



Addendum No. 2 to Contract Documents

Project	Grit Removal and Plant Modifications Ithaca Area Wastewater Treatment Facility	Project No.	11153020
Owner	City of Ithaca, NY Town of Ithaca, NY Town of Dryden, NY	Federal Project No.	--
Contract No.	1 - General 2 - Electrical 3 - HVAC	Date	November 8, 2019

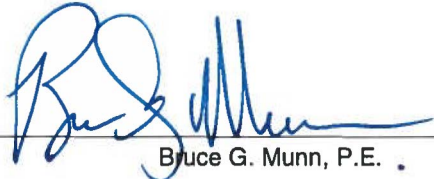
To All Contractors:

Contractors submitting proposals for the above-named project shall take note of the following changes, additions, deletions, clarifications, etc., in the Contract Documents, which shall become a part of and have precedence over anything contrarily shown or described in the Contract Documents, and all such shall be taken into consideration and be included in the Contractor's Bid Proposal.

Please see attached pages.

The return receipt requested with this communication is to be deemed evidence that the bidder has received this addendum and has followed the instructions outlined therein.




Bruce G. Munn, P.E.



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Grit Removal and Plant Modifications
Ithaca Area Wastewater Treatment Facility
City of Ithaca, NY; Town of Ithaca, NY; Town of Dryden, NY
Contract No. 1 - General
Contract No. 2 - Electrical
Contract No. 3 - HVAC
GHD Project No. 11153020
November 8, 2019

Item No. 1:

Invitation to Bid. In the first paragraph, **DELETE** "November 12, 2019" and **REPLACE** with "November 19, 2019."

Item No. 2:

Section 16620, Packaged Engine Generator Systems. **DELETE** existing Section 16620 and **REPLACE** with attached Section 16620 (Attachment No. 1).

Item No. 3:

Contract Drawings, Sheet C001. **INSERT** Figure 1 (Attachment No. 2).

Item No. 4:

Contract Drawings, Sheet A002.

A. **ADD** the following note: "Interior of new grit building shall be painted, as specified in Section 0990, Painting."

Item No. 5:

Contract Drawings, Sheet S009.

A. **ADD** the following note: "Structural steel shall be galvanized. Provide isolation coating to prevent direct contact with aluminum, as specified in Section 05500, Miscellaneous Fabrications."

Item No. 6:

Contract Drawings, Sheet S012.

A. **ADD** the following note: "Chemical unloading pad vault as specified in Section 03410, Plant-Precast Structural Concrete."

B. **ADD** the following dimensions to the chemical unloading pad vault:

- Inside Diameter 6 feet
- Inside Height..... 5 feet

Item No.7:

Contract Drawings, Sheet E003. Electrical Lighting Details. For Luminaire "BL" manufacturer, **DELETE** "DAY-BRITE" and **REPLACE** with "PHILIPS/DAY-BRITE."

Item No. 8:

Contract Drawings, Sheet E005. Process Structure North - Partial Lower Level Lighting, HVAC and Utilities Plans,

A. **ADD** a second lighting switch adjacent to the lighting switch shown.



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- B. **REVISE** lighting wiring such that 50% of lighting fixtures are controlled by each switch.
- C. **DELETE** the annotation "GRB-F-1, GRB-MOD-1, GRB-MOD-2, and GRB-EUH-1" and **REPLACE** with "PRS-F-1, PRS-MOD-1 ROOF Mounted, PRS-MOD-2 ROOF Mounted, and PRS-EUH-1", respectively.
- D. **ADD** a Manual Motor Starter (MMS) near Electrical Room Exhaust Fan PRS-F-1.
- E. **ADD** a duplex receptacle with weatherproof while in use cover adjacent to the influent sampler and provide 3/4"Cw/2#12's, 1#12G (120V power) and wire to LP-PSN1 Panelboard.
- F. In General Notes 1 and 2, **DELETE** "16120" and **REPLACE** with "16055."

Item No. 9:

Contract Drawings, Sheet E007. Grit Building Electrical Lighting, Utilities, and HVAC Plans.

- A. **ADD** a second explosion-proof lighting switch adjacent to the explosion-proof lighting switch shown.
- B. **REVISE** the lighting wiring such that 50% of lighting fixtures are controlled by each switch.
- C. In Panelboard General Note 2, **DELETE** "16120" and **REPLACE** with "16055."

Item No. 10:

Contract Drawings. Sheet E008, Grit System Electrical Schematic Diagrams, **ADD** the following note:

"GRIT SYSTEM DIAGRAM NOTE:

1. GRIT CONVEYORS (GWC-01, GWC-02) FIELD DISCONNECT SWITCHES SHALL BE 480V, 30A, 3P, NEMA 7."

Item No. 11:

Contract Drawings, Sheet E009, Grit Building Electrical Schematic Diagrams.

- A. **DELETE** the callout "Louver," "Motorized Damper," and "Exhaust Fan GRB-F-1" and **REPLACE** with "PRS-MOD-1," "PRS-MOD-2," and "PRS-F-1", respectively, in both the Elementary and Schematic diagrams.
- B. **REMOVE** louver, motorized dampers, and related wiring and seal-off fittings in Roof Heat Recovery Unit (GRB-HRU-1) schematic diagram.

Item No. 12:

Contract Drawings, Sheet E010, Grit Building Addition One-Line Diagram, **DELETE** Sheet No. E010 and **REPLACE** with revised Sheet No. E010 (Attachment No. 3).



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Item No. 13:

Contract Drawings, Sheet E011, Electrical Panel Schedules and Equipment Schedules

A. **ADD** the following Note 2 to the LP-PSN1 Panelboard schedule:

“2. Breaker to be GFEP type.”

B. **ADD** number “2” in the “NOTE” column next to Influent Sampler in LP-PSN1 Panelboard schedule.

C. **ADD** the word “Receptacle” next to Influent Sampler in LP-PSN1 Panelboard schedule.

SECTION 16620

PACKAGED ENGINE GENERATOR SYSTEMS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Packaged engine generator sets and controls, including paralleling controls.
- B. Exhaust silencers, catalyts, and fittings.
- C. Batteries and chargers.
- D. Fuel piping and fittings.
- E. Remote annunciator panels.
- F. Coordination with local electric utility.
- G. Weatherproof, non-walk-in, sound attenuating enclosure.
- H. Switchgear and automatic transfer switch

1.02. RELATED SECTIONS

- A. Section 01010 – SUMMARY OF WORK
- B. Section 01039 - COORDINATION
- C. Section 01300 - SUBMITTALS
- D. Section 01400 - QUALITY CONTROL
- E. Section 01600 - MATERIAL AND EQUIPMENT
- F. Section 01640 - EQUIPMENT-GENERAL
- G. Section 01700 - RECORD DOCUMENTS
- H. Section 03300 - CAST-IN-PLACE CONCRETE
- I. All Division 16 Specification Sections

1.03. REFERENCES

NEMA AB1	Molded Case Circuit Breakers
NEMA MG1	Motors and Generators
NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)
NFPA 30	Flammable and Combustible Liquids Code
NFPA 70	National Electrical Code
NFPA 99	Health Care Facilities

NFPA 101	Life Safety Code
NFPA 110	Emergency and Standby Power Systems

1.04. SCOPE OF WORK

- A. The emergency power system is designed to accommodate two, new diesel emergency generators operating in parallel with each other in a stand-by emergency power mode. Each generator shall be provided with an individual output circuit breaker, paralleling controls, and protective relay functions. Each will have the capability of being the 'master' control to which the second generator syncs to. Synchronizing controls shall be either integral to the generator controls or provided as a separate section of the generator supplier's switchgear. Each generator enclosure shall be provided with a 208/120V, 100A, 3P, 4-wire panelboard with quantity and size of circuit breakers as required to power generator ancillary loads.
- B. The generator supplier shall provide switchgear with a minimum of; a circuit breaker for each generator, a main emergency bus circuit breaker; a main utility service entrance circuit breaker; a closed transition automatic transfer switch; a transfer switch load side main circuit breaker; a 75 kW transformer (480V primary, 208/120V secondary, 3P, 4-wire); and a 208/120V, 225A, 3P, 4-wire panelboard with quantity and size of circuit breakers as required to power individual generator panelboards and switchgear ancillary loads.
- C. Each generator shall be provided with a weather-proof, sound attenuated enclosure and skid-mounted fuel tank and all associated piping, conduit, wiring, and all required appurtenances for a complete emergency standby generating system as shown, specified, and required. Provide one emergency generator, complete paralleling controls and switchgear, and closed transition automatic transfer switch as part of the base bid. The second generator shall be part of an alternate bid item. The Base Bid shall include accommodations in the switchgear and control scheme to seamlessly integrate a second generator in the future should the Alternative Bid (second generator) not be accepted.
- D. The Contractor and/or emergency power system supplier shall coordinate with the local electric utility and submit all required applications and permit requests for utility acceptance of the closed transition automatic transfer switch. All cost of this effort shall be included in the contract.
- E. Contract Drawings E019, E020, and E021 illustrate a typical design arrangement where the paralleling controls are integral to the generator controls. Contract Drawings E022, E023, and E024 illustrate a typical design arrangement where the paralleling controls are centrally located in the switchgear. The actual arrangement of the switchgear, as well as the quantity and size of conduits, conductors and circuit breakers will be dependent upon the actual emergency power system submitted by the Contractor. The Contractor shall coordinate with his manufacturers and suppliers to determine the exact arrangement. No change orders will be considered if the actual layout submitted differs from the typical arrangements shown on the Contract Drawings.
- F. Coordinate actual equipment physical sizes and weights with the General Contract for concrete pad sizing.

1.05. SUBMITTALS

- A. Submit under provisions of Sections 01300, Submittals, and 16055, Electrical Work.
- B. Shop Drawings - Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, electrical diagrams including various system schematic and interconnection diagrams. These include, but are not

limited to, switchgear, automatic transfer switch, paralleling controls and annunciator. Provide fuel piping diagrams, together with schematics for fuel piping. Indicate weights of all major components.

- C. Product Data - Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer and, vibration isolators.
 - D. Test Reports - Indicate results of performance testing.
 - E. Manufacturer's Installation Instructions - Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
 - F. Distributor's/Supplier's Performance Affidavit - Certify that Products meet or exceed specified requirements in accordance with Sections 01300, Submittals, and 01640, Equipment-General. Performance affidavit shall be as required in Section 01640, Equipment-General, except it shall be signed by a Vice President or higher of the generator system supplier. This affidavit shall include the generator and paralleling switchgear.
 - G. Shop drawing will not be reviewed prior to receipt by the Engineer of an acceptable performance affidavit.
 - H. Manufacturer's Field Reports - Submit under provisions of Section 01400, Quality Control.
 - I. Manufacturer's Field Reports - Indicate procedures and findings.
- 1.06. OPERATION AND MAINTENANCE DATA
- A. Contractor shall submit operation and maintenance data in both hard copy and electronic formats. Submit under provisions of Section 01700, Record Documents. Contractor shall provide manufacturer/supplier with a copy of Section 01700, Record Documents.
 - B. Operation Data - Include instructions for normal operation.
 - C. If the manufacturer does not have an operation and maintenance manual, then the Contractor shall prepare and provide a complete detailed manual to enable the Owner to operate and maintain the generation system.
 - D. Maintenance Data - Include instructions for routine maintenance requirements, service manuals for engine, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.07. QUALITY ASSURANCE

- A. To provide proven reliability of the generator set, three series of tests shall be performed, no exceptions taken:
 - 1. Prototype model tests.
 - 2. Fully assembled factory production model tests.
 - 3. Field acceptance tests.

- B. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results. Generator sets that have not been prototype tested and factory production tested as described herein shall not be acceptable.
- C. Generator Set Prototype Tests - These tests and evaluations must have been performed on a prototype generator set representative of the model specified. A summary of the generator set testing results shall be submittal for review. The manufacturer's standard series of components development tests on the generator system, engine and other major components shall be performed and available for review, but shall not be acceptable as a substitute for a prototype testing on the complete representative generator set prototype.
- D. Torsiograph Analysis and Test - The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torsional stresses. The analysis shall include correlation of empirical data from tests on a representative prototype. The empirical data must include spectrum analysis of the torsional transducer output within the operating speed range of the engine generator set. Calculations based on engine and generator separately are not acceptable.
- E. Temperature Rise Test - Complete thermal evaluation of a prototype generator rotor and starter must include actual measurement of internal generator and exciter temperatures by embedded detector method, and measurement of average temperature rise by resistance method. No position measured any place in the windings may exceed the temperature rise limits of NEMA for the particular type of insulation system used. Resistance method temperature rise data shall be confirmed by a full load test on the generator set prototype to include conducted and radiated heat from the engine.
- F. Short Circuit Test - A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. With the generator set operating at rated load and speed, the generator terminals must be short circuited on all three phases for a duration of 20 seconds. At the conclusion of this test, the generator set must be capable of full load operation.
- G. Endurance Run Test - A minimum of 500 continuous hours of endurance testing with a representative generator set prototype operating as defined by the manufacturer's standby rating shall have been performed. Endurance testing shall be used to verify structural soundness and durability.
- H. Maximum Power Test - With the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place, the maximum power available at rated speed shall be determined with the governor set at its fuel stop. The generator set shall maintain this power for a minimum of 2 minutes.
- I. Linear Vibration Test - A test for in-line motion of components occurring along a repeatable path shall meet the manufacturer's acceptable criteria.
- J. Cooling System Test - A cooling system test shall demonstrate the ability of the generator set cooling system to maintain normal operating temperature while operating at full rated load and power factor at the highest ambient temperature (122 degrees F) of the system rating. Cooling air requirements, radiator air flow and maximum allowable restriction at radiator discharge shall be verified by this test.
- K. Maximum Motor Starting KVA Test - Motor starting KVA shall be determined by test, based on a sustained RMS recovery voltage of at least 90 percent on no load voltage with the specified load KVA at near zero power factor applied to the generator set.

- L. Transient Response, Steady State Speed Control and Voltage Regulation Test - Prototype generator set tests shall demonstrate consistent performance as follows; stable voltage and frequency at all loads from no load to full rated load, consistent frequency kp on load acceptance and rejection and restoration to steady state after sudden load changes. Transient response is a complete generator set (engine, generator, exciter, and regulator) performance criteria and cannot be established on generator data alone.
- M. Generator Set Factory Production Tests - On the equipment to be shipped, a five-hour test shall be performed at rated load. These tests shall include certified data to document the following: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup, and safety shutdowns. Provide a factory test record of the production testing.
- N. Factory Test - The unit shall be completely assembled and all preliminary adjustments made before the test is initiated. Genset shall be tested with the complete radiator and fan assembly to be shipped. Outside radiator heat exchanger attachments shall not be acceptable.
- O. Testing Procedure - Test engine-alternator unit in the following sequence:
1. 1/2 hour at 1/4 load.
 2. 1 hour at 1/2 load.
 3. 1 hour at 3/4 load.
 4. 2 hours at full load.
- P. Above testing shall be strip chart recorded and certified. During this test, the following measurements shall be taken and recorded on a certified report format:
1. Barometric pressure.
 2. Intake air pressure.
 3. RPM.
 4. Output voltage per phase.
 5. Output amperes per phase.
 6. Power factor.
 7. KW.
 8. Transient Response Testing Sequence
 - a. 0-25 percent, 25 percent-0.
 - b. 0-50 percent, 50 percent-0.
 - c. 0-75 percent, 75 percent-0.
 - d. 0-100 percent, 100 percent-0.

- Q. The above testing shall be strip chart recorded. Provide necessary equipment and instruments to measure voltage dips and frequency dips. Comparison shall be made to the herein specified alternator performance characteristics prior to acceptance.
 - R. Field Acceptance Tests - Generator supplier shall provide and conduct a four-hour loadbank test at unity power factor for the generator set. Contractor must provide portable loadbank for testing generator set at 100 percent load. Loadbank test shall test each generator at full nameplate KW ratings. Generator manufacturer's representative shall record test data, as described below. Test data shall be tabulated and typed for submission and approval by the Engineer for final acceptance. No handwritten field notes will be allowed.
 - S. Initial startup and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment. Contractor responsible for protection of testing equipment and any additional cable, etc., required if equipment cannot be located internally during testing.
 - T. Test data shall be collected and recorded on the following: Time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every 15 minutes.
- 1.08. QUALIFICATIONS
- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 10 years' documented experience; local manufacturer's representative within 150 miles of project; with factory trained service personnel, technical assistance, and stock of replacement parts.
 - B. Supplier - Authorized distributor of specified manufacturer with minimum 10 years' documented experience.
- 1.09. REGULATORY REQUIREMENTS
- A. Conform to requirements of NFPA 70, NFPA 110, and NFPA 101.
 - B. Furnish products listed and classified by Underwriters Laboratories or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.
- 1.10. DELIVERY, STORAGE, AND HANDLING
- A. Deliver, store, protect and handle products to site under provisions of Section 01600, Materials and Equipment.
 - B. Accept unit on site on skids. Inspect for damage.
 - C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic.
- 1.11. MAINTENANCE SERVICE
- A. Furnish service and maintenance of engine generator(s) and all other equipment provided under this specification for two years from Date of Substantial Completion at no additional cost to the Owner.

1.12. WARRANTY

- A. Warranty - The manufacturer of either the engine or the generator shall warrant the complete standby power system specified herein to be free from defects in materials and workmanship, whether functional or non-functional, and shall replace or repair without cost to the Owner any defects which, with normal usage, appear or otherwise manifest themselves within five years or 1,500 operating hours of service, commencing from the date of substantial completion. Coverage shall include parts, labor, travel expenses, and labor to remove/reinstall any parts of equipment. There shall be no deductibles applied to this warranty.

1.13. MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of Section 01700, Record Documents.

1.14. EXTRA MATERIALS

- A. Furnish under provisions of Section 01700, Record Documents.
- B. For each engine generator, provide two of each oil and air filter element under provisions of Section 01700, Record Documents. These are not for use by the Contractor during the two-year service/maintenance period.

1.15. PRE-INSTALLATION CONFERENCE

- A. Convene two weeks prior to commencing work of this section.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Cummins - Design basis.
- B. Caterpillar.
- C. Waukesha.
- D. Or equal.

2.02. PACKAGED ENGINE GENERATOR SYSTEM

- A. System Capacities - The Engineer has initially sized the generators as follows:

1. Nominal KW (KVA) 1000 (1250)

Alternator rating Capable of accepting 5,500 kVA in a single step and capable of recovering to a minimum of 90 percent of rated no-load voltage. (Provide oversized alternators if required).

Alternator temperature 80 degrees F

Nominal voltage 277/480 wye, 3 phase, 4-wire, 60 Hertz.

Each generator shall be capable of starting and running their full KW rating (resistive) in one step with a 15 percent maximum volt dip.

The above sizing is for a unit located at or below 500 feet above sea level, rated "standby duty" with an engine-mounted radiator..

2. Generator sets shall be capable of complying with the 2009 EPA New Source Performance Standard (NSPS) for Spark Ignited (SI) Engine Exhaust Emissions Regulations – 40 CFR Part 60 Subpart JJJJ. The engine emission levels shall not exceed 1.5g/bhp-hr NOx, 2.0g/bhp-hr CO, or 1.0g/bhp-hr VOC.

- B. Description - NFPA 110, engine generator systems to provide source of power for Level 2 applications and conforming to NFPA 99.

2.03. ENGINE

- A. Type - Water-cooled inline or V-type, four-cycle spark ignited, internal combustion engine.
- B. Fuel System – Diesel.
- C. Engine speed - 1800 rpm.
- D. Governor - Isochronous type to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes. Equip governor with means for manual operation and adjustment.
- E. Safety Devices - Engine shutdown on high water temperature, low oil pressure, over speed, low coolant level, and engine over crank. Limits as selected by manufacturer.
- F. Engine Starting - DC starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Include remote starting control circuit, with Manual-Off-Remote selector switch on engine generator control panel.
- G. Engine Jacket Heaters - Dual or single thermal circulation-type or pumped water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F (32 degrees C) (initially sized at 4,000 watts each) and suitable for operation on 208 volts AC.
- H. Radiator - Radiator using glycol coolant, with blower type fan, sized to maintain safe engine temperature in a minimum ambient temperature of 122 degrees F (50 degrees C). Radiator air flow restriction 0.5 inches of water (1.25 Pa) maximum.
- I. Engine Accessories - Fuel strainer, lube oil filter, intake air filter, lube oil cooler, fuel solenoid valve, water pump. Include water temperature gauge, and lube oil pressure gauge on engine/generator control panel.
- J. Mounting - Provide unit with suitable vibration isolators and mount on structural steel base as specified in paragraph 2.08.F.

2.04. ALTERNATOR

- A. Generator - NEMA MG1, three phase, four-pole, reconnectible brushless synchronous generator with brushless permanent magnet generator (PMG) exciter.
- B. Rating - 480Y/277 volts, 60 Hertz at 1800 rpm with the following minimum ratings:
 1. kW – 1000.
 2. KVA – 1250 (at 0.8 power factor and 105 degrees C).

3. Maximum Volt Dip - 15 percent (starting and running the full and stepped loads as noted herein). An oversized alternator may be required to be provided.

C. Insulation Class - H.

D. Temperature Rise - 125 degrees C.

E. Enclosure - NEMA MG1, open drip proof.

F. Voltage Regulation - Include generator-mounted volts per hertz exciter-regulator to match engine and generator characteristics, with voltage regulation ± 1 percent from no load to full load. Include manual controls to adjust voltage drop, voltage level (± 5 percent) and voltage gain.

2.05. CONTROL AND MONITORING

A. Engine generator control shall be microprocessor based and provide automatic starting, monitoring, protection and control functions for the unit.

B. Automatic Starting System Sequence of Operation - When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator set shutdown. (Switches with different configurations but equal functions are acceptable.) When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.

C. Manual Starting System Sequence of Operation - Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.

D. Configuration - Operating and safety indications, protective devices, system controls, engine gages and associated equipment shall be grouped in a common control and monitoring panel. Mounting method shall isolate the control panel from generator-set vibration. AC output power circuit breakers and other output power equipment shall not be mounted in the control enclosure.

E. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:

1. AC voltmeter (3-phase, line-to-line, and line to neutral values).
2. AC ammeter (three phases).
3. AC frequency meter.
4. AC kW output (total and for each phase). Display shall indicate power flow direction.
5. AC kVA output (total and for each phase). Display shall indicate power flow direction.

6. AC power factor (total and for each phase). Display shall indicate leading or lagging condition.
7. Ammeter-voltmeter displays shall simultaneously display conditions for all three phases.
8. Emergency Stop Switch - Switch shall be a red "mushroom head" pushbutton device complete with lock-out/tag-out provisions. Depressing switch shall cause the generator set to immediately stop the generator set and prevent it from operating.
9. Fault Reset Switch - Supply a dedicated control switch to reset/clear fault conditions.
10. DC voltmeter (alternator battery charging).
11. Engine coolant temperature gauge.
12. Engine lubricating oil pressure gauge.
13. Running time meter.
14. Generator-voltage and frequency digital raise/lower switches. Rheostats for these functions are not acceptable. The control shall adjustment of these parameters in a range of ± 5 percent of the voltage and frequency operating set point (not nominal voltage and frequency values.) The voltage and frequency adjustment functions shall be disabled when the paralleling breaker is closed.
15. Fuel tank derangement alarm.
16. Fuel tank high level shutdown of fuel supply alarm.
17. AC Protective Equipment - The control system shall include over/under voltage, reverse kVAR, reverse kW, over load (kW) short circuit, over current, loss of voltage reference, and over-excitation shutdown protection. There shall be a ground fault alarm for generator sets rated over 1000 amps, overload warning, and overcurrent warning alarm.
18. Status LED indicating lamps to indicate remote start signal present at the control, existing shutdown condition, existing alarm condition, not in Auto, and generator set running.
19. A graphical display panel with appropriate navigation devices shall be provided to view all information noted above, as well as all engine status and alarm/shutdown conditions (including those from an integrated engine emission control system). The display shall also include integrated provisions for adjustment of the gain and stability settings for the governing and voltage regulation systems.
20. Panel lighting system to allow viewing and operation of the control when the generator room or enclosure is not lighted.
21. Datalogging - The control system shall log the latest 20 different alarm and shutdown conditions, the total number of times each alarm or shutdown has occurred, and the date and time the latest of these shutdown and fault conditions occurred.
22. DC Control Power Monitoring - The control system shall continuously monitor DC power supply to the control, and annunciate low or high voltage conditions. It shall also provide an alarm indicating imminent failure of the battery bank based on degraded voltage recover on loading (engine cranking).

23. Paralleling Breaker Control Switches - The control shall include manual open and close provisions for the paralleling breaker, and LED status lamps indicating whether the breaker is open or closed.
 24. First Start Sensor to provide a control function that positively prevents multiple gensets from simultaneously closing to an isolated bus under black start conditions. The First Start Sensor system is a communication system between the gensets that allows the gensets to work together to determine which genset is a system should be the first to close to the bus. The system includes an independent backup function so that if the primary system is disabled, the required functions are still performed
 25. Synchronizing – Control incorporates a digital synchronizing function to force the genset to match the frequency, phase, and voltage of another source (i.e., the second genset). The synchronizer includes provisions to provide proper operation even with highly distorted bus voltage waveforms. The synchronizer can match other sources over a range of 60 to 110 percent of nominal voltage and -24 to +6 Hertz. The synchronizer function is configurable for slip frequency synchronizing for applications requiring a known direction of power flow at instant of breaker closure or for applications where phase synchronization performance is otherwise inadequate
 26. Load Sharing Control – The genset control includes an integrated load sharing control system for both real (kW) and reactive (kVar) loads when the genset(s) are operating on an isolated bus. The control system determines kW load on the engine and kVar load on the alternator as a percent of genset capacity, and then regulates fuel and excitation systems to maintain system and genset at the same percent of load without impacting voltage or frequency regulation. The control can also be configured for operation in droop mode for kW or Kvar load sharing.
 27. Load Govern Control – When the control receives a signal indicating that the genset is paralleled with an infinite source such as a utility (mains) service, the genset will operate in load govern mode. In this mode, the genset will synchronize and close to the bus, ramp to a pre-programmed kW and kVar load level, and then operate at that point. Control is adjustable for kW values from 0 to 100 percent of standby rating, and 0.7 to 1.0 power factor (lagging). Default setting is 80 percent of standby and 1.0 power factor. The control includes inputs to allow independent control of kW and kVar load level by a remote device while in the load govern mode. The rate of load increase and decrease is also adjustable in the control. In addition, the control can be configured for operation in kW or kVAr load govern droop.
 28. Load Demand Control – The control system includes the ability to respond to an external signal to initiate load demand operation. On command, the genset will ramp to no load, open its paralleling breaker, cool down, and shut down. On removal of the command, the genset will immediately start, synchronize, connect, and ramp to its share of the total load on the system. This function must be accomplished without the use of external PLC's or modules.
- F. Common Remote Audible Alarm - Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.
1. Overcrank shutdown.
 2. Coolant low-temperature alarm.
 3. Control switch not in auto position.

4. Battery-charger malfunction alarm.
 5. Battery low-voltage alarm.
- G. Remote Alarm Annunciator - Comply with NFPA 110. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition.

2.06. GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Overcurrent Protection - The generator set shall be provided with a UL Listed/CSA Certified protective device that is coordinated with the alternator provided to prevent damage to the generator set on any possible overload or overcurrent condition external to the machine. The protective device shall be listed as a utility grade protective device under UL category NRGU. The control system shall be subject to UL follow-up service at the manufacturing location to verify that the protective system is fully operational as manufactured. Protector shall perform the following functions:
1. Initiates a generator kW overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
 - a. Under single phase or multiple phase fault conditions, or on overload conditions, indicates an alarm conditions when the current flow is in excess of 110 percent of rated current for more than 10 seconds.
 - b. Under single phase or multiple phase fault conditions, operates to switch off alternator excitation at the appropriate time to prevent damage to the alternator.
 - c. The operator panel shall indicate the nature of the fault condition as either a short circuit or an overload.
 - d. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot greater than 120 percent of nominal voltage.
 - e. The protective system provided shall not include an instantaneous trip function.
 2. Ground Fault Indication - Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

2.07. GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive - Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation - Class H
- D. Temperature Rise - 80 degrees F / Class B environment.
- E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, over speed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

- F. PMG shall provide excitation power for optimum motor starting and short circuit performance.
- G. Enclosure - Drip-proof.
- H. Voltage Regulator - Solid-state type, separate from exciter, providing performance as specified. The voltage regulation system shall be microprocessor-controlled, 3-phase true RMS sensing, full wave rectified, and provide a pulse-width modulated signal to the exciter. No exceptions or deviations to these requirements will be permitted.
- I. The alternator shall be provided with anti-condensation heater(s) in all applications where the generator set is provided in an outdoor enclosure, or when the generator set is installed in a coastal or tropical environment.
- J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding. Alternators operating at voltage higher than 690VAC shall be provided with form-wound stator coils.
- K. Subtransient Reactance - 12 percent maximum, based on the rating of the engine generator set.

2.08. ACCESSORIES

- A. Exhaust Silencer – Critical-type single silencer, with muffler companion flanges, enclosure thimble as required, vertical stack with counterbalanced flapper, flexible sections or wye, stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions.

Contractor shall provide complete exhaust piping system per manufacturer's recommendations. Exhaust pipe shall be minimum 1,000 degrees F black iron Schedule 80 with welded or flanged joints. Size as recommended by manufacturer.

Vibration insulators shall be provided between the enclosure and the exhaust silencer supports as required by the manufacturer. They shall be sized to prevent any vibrating stress on the enclosure.

The exhaust stack shall terminate at least 10 feet above the enclosure roof, and shall include any required wind bracing.

- B. Batteries - Heavy duty, diesel starting type lead-acid storage batteries, 1300 cold cranking amps capacity. 12 or 24 volts - match battery voltage to starting system. Include necessary cables and clamps.
- C. Battery Trays - Treated for electrolyte resistance, constructed to contain spillage. If manufacturer's standard tray does not comply with the above, provide a non-metallic containment-type insert of plastic, rubber, or equivalent. Plywood inserts shall not be acceptable.
- D. Battery Chargers - Current limiting type designed to float at 2.17-2.25 volts per cell and equalize at 2.33 volts per cell. Provide equalize timer, user adjustable for up to 72 hours minimum. Include overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input. Charger shall fully charge battery within 24 hours. LaMarche or equal. Charger shall be factory mounted by generator manufacturer.
- E. Line Circuit Breakers - NEMA AB 1, molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole, sized in accordance with NFPA 70. Provide AC power entrance box.

F. Seismic Vibration Isolators – Mount generator on adjustable spring isolators complete with side movement snubbers or neoprene isolators. At least four such isolators shall be utilized and be sized to load the spring or neoprene within their proper working range for the unit supplied.

G. Outdoor Weather-Protective Enclosure

1. The generator set shall be provided with a factory supplied aluminum outdoor enclosure. The package shall comply with the requirements of the National Electrical Code for all wiring materials and component spacing. The total assembly of generator set and enclosure shall be designed to be lifted into place using spreader bars. Housing shall provide ample airflow for generator set operation at rated load in an ambient temperature of 122 degrees F. The housing shall have stainless steel hinged access doors as required to maintain easy access for all operating and service functions. All doors shall be lockable and include retainers to hold the door open during service; all hardware shall be stainless steel. Enclosure roof shall be cambered to prevent rainwater accumulation. All roof or wall penetrations shall be sealed or otherwise protected to keep snow and rain from entering enclosure. Openings shall be screened to limit access of rodents into the enclosure. All electrical power and control interconnections shall be made within the perimeter of the enclosure.
2. All aluminum shall be primed for corrosion protection and finish painted with the manufacturers' standard color using a two-step electro-coating paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:
 - a. Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.
 - b. Gloss, per ASTM D523-89, 80 percent \pm 5 percent. Gloss retention after one year shall exceed 50 percent.
 - c. Crosshatch adhesion, per ASTM D3359-93, 4B-5B.
 - d. Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.
 - e. Salt spray, per ASTM B117-90, 1,000+ hours.
 - f. Humidity, per ASTM D2247-92, 1,000+ hours.
 - g. Water soak, per ASTM D2247-92, 1000+ hours.
3. Fasteners used shall be stainless steel and designed to minimize marring of the painted surface when removed for normal installation or service work.
4. Enclosure shall be constructed of minimum 12 gauge aluminum for framework and 14 gauge aluminum for panels. All hardware and hinges shall be stainless steel.
5. A factory-mounted critical exhaust silencer shall be installed inside the enclosure. The exhaust shall exit the enclosure and pass through the required three-way catalyst, terminating in the required 10-foot exhaust stack. Exhaust connections to the generator set shall be through seamless flexible connections.
6. The enclosure shall include the following maintenance provisions.
7. Flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure, with internal drain valves

8. External radiator fill provision.
9. Provide an external break glass-type emergency stop switch that is protected from accidental actuation.
10. Provide motorized louvers to minimize air flow through the enclosure when generator set is not operating. Louvers shall include provisions to prevent accumulation of ice or snow that might prevent operation. Fixed louvers shall not be acceptable.
11. Inlet ducts shall include rain hoods.
12. Provide a factory mounted and wired electrical distribution panel to serve the generator set and enclosure. The provisions required include:
 - a. 100-amp distribution panelboard connected to a 120/208 VAC utility service by the installer.
 - b. Two duplex GFI receptacles, one inside the enclosure, and a weatherproof receptacle on the outside of the enclosure.
 - c. Two three-way switches controlling three AC lamps mounted in vapor tight and gasketed fixtures.
 - d. Factory-wired normal AC service from the panelboard to the engine coolant and alternator heaters, and battery charger.
13. The generator set shall be provided with a sound-attenuated non-walk-in housing which allows the generator set to operate at full rated load in an ambient temperature of up to 122 degrees F. The enclosure shall reduce the sound level of the generator set while operating at full rated load such that maximum sound level at 7 meters from the generator set in any direction does not exceed 75 dba.
14. The enclosure shall be insulated with non-hygroscopic materials.

H. Fuel Tank - Base tank with double-wall secondary installed within the generator skid and sized for a minimum of 24 hours of operation at 100 percent load. Include leak detection alarm with a 120 volt, 10 amp, form-C contact for remote indication. Provide fuel level sensing with local display and 4-20 mA tank level output for remote level indication. Include flexible fuel line connections, check valve, high fuel level and low fuel level alarm contacts and local indicating lights. Provide lockable fill cap, fill port with overfill prevention valve and spill pan with minimum 5-gallon capacity, venting to UL 142 in both primary and secondary containment. Conform to NFPA 30, and all local and regional code requirements for above grade fuel tanks. Contractor shall initially fill base tanks to 90 percent. Fuel for testing and start-up shall be the responsibility of the Contractor. Once testing and start-up is complete, the Contractor shall re-fill the tank to the 90 percent fill level.

2.09. SWITCHGEAR

A. Manufacturers

1. Schneider Electric
2. Eaton/Cutler-Hammer
3. Allen-Bradley

B. Ratings

1. 480Y/277 volt, three phase, four wire, 60 Hertz.
2. 4000 ampere main bus.
3. Full sized neutral bar.
4. Bus braced to withstand 200,000 rms amps.
5. Wiring to be SIS, 90 degrees C, 600 volt insulation.

C. Mechanical Characteristics

1. Free-Standing, NEMA 3R - Rainproof, dead front, compartmentalized front line-up, general purpose enclosure, front accessibility only.
2. Temperature Rise - Maximum 65 degrees C above 40 degrees C ambient.
3. Provide barriers as follows:
 - a. Individual cell compartment, each breaker, breaker space, instrument or blank space.
 - b. Metal barrier between main bus and users feeder connection compartment.
4. Channel sills for base.
5. Main Bus - Tin-plated copper, fully insulated.
6. Ground Bus - Solid copper, 1/4 inch x 4 inch, mounted near bottom on enclosure, predrilled for NEMA two-hole crimp-type lugs. Bus bars shall be assembled using "Belleville" spring washers.
7. Painting - Manufacturer's standard.
8. Power cables shall enter the top or bottom of the switchgear, size and type as called for. Provide provisions for the connection of bus bar/bus duct as called for on the Contract Drawings.
9. The enclosure, all devices and wire shall be label per the requirements of the electrical specifications.
10. Provide breakers as called for in schedule on Contract Drawings.
11. Dimensions - Refer to elevations on Drawings for any limiting dimensions.
12. Wiring and Terminations
 - a. Instrumentation and Control Wiring
 - 1) Provide SIS, 90 degrees C, 600 volt insulation switchboard wire.
 - 2) Provide crimp-type nylon insulated ring or locking spade type terminals for all control wire terminations.

- 3) Identify each control wire termination with permanent wire marker, number keyed to interconnection diagram.
 - 4) Provide cable protective device and support cable at each door hinge to prevent wear of control wires.
 - 5) Provide all additional devices, wiring, terminal boards, etc., to perform operating, control, operating, control, and protection functions as called for.
 - 6) Wire shall meet requirements of the electrical specifications.
- b. Cable Terminations
- 1) Provide incoming and outgoing power cable terminations; use two-hole Hy-Dent cable lugs.
 - 2) Provide copper body lugs for copper cable, mounted to bus runouts.
 - 3) Size, material and quantity of cables to be terminated as called for.
- c. Busway Terminations
- 1) The Contractor shall coordinate the selection of the busway and switchboards to ensure compatibility of connections between the devices.
 - 2) The ratings of the busway and the switchboard termination points shall be as called for on the Contract Drawings.

2.10. CLOSED TRANSITION AUTOMATIC TRANSFER SWITCH

- A. Manufacturer shall be Russelectric, ASCO, or the same as the generator manufacturer.
- B. Closed Transition Automatic Transfer Switch - Include the following functions and characteristics:
1. Fully automatic make-before-break operation, when both sources are available, and break-before-make when one source fails.
 1. Failure of power source serving load initiates automatic break-before-make transfer.
 2. When operating in closed transition mode, load is transferred` without interruption, through momentary interconnection of both power sources not exceeding 100 msec in closed-transition operation mode.
 3. Initiation of no-interruption transfer: Controlled by sync check monitor and sensors confirming both sources are present and acceptable.
 - a. Controls ensure that closed-transition load transfer closure occurs only when the two sources are within ± 5 electrical degrees maximum, and ± 5 percent maximum voltage difference.

4. The control system shall actively monitor operating speed and automatically adjust operation timing to retain sync check function precision. The controls shall monitor the operating speed of the contact mechanism, and adjust sync check parameters to result in contact closure within acceptable ranges as the equipment ages. Sync check window and time delay shall be field adjustable.
5. The transfer switch shall be provided with all equipment necessary and all functions required for compliance with the requirements for momentary closed-transition operation with the local utility. As a minimum, equipment will include a contact closure to indicate transfer switch has failed to disconnect the generator set from the utility during closed-transition transfer. Contacts will be used to trip the upstream (genset or utility) breaker.
6. Fail-to-disconnect timer prevents engine damage by disconnecting either generator or utility if transfer is unsuccessful.

C. Ratings

1. Voltage – 480/277 volts, 3 phase, 4 wire, 60 Hertz.
2. Switched Poles - Three.
3. Continuous Rating – 4,000 amperes.
4. Withstand and Closing Rating - 200,000 rms symmetrical amperes

D. Product Options and Features

1. Solid-state under-voltage sensors to simultaneously monitor all phases of the normal power source and emergency source and arrange system for automatic starting upon failure of or a drop below the adjustable percentage of the normal source voltage. Field adjustable from 85 to 100 percent of normal source voltage.
2. Provide a 2-second timed start delay, field adjustable from 3 to 6 seconds. Delay time between normal source failure and engine starting. The transfer switch shall control the generator set to allow generator set to start and transfer load within 10 seconds after normal source power failure.
3. Provide contacts for engine starting.
4. Transfer loads from normal source power to emergency source when engine generator reaches 90 percent of its rated voltage.
5. Retransfer emergency loads from emergency generator to normal source (10) minutes after normal source has reached 90 percent or more of normal voltage. Provide 0 to 30-minute field adjustable timer. (Retransfer delay)
6. Retransfer emergency loads from emergency generator to normal source instantaneously when normal source has reached 90 percent or more of normal voltage, if emergency generator has failed while supplying load.
7. Run engine for a period of 5 minutes after retransfer of emergency loads to normal source. Engine generator will then shut down, automatically resetting and leaving all controls ready for the next emergency start condition (overrun delay).

8. Use time clock to automatically exercise engine once each 168 hours (programmable). Time clock contacts shall simulate loss of normal voltage, start engine, and shut engine down after 60 minutes of operation. A switch option shall be provided to exercise the plant with or without load.
9. Operating voltage for transfer shall be obtained from the source to which the load is to be transferred.
10. Provide voltage supervisory relays on each phase, such that transfer and engine start is affected should any one of the three phase supplies fall below 70 percent on normal voltage.
11. Provide four (minimum) auxiliary contacts on shaft (field convertible). No common wires for contacts. Bring wires to terminal block, suitably labeled.
12. Provide indicating lights (door mounted) for the following:
 - a. Normal switch position (green).
 - b. Normal source available (white).
 - c. Emergency switch position (red).
13. Provide any other accessories as may be required to achieve operation as described in this specification.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Contractor shall coordinate with the Owner and the Contractor's subcontractors and employ all reasonable means necessary to cause minimal disruption to the Owner's operations during installation.

3.02. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400, Quality Control. Manufacturer's representative shall visit site to assist the Contractor with the installation and to make a final site inspection at least two weeks prior to the loadbank test. A copy of the site inspection report shall be provided to the Engineer prior to load testing.
- B. Provide full load (100 percent of gen set rating) NFPA 110 test utilizing a portable test bank for four hours minimum for each generator. Actual hours on site are as required to set up, complete test, and clean up after tests. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown and return to normal. Load may be stepped onto gen set in up to a maximum of four equal steps. Generator shall also be loaded in one step. Output voltage dips shall not exceed 15 percent at any load step, including the one step full load.
- C. Record in 15-minute intervals during 4-hour test:
 1. Kilowatts.

2. Amperes.
3. Voltage.
4. Frequency.
5. Coolant temperature.
6. Room temperature.
7. Oil pressure.

- D. Test alarm and shutdown circuits by simulating conditions.
- E. Testing shall be coordinated with and approved by the Owner prior to test date and shall be performed in such a manner as to cause minimal disruption to plant operations.

3.03. MANUFACTURER'S FIELD SERVICES

- A. For each generator, provide the service of a manufacturer's service technician for a minimum of two hours for each unit to inspect the installations and a minimum of six hours for each system to start up and perform load testing (final acceptance). Technician shall be factory trained and certified by the manufacturer to perform startup, testing, troubleshooting, service, and maintenance of engine generator systems of the type and size (rating) specified herein. Technician shall be regularly engaged in this type of work as their primary job function. The technician shall arrive on site with his own tools, spare parts, and a copy of the field inspection report specified in paragraph 3.02.A. Prior to the scheduling of testing, the Contractor shall submit, for approval by the Engineer, the technician's name and qualifications/certification data, along with the name, address, and telephone number of the office or division from which they are dispatched. All fuel for testing shall be paid for by the Contractor.
- B. Prepare and start systems under provisions of Section 01400 Quality Control.
- C. Submit three copies of a final typed report covering all observations, site conditions, test values, and instructions given to the Owner.
- D. Provide manufacturer's complete instruction manual per Section 01700, Record Documents. Also provide electronic copies of available and applicable operation and maintenance materials.
- E. For each generator system, provide up to two hours of on-site training by manufacturer's service technician at the time of the load test. A second two-hour on-site training session per system shall be provided during the first year of the five-year warranty period. Owner will arrange through Contractor. Initial training session shall be videotaped by the Contractor and two digital copies given to the Owner. If the tape or the training presentation is not of the quality necessary for the Owner's continued use as determined by the Owner, the training session shall be redone within two weeks of notification. The second videotaping does not qualify as the required second session. All costs of the retraining and taping are the responsibility of the Contractor.
- F. All times are the minimum hours required and are actual on-site times and include all labor, travel, and subsistence expenses.

3.04. ADJUSTING

- A. Adjust work under provisions of Section 01700, Record Documents.
- B. Adjust generator output voltages and engine speeds.
- C. Prepare and submit a typewritten tabulation of all adjustable settings, including factory default settings.
- D. Tighten all connections if any leakage is detected.

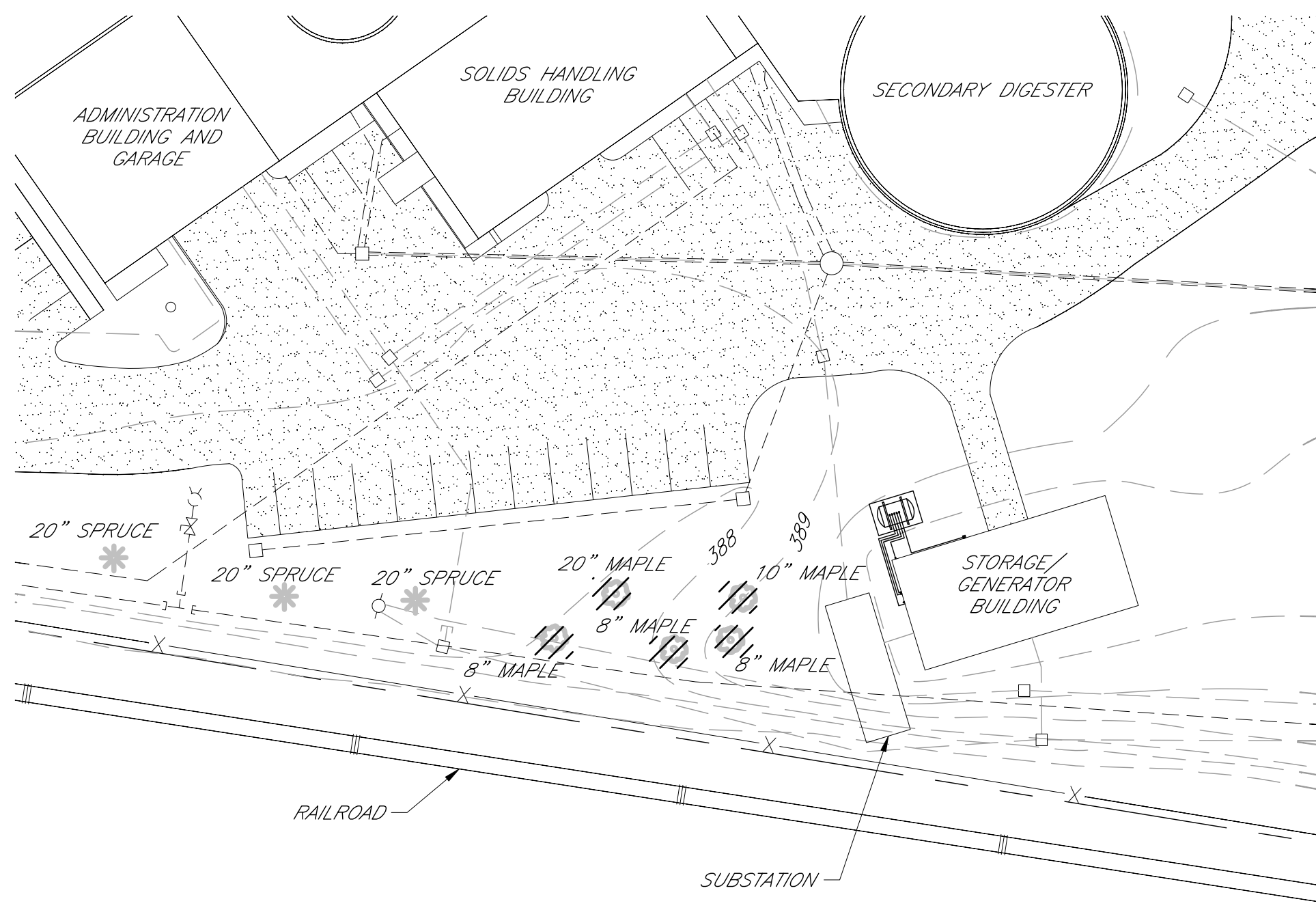
3.05. CLEANING

- A. After testing, clean work under provisions of Section 01700, Record Documents.
- B. Clean engine and generator surfaces. Replace both oil and fuel filters after full load test. Contractor to properly dispose (off site) of used filters in accordance with applicable regulatory requirements. Replacement filters shall be in addition to the required spares.

3.06. DEMONSTRATION

- A. Provide systems demonstration under provisions of Section 01700, Record Documents.
- B. Describe loads and how they are connected to emergency system and if there are any restrictions for future load additions.
- C. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide emergency power.

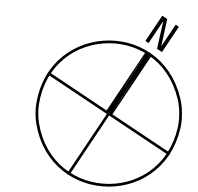
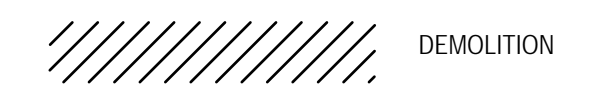
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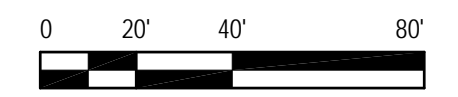
NOTE:

1. CONTRACTOR SHALL DEMOLISH TREES AND THEIR ROOT SYSTEMS AS SHOWN AND AS NEEDED TO INSTALL NEW WORK. COORDINATE WORK IN THIS AREA WITH THE ELECTRICAL DRAWINGS.

LEGEND



PARTIAL SITE PLAN - TREE REMOVAL
SCALE: 1"=40'

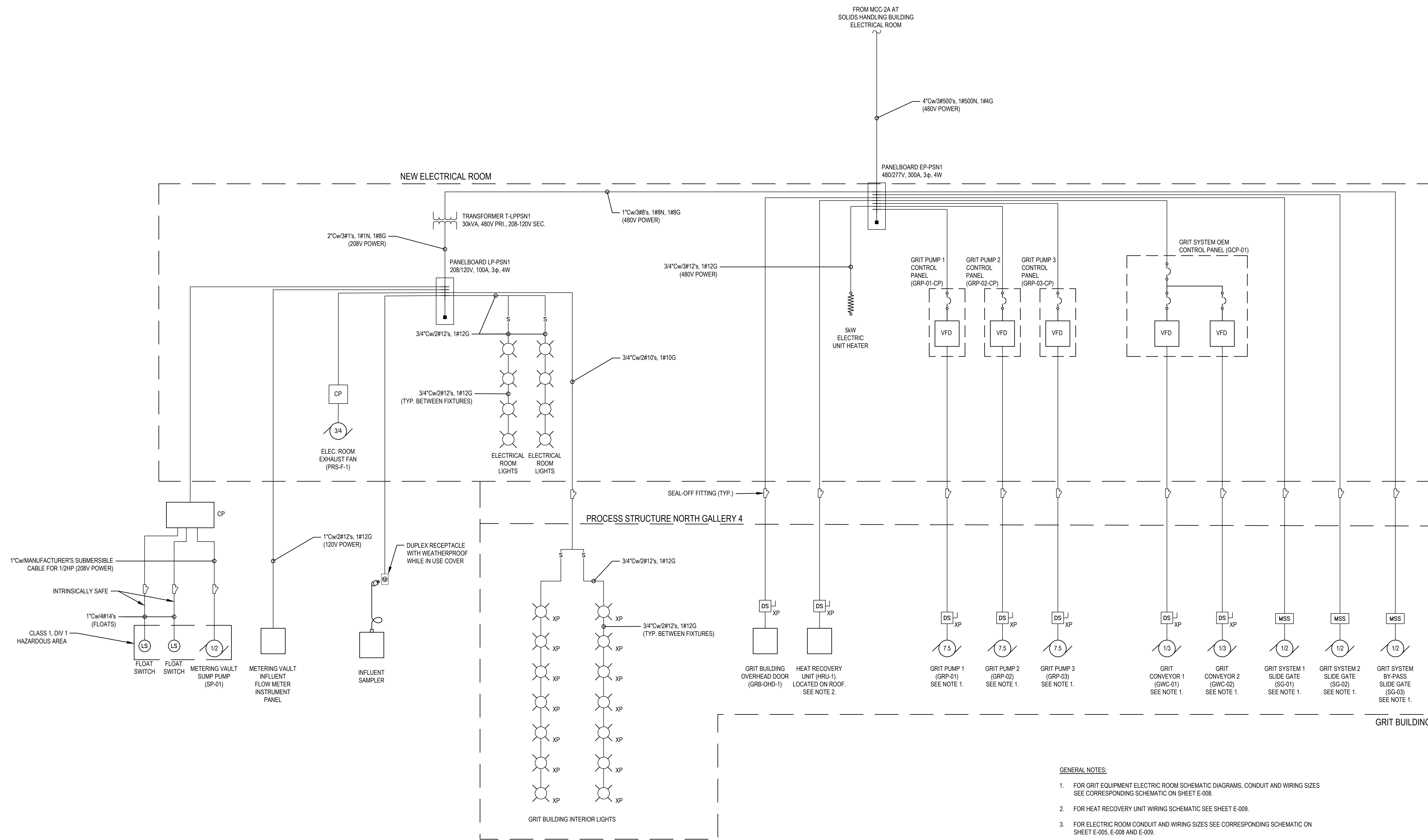


ITHACA AREA WASTEWATER TREATMENT FACILITY
GRIT REMOVAL AND PLANT MODIFICATIONS
PARTIAL SITE PLAN - TREE REMOVAL

Project No. 111-53020
Addendum No. 2
Date 11/2019

FIGURE 1

Filename: G:\111\11153020 Ithaca Grit Removal\CADD\Drawings\Civil\111-53020-C001.dwg
Plot Date: 6 November 2019 - 12:16 PM



- GENERAL NOTES:**
- FOR GRIT EQUIPMENT ELECTRIC ROOM SCHEMATIC DIAGRAMS, CONDUIT AND WIRING SIZES SEE CORRESPONDING SCHEMATIC ON SHEET E-008.
 - FOR HEAT RECOVERY UNIT WIRING SCHEMATIC SEE SHEET E-009.
 - FOR ELECTRIC ROOM CONDUIT AND WIRING SIZES SEE CORRESPONDING SCHEMATIC ON SHEET E-005, E-008 AND E-009.

No.	Issue	Drawn	Approved	Date
1	ADDENDA 2	KYJ	BGM	11/2019
0	FOR CONSTRUCTION	EPP	JDG	08/2019

Notes	Bar is one inch on original size sheet
Underground facilities, structures, and utilities have been plotted from available surveys and records, and therefore their locations must be considered approximate only. There may be others, the existence of which is presently not known.	0 1"
It is violation of New York State education law for any person, unless acting under the direction of a licensed professional engineer, to alter an item on this drawing in anyway. If an item is altered, the altering engineer shall affix to the item his/her seal and the notation "altered by" followed by his/her signature and date of such alteration and a specific description of the alteration.	Reuse of Documents This document and the ideas and designs incorporated herein, as an instrument of professional service, is the property of GHD and shall not be reused in whole or in part for any other project without GHD's written authorization. © 2019 GHD

STATE OF NEW YORK
BRUCE G. MUMFORD
LICENSED PROFESSIONAL ENGINEER

GHD
GHD Consulting Services Inc.
One Remington Park Drive
Cazenovia NY 13035 USA
T 1 315 679 5800 F 1 315 679 5801 W www.ghd.com

Drawn	EPP	Designer	EPP
Drafting	TKK	Design	TWD
Check		Check	
Project Director	BGM	Date	08/2019
This document shall not be used for construction unless signed and sealed for construction.		Scale	NOT TO SCALE

Client	ITHACA AREA WASTEWATER TREATMENT FACILITY		
Project	GRIT REMOVAL AND PLANT MODIFICATIONS		
Title	GRIT BUILDING ADDITION ONE-LINE DIAGRAM		
Project No.	111-53020		
Original Size	Arch D	Sheet No.	111-53020-E010
CONTRACT 2			