.5 CONTROL PANEL

The Control panel shall be of the rotatable dead-front type, vibration free mounted on the generator set. The generator control panel and the generator main circuit breaker shall be installed per NEC clearances and provide accessibility to equipment. The tops of control panels and the circuit breakers shall be mounted a maximum of 72 inches above the finished floor.

- A. The control panel shall operate at 12 or 24 VDC from the generator/battery electrical system as required by manufacturer based on the size of the system.
- B. Control panel shall include the following functions/devices:
 - 1. Automatic Starting System
 - a. Provides three 15 second cranking cycles and two rest periods followed by a lockout and alarm.
 - b. Operation is initiated by the closing of a remote Form A contact in the automatic transfer switch control circuit.
 - 2. Indicating light for alarm condition.

3. Indication for the following:
 - a. Running
 - b. Low coolant level
 - c. High coolant temperature
 - d. Low oil pressure
 - e. Over speed
 - f. Over crank
 - g. AC volts for each phase
 - h. AC current for each phase
 - i. Frequency
 - j. Lube oil pressure
 - k. Coolant temperature
 - l. Run Time
 - m. Number of Starts
4. Engine “AUTO-OFF-MANUAL” control selector switch.
5. Red colored emergency shutdown pushbutton/switch.
6. Time delay relay to permit operation at “NO-LOAD” after retransfer of load to normal source (cool down timer).
7. Automatic safety controls which shut down the engine on:
 - a. Low lubricating oil pressure
 - b. Low coolant level
 - c. High jacket water temperature
 - d. Engine over speed

8. Include a Form A (N.O. Dry) contact for remote connection for each of the following Generator functions.
 - a. Running
 - b. General Alarm
 - c. Fail (shall include, as a minimum, any combination of conditions in 8 above)
 - d. AUTO-OFF-MANUAL control switch in Auto Mode
 - e. Low Battery Voltage
 - f. Low Oil Pressure
 - g. High Coolant Temperature
 - h. Low Fuel Pressure

2.6 ACCESSORIES

A. GENERATOR AUXILIARY DEVICE PANEL

The generator manufacturer shall provide, install, and prewire a Generator Auxiliary Device Panel (GADP) as part of the generator system with the following minimum features:

1. The GADP shall consist of a NEMA 1 gasketed 240/120 VAC rated single phase load center with a main breaker and appropriately sized branch circuit breakers for the battery charger and the heaters listed below under GENERATOR HEATERS. Available power to the panel shall be 208/120 VAC, single phase.

Exception:

The GADP load center can be replaced with one or more 20 A, 4-plex receptacle sets in cast aluminum boxes under the following conditions:

- a. *The battery charger and all heater loads are 120 VAC, single phase,*

- b. *The sum of the battery charger and all heater loads does not exceed 1920 VA (16 A),*
 - c. *All loads are prewired by the manufacturer with grounded plug cables,*
 - d. *The receptacles are placed within reach of all load plugs,*
 - e. *If required, multiple 4-plex receptacle sets are connected together by the manufacturer (provide a single electrical connection point for the Contractor).*
2. For outdoor generators, the GADP shall be securely mounted within the enclosure in a location easily accessible by the operator and to a Contractor-provided power conduit.
 3. The GADP shall be internally connected to the described loads by the generator manufacturer.
 4. It is the intent that the Contractor need only provide a single power conduit and associated conductors to the manufacturer-provided GADP and terminate the conductors to a main circuit breaker, neutral, and ground. All connections for heater controls and devices shall be prewired and pretested by the manufacturer.

B. GENERATOR HEATERS

1. Coolant Heater

Engine mounted, thermostatically controlled immersion type engine coolant heater to ensure a minimum coolant temperature of 120 degrees F at ambient room temperature of 5 degrees F. Provide as shown in the table below.

Provide the following generator set heaters:

Device	Voltage Configuration	Wattage (W)
Coolant Heater	208 (1ph) or 120V	~1,500

C. CIRCUIT BREAKERS

1. Provide an output main circuit breaker according to the plans and specifications section 16410. This breaker shall be lockable in its

open position. The breaker shall have an auxiliary contact that is open when the breaker is in the open position. This circuit shall be prewired by the generator manufacturer to dedicated terminals in the generator control panel. Wire between these devices in LFMC conduit.

2. Provide a generator field protection circuit breaker, or other means to protect the alternator.
3. Provide a load bank circuit breaker according to the plans and that meets specification section 16410.

D. DECALS, PLACARDS, AND SIGNS

1. The generator manufacturer shall provide all decals and signage as required by the regulatory and/or inspecting agency for the particular installation, including, but not limited to the following:
 - a. One hazardous material placard, diamond shape, 4 color (red, white, blue, yellow) in accordance with NFPA 704.

E. VIBRATION ISOLATORS

1. Provide vibration isolators between the unit and the concrete equipment pad. The isolation mountings shall consist of malleable cast iron top and bottom housings incorporating steel spring or elastomeric construction and shall be provided with built-in leveling bolts, elastomeric pad and built-in resilient chocks to control oscillation and withstand lateral forces in all directions. Isolators shall be presized and installed in accordance with the recommendations of the generator set manufacturer.
2. Vibration isolation efficiency shall be 96 percent at 1,800 rpm. Provide Korfund or equal.
3. Calculations shall be provided with the vibration isolation submittal demonstrating that the specified efficiency can be met with the project specific system characteristics.
4. Vibration isolators may be waved with manufacturer's documentation that the entire generator package including mounted accessories is IBC certified without them.

F. ANCHORS

Anchors used to secure the generator to the base or other stable surface shall be designed and sized by the manufacturer. Anchors shall be cast-in-place 316 stainless steel anchor bolts or drilled-in 316 stainless steel anchors set with epoxy adhesive. Expansion type anchors shall not be acceptable. The Contractor shall provide and install these anchors.

2.7 EXHAUST SYSTEM

A. Sufficiently sized to ensure against loss of power due to excessive backpressure in accordance with engine manufacturer's recommendations. Include a drain plug and drip leg in low point of exhaust piping to protect engine. Terminate exhaust piping with a rain cap.

B. The exhaust systems shall be mounted inside the enclosure.

C. FLEX CONNECTION

Provide a stainless steel flexible exhaust connector, with an exhaust temperature test fitting, flanged for service disconnection.

D. SILENCER

Provide a critical grade silencer. Silencer construction shall be steel with high temperature paint or aluminized finish.

2.8 ENCLOSURE

A. ACOUSTICAL ENCLOSURE

The Generator shall be provided with a skintight acoustical weather protective enclosure.

1. The enclosure shall reduce the sound pressure level of the generator set while operating at full rated load to an average of 65 dBA at any location 23 feet (7 meters) from the generator set in a free field environment.

2. The enclosure shall have hinged access doors to maintain easy access for all operating and service functions. All hardware and hinges shall be stainless steel. All doors shall be lockable and include retainers to hold the door open during servicing. The roof shall be cambered to prevent the accumulation of water. The roof

and walls shall be designed to withstand snow and wind loads per the IBC.

3. All sheet metal shall be primed for corrosion protection and finish painted with a color chosen by the Owner from the manufacturer's standard options.
4. The air intake and exhausts shall be sized to provide ample airflow for the generator set operation at rated load in ambient temperature of 100 degrees F.

2.9 FINISH

The entire standby generator set assembly with accessories is to be factory painted, color chosen by Owner from manufacturer's standard colors. Generator set manufacturer shall provide appropriate epoxy/polyurethane coating system for high heat conditions.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

Deliver engine generator set and system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is safe from such hazards. Field repair of material or equipment made defective by improper storage or site construction damage by other trades may be cause for rejection of installation.

3.2 PROPANE FUEL VENDOR

The District's propane fuel vendor is Peak Propane, (360) 463-1381. Peak propane will provide and install the propane fuel tank, and fuel lines and accessories from the fuel tank to the generator.

The Contractor shall be responsible for coordinating and scheduling the propane fuel vendor's work, shall coordinate the location of the fuel stub up into the generator enclosure, and shall provide all earthwork trenching and backfill for the buried fuel lines.

3.3 INSTALLATION

- A. Install the complete generator set and accessories per the manufacturer's installation instructions.

1. Anchor the generator set to concrete housekeeping base or pad with high strength anchors and adequate penetration suitable for the Seismic Design Category as specified in the Plans.
 2. Make all electrical connections between accessory items, which are not factory wired, prior to requesting the test engineer.
- B. Maintain minimum workspace around unit and components per manufacturer's installation shop plans and NFPA 70 NEC.
- C. Provide a complete fill of lubricating oil.
- D. Provide a complete fill of manufacturer approved antifreeze (ethylene-glycol) and water to protect the engine and heat exchanger cooling system to minus 25 degrees F.
- E. Contractor shall locate generator control panel and the generator main circuit breaker per NEC clearances and provide accessibility to equipment. Neither shall be mounted more than 72 inches above the floor. Include all costs associated with relocating the standard control/service panel arrangement on generator set to maintain code requirements in the Bid Cost.
- F. The generator set shall not be started up or tested in the field until all exhaust piping has been insulated as specified and shown on the Plans. All intake and exhaust louvers and fuel system components shall be fully functional.

3.4 IDENTIFICATION

Identify field installed wiring, components, and provide warning signs as specified in Section 16050.

3.5 GROUNDING

Provide ground continuity to facility electrical ground system as indicated in the Plans and Specification 16060.

3.6 FIELD QUALITY CONTROL

- A. Provide services of a factory authorized service representative to provide inspection results of field visit and field testing in writing.

B. TESTING AGENCY

Provide the services of a qualified independent testing agency to perform specified field quality-control testing.

C. TESTING

1. Prior to Energization

After installing disconnect switches and circuit breakers, perform visual and mechanical inspection of enclosure and devices.

2. After Energization

After electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

Correct malfunctioning units on site where possible and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

D. FIELD TEST

Test the assembled generator set after installation at the job site is complete.

1. Advise the Engineer, the Integrator, the Contractor, the local Fire Prevention Inspector, and the Owner of the proposed time and date of the field test at least 2 weeks in advance so that the test may be witnessed if desired.
2. Under supervision of a factory authorized service representative, pretest all system functions, operations, and protective features. Provide all instruments and equipment required for tests. Adjust to ensure operation is according to specifications.
3. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations and these specifications under the environmental conditions present and expected.
4. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include, but not be limited to: all electric heaters, battery charger(s), etc.

5. Cold Start Test
 - a. The unit shall demonstrate the ability to start from a “cold” standby condition (i.e., normal standby mode with engine coolant temperature established by properly functioning water-jacket heater).

6. Calibration and PLC Signal Status Check
 - a. Calibrate all sensors and instruments.
 - b. Verify the scaling and connections of each signal to the terminal strip identified in the Planset.

7. Generator Load Testing

8. Generator load testing shall be provided using a manufacturer-provided temporary load bank at 1.0 power factor. The generator shall be operated at 50 percent of full load rating for thirty minutes, followed seamlessly by thirty minutes at 80 percent of full load rating, followed seamlessly by one hour at 100 percent full load rating.

9. After the first 15 minutes at full load, the following shall be recorded at 15-minute intervals (four recordings).
 - a. Voltage (phase to phase and phase to ground) and phase rotation
 - b. Amperage (each phase)
 - c. Frequency
 - d. Fuel pressure, oil pressure, and water temperature
 - e. Exhaust gas temperature at engine exhaust outlet
 - f. Ambient temperature

During the load test period, check for exhaust leaks, path of exhaust gases outside the building or enclosure, cooling air flow, movement during starting and stopping, vibration during 80 percent and 100 percent loading.

A certified copy of the test results shall be given to the Engineer and supplied with the O&M manuals.

10. The following test shall be observed by the local Fire Prevention Inspector:
 - a. Prior to any filling of combustible or flammable liquids the base tank shall be pressure tested per NFPA 30, Section 2.4.2. Include the test report in the O&M manuals.
 - b. The fuel fill container shall be tested for proper operation.
11. The Contractor shall demonstrate the backup power system is fully functional by simulating power outages. Coordinate phase rotation with the Contractor prior to transferring power.

E. RETEST

Correct deficiencies identified by field tests and observations, and retest until specified requirements are fully met.

3.7 TRAINING

- A. The manufacturer of the generator set shall conduct specifically organized training sessions covering operation and maintenance of the unit for personnel employed by the Owner. The training sessions shall be conducted to educate and train the personnel in maintenance and operation of all components of the unit. Training shall include, but not be limited to, the following:
 1. Preventative maintenance procedures
 2. Trouble-shooting
 3. Calibration
 4. Testing
 5. Replacement of components
 6. Automatic mode operation
 7. Manual mode operation

- 8. Fuel and monitoring system
- 9. Spare parts that have been provided
- B. At least one training session, at least 3 hours in duration, shall be conducted at the site after startup of the system. The manufacturer shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least 2 weeks prior to the time of the training.

3.8 FINAL ADJUSTMENTS

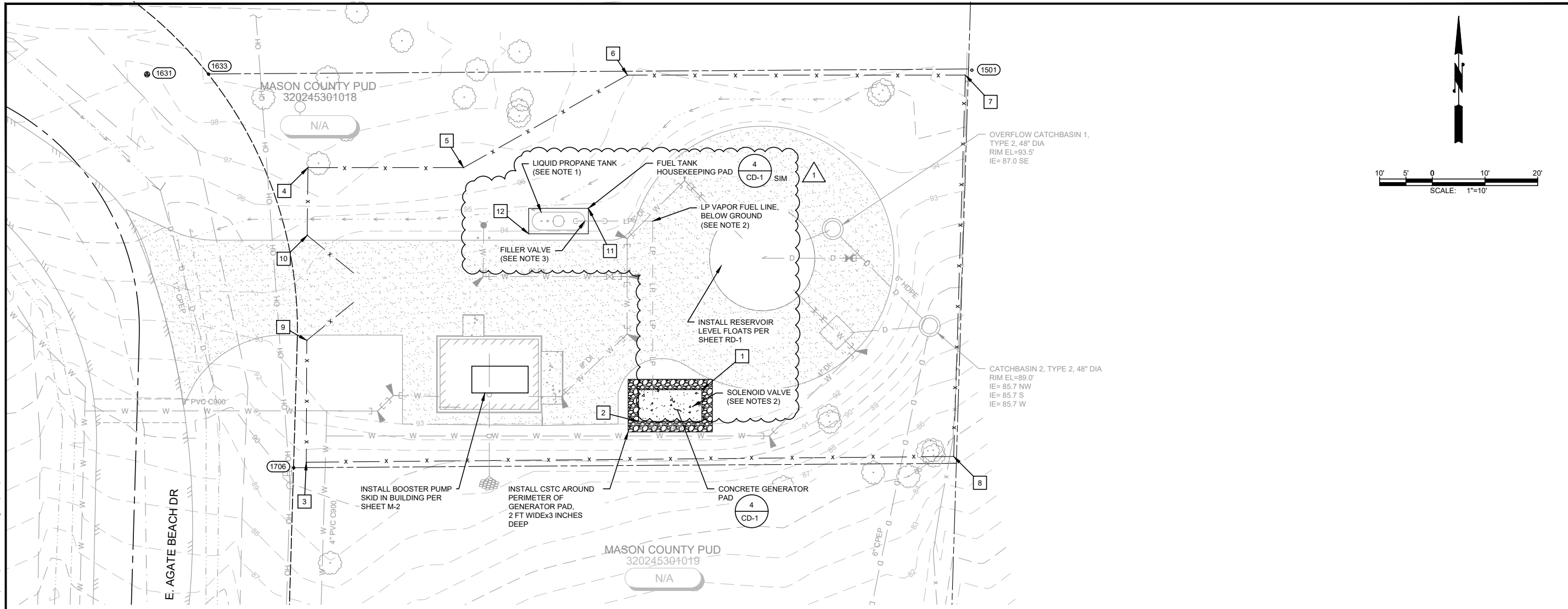
- A. Adjust voltage and frequency output of generator set to nominal ratings and mark gauges with plastic pen for normal, operation references for Owner.
- B. Adjust time response of control system to meet site performance requirements.
- C. Check all remote connections again for proper tightness.

3.8 CLEANING

Upon completion of installation and startup, inspect engine generator set. Remove paint splatters, other spots, dirt, and debris. Perform touchup painting to cover scratches and marks to finish. Match original finish of generator set.

***** END OF SECTION *****

\\goSERVER3\data2\Mason County PUD 1\20275.00 Agate Beach Water System Improvements\01 Design\Planset PH3\Civil\SITE PLAN.dwg, 4/19/2024 2:08 PM, ERIN SO



- NOTES:**
1. THE OWNER'S PROPANE VENDOR, PEAK PROPANE, WILL PROVIDE AND INSTALL A "500 WATER GALLON" LIQUID PROPANE TANK THAT WILL SUPPLY A VAPOR SUPPLY TO THE GENERATOR. EARTHWORK, TRENCHING, BACKFILL, AND RESTORATION SHALL BE BY GENERAL CONTRACTOR.
 2. THE LP VAPOR LINE, A 1ST STAGE PROPANE REGULATOR AT THE FUEL TANK AND A 2ND STAGE REGULATOR AT THE GENERATOR SHALL BE SIZED, PROVIDED AND LOCATED BY THE OWNER'S PROPANE VENDOR TO ALLOW THE GENERATOR TO OPERATE AT 100% LOAD PER NFPA 58. THE GENERATOR HAS A FUEL CONSUMPTION RATE OF 220 CUBIC FEET PER HOUR AT 100% LOAD. CONTRACTOR TO CONNECT TO THE GENERATOR.
 3. LOCATE THE FILLER VALVE ON THE WEST SIDE OF THE FUEL TANK.

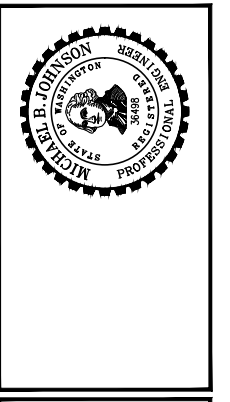
PAD AND FENCE TABLE

X	DESCRIPTION	ELEVATION	NORTHING	EASTING
1	CONCRETE PAD, NE CORNER	93.0	694116.41	1017305.05
2	CONCRETE PAD, SW CORNER	93.0	694122.41	1017317.05
3	FENCE CORNER	90.5	694108.66	1017241.97
4	FENCE CORNER	95.9	694164.58	1017242.29
5	FENCE CORNER	94.5	694164.58	1017271.83
6	FENCE CORNER	96.0	694182.15	1017302.94
7	FENCE CORNER	95.7	694182.15	1017367.08
8	FENCE CORNER	84.3	694109.75	1017364.85
9	GATE POST	94.2	694131.80	1017242.07
10	GATE POST	95.0	694151.73	1017242.16
11	CONCRETE PAD, NE CORNER	94.0	694156.86	1017295.52
12	CONCRETE PAD, SW CORNER	94.0	694152.02	1017284.19

Gray & Osborne, Inc.
CONSULTING ENGINEERS
1130 RAINIER AVENUE SOUTH, SUITE 300
SEATTLE, WASHINGTON 98144 • (206) 264-0860

DATE: NOV 2023
DRAWN: RAH
CHECKED: ANM
APPROVED: MBU

REVISION	DATE	APPD
PROPANE GENERATOR ADDENDUM	4/24	AMP
1		No.



MASON COUNTY PUD #1
WASHINGTON
AGATE BEACH WATER SYSTEM
IMPROVEMENTS PHASE 3 -
BOOSTER PUMP EQUIPMENT/HVAC/
AND ELECTRICAL
SITE PLAN

SHEET: C-1
OF: 1
JOB NO.: 20275
DWG: SITE PLAN

0 1" 2"
TWO INCHES AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY