COMPETITVE SEALED PROPOSAL

BACKUP POWER GENERATORS AND DIESEL FUEL STORAGE AND DISPENSING SYSTEMS

SMITHCO CONSTRUCTION, INC.

VOLUME 2 OF 2

TECHNICAL DOCUMENTS FOR

GMP 1: EARLY EQUIPMENT PACKAGE 1

JUNE 2023

ISSUED FOR PROPOSAL

EPWATER BACKUP GENERATORS
GMP1- EARLY EQUIPMENT PACKAGE

	
Electrical Engineer	Electrical Engineer
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EL PASO WATER UTILITIES
PUBLIC SERVICE BOARD

EPWATER BACKUP GENERATORS
GMP1- EARLY EQUIPMENT PACKAGE

CITY OF EL PASO, TEXAS

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PART 1 - GENERAL

1.1 SUMMARY

A. This section describes requirements for controls and switchgear for generator sets and distributing alternate source power. Equipment provided shall be new factory assembled equipment with dedicated purpose microprocessor-based controls designed for fast, reliable operation and including the functions described herein. Generator and Switchgear package shall be provided by the same Manufacturer.

B. Equipment shall be NEMA 1 Design and installed in a dedicated electrical building to be constructed by the contractor and to be issued under a separate construction package. The switchgear shall include the master control, and 125 VDC battery plant and all appurtenances needed for a fully functional installation.

C. Related sections of the project specifications include:
   1. Section 26 23 13.13 - Diesel-Engine Driven Generator Sets

1.2 DEFINITIONS

A. NETA ATS: International Electrical Testing Association, Acceptance Testing Specifications.

B. GFP: Ground Fault Protection.

C. HMI: Human-Machine Interface

D. PLC: Programmable Logic Controller. A device with associated accessory components that is designed to accept programmable inputs and provide completely field-programmable logically controlled outputs.

E. Manufacturer: The entity that maintains engineering design control for the equipment provided, provides service and maintenance documentation, provides service direction, and provides warranty support.

F. Supplier: The entity that provides manufacturer-authorized local sales and service support for the manufacturer's equipment.

1.3 ACTION SUBMITTALS

A. Pre-and Post-Submittal Meeting
   1. Supplier shall include in his bid the cost of attending a one-day pre-submittal meeting and a one-day post-submittal meeting in the Construction Manager at Risk (CMAR's) offices in El Paso, Texas or El Paso Water, main offices, 1154 Hawkins Blvd, El Paso, TX 79925 A pre-submittal meeting shall be held before any shop drawings are submitted. A post-submittal meeting shall be held after the Engineer's shop drawing review comments have

been submitted. Vendor shall determine the exact number of people attending the meeting per the specification requirements and cover each person's cost.

2. Any shop drawings submitted before the pre-submittal meeting will be rejected and sent back Not Approved, Revise and Re-submit. The Switchgear Supplier shall bring with them a detailed list of the items their submittal will include for review by the Engineer or a bootleg copy of the actual submittal.
3. As a minimum the following shall attend the meeting:
    a. CMAR Contractor,
    b. Electrical Contractor ,
    c. Switchgear Supplier and Engineer. Representatives from the Switchgear Supplier shall include:
        1) The Project Manager who will be responsible for putting together the submittal and who will be responsible for the project at the factory, no exceptions.
        2) The Project Engineer at the factory who has technical knowledge of the equipment, no exceptions.
        3) A sales person may attend, but not as a substitute for the Project Manager and/or Project Engineer.

B. Seismic Product Data:
1. Restraints - rigid type.
2. Restraints - cable type.
3. Restraint accessories.
4. Post-installed concrete anchors.
5. Concrete inserts.

C. Seismic Shop Drawings: Show coordination of seismic and wind-load bracing for components with other systems and equipment in the vicinity, including other supports and seismic restraints.

D. Delegated Design Submittal for Each Seismic-Restraint Device: Signed and sealed by qualified structural professional engineer.
1. For each seismic-restraint device, including restraint - rigid and cable type, restraint accessory, and concrete anchor and insert that is required by this Section, submit the following:
    a. Seismic Restraints: Select seismic restraints complying with performance requirements, design criteria, and analysis data.
    b. Post-Installed Concrete Anchors and Inserts: Include calculations showing anticipated seismic loads. Include certification that device is approved by qualified testing laboratory for seismic reinforcement use.
    c. Seismic Design Calculations: Submit input data and loading.

E. Delegated Design Submittal for Each Wind-Load Protection Device: Signed and sealed by qualified structural professional engineer.
1. For each wind-load protection device, including restraint - rigid and cable type, restraint accessory, and concrete anchor and insert that is required by this Section or is indicated on Drawings, submit the following:
    a. Wind-Load Restraint: Select wind-load restraints complying with performance requirements, design criteria, and analysis data.
    b. Post-Installed Concrete Anchors and Inserts: Include calculations showing anticipated wind loads. Include certification that device is approved by qualified testing laboratory for reinforcement use.

c. Wind-Load Design Calculations: Submit static and dynamic loading calculations.

2. Seismic- and wind-load-restraint detail Drawings prepared by qualified structural professional engineer.
   a. Design Analysis: To support selection and arrangement of seismic and wind-load restraints. Include calculations of combined tensile and shear loads.
   b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
   c. Coordinate seismic-restraint details with wind-load details required for equipment mounted outdoors.

F. Product Listing, Preapproval and Evaluation Documentation: By UL, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

G. Product Data: Provide the noted technical data for the controls, switchgear, and transfer equipment described in this section. Materials required include:

1. Technical data fully describing the critical design features of the equipment proposed, and substantiating compliance to the requirements of this specification. This material shall include 3rd party certifications and listing details for all equipment provided, including seismic certifications described herein.
2. Data shall include a complete description of the features and function of the proposed equipment, described on the manufacturer's published literature or manufacturer's letterhead with a manufacturer's employee signature validating its accuracy.
3. Include a listing of all setting ranges and factory default settings.
4. Include a detailed sequence of operation for the specific equipment provided.

H. Shop Drawings: For each control enclosure, switchgear section, or independent piece of equipment provide:

1. Elevation and other Drawings: Describing physical dimensions, weights, mounting provisions and requirements, mechanical and wiring access points.
2. Wiring Diagrams: project specific interconnecting wiring details including recommended control conduit configurations.
3. Project specific system one-line schematics shall indicate both the power system and the communication system on the same drawings with surge arrestors, suppressors and snubbers sized and located per engineering study performed by manufacturers registered engineer.
4. Provide a project specific composite 3-line drawing indicating power to breakers, relays, and instrumentation.
5. Provide a project specific DC schematic indicating power to breakers and relays and auxiliary contacts to all devices including contacts to El Paso Electric Recloser for monitoring main and generator breaker position and trip status.
6. Submit name and qualifications of engineer performing the design, study, and drawings.
7. Complete description of all equipment, including catalogs, cuts, and pertinent engineering data. Clearly identify on cut sheets the model number of the equipment being provided. Complete Bill of Material identifying make and model number of all major components.
8. Provide an overall outline drawing showing Metal-Clad Switchgear.

9. HMI Screen Shots.
10. Front and rear elevation drawings clearly showing layout of all devices and mounting heights.
11. Mimic bus layout.
12. Nameplate schedule.
13. Electrical interlock scheme with detailed written sequence of operations for main, generator breakers and generator main.
14. Detailed information on remote racking device and breaker truck.
15. BIL test data on previously tested equipment of the same design.
16. Spare parts list.
17. Equipment Installation Report.
18. Prior to Shipment: The manufacturer shall provide detailed addresses (memory map) for the software I/O points that are communicated over Ethernet, RS485, Ethernet/IT etc. that are applicable to this project. Coordinate with Owner/Engineer for the list of I/O that will be transmitted over the data highways, the manufacturer shall verify with Owner if any changes have been made to the lists prior to submitting the memory map.

I. Source Quality Control Test Reports: Provide sample factory test report plan for integrated generator controls and paralleling system. Submit factory test reports as a formal submittal to the Engineer for approval prior to shipping the equipment.

J. FIELD TESTING PROCEDURES
1. Submit both dry testing and live testing procedures specified in Part 3 of these specifications.

K. FIELD TEST REPORTS
1. Submit Equipment Installation Report certifying the equipment is properly installed, is in accurate alignment, is free from undue stress from connecting appurtenances, that it has been operated under full load conditions, and that it is operating satisfactorily.

L. OPERATION AND MAINTENANCE MANUALS
1. Submit Manuals with instructions for installation, adjustment, lubrication, operation, and maintenance of the equipment in accordance with the specific conditions.
2. List all factory setting relays and provide relay-setting and calibration instructions, including software, where applicable. O&M manuals shall include a hard copy of the power meter settings.
3. Operation and maintenance manuals shall be prepared by the equipment manufacturer and shall contain the final certified approved shop drawings, submittals, list of manufacturer's recommended spare parts, schematics, and maintenance procedures, and field test data. O&M manuals shall include all field changes made during startup and testing.
4. Manuals may be the manufacturer's standard instructions but shall be supplemented as necessary to cover any special feature not included in standard material.
5. Manuals shall be prepared by the Equipment Manufacturer and shall also incorporate appropriate final certified shop drawings and test data. Manuals may be the manufacturer's standard instructions but shall be supplemented as necessary to cover any special feature not included in standard material.
6. O&M manuals shall include a single document that clearly summarizes and states when the routine maintenance per the manufacturer's recommendations is to be performed on the switchgear.
7. Submit preliminary manuals for review prior to start-up of equipment.

8. O&M Manuals shall be submitted in both hard copy and electronic format. Electronic format shall be fully indexed.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications

B. The paralleling equipment manufacturer shall be certified to ISO 9001 International Quality Standard

C. Source Limitations: The paralleling switchgear shall be designed, manufactured, and warranted by the generator set manufacturer to provide a single source of responsibility for all the products provided. Warranty documents shall be provided verifying compliance to this requirement. Supplier shall directly employ service technicians specifically trained and qualified on the diagnosis and repair of engines, alternators, power transfer equipment, and paralleling equipment. The technicians shall be trained in the installation and commissioning of complex generator systems, including line voltage generator paralleling equipment. Switchgear manufacturer shall have more than (15) years experience to ensure quality. Documentation for similar projects shall be provided upon request.

D. The system, including generator sets and switchgear equipment, shall be serviced by a single local service organization that is trained and factory certified in both generator set and paralleling equipment service. The technicians serving the site shall be specifically trained and certified by the manufacturer in the diagnosis and repair of the synchronizing, paralleling, and load sharing equipment provided. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

E. Submit names, qualifications, and locations of individuals who will service and support the equipment.

F. The manufacturer shall maintain model and serial number records for the paralleling equipment for at least 20 years.

G. Equipment provided shall conform to the requirements of the following codes and standards to the extent that they are applicable:

1. ANSI/IEEE C37.20.2 - Standard for Metal-Clad Switchgear.
2. ANSI/IEEE C37.04 and .06 - Standard ratings and preferred ratings for Indoor AC Medium-Voltage Circuit Breakers used in Metal-Clad Switchgear.
3. ANSI/IEEE C37.11 - Requirements for electrical control for AC High-Voltage Circuit Breakers rated on a symmetrical current basis or a total current basis.
4. ANSI/IEEE C37.09 - Standard Design and Production Testing.
5. ANSI Z55.1 - Gray Finishes for Industrial Apparatus and Equipment.
6. ANSI/IEEE C57.13 - Requirements for Instrument Transformers.
7. NEMA SG4 - Alternating Current High Voltage Circuit Breakers.
8. NEMA SG5 - Power Switchgear Assemblies.
9. EN55011, Class B Radiated Emissions
10. EN55011, Class B Conducted Emissions

11. EN60947-6-1 Standard for Low-voltage switchgear IEC 1000-4-5 (EN 61000-4-5); AC Surge Immunity. Similar waveforms are described in ANSI/IEEE 62.41-1991
12. IEC 1000-4-4 (EN 61000-4-4) Fast Transients Immunity
13. IEC 1000-4-2 (EN 61000-4-2) Electrostatic Discharge Immunity
14. IEC 1000-4-3 (EN 61000-4-3) Radiated Field Immunity
15. IEC 1000-4-6 Conducted Field Immunity
16. IEC 1000-4-11 Voltage Dip Immunity
17. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
18. NFPA110 – Emergency and Standby Power Systems. All equipment provided shall meet all requirements for Level 1 systems.
19. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
20. UL891 – Controls. Control equipment provided in switchboard enclosures shall be listed and labeled under this standard.

H. FACTORY TESTS

1. GENERAL
   a. Switchgear sections shall be completely assembled, wired, adjusted, and tested at the factory. After complete assembly with breaker vacuum circuit interrupter in position, each unit shall be tested for operating sequence to assure accuracy of wiring, correctness of control scheme and functioning of the equipment.
   b. Factory tests shall include electrical tests as described by American National Standards Institute Standard C 37.20.
   c. The switchgear shall be assembled and shipped in sections of the largest size practicable to be unloaded and handled at the job. Breakers shall be shipped separately from switchgear units.
   d. The manufacturer shall perform all tests required by the applicable standards and shall be responsible for testing all control and relaying circuits within the switchgear to ensure proper function performance and operable condition.
   e. The switchgear shall be tested and certified in accordance with the applicable requirements of ANSI/IEEE C37.20.2 and ANSI C37.55. The switchgear unit shall be tested with the breakers included. "Test" breakers will not be acceptable.
   f. All AC high voltage circuit breakers shall be tested and certified in compliance with the applicable requirements of ANSI/IEEE C37.09 and ANSI C37.54.
   g. All instrument transformers furnished for metering and relaying service shall be tested and certified in accordance with the applicable requirements of ANSI/IEEE C57.13.
   h. All buses and power circuit breakers shall undergo a one-minute, 60 Hz dielectric withstand test. All control circuits shall undergo a one-minute insulation resistance test.
   i. Proper wiring of protective relays shall be checked by injecting secondary current into the associated current transformer circuits and verifying that the relays respond properly.
   j. Components manufactured in different factories shall be shipped to the main switchgear assembly point for testing at the manufacturer's expense. Additional testing of components is limited to those tests associated with test of completed equipment.
   k. Each unit shall be tested for operating sequence to assure accuracy of wiring, correctness of control scheme and functioning of the equipment.

l. Factory tests for medium voltage metal enclosed switchgear shall include electrical tests as described by NEMA ICS 1-109 and ANSI C19.3.
m. A statement of calibration shall be provided to cover all meters and relays.
n. Provide a copy of the certified test report to Engineer for approval prior to the switchgear being shipped to the jobsite.
o. Detailed functional testing of switchgear main, tie, and generator breaker controls for all possible operating scenarios.

2. Witnessed factory tests shall include a test and demonstration of all equipment functions, per manufacturer's standard testing procedures. The purpose of the test shall be to verify the functionality, performance, and stability of the paralleling switchgear. he test shall include, but not be limited to, a complete operational test demonstrating all controls, inputs, outputs, etc., shown per the plans and specifications. The manufacturer shall submit two weeks in advance of the day that test will be made a detailed testing plan. This plan shall be subject to the Engineer's approval.
3. The Switchgear manufacturer shall provide the actual test data, observations, and certification that the tests have been completed prior to shipment to the Engineer for approval.

I. FACTORY INSPECTION AND TESTS
1. GENERAL
a. Equipment furnished under these specifications shall be subject to inspection during manufacturing by representatives of the Owner who shall be afforded proper facilities for determining compliance with the specifications.
b. Switchgear manufacturer shall provide to the Engineer a complete list of all tests to be performed on the switchgear as a formal submittal to the Engineer prior to the switchgear being tested.
2. The switchgear manufacturer shall provide the actual test data, observations, and certification that the tests have been completed prior to shipment to the Engineer for approval.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver paralleling system equipment in section sizes that can be moved past all obstructions in the physical site.

B. All paralleling equipment shall be stored indoors in a temperature controlled environment, in accordance with manufacturers temporary storage instructions. At a minimum, equipment shall be protected from moisture, dirt, and physical damage.

C. With written approval of the equipment manufacturer, equipment may be stored outdoors, as long as it is protected according to the manufacturer's instructions, including protection from condensation, rain, dust/dirt, and physical damage.

D. All materials and equipment to be incorporated into the Work shall be handled by Contractor in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.

E. Provide low-boy type, flat, air suspension freight lines when transporting equipment. Use minimum Marine grade vinyl wrap to protect switchgear and enclosures.

1.6 EXTRA MATERIALS

A. Provide additional items to support the paralleling system equipment, completely programmed and tested, packaged and labeled consistently with designations in system drawings.

1. One set of fuses of each type used in the system
2. Submit one racking handle(s) with equipment. A charging handle shall be furnished on each breaker mechanism.
3. For all switchgear with circuit breakers in upper compartments, provide one circuit breaker lifting device - portable, floor-supported with a roller base.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: -22.2 deg C (-8 deg F) to 45 deg C (113.0 deg F).
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Refer to Generator Data Sheet.

B. Seismic Hazard Design Loads:
1. Unless otherwise indicated on Contract Documents, specified Work must withstand seismic hazard design loads determined in accordance with requirements specified in this Section, adjusted for installed elevation above or below grade.
    a. The term "withstand" means "unit must remain in place without separation of parts from unit when subjected to specified seismic hazard design loads and unit must be fully operational after seismic event."
2. Perform calculations to obtain force information necessary to properly select seismic-restraint devices, fasteners, and anchorage. Perform calculations using methods acceptable to applicable code authorities and as presented in ASCE/SEI 7-16. Where "ASCE/SEI 7" is used throughout this Section, it must be understood that the edition referred to in this subparagraph is the edition intended as reference throughout the Section Text.
    a. Data indicated below to be determined by Delegated Design Contractor must be obtained by Contractor and must be included in individual component submittal packages.
    b. Coordinate seismic design calculations with wind-load calculations for equipment mounted outdoors.
    c. Building Occupancy Category: IV.
    d. Building Risk Category: IV.
    e. Building Site Classification: D.
3. Calculation Factors, ASCE/SEI 7-16, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-16 unless otherwise indicated.
    a. Horizontal Seismic Design Force F_p: Value must be calculated by Delegated Design Contractor using Equation 13.3-1. Factors below must be obtained for this calculation:
        1) Spectral Acceleration (S_{DS}): .339. Value applies to all components on Project.
        2) Component Amplification Factor (a_p): See Drawing Schedule for each component.

3) Component Importance Factor (I_p): 1.5.
4) Component Operating Weight (W_p): For each component. Obtain by Delegated Design Contractor from each component submittal.
5) Height in Structure of Point of Attachment of Component for Base (z): Determine from Project Drawings for each component by Delegated Design Contractor. For items at or below the base, "z" must be taken as zero.
6) Average Roof Height of Structure for Base (h): Determine from Project Drawings by Delegated Design Contractor.

b. Vertical Seismic Design Force: Calculated by Delegated Design Contractor using method explained in ASCE/SEI 7-16, Paragraph 13.3.1.2.
c. Seismic Relative Displacement (D_{pl}): Calculated by Delegated Design Contractor using methods explained in ASCE/SEI 7-16, Paragraph 13.3.2. Factors below must be obtained for this calculation:
1) Relative Seismic Displacement that Each Component Must Be Designed to Accommodate (D_p): Calculated by Delegated Design Contractor in accordance with ASCE/SEI 7-16, Paragraph 13.3.2.
2) Structure Importance Factor (I_e): 1.5. Value applies to all components on Project.

C. Wind Hazard Design Loads:
1. Perform calculations to obtain force information necessary to properly select wind-load restraint devices, fasteners, and anchorage. Perform calculations using methods acceptable to applicable code authorities and as presented in ASCE/SEI 7-16. Where "ASCE/SEI 7" is used throughout this Section, it must be understood that the edition referred to in this subparagraph is intended as referenced throughout the Section Text unless otherwise indicated.
a. Data indicated below that are specific to individual pieces of equipment must be obtained by Contractor and must be included in individual component submittal packages.
b. Coordinate design wind-load calculations with seismic-load calculations for equipment requiring both seismic- and wind-load reinforcement. Comply with requirements in other Sections in addition to those in this Section.
2. Design wind pressure "p" for external sidewall-mounted equipment must be calculated by Delegated Design Contractor using methods in ASCE/SEI 7-16, Ch. 30.

1.8 WARRANTY
1. Equipment Manufacturer shall warrant the equipment furnished under this Specification for a period of two (2) years against defects in materials and workmanship, equipment design, and operational failure.
2. In the event of failure in material, workmanship, or equipment design of any part or parts of the equipment during the warranty period, and provided that the equipment has been operated and maintained in accordance with good practice, the Equipment Manufacturer shall furnish, deliver, and install the defective part or parts at Equipment Manufacturer’s own expense. During the warranty period, the Owner will remove and load the Goods on a vehicle provided by the Equipment Manufacturer if it is necessary to return the Goods to the Equipment Manufacturer for correction of defects during the Warranty Period. Owner will reinstall the Goods when they are returned to the Site after defects have been corrected. The Equipment Manufacturer is to provide all parts, labor, and incidental cost for making repairs, shipping the Goods to the Site and providing startup services in accordance with specifications.

3. The warranty period shall be interpreted as the twenty-four (24) month period following the installation, adjusting and acceptance testing, and the start of actual operation of the equipment.

1.9 COORDINATION STUDY AND TRANSIENT STUDY

A. Equipment supplier shall commission a short circuit study and protective-device coordination study of relays, fuses, circuit breakers, and all other protective devices and shall submit a coordination report as specified herein. The study shall include all new electrical equipment installed under this contract. The equipment supplier shall ensure that all settings meet the requirements of the electric utility for closed transition (for applicable switchgear lineups). This shall include compliance with the maximum 10 second paralleling time.

B. Equipment supplier shall perform a switching transient study using the Electromagnetic Transients Program (EMTP) to determine the transient response, and properly select and rate the transient mitigation equipment. Through the EMTP study, the surge capacitor and resistor components of the RC snubber shall be precisely selected for each application, to match the electrical system surge impedance and to provide superior transient suppression. The EMTP study shall also provide the recommendation for the best location of the snubber assembly to protect the transformer, generator or plant loads. When appropriate for all systems under study, but especially in the case of PTs and CPTs, the EMTP study shall recommend additional forms of surge protection, mitigation techniques and/or alternative equipment ratings and configurations.

C. Equipment supplier shall be responsible for and shall ensure that all relays and circuit breakers are set according to the study results.

D. The study shall include, but shall not be limited to, the following:
   1. Color-coded printouts of coordination curves prepared with calculation software.
   2. A tabulation of all protective relay and circuit breaker trip settings and recommended sizes and types of medium-voltage fuses.
   3. Calculated short-circuit values at all nodes in the distribution system included within the scope of the coordination study.
   4. SEL Engineering Services, or an Engineering and Testing Service firm acceptable to the Engineer shall conduct the coordination study.

E. Equipment supplier shall be responsible for obtaining the following:
   1. The coordination curves for relays, fuses, and circuit breakers included in the scope of work of this study.

F. Other applicable information for all new and existing electrical equipment included in the scope of work.

G. Engineer will obtain the available 3 phase, symmetrical fault current at the point of service, from El Paso Electric Co.

1.10 ARC FLASH HAZARD ANALYSIS

A. Equipment Supplier shall commission an Arc Flash Hazard Analysis for each piece of new electrical equipment in accordance with OSHA 29 CFR Part 1910, NEC, NFPA 70E, and IEEE 1584 and shall submit and Arc Flash Hazard Analysis report as specified herein.

B. The Arc Flash Hazard Analysis shall be performed in association with, or as a continuation of, the short circuit study and protective device coordination study.

C. Arc Flash Hazard Analysis calculations shall lead to the selection of a level of Personal Protective Equipment (PPE) that is a balance between the calculated incident energy exposure and the work activity being performed, while meeting the following concerns:
   1. Provide adequate protection.
   2. Avoid the need for more protection than is warranted.

D. Results of the Arc Flash Hazard Analysis shall be used to identify the flash protection boundary and the incident energy at assigned work distances throughout any position or level in the overall electrical generation, transmission, distribution, or utilization system.
   1. The analysis shall include, but shall not be limited to, the following:
      a. A tabulation of the symmetrical RMS bolted fault current available and X/R ratio at each piece of electrical equipment.
      b. A tabulation of the arc fault current available at each piece of electrical equipment included in the scope of work.
      c. A list containing the incident energy and the flash-protection boundary for all electrical equipment included in the scope of work.
      d. A list containing each piece of electrical equipment included in the scope of work, its corresponding incident energy, hazard rating, and required Personal Protective Equipment.

E. SEL Engineering Services, or an Engineering and Testing Service firm acceptable to the Engineer shall conduct the Arc Flash Hazard Analysis.

F. The Arc Flash Hazard Analysis shall be performed using the latest version of SKM Power*Tools for Windows software, without exception. After the final version of the study and analysis are completed and accepted, Equipment Supplier shall provide two (2) copies of the SKM electronic file to Owner.

G. Equipment Supplier shall be responsible for submitting complete and accurate arc flash analysis information in the Arc Flash Hazard Report. The report shall be submitted to Engineer for review before the final report is prepared. Equipment Supplier shall ensure that calculated values for flash-protection boundary, working distance, incident energy, and required.

H. Personal Protective Equipment is submitted and provide substantiation that the information will be prominently displayed on electrical equipment.

I. The Arc Flash Hazard Analysis report shall be bound in a standard 8-1/2 by 11inch three-ring binder and shall be submitted in accordance with the Submittals section. Final selection of required Personal Protective Equipment shall be subject to review and acceptance by Engineer.

J. After approval of the Arc Flash Hazard Report, Equipment Supplier shall furnish arc flash warning labels to be installed by others on the applicable electrical equipment. All electrical equipment shall be provided with the appropriate ANSI compliant arc flash labelling. Labels shall include the flash protection boundary distance, incident energy, and minimum required Personal Protective Equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Only approved bidders shall supply equipment provided under this contract. Equipment specifications for this project are based on microprocessor-based paralleling equipment manufactured by Cummins Power Generation.

2.2 GENERATOR PARALLELING MONITOR AND CONTROL SYSTEM

A. Acceptable Manufacturers

1. Cummins Power Generation.
2. Caterpillar
3. ABB
4. Schneider Electric, Square D
5. EATON, Cutler Hammer

B. Individual Generator Monitoring and Control Panel: Provide a paralleling control panel for each generator set in the emergency/standby power system. The paralleling control functions shall be integrated with the generator set control functions, and provided in a single, dedicated purpose microprocessor-based control designed and manufactured by the generator set manufacturer. Each paralleling control panel shall contain the functions as described in this section. All printed circuit boards and electronics shall be conformal coated for protection against H2S environment and moisture. No PLC-based control shall be used to provide these functions. Each paralleling control shall be independent and autonomous, requiring no interaction with other controls for proper operation, except load sharing and paralleling breaker status functions. Failure of the system master control shall have no impact on the functions described in this section for the generator sets.

1. Operator Panel. Each paralleling control shall be provided with an operator panel to allow the operator to view the status and control operation of the specific generator set being paralleled. The operator panel shall be provided with the following features and capabilities.

    a. 1% or better accuracy generator set AC output instruments; Ammeter, Voltmeter, Frequency Meter, Wattmeter, KW-hour meter, Power Factor Meter, or other means shall be provided to allow viewing of voltage and amperes for each phase shall be provided. For 3-phase/4-wire systems the voltmeter shall indicate line to line and

line to neutral conditions. Voltmeter, ammeter, frequency meter, kW meter and power factor meter shall have both analog and digital displays. Switches and/or other provisions shall be included to allow reading of bus voltage and frequency from this metering set.

b. Synchronizer shall be an integral part of the multi-function digital generator set control. Independent synchronization swing panels are prohibited.

c. Running Time Meter, Start Counter

2. Generator Set Operator Panel: Panel shall provide manual and automatic functions for control of the generator set. Press the manual mode button to put the unit in manual mode if the operator does not press the Start button in 10 seconds, the control is put in the Off mode. Both manual and off modes prevent generator set from starting remotely or immediately shuts down the generator set if it is running. Press the auto mode button to put the unit in auto mode. The auto mode allows remote start, stop, breaker open, and breaker closed commands to be active. Generator controller must withstand voltage drops down to 8V DC upon engine starting.
3. Breaker trip/close switch with breaker status indicating lamps. The switch shall be interlocked with the control system such that breaker closure is not possible unless the mode select switch is in the run position and the generator set is synchronized with the system bus.
4. Control Reset push button switch with indicating lamp. Lamp shall flash to indicate that generator set is locked out due to a fault condition.
5. Lamp test push button switch. Operation of this switch shall cause all lamps on the panel to be simultaneously tested.
6. The control panel shall be provided with a set of DC-powered lamps with a switch to allow viewing of all functions on the front panel when normal lighting systems are not available.
7. Emergency Stop switch. The emergency stop switch shall be a red, mushroom head switch which maintains its position until manually reset.
8. Precision voltage and frequency raise lower function. The generator set frequency and voltage may be adjusted plus or minus 5% when the generator set is operating independently of the system bus. Voltage and frequency adjustments are integral to the generator set control, along with bus metering, breaker control switches, and manual paralleling controls for ease of use by the operator. The ability to make frequency and voltage adjustments shall be disabled when the paralleling breaker is closed. Voltage and frequency adjustments while the paralleling breaker is open shall not impact on the load sharing when the paralleling breaker is closed.
9. Alarm and status indicating panel to indicate the following conditions (alarm horn shall be located on master control)

C. Internal Controls. The following internal control functions shall be provided for each generator set in the system.

1. Electronic isochronous kW load sharing control to operate the engine governors during synchronizing and to provide isochronous load sharing when paralleled with the electric utility infinite bus when transferring back to normal or when testing generator with plant load. The control system shall allow sharing of real kW load between all generator sets in the system to within 1% of equal levels, without introduction of frequency droop into the system. The control system shall include all equipment required for kW load sharing temporarily with an infinite bus. The infinite bus governing controls shall allow the generator set to synchronize to an infinite bus, parallel, and ramp up to a preset load level on the generator set. Additional controls shall be provided to cause the generator set to

ramp up to a kW load level signaled by the system master control. The isochronous load sharing module and engine governor shall be a coordinated system of a single manufacturer.

2. Load demand governing controls shall be provided to cause the generator set to ramp down to zero load when signaled to shut down in a load demand mode. On a signal to re-start, the load demand governing controls shall cause the generator set to synchronize to the system bus, close, and ramp up to it's proportional share of the total bus load. The ramp rate of the generator set shall be operator-adjustable.
3. Electronic kVAR load sharing control to operate the alternator excitation system while the generator set is paralleled. The control system shall allow sharing of reactive load between all generator sets in the system to within 1% of equal levels, without introduction of voltage droop into the system. The control system shall include all equipment required for VAR load sharing with an infinite bus in either a constant VAR or constant power factor mode for future application flexibility. (Mode and adjustments selectable by the operator)
4. Equipment shall be provided to monitor the generator set as it is starting, and verify that it has reached at least 90% of nominal voltage and frequency before closing to the bus. The equipment provided shall positively prevent out of phase paralleling if two or more engine generator sets reach operating conditions simultaneously by providing a lockout signal to disable breaker closure for generator set(s) in the system which have not been selected to be the first units to close to the bus. Controls to recognize the failure of the first breaker signaled to close, and allow system operation to proceed in spite of this failure shall also be provided (breaker failure alarm). Systems using dead bus relay schemes without a disable signal to positively prevent out of phase paralleling shall not be acceptable under this specification. System shall include an independent backup using the SEL sync relay features to automatically operate in the event that the primary system fails.
5. Synchronizer to electronically adjust the engine governor to match the voltage, frequency and phase angle of the bus. Synchronizer shall maintain the engine generator voltage within 1% of bus voltage and phase angle within 15 electrical degrees of the bus for 0.5 seconds before circuit breaker closing. Each unit shall have its own synchronizer; systems using a switching scheme to utilize a single system synchronizer will not be approved. Synchronizers and systems which utilize a motor driven pot for control of AC voltage during the synchronizing process will not be accepted. The system shall be provided with a fail to synchronize time delay that is adjustable from 10-120 seconds. Control logic for fail to synchronize function shall allow field adjustment of function for either alarm or shutdown of the generator set on failure condition.
6. Controls shall include a permissive relay function to assure that the generator set does not attempt to close out of phase with the bus, due to errant operation of the synchronizer.
7. Controls shall include a permissive (sync check) function, to be used with "generator synchronized" indicator during manual paralleling, to prevent accidental closure of the breaker with the generator set out of phase with the bus. Provisions to allow manual closure of the first generator set to a de-energized bus shall be included.
8. Controls shall be provided to verify generator set and bus phase rotation match prior to closing the paralleling breaker.
9. Electronic alternator overcurrent alarm and shutdown protection. This protection is required in addition to the overcurrent trip on the paralleling breaker, and shall sense current flow at the generator set output terminals. The overcurrent alarm shall be indicated when the load current on the generator set is more than 110% of rated current for more than 60 seconds. The overcurrent shutdown shall be matched to the thermal damage curve of the generator set, and shall not have an instantaneous function.
10. Electronic alternator short circuit protection. This protection is in addition to the overcurrent trip on the generator breaker. The short circuit shall occur when the load

current on the generator set is more than 175% of rated current and an aggregate time/current calculation indicates that the system is approaching the thermal damage point of the alternator. The equipment used shall not have an instantaneous function and shall be selectively coordinated with the feeder circuit breakers. This protective function shall be provided by equipment that is UL-listed as a utility grade protective relay.

11. Provide overcurrent and short circuit protection for the conductors connecting the generator set to the paralleling switchgear. This protection may be integrated with alternator protection but must be positively coordinated to prevent tripping of the paralleling breaker prior to the operation of the alternator protective equipment.
12. Controls shall be provided to sense reverse VAR conditions on the alternator while paralleled to the system bus. Reverse VAR protection shall be set to operate at not less than 20% of the kVAR rating of the alternator at standby conditions. A reactive capability curve shall be provided to allow proper setting of this protection.
13. Generator set start contacts rated 10 amps at 32 VDC. A redundant network-based starting system shall also be provided.
14. Cooldown time delay, adjustable: 0-600 seconds. The control panel shall indicate the time remaining in the time delay period when the generator set is timing for shutdown.
15. Start time delay, adjustable: 0-300 seconds. The control panel shall indicate the time remaining in the time delay period when the generator set is timing for start.
16. The control system shall monitor the paralleling breaker auxiliary contacts, and initiate a fault signal if the breaker fails to close within an adjustable time delay period after the control has signaled it to close (0.1 - 1 second). Breaker failure alarm shall cause the paralleling breaker to trip open, and lock out until manually reset.
17. Controls shall be provided to shut down generator set and initiate alarm when the generator set is at less than 85% of nominal voltage for more than 10 seconds, more than 110% of nominal voltage for more than 10 seconds. When the control is set to operate as Inverse time, the unit will be more sensitive to voltage spikes and trip more rapidly.
18. Provide all other components required, such as properly sized current transformers, transducers, terminal blocks, etc., for reliable system operation, as described herein under “SYSTEM OPERATION".

D. Master Control System and Monitoring Equipment: Provide an independent system master control to monitor and control the operation of the entire paralleling system, DMC8000 or equal.

1. Main Operator Panel. The master control panel shall be provided with at least a 21 Inch full color high resolution resistive touch Advantech HMI operator interface panel to allow the operator to view the status and control operation of system. The operator panel shall be provided with the following features and capabilities.

    a. Main One Line Screen shall give a graphical display of the power system components directly controlled by the paralleling, auto transfer, generator and complete switchgear breakers, meters, relays and system components. System status displays a combination of multi-color animation, messages and pop-up indicators.
    b. System Control Screen shall provide the operator with the ability to:

        1) Enable or disable load demand operation;
        2) Initiate test (with or without load);
        3) Control the shutdown sequence for the generator sets in the load demand mode;
        4) Set the load demand time delays;
        5) Set the load demand operation set points;

c. Load Control Screen shall allow the operator to monitor genset capacity, levels of load that have been added or shed.

1) Allow the operator to manually shed or add load levels.
2) Display the name, status and priority of each load block (whether on or off).
3) Display total load, as a percentage of online generation capacity, displays on a bar graph in kW and amps.
4) Display actual system load.

d. Genset Control Screen.

1) Allow the operator to manually start and stop the genset.
2) Allow the operator to manually open and close the genset and generator main breaker.
3) Manual control of the genset and generator main breaker can be performed by an operator via the genset or master control
4) Display generator set status and percent load.
5) Allow the operator to attempt to reset generator faults from the HMI.

e. Genset Summary Screen shall provide numeric and graphical displays of critical operating parameters for each genset.

f. Generator Set Metering shall include the following parameters for each generator set:

1) Line to line voltage (all three phases simultaneously),
2) Line to Neutral voltage (all three phases simultaneously),
3) Bus Line to Line voltage (all three phases simultaneously),
4) Bus Line to Neutral voltage (all three phases simultaneously),
5) Alternator frequency,
6) Alternator output current (all three phases simultaneously),
7) Power Factor,
8) KW output of generator and as a percentage of rated KW,
9) KVA,
10) KVAR,
11) Alternator line to line voltage (all three phases simultaneously) (graphical format),
12) Alternator output current (all three phases simultaneously) (graphical format),
13) Power Factor (graphical format),
14) KW output of generator, (graphical format),
15) Frequency (graphical format).

g. Bus metering display shall include the following parameters for each bus segment:

1) Bus Line to Line voltage (all three phases simultaneously),
2) Bus Line to Neutral voltage (all three phases simultaneously),
3) Bus output current (all three phases simultaneously),
4) KW output of bus and as a percentage of rated KW,
5) KVA,
6) KVAR,
7) KW hours

8) KVAR hours
9) Bus line to line voltage (all three phases simultaneously) (graphical format),
10) Power Factor (graphical format), F
11) Bus output current (all three phases simultaneously) (graphical format),

h. KW output of bus, (graphical format) Frequency (graphical format).

1) Selector buttons shall be provided to allow the user to choose which bus to monitor.

i. Active Alarm Screen shall display the date, time, alarm description and acknowledged date and time for genset and system alarms (alarm horn shall be located on master control).

j. Historical Alarm Log Screen shall display the date, time, alarm description and acknowledged date and time for genset and system alarms (alarm horn shall be located on master control). These alarms should be stored and displayed in the master control for x days or x alarms.

k. Real Time Trending Screen should monitor and display four pens simultaneously. Display parameters should include voltage, current, power, and frequency for each bus. Selector buttons shall be provided to allow the user to choose which bus to monitor.

l. Historical Trending Screen The system shall include historical trending which collects, displays, and stores data. The historical data base shall be a FIFO file with storage capacity up to 26 days, or saved to a USB flash drive. Data will be saved in ".csv" file format. Each trend pen will have stop/pause/zoom features to allow the operator to magnify the trend, and also scroll back in time to view history. Historical Trend properties shall include: Refresh rate = on data change or every 2 seconds Buffering for extra data = 360 data points Continuous scrolling with pause and sliding time Time span on display = 8 hours (normal view) Time span on display = 2 hours (zoon view) USB data storage = 1 Year (with Minimum 1 Gig) Maximum and Minimum scale values = selectable by operator via touch screen Print screen function Required Trend pens required: Total KW Total KVAR Average Amps Average L-L Voltage

m. User Login Security shall consist of 3 levels of security: Guest, Operator, and Technician. Automatic logout feature will reset access to “Guest” after defined period of time

n. Event Log Screen shall be capable of logging all breaker operations, security level changes, and system status changes with a time and date stamp.

o. All screens on the master control shall be available on the Remote Web Interface without any additional software or licensing required.

p. The plant test report function shall provide a record that System generator sets have been operated above 30% load for a particular duration. The report shall be enabled individually for each generator set in the system. The report duration shall be adjustable between 5 – 240 minutes. The control will store at least 12 reports per generator. The operator may select, view, and print any and all of the 12 available reports per generator set. Reports shall be available via the remote web interface or FTP site. Each report shall contain the following information: Generator Set Name, Generator Set Model, 3 Phase L-L Voltage, 3 Phase Amps, Frequency, Power Factor, % KW, KW, KVAR, KVA, Oil Pressure, Coolant Temperature, Battery Voltage, Engine Hours

q. All screens shall have detailed help content

r. Diagnostic screens shall display: Operator panel diagnostics, Communications processor diagnostics and Primary controller diagnostics.
s. Modbus TCP/IP over Ethernet and Ethernet/IP gateway for SCADA Interface.

2. Internal Controls. The following internal control components or functions shall be provided for the master control:

a. Provide load demand control signals for each generator set provided, which operate when enabled to minimize fuel consumption during extended outages. The load demand can be enabled or disabled.
b. Load add and shed output contacts, rated 18 A at 250VAC/VDC. The priority level for each load contact set shall be field configurable through the master control operator panel.
c. The master functions shall include:

1) Automatic and manual start/stop commands for generator sets as well as paralleling breaker control.
2) System test with and without load initiated locally or remotely

d. Provide all other components required, such as properly sized current transformers, transducers, terminal blocks, etc., for proper and reliable system operation.
e. Master control equipment shall contain a system of diagnostic LED's to assist in analyzing proper system function.

3. Remote Operator Panel. A separate remote HMI operator shall be provided in a NEMA 1 enclosure with at least a 21 Inch and installed in the control room designated by owner and interfaced with Main Operator Panel to display and perform exact same features and capabilities.
a.

E. Construction

1. Manufacturer shall supply drawings that note dimensions, access requirements, and conduit entry details.
2. The master control system shall be listed and labeled under the requirements of UL891 including all covers, barriers, and supports. Individual control sections shall be isolated from each other by metal or insulating barriers.
3. All wiring shall be IEC UL891 listed 105 deg C, 600 volt rated and sized as required. Each wire, device or function shall be suitably identified by silk screen or similar permanent identification.
4. The framework and all other sheet metal components of the system shall be primed with a rust inhibiting primer, and finished with two coats of satin finish ANSI 61 gray enamel and must meet corrosion requirements of IEC 61439
5. All door mounted control components shall be industrial type oil tight devices with contact ratings a minimum of twice the maximum circuit ampacity they are controlling. Toggle switches and other light duty control devices are not acceptable. Indicator lamps shall be high intensity LED type devices. Indicator lamp condition (on or off) shall be easily visible in bright room lighting conditions.
6. AC control circuits in the switchboard shall be protected with properly sized fuses or circuit breakers,. Potential transformers shall be protected on line and load side.
7. All CT installations shall include 6 place shorting type terminal blocks using 12 gauge wire with ring terminal connectors.

8. All active control system components in the system shall be suitable for operation in ambient temperatures ranging from 0 to +50 degrees C. The controls shall be suitable for operation in an ambient ranging from 5-95% relative humidity, and shall be protected from the effects of equipment vibration.
9. The Touchscreen and other non-LED displays specified shall be suitable for operation from 0-50 degrees C. The controls shall be suitable for operation in an ambient ranging from 5-95% relative humidity.

F. System Control Power

1. Provide integral UPS served from "best scan" system below with minimum of 30 minute run-time.
2. Control power for the paralleling system controls shall be derived from the generator set 24VDC starting batteries. A solid state, no break "best scan" selector system shall be provided so that control voltage is available as long as any battery bank in the system is available, and that all battery banks are isolated to prevent the failure of one battery from disabling the entire system. The power transfer control shall be supplied with redundant DC control power from two independent sources and 120V power from house power.
3. The generator set governing, voltage regulation, load sharing, synchronizing, and protection, shall be capable of proper operation with battery voltage levels down to 8vdc without external battery support. The master control shall be supplied with a station battery system rated to 10 amp minimum. The control power for the system master controls shall be derived from at least two different sets of generator set battery banks.

G. Sequence of Operation
1. All system operation and control functions shall be coordinated and integrated such that during automatic or manual operation, no unsafe condition shall occur, no malfunction of intended operation shall occur, and the highest possible reliability of operation shall be maintained.
2. The Load Demand shall be used to match generating capacity to the load in order to optimize fuel efficiency and prolong Generator Set life while maintaining the right amount of reserve capacity for the customer's application. Once all generators are connected to plant load, the system shall observe the steady state load and drop off any generators not needed to meet the load.
3. The Load Demand sequence shall automatically be adjusted if a Generator Set warning alarm occurs. The Generator Set that has a warning fault will be moved to the lowest priority Generator Set in the sequence. If not all Generator Sets are required to supply the load the Generator Set experiencing the fault will be the first to shut down, reducing the risk that the warning condition could develop into a more serious fault. This takes priority over all other sequence settings methods.
4. There are a number of conditions that would inhibit or cancel the Load Demand function. All Load Demand stop commands will be removed. They are as follows:
    a. There is an active Overload condition.
    b. The system is set to the Manual Mode from the Control Screen.
    c. The Genbus metering fails.
    d. The Generator Set I/O Island fails.
    e. The Load Demand feature is disabled from the DMC Load Demand Screen.
    f. Load Demand Modes shall be:
        1) Run Hours Monitoring, the Generator Sets with the lowest run hours will have the highest priority in the Load Demand sequence

2) Auto Rotate, the Load Demand sequence can be set to change every time the Load Demand function is activated. The lead unit will become the lowest priority Generator Set and all other Generator Sets in the system will increase in priority by one level.

H. Redundant Multiple-Generator Monitoring and Control System Controller:
1. Fully equip with hot swappable stand-by programmable logic controller and redundant power supplies.

I. System Modes
1. The normal operating mode for all switchgear lineups is the main breaker closed and generator main breaker open.
2. Loss of Utility Power
   a. Upon loss of electric utility power for any reason, the main breaker and the load breakers shall open to isolate the plant service from the electric utility power. Once the main breaker is opened, a start signal shall be sent to all the engine-generator control panels. The first generator breaker shall close onto the generator bus once it has reached utility voltage and frequency, then the remaining generator breakers shall close once they have matched the voltage and frequency of the generator bus. Once the generator bus is ready to accept load, the generator main breaker shall closed, then the load breakers shall close and plant load can be added by the plant operators.
3. Return of Electric Utility Power
   a. When electric utility power is restored, after a time delay (adjustable by Owner), the generators shall synchronize with the utility and the main breaker shall close. Generators and electric utility shall be in closed transition mode for less than 10 seconds as limited by the electric utility. Plant load shall be soft load transitioned back to electric utility power. Generator main breaker and generator breakers shall open and generator shall continue to run through a cool down period and then stop.
4. Plant Service Transfer
   a. Under bad weather conditions, the plant superintendent may decide to transfer service to generator power to avoid an unexpected plant shutdowns. An authorized operator will send a transfer command via the local or Remote HMI generator control panel to signal the generators to start. Once available, the engine-generators will automatically start and synchronize to the electric utility source and the generator main breaker shall close. Generator and electric utility shall be in closed transition mode for less than 10 seconds as limited by El Paso Electric Company and main breaker shall open. Once operators decide to return to electric utility power, the return to Electric Utility power mode shall be implemented.
5. Exercise/Test
   a. System shall allow programmed automatic or local starts of the engine-generator for testing engine-generators with or without plant load or to load bank through load bank breaker. Exercise/Test mode shall also be available from a local “RUN” switch or remote test command. If units are in test mode, but called to run under “Plant Service Transfer” sequence, units shall be capable of seamless transfer to desired mode of operation.
6. Failure Modes: Provide manufacturer standard generator and circuit breaker failure modes for each system mode to alarm, cool down and shutdown generators in a safe manner.

2.3 MANUFACTURED UNITS

A. The paralleling/distribution power equipment shall be configured as shown on the contract drawings and rated for operation at voltage and current levels as shown on the contract drawings. It shall contain devices and equipment as shown on the drawings, in addition to meeting the requirements of this section.

B. Construction (Medium Voltage Paralleling and Power Distribution Equipment):

1. Ratings
   a. The metal-clad switchgear shall consist of an indoor enclosure containing circuit breakers and the necessary accessory components all factory assembled (except for necessary shipping splits) and operationally checked.
   b. The assembly shall be a self-supporting and capable of being floor mounted on a level concrete pad.
   c. The integrated switchgear assembly shall withstand the effects of closing, carrying and interrupting currents up to the assigned maximum short circuit rating.
   d. The switchgear described in this specification shall be designed for operation on a 13800, Series Wye, 3 Phase 3 Wire, Impedance Grounded, 60Hz system.
   e. Switchgear and each circuit breaker shall have the following ratings:

      1) Maximum Voltage 15 kV
      2) BIL Rated 95 kV
      3) Continuous Current (15 kV) 1200A
      4) Short-Circuit Current at rated Maximum kV 25/28kA RMS SYM
      5) Maximum symmetrical Interrupting and Three Second Rating 36 kA RMS SYM
      6) Nominal 3-Phase MVA Class 500 MVA
      7) Rated Interrupting Time Five cycles

2. Stationary Structure

   a. The sections are divided by metal barriers into the following separate compartments: Circuit breaker, instrument, main bus, auxiliary device and cable. Each feeder section may have up to two circuit breaker compartments.
   b. Stationary element shall include insulated tinned copper busses, insulated copper connections, instrument transformers, primary disconnecting devices, automatic shutters, steel barriers between compartments, a manually or electrically operated mechanism for moving the circuit breaker to and from the connected position, mechanical interlocks, ground bus, terminal blocks and wiring for control and secondary connections, control fuses, and provision for connecting cables.
   c. The stationary units shall be constructed of welded structural shaped steel members together with formed sections of smooth panel sheet steel approximately 1/8" thick.
   d. Each unit shall be completely enclosed by a hinged panel door and removable plates permitting access to all compartments.
   e. The equipment shall be arranged so that all components, except potential or control transformers, may be removed from the front. Hinged-back access doors shall be provided.
   f. A tin-plated copper ground bus shall extend through the stationary structure. It shall have a momentary rating at least equal to the highest momentary rating of any circuit

breaker in the structure assembly. Each stationary unit shall be grounded directly to the ground bus.

3. Circuit Breaker Compartment

   a. Each circuit breaker compartment shall be designed to house a horizontal draw out metal-clad interrupting type vacuum circuit breaker complete with solenoid operation mechanism, auxiliary switches, and interlocks mounted on a mobile frame.
   b. The frame shall be fabricated from formed steel plates electrically welded to form a rugged support for the equipment. A steel barrier shall separate the high-voltage parts of the circuit breaker from the operating mechanism and control devices. The frame shall have four wheels with bearings and a flange construction which shall engage with the rail as the unit is rolled into the housing. Each circuit breaker shall have the capability to be remotely operated (open/close) via the closing of a remote set of dry contacts.
   c. The stationary primary disconnecting contacts are to be tin-plated copper and mounted within porcelain support bushings. The movable contacts and springs shall be mounted on the circuit breaker element for ease of inspection/maintenance.
   d. Entrance to the stationary primary disconnecting contacts shall be automatically covered by metal shutters when the circuit breaker is withdrawn from the connected position to the test or disconnected position or removed from the circuit breaker compartment.
   e. Extend a ground bus into the circuit breaker compartment to automatically ground the breaker frame with high-current spring type grounding contacts located on the breaker chassis when in the test and connected positions.
   f. Guide rails for positioning the circuit breaker and all other necessary hardware are to be an integral part of the circuit breaker compartment.
   g. Blocking devices shall interlock breaker frame sizes to prevent installation of a lower ampere rating or interrupting capacity element into a compartment designed for one of a higher rating.
   h. It shall be possible to install a circuit breaker into a bottom compartment without use of a transport truck or lift device.
   i. The breaker unit shall move between the "test" position and "operating" position by means of a worm gear levering device operated by a removable hand crank. The device shall be mechanically interlocked with the breaker closing mechanism so that a closed breaker cannot be removed from the "operating" position or inserted from the "test" position.

4. Cable Compartment/Ground Bus
   a. Compression type cable lugs and stress cone terminations shall be furnished by the installing contractor as shown on plans.
   b. Provide horizontal support members to support cables bushings and support for cables to eliminate stress on connections and to avoid movement during arc flash event. The ground bus shall extend through this compartment for the full length of the switchgear.
   c. Auxiliary bus, if needed, and load bus support NEMA Class A-20 standoff insulators shall be epoxy. Porcelain insulators available on optional basis.

5. Main Bus Compartment

a. The main bus shall be tin-plated copper and is to be rated 1200A amps and be fully insulated for its entire length with an epoxy coating by the fluidized bed process. Provide insulated boots over all bus splicing and cable terminations.
b. The busses are to be Tin Plated Copper and be of a bolted design.
c. Access to this compartment is gained from the front or rear of the structure by removing a steel barrier.
d. Provide standard provisions for future extension, as applicable.
e. Cable conduit entry and exit shall be from the bottom.

6. Doors and Panels

a. Relays, meters, control switches, etc., shall be mounted on a formed front-hinged panel for each circuit breaker compartment.
b. Rear access shall be hinged doors to assist in installation and maintenance of bus and cables.
c. Provide locking mechanism for doors.
d. Infrared scanning windows in each compartment visible to exposed connections.

7. Fabrication

a. Each equipment bay shall be a separately constructed cubicle assembled to form a rigid freestanding unit.
b. Minimum sheet metal thickness shall be 11 gauge steel on all exterior surfaces.
c. Rear Access Type - Hinged Doors, Left, non-lockable
d. Front Access Type - Handle, Right, lockable
e. Adjacent bays shall be securely bolted together to form an integrated rigid structure.
f. Each individual unit shall be braced to prevent distortion.
g. The metal-clad switchgear shall be fully assembled, inspected and tested at the factory prior to shipment.
h. Large line-ups shall be split to permit normal shipping and handling as well as for ease of rejoining at the job site.

8. Dimensions

a. As specified in Drawings.

9. Factory Finishing

a. All steel parts, shall be cleaned and a zinc-phosphate pre-treatment applied prior to paint application.
b. Paint color shall be ANSI-61 light grey; TGIC polyester powder, applied electrostatically through air. Following paint application, parts shall be baked to produce a hard durable finish. The average thickness of the paint film shall be 2.0 mils.
c. Paint film shall be uniform in color and free from blisters, sags, flaking and peeling.
d. Adequacy of paint finish to inhibit the buildup of rust on ferrous metal materials shall be tested and evaluated per paragraphs 5.2.8.1-7 of ANSI C37.20.2-1987.
e. Salt spray withstand tests in accordance with ASTM #D-1654 and #B-117 shall be performed on a periodic basis to provide conformance with the corrosion resistance standard of at least 2500 hours minimum.
f. Metal structures shall be thoroughly cleaned, bonderized as a unit and then given a primary coat, a coat of rust preventative and a finishing coat of quick-drying lacquer.

g. Instruments, relays, and meters shall have dull black standard finish.

C. Components

1. Circuit Breakers

a. The circuit breakers shall be rated 13800, Series Wye, 15 maximum kV, 60 Hz, with a continuous current rating of 1200A and a maximum symmetrical interrupting rating of 28 kA RMS SYM.
b. Furnish circuit breakers with one vacuum interrupter per phase.
c. Breakers of same type and rating shall be completely interchangeable.
d. The circuit breaker shall be operated by means of a stored energy mechanism which is normally charged by a universal motor but can also be charged by the manual handle supplied on each breaker for manual emergency closing or testing.
e. The closing speed of the moving contacts is to be independent of both the control voltage and the operator.
f. Provide a full front shield on the breaker.
g. Secondary control circuits shall be connected automatically with a self-aligning, self-engaging plug and receptacle arrangement when the circuit breaker is racked into the connected position.
h. Provision shall be made for secondary control plug to be manually connected in test position.
i. A minimum of 4 auxiliary contacts (2a 2b), shall be provided for external use.
j. Provisions shall be made for 10 additional cell-mounted auxiliary contacts both MOC and TOC type for external use.
k. The racking mechanism to move the breaker between positions shall be operable with the front door closed and position indication shall be visible with door closed.
l. An interlocking system shall be provided to prevent racking a closed circuit breaker to or from any position. An additional interlock shall automatically discharge the stored-energy operating mechanism springs upon removal of the breaker out of the compartment.
m. The breakers shall be electrically operated by the following control voltages: 125 VDC.

2. Instrument Transformers

a. Current transformers:
1) Each breaker compartment shall have provision for front- accessible mounting of up to four current transformers per phase* (ANSI standard relay accuracy), two on bus side and two on cable side of circuit breaker. The current transformer assembly shall be insulated for the full voltage rating of the switchgear. At normal rated amperes, under usual service conditions, no part of the transformer shall exceed the heating limits specified in the IEEE standards. Each current transformer shall be capable of carrying continuously its rated primary amperes, under conditions of accidental open secondary circuit, without damage to the primary insulation
2) The current transformers wiring shall be Type SIS #12 AWG.
3) Accuracy shall meet or exceed the requirements of ANSI C37.20.2, Table 5. Current Transformers shall be metering accuracy rated power meter. Accuracy shall be 0.2% ANSI Accuracy Class with a B0.1 Meter Burden. Current transformers connected to the power meter shall be ANSI metering

accuracy class current transformers. Provide ANSI relay accuracy class current transformers for all relays.

b. Voltage transformers:
   1) Draw out mounted with primary current-limiting fuses and shall have ratio as indicated. The transformers shall have mechanical rating equal to the momentary rating of the circuit breakers and shall have metering accuracy per ANSI Standards.
   2) At normal ratings under usual service conditions no part of the transformer shall exceed the heating limits specified in the IEEE Standards.

c. Control power transformers up to 15 kV, 15 kVA, single-phase shall be mounted in draw out drawers.

3. Breaker Control Switch
   a. Switch shall have a time-delay pushbutton feature, Electroswitch, model TD-CSR. Provide control description for the control device on the front of each section of the Metal Clad enclosure that details the operation of the time-delay switch located near each time-delay switch.

4. Control Wiring

   a. The switchgear control circuits shall be wired with type SIS #14 AWG, except where larger size wire is specified or manufacturers calculated load requires larger conductors. All control components shall be wired within manufacturer specifications.
   b. The switchgear shall be provided with terminal blocks for outgoing control connections.
   c. Wire markers shall be provided for each end of all control wires.
   d. Secondary and control wiring within the high voltage compartment shall be completely shielded in a protective metal covering.

5. Station Battery System

   a. 125 VDC with Battery Charger sized as required by the switchgear manufacturer.
   b. Consisting of sealed lead-acid batteries, battery rack, battery charger, connected to switchgear control power terminals and other components shall be furnished by the switchgear manufacturer. The system shall provide control power to open and close circuit breakers, and provide power supply voltage to all relays, PLCs, and other DC powered components within the switchgear. A disconnect switch shall be provided integral to the switchgear from the DC terminal blocks for connection to a remote DC power source in the event the batteries are dead.
   c. Batteries shall be Valve Regulated Lead Acid (VRLA) Battery Series Ideally Suited for Switchgear & Control Applications
      1) Ideal for step load applications: Provides short term energy capability and long term capacity to meet the typical utility cycles
      2) Provide AGM VRLA solution where flooded is not possible or is undesirable Electric Utility Substations
      3) Thermally welded case-to-cover bond - hermetic leak free seal Molded in terminal bushing for durability and leak free seal Thick positive grids and superior grid alloy improving high temperature performance and longer life
   d. Absorbent Glass Mat (AGM) technology for efficient gas recombination of 99% plus Flame Retardant Polypropylene Case & Cover - Self-extinguishing with LOI _ 28 Patented Flame arresting pressure relief vents.

6. Protective Relays

a. All protective relays and power meters shall be provided with 5 inch touchscreen and Ethernet/IP communications protocol.
b. The switchgear manufacturer shall furnish and install, in the metal-clad switchgear, the quantity, type and rating of protection relays as indicated on the drawings and described hereafter in this specification.
c. Protective relays shall be provided with draw out construction with wiring terminated at the rear of the fixed case. Shorting contacts shall be provided for the CT inputs and output relay contacts to allow for removal of the relay for bench testing without feeder shutdown. Test switches shall be provided for testing and maintenance.
d. Management functions shall include Statistical Data, Pre-trip Data, ability to learn, display and integrate critical parameter to maximize feeder protection and communication with external devices.
e. Provide and install arc flash point sensor(s) in each compartment and fiber optic loop sensor(s) along each phase bus bar of the equipment. Installation of the arc flash point sensors and fiber optic loop sensors shall be field installed by authorized Schweitzer service representative (KD Johnson, Inc. Contact: Scott Blackerby).

f. Each generator paralleling breaker section for control of a generator paralleling circuit breaker shall include the following relays:

1) One – Set of three Multi Ratio Current Transformers connected on the load side of the generator circuit breaker and a zero sequence CT connected on the line side of the circuit breaker.
2) One – Position indicator with red and green indicating lights and spring charge white indicating light.
3) One – Microprocessor-based multi-function generator protection relay:
   a) Schweitzer SEL-700G
4) One – Manually reset lockout relay, ANSI device number 86 with indication trip and coil healthy lamps.
5) GE 515 test switches or approved equal for voltage and current transformer inputs for relay testing
6) Three phase station - type lightning arrester.
7) Three phase surge capacitor.
8) One – Set of three Control Power Transformers connected to the line side of the circuit breaker with a secondary voltage of 120 volts.

g. Each generator main circuit breaker and generator circuit breaker section shall include the following relays:
1) One – Set of three Multi-Ratio Current Transformers connected on the load side of the main circuit breaker.
2) One – Circuit breaker control switch with red and green indicating lights
3) One –Schweitzer SEL-751A Multifunction relay.
4) One – Manually reset lockout relay, ANSI device number 86
5) GE 515 test switches or approved equal for voltage and current transformer inputs for relay testing.
6) One – Circuit breaker control switch with red and green indicating lights.

7) Three phase station - type lightning arrester.
8) Three phase surge capacitor
9) One – Set of three Control Power Transformers connected to the line side of the circuit breaker with a secondary voltage of 120 volts.

h. The main circuit breaker section for control of main circuit breaker shall include the following relays:

1) One – Set of three Potential Transformers connected to the line side of the circuit breaker with a secondary voltage of 120 volts.
2) One – Set of three Potential Transformers connected to the bus side of the circuit breaker with a secondary voltage of 120 volts.
3) One – Set of three Multi-Ratio Current Transformers connected on the line side of the main circuit breaker and a zero sequence CT connected on the line side of the circuit breaker.
4) One – Schweitzer SEL-751A
5) GE 515 test switches or approved equal for voltage and current transformer inputs for relay testing
6) One – Auto/Manual control switch with red and green indicating lights
7) One – Circuit breaker control switch with red and green indicating lights
8) One – Manually reset lockout relay, ANSI device number 86 with indication trip and coil healthy lamps.
9) One Schweitzer SEL-735 Power Quality and Revenue Meter
10) Three phase station - type lightning arrester.
11) Three phase surge capacitor.
12) One – Set of three Control Power Transformers connected to the line side of the circuit breaker with a secondary voltage of 120 volts.

i. Each switchgear feeder circuit breaker shall include the following relays:

1) One – Set of three Multi-Ratio Current Transformers connected on the load side of the main circuit breaker and a zero sequence CT connected on the line side of the circuit breaker.
2) One – Circuit breaker control switch with red and green indicating lights.
3) One – Schweitzer SEL-751A Multifunction relay
4) One – Manually reset lockout relay, ANSI device number 86 with indication trip and coil healthy lamps.
5) GE 515 test switches or approved equal for voltage and current transformer inputs for relay testing
6) One – Set of three Control Power Transformers connected to the line side of the circuit breaker with a secondary voltage of 120 volts.

j. Each transformer feeder circuit breaker
1) One – Set of three Multi-Ratio Current Transformers connected on the load side of the circuit breaker and a zero sequence CT connected on the line side of the circuit breaker.
2) One – Circuit breaker control switch with red and green indicating lights
3) One – Schweitzer SEL-751A Multifunction relay
4) One – Manually reset lockout relay, ANSI device number 86 with indication trip and coil healthy lamps.

5) GE 515 test switches or approved equal for voltage and current transformer inputs for relay testing
6) One – Set of three Control Power Transformers connected to the line side of the circuit breaker with a secondary voltage of 120 volts.

D. Surge Arrestors
1. The generator set paralleling breakers shall each be provided with distribution class surge arresters.

E. Surge Capacitors and snubbers per recommendations from manufacturers engineers.

F. Accessories and Testing Equipment
1. Submit 1 racking handle(s) with equipment. Charging handle to be furnished on each breaker mechanism.
2. For all switchgear with circuit breakers in upper compartments, provide 1 circuit breaker lifting device - portable, floor-supported with a roller base.
3. Test jumper set (Electrical Control Panel to operate circuit breaker which has been racked out of the Switchgear.
4. Closing levers for maintenance closing of circuit breakers in the test position.
5. Removable hand cranks for operation of the levering-in device.
6. Sets of special wrenches for the primary disconnecting devices.
7. Sets of test plugs for meters and relays.
8. Spare fuses of each type and size for Switchgear.

G. Indicating Lights, Selector Switches, Pushbuttons
1. Heavy duty and oil tight; Square D Class 9001 (30.5mm) or approved equal. Pilot lights shall be push-to-test (LED type) and shall be Square D SK or approved equal.

H. Infrared Inspection Windows
1. The rear of each breaker section shall be provided with an infrared inspection window. The window shall be permanently fitted into the indicated electrical equipment to give permanent access for infrared inspections. Window material must be transparent to visual, infrared and ultraviolet energy (corona) bands. Window shall be manufactured by IRISS and shall be Platinum Series CAP-CT-12 model.

I. Mimic Bus
1. Provide an approved mimic bus on front of each switchgear assembly. Color shall be black for the Normal Power system and red for the Essential Electrical System, 1/8" x 1/2" (color selected by purchaser) acrylic mimic bus. Plastic tape shall not be used. Use symbols similar to one line diagram shown on drawings. Plastic or metal strips shall be mounted with plated screws. Mimic bus shall be on each compartment applied to the front of the switchgear shall functionally represent the one-line diagram power circuits including CPT's, PT's, etc.

J. Nameplates
1. Plastic, white, .33" white letters on black background, on the front of each door on the switchgear; identifying the compartment contents for each compartment and above all devices such as protective relays, test switches, breaker control switches, indicating lights, selector switches, etc.

2. Attach nameplates with a stainless-steel screw and nut at each end of the nameplate. Adhesive backed nameplates shall not be installed.
3. Provide nameplates with white letters on black background on the rear compartment of each switchgear door section stating what it is associated with.

K. Uninterruptible Power Supply (UPS)
1. UPS to be used for Feeder breakers and Generator breaker protective relaying control power, PLC control and breaker opening and closing. UPS shall be of the on-line, double-conversion technology type. Provide all hardware and software as required to communicate via Ethernet. UPS shall be suitable for operating in a 0 to 40 deg C ambient temperature. The UPS shall be equal to Liebert GXT3-2000RT120 or approved equal.

L. Control Relays
1. Industrial type; contacts rated for 10 amps at 600 VAC; Allen-Bradley Bulletin 700 Type PK, Square D Class 8501 Type X, or approved equal. Relays shall have the capability of having contact decks added in the field. Contacts shall be field convertible to normally open or normally closed. Coils and contacts shall each be replaceable without replacing any other part of the relay.

M. Feeder Protective Relays (FPR)
1. The feeder protective relays shall be Switchgear SEL-751A Feeder Protection Relay. See one-line diagram for more information.
2. Furnish and install where shown on the plans a feeder management and protective relay. Relay shall be provided with 5" touch screen display.
3. Communications protocol shall be Ethernet. Manufacturer shall provide all hardware, firmware, and software to permit communications using Ethernet.

N. Intertie Protection Relays
1. The protective relays shall be Switchgear SEL-700G Intertie Protection Relay. See one-line diagram for more information.
2. Relay shall be provided with 5" touch screen display.
3. Communications protocol shall be Ethernet. Manufacturer shall provide all hardware, firmware, and software to permit communications using Ethernet.

O. Programmable Logic Controller (PLC)
1. The PLC for the switchgear breaker controls shall be manufacturer standard PLC. The Owner shall have access to the programming in the PLC without any further licenses, fees, or passwords. The PLC shall communicate via Ethernet with the Owner's PLC. All alarms, breaker open/close status, run status, etc. shall be communicated via Ethernet to the Owner's PLC. Provide all hardware and software as required.

P. Metering Device
1. Metering device on main incoming breaker shall be Schweitzer 735 Power Quality Meter. Meter shall have capability to communicate using Ethernet. Provide all hardware and software as required for Ethernet communications.
2. The metering device shall incorporate the following functions and features:
    a. Metering Functions with accuracy of 0.05 percent for A & V and 0.04 percent for power parameters. Meter shall comply with ANSI C12.20.5 class for revenue meters.
        1) A, V, VA, W, var, KWH, KVARH, PF, Hz
        2) W, var, A VA Demand

3) A, V, Unbalance
4) Total Harmonic Distortion (THD) of each current and voltage
5) Waveform Capture
6) Data Logging
7) Communications – Ethernet

b. User Interface
1) The digital meter shall have the following user interfaces:
a) Integrated keypad to access actual values and setpoints.
2) Relay output shall be through alarm, auxiliary and pulse output functions.
3) The meter shall provide a user configurable pulse output base on KWH, KVARH, or KVAH.
4) The meter shall provide a pulse input for demand synchronization.
5) The meter shall include a simulation mode capability for testing the functionality and meter response to programmed conditions without the need for external inputs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The installer shall be responsible for inspection of the site and verification that the equipment can be installed and operated as required by the manufacturer.

3.2 INSTALLATION

A. The manufacturer's representative has the responsibility to direct the installation and field testing of the equipment as described in this section. Installation of the equipment shall be performed by the Construction Contractor who shall be required to assemble the equipment and install it as recommended by the equipment manufacturer. Installation, Operation and Maintenance instructions which shall be furnished by the vendor or manufacturer and the installation drawings for this project. Manufacturer’s representative in conjunction with the Construction Contractor shall submit a written plan of action for the installation of the switchgear. Plan of action shall be submitted for approval by the Owner.

B. Remove temporary lifting provisions prior to commissioning.

C. Furnish the services of an experienced service person who shall be experienced in the assembly and wiring of the metal clad switchgear units of similar size and character. He also shall assist in the adjustment and testing of the equipment during the testing, checkout, and start-up.

D. Adjust the calibration of protective relays according to the schedule and test the settings. Prepare a card index for the relays, the settings, the test results and marked thereon, and submit to the Owner.

E. Time spent on the job by the service person shall be adequate for performing the above functions but shall in no case be less than that tabulated below:
Field start-up/testing, days: 12 - (8-hour days which does not include travel time)
Training days: 2 - (8-hour days which does not include travel time)

F. Field start-up/testing shall include programming of the protective relay settings based on short circuit and relay coordination study.

G. In addition, a Relay Specialist shall be provided from the Relay Manufacturer for a 1-day training class. Training shall be one 8-hour day (excluding travel time). Training sessions for switchgear and relays shall follow the method below:
   1. Training shall include theory of operation, application, and troubleshooting. A training outline and manual of training course material shall be provided to the Owner two weeks in advance of the course. Training shall be for four members of the Owner's staff. Eight-hour training sessions shall be broken into two segments, each of 4 hours with a 15 minute break every two hours. Lunch break shall be one hour. Training session shall be coordinated and scheduled with Owner.

H. Training shall not take place until equipment is online and fully operational.

I. When requested within the equipment warranty period, provide an additional training session from that indicated above for the Owner’s Representative at the jobsite or other office location chosen by the Owner. Each eight-hour training session shall be broken up into two segments, each of 4-hours with a 15 minute break every two hours. Lunch break will be for one hour. Training sessions shall be scheduled and coordinated with the Owner.

J. All costs (travel expenses, testing equipment, etc.) required for the start-up, testing and training shall be the responsibility of the equipment manufacture.

3.3 IDENTIFICATION

A. Mount permanent operating instructions at each transfer point, and at the system master control. Instructions shall include a one-line system drawing, description of the operating sequences of the system and the manual operation instructions for the panel where they are installed.

B. A notice indicating location of the operation and maintenance manual shall be provided.

C. A notice indicating service support information including supplier name, telephone numbers, and manufacturer’s contact information shall be provided on each major piece of equipment.

3.4 CONNECTIONS

A. Ground each piece of equipment according to the requirements elsewhere in Division 26 “Grounding and Bonding for Electrical Systems”, and in compliance with instructions in the drawings.

B. Connect power conductors in compliance to appropriate instructions based on voltage class, elsewhere in Division 26.

C. Provide control interconnection wiring and connect all control interconnections in strict compliance to the equipment manufacturers’ instructions.

3.5 FIELD QUALITY CONTROL

A. Prior to acceptance testing, test insulation resistance of each switchgear bus, component, connecting supply, feeder, and control circuit (in compliance with equipment manufacturer(s).) Test continuity of each circuit. Retain permanent records of this testing.

B. A factory-authorized and certified service technician shall inspect all control wiring for type of wiring material and installation practice, verify that the wiring is properly installed by point to point testing, and complete installation and startup checks as required by the equipment manufacturer.

C. Upon completion of the installation, perform continuity tests and functional checkout to assure the proper operation of all equipment. The manufacturer's representative shall be available to assist the Contractor in checking the operation of the metal clad switchgear.

D. Functional checkout shall include all possible operating scenarios of the main breaker, tie breaker and generator breaker combinations and automatic throw over schemes.

E. Start-up procedures, testing and troubleshooting of the metal clad switchgear shall be performed under the supervision of the manufacturer's representative. Energization of the metal clad switchgear shall not be permitted without the manufacturer's representative's permission.

F. No equipment is to be energized until the power system studies have been performed by the installation Contractor, the protective relays and breakers have been set per the short circuit and relay coordination study and the arc flash labels have been installed on the equipment. No exceptions.

G. The manufacturer's representative shall submit an equipment installation report certifying the equipment if properly installed, has been tested and operated under all conditions which may be encountered during operation and is operating satisfactorily.

H. Tests shall be conducted to ensure proper operation of all circuits. The manufacturer's representative shall assist in correcting any deficiencies at no expense to the Owner.

3.6 ADJUSTING

A. Set all protective relaying according to the results as required by a coordination study. Set all other settings as recommended by the equipment manufacturer.

B. Record all settings and provide in system operation and maintenance manuals.

3.7 CLEANING

A. All equipment is to be thoroughly cleaned, with any shipping or installation damage repaired, prior to equipment commissioning and final test.

B. The manufacturer shall furnish sufficient touch-up paint of the same type and color used at the factory to repair damages incurred in installation. Perform touch up painting to achieve the original paint thickness, quality and appearance.

3.8 PROTECTION

A. Equipment shall be protected from the environment in compliance to manufacturer's recommendations. As a minimum, equipment shall be protected from moisture, dirt, and condensation.

3.9 TESTING

A. Factory Testing; Before shipment of the equipment to the jobsite, the entire control system (including generator set controls) and all the new switchgear directly controlled by the control system shall have sequence of operation tested at the manufacturer's facility to demonstrate that it is fully functional prior to shipment to the jobsite. No exceptions to the requirements of this paragraph will be accepted.

B. Factory acceptance testing shall be executed successfully prior to shipment from factory.

C. The supplier of the paralleling system shall provide a manufacturer-certified representative to train the owners personnel in the proper operation and maintenance of the paralleling system.

D. Provide NETA testing of switchgear by third party testing agency.

E. Manufacturers engineers and technicians shall Provide on-site simulation of all breaker and relay trip signals. Startup testing must include dry runs to debug the system prior placing in operation. Then do a live acceptance test witnessed by EPE to prove the closed-transition complies with E El Paso Electric's constraints and settings.

F. Upon successful operation of breaker and relays perform live test on all sequences. Monitor the power quality meter for harmonics and transients and adjust sizes of surge arrestors and snubbers as require per El Paso Electric guidelines.

G. System Function Tests: System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality control tests have been completed and all components have passed specified tests.
   1. Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
   2. Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
   3. Verify the correct operation of sensing devices, alarms, and indicating devices.

3.10 FIELD TESTING

A. General Field Testing Requirements:
   1. Comply with the provisions of NFPA 70B, "Testing and Test Methods."
   2. After installing switchgear and after electrical circuitry has been energized, test for compliance with requirements.
   3. Perform each visual and mechanical inspection and electrical test. Certify compliance with test parameters.

4. Contractor shall confirm all incoming, outgoing and generator voltage phase rotation testing has been performed and verified and coordinated with electric utility and Owner plant motor and equipment phase rotation.
5. Perform a dry run simulation on all sequence of operations and system modes, to confirm breaker operation, synchronization and transfer times prior to live test.
6. Perform a power failure test on the entire installed system and coordinate with Owner and Engineer and provide testing procedures 30 days prior to testing. This test shall be conducted by opening the power supply from the electric utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.
7. Perform live test on all sequence of operations and system modes to confirm breaker operation, synchronization and transfer times and coordinate with Owner and Engineer and provide testing procedures 30 days prior to testing.

B. Medium-Voltage Switchgear Assembly Field Tests:
   1. Visual and Mechanical Inspection:
      a. Verify that fuse and circuit breaker sizes and types correspond to Drawings and coordination study.
      b. Verify that current and voltage transformer ratios correspond to Drawings.
      c. Inspect bolted electrical connections for high resistance using one of the following two methods:
         1) Use a low-resistance ohmmeter to compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
         2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels shall be according to the manufacturer’s published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.
      d. Confirm correct operation and sequencing of electrical and mechanical interlock systems.
         1) Attempt closure on locked-open devices. Attempt to open locked-closed devices.
      e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
      f. Inspect insulators for evidence of physical damage or contaminated surfaces.
      g. Verify correct barrier and shutter installation and operation.
      h. Exercise active components.
      i. Inspect mechanical indicating devices for correct operation.
      j. Verify that filters are in place and vents are clear.
      k. Perform visual and mechanical inspection of instrument transformers according to according to Article "Instrument Transformer Field Tests.”
      l. Inspect control power transformers:
         1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
         2) Verify that primary and secondary fuse or circuit breaker ratings match drawings.
         3) Verify correct functioning of draw out disconnecting and grounding contacts and interlocks.

END OF SECTION 26 13 26

SECTION 26 23 13.13 - DIESEL-ENGINE-DRIVEN GENERATOR SETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes packaged engine-generator sets suitable for use in mission critical applications with the features as specified and indicated. Engine generators will be used as the Standby power source for the system and shall provide reliable power with no run-time limitations while the primary source of power is unavailable. The emergency generator system application for this project is Level 2 per NFPA 110 definition but equipment and accessories provided and testing requirements under this specification shall meet NFPA 110 Level 1 requirements as specified herein.

B. Provide complete factory assembled generator set equipment with digital (microprocessor-based) electronic generator set controls, Power Command 3.3, digital governor, and digital voltage regulator for paralleling multiple generators as indicated on the drawings.

C. Provide factory test, startup by a supplier authorized by the equipment manufacturer(s), and on-site testing of the system.

D. The generator set manufacturer shall warrant all equipment provided under this section, whether or not is manufactured by the generator set manufacturer, so that there is one source for warranty and product service. Technicians specifically trained and certified by the manufacturer to support the product and employed by the generator set supplier shall service the generator sets.

E. The equipment specified in this section is the basis of design used to meet the project requirements. The generator manufacturer shall provide all generator components, switchgear and control system and serve as single point of responsibility for developing control and interface wiring diagrams, assembly, startup, programming and testing. Submitting separate packages by different subcontractors will result in submittal rejection.

F. The generator set supplier shall be responsible for complete compliance to all specification requirements for the entire on-site power supply system, including generator set(s), paralleling switchgear, and paralleling equipment between generators. The complete generator system shall operate in closed transition mode with the electric utility as required by El Paso Electric during transfer and retransfer from electric utility after power outage and for testing with load for a duration not to exceed 10 seconds.

G. Prototype testing, factory testing, site testing.

1.3 COORDINATION

A. All equipment specified in this section shall be furnished through a single engine-generator manufacturer who shall be responsible for the design and manufacturing of the entire system and coordination with the installation contractor.

B. Each engine-generator unit shall be a standard product of the manufacturer and shall be a packaged type unit, fully shop assembled, wired and tested, requiring no field assembly of critical moving parts. Radiators for Cummins 95L engines and larger or approved equal may be shipped loose.

C. Engine-generator manufacturer shall verify that each component of the system is compatible with all other parts of the system; that all piping, materials, and motor sizes are appropriate; and that all devices necessary for properly functioning system have been provided.

D. Engine-generator controls shall be coordinated with the paralleling and automatic transfer Generator Switchgear controls and El Paso Electric for closed transition to and from the electric utility. The automatic transfer function shall be capable of operating in island mode and open-transition mode.

E. Equipment furnished under this section will be assembled and erected by Purchaser. Equipment Manufacturer shall provide field services specified to assist in commissioning, testing, and placing the units in operation in full conformity with equipment manufacturer's specifications.

1.4 CODES AND STANDARDS

A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards, as applicable. The generator set shall include necessary features to meet the requirements of these standards.
   1. ANSI S1.13-1971—Measurement of Sound Pressure Levels in Air
   2. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
   3. NFPA 30 – Flammable and Combustible Liquids
   4. NFPA 37 – Standard For the Installation and Use of Stationary Combustion Engines and Gas Turbines
   5. NFPA 70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
   6. NFPA 110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

B. The generator set and supplied accessories shall meet the requirements of the following standards:
   1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.
   2. UL142 – Sub-base Tanks
   3. UL1236 – Battery Chargers for Charging Engine-Starter Batteries.

C. The control system for the generator set shall comply with the following requirements.
   1. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.

2. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
3. FCC Part 15, Subpart B.
4. ISO 8528 part 4. Control Systems for Generator Sets
5. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.5 DEFINITIONS

A. Emergency Standby Power (ESP): Per ISO 8528: The maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of an electric utility power outage or under test conditions for up to 200 hours of operation per year with the maintenance intervals and procedures being carried out as prescribed by the manufacturers. The permissible average power output (Ppp) over 24 hours of operation shall not exceed 70 percent of the ESP unless otherwise agreed by the reciprocating internal combustion engine manufacturer. Per TCEQ Rule 106.511, "Standby" means to be used as a "substitute for" and not "in addition to" other equipment. Standby services are permitted by this rule, provided that the maximum annual operating hours shall not exceed 10% (maximum of 876 hours) of the normal annual operating schedule of the primary equipment; and all electric motors.

B. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

C. Steady State Voltage Modulation: The uniform cyclical variation of voltage within the operational bandwidth, expressed in Hertz or cycles per second.

1.6 ACTION SUBMITTALS

A. Pre-and Post-Submittal Meeting
   1. Supplier shall include in his bid the cost of attending a one-day pre-submittal meeting and a one-day post-submittal meeting in the Construction Manager at Risk (CMAR's) offices in El Paso, Texas or El Paso Water Offices, 1154 Hawkins Blvd, El Paso, TX 79925. A pre-submittal meeting shall be held before any shop drawings are submitted. A post-submittal meeting, if needed, shall be held after the Engineer's shop drawing review comments have been submitted. Vendor shall determine the exact number of people attending the meeting per the specification requirements and cover each person's cost.
   2. Any shop drawings submitted before the pre-submittal meeting will be rejected and sent back Not Approved, Revise and Re-submit. The Generator Supplier shall bring with them a detailed list of the items their submittal will include for review by the Engineer or a bootleg copy of the actual submittal.
   3. As a minimum the following shall attend the meeting:
      a. CMAR Contractor,
      b. Electrical Contractor,
      c. Generator Supplier and Engineer. Representatives from the Generator Supplier shall include:

1) The Project Manager who will be responsible for putting together the submittal and who will be responsible for the project at the factory, no exceptions.
2) The Project Engineer at the factory who has technical knowledge of the equipment, no exceptions.
3) A salesperson may attend, but not as a substitute for the Project Manager and/or Project Engineer.

B. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
1. Submittals shall include a copy of the applicable specification section. The section shall be marked to indicate if the contractor will Comply "C", Deviate "D", or take an Exception "E" to the requirement. All requirements the contractor has deviated or taken exception to shall be provided with explanation in writing for the reasoning of the change to the specified product or method described. Deviations from the Contract Documents can only be approved by Change Order or Field Order. Submittals that are not marked as described will be marked not approved, revise, and resubmit.
2. Thermal damage curve for generator, include X and R information, transient and sub-transient reactance, etc.
3. Time-current characteristic curves for generator protective device (if applicable).
4. Sound test data, based on a free field requirement.
5. Technical data on all major components. Technical data must include an alternator thermal damage curve, description and operating characteristics of the alternator protection device demonstrating alternator protection, and an alternator reactive capability curve.
6. Certification of the emissions performance of the generator set engine by the engine manufacturer.
7. Seismic certification, demonstrating compliance to local requirements.
8. Generator characteristics, including, but not limited to, kilowatt rating, efficiency, short-circuit current capability.
9. Information on fuel consumption at:
   a. 25%, 50%, 75% and 100% of the generator's KW rating.
10. Generator efficiency at 0.8 power factor at .25, 0.5, 0.75-, and 1.0-times generator capacity.
11. Airflow requirements for cooling and combustion air in cubic feet per minute (cubic meters per minute) at 0.8 power factor. Provide Drawings indicating requirements and limitations for location of air intake and exhausts.

C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, components, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
2. Wiring Diagrams: Control interconnection, Customer connections.
3. Outline drawings of assembly.
4. One-line diagrams and wiring diagrams for assembly and components.
5. Submit names, experience level, training certifications, and locations for technicians that will be responsible for servicing equipment at this site.
6. Generator sizing analysis.
   a. Detailed sizing analysis shall clearly identify assumptions made for loads being started/operated by the generator. Refer to attached load list.
      1) The maximum voltage dip allowed shall be 15%.

2) Maximum genset load allowed as a percentage of rated capacity is 87%.
3) The generators shall be sized as follows:
   a) The generator shall be sized to start and power electrical loads listed in the data sheets.
   b) Any changes to the generator size shall be brought to the Engineer's attention. Sizing analysis shall be submitted to the Engineer with the generator's initial submittal. Submittals without sizing analysis shall not be accepted.

b. The kW rating shown on the plans is anticipated but shall not be used to determine the actual size of the generator provided for this project.

7. Provide cut sheets for all equipment being provided for the generator including:
   a. Generator and Enclosure
   b. Transformer
   c. Panelboard.
   d. Current Transformers (CTs) and shorting terminal blocks.
   e. Exhaust Fans and louvers.
   f. Conduits
   g. Wiring
   h. Lights
   i. Switches
   j. Receptacles
   k. Batteries and charging system
   l. Neutral Grounding Resistor
   m. Service Platform (reference layout on the contract plans)
   n. Fuel Maintenance System
   o. Starters, disconnects, pushbutton, etc.
8. Provide a detailed panelboard schedule for the panelboard provided in the generator enclosure.
9. Provide a project specific control schematic for exhaust fans and all other connections in generator enclosure.

D. OPERATION AND MAINTENANCE MANUALS
1. Submit Manuals with instructions for installation, adjustment, lubrication, operation, and maintenance of the equipment in accordance with the specific conditions.
2. List all factory setting relays and provide relay-setting and calibration instructions, including software, where applicable. O&M manuals shall include a hard copy of the power meter settings.
3. Operation and maintenance manuals shall be prepared by the equipment manufacturer and shall contain the final certified approved shop drawings, submittals, list of manufacturer's recommended spare parts, schematics, and maintenance procedures, and field test data. O&M manuals shall include all field changes made during startup and testing.
4. Manuals may be the manufacturer's standard instructions but shall be supplemented as necessary to cover any special feature not included in standard material.
5. Manuals shall be prepared by the Equipment Manufacturer and shall also incorporate appropriate final certified shop drawings and test data. Manuals may be the manufacturer's standard instructions but shall be supplemented as necessary to cover any special feature not included in standard material.
6. O&M manuals shall include a single document that clearly summarizes and states when the routine maintenance per the manufacturer's recommendations is to be performed on the switchgear.
7. Submit preliminary manuals for review prior to start-up of equipment.

8. O&M Manuals shall be submitted in both hard copy and electronic format. Electronic format shall be fully indexed.

E. Certifications:

1. Submit statement of compliance which states the proposed product(s) is certified to the emissions standards required by the location for EPA, stationary emergency application.

F. Above Ground Storage Fuel Tank Registration:
1. Contractor shall submit TCEQ Above Ground Storage Tank registration form and construction notification form with subbase tank fuel and vapor recovery information with Owner's information for submission by Contractor 30 days prior to construction and prior to any fuel being placed into the tank.

G. Seismic Product Data:
1. Restraints - rigid type.
2. Restraints - cable type.
3. Restraint accessories.
4. Post-installed concrete anchors.
5. Concrete inserts.

H. Seismic Shop Drawings: Show coordination of seismic and wind-load bracing for components with other systems and equipment in the vicinity, including other supports and seismic restraints.

I. Delegated Design Submittal for Each Seismic-Restraint Device: Signed and sealed by qualified structural professional engineer.
1. For each seismic-restraint device, including restraint - rigid and cable type, restraint accessory, and concrete anchor and insert that is required by this Section, submit the following:
   a. Seismic Restraints: Select seismic restraints complying with performance requirements, design criteria, and analysis data.
   b. Post-Installed Concrete Anchors and Inserts: Include calculations showing anticipated seismic loads. Include certification that device is approved by qualified testing laboratory for seismic reinforcement use.
   c. Seismic Design Calculations: Submit input data and loading.

J. Delegated Design Submittal for Each Wind-Load Protection Device: Signed and sealed by qualified structural professional engineer.
1. For each wind-load protection device, including restraint - rigid and cable type, restraint accessory, and concrete anchor and insert that is required by this Section or is indicated on Drawings, submit the following:
   a. Wind-Load Restraint: Select wind-load restraints complying with performance requirements, design criteria, and analysis data.
   b. Post-Installed Concrete Anchors and Inserts: Include calculations showing anticipated wind loads. Include certification that device is approved by qualified testing laboratory for reinforcement use.
   c. Wind-Load Design Calculations: Submit static and dynamic loading calculations.
2. Seismic- and wind-load-restraint detail Drawings prepared by qualified structural professional engineer.
   a. Design Analysis: To support selection and arrangement of seismic and wind-load restraints. Include calculations of combined tensile and shear loads.

b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
c. Coordinate seismic-restraint details with wind-load details required for equipment mounted outdoors.

3. Product Listing, Preapproval and Evaluation Documentation: By UL, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.7 INFORMATIONAL SUBMITTALS

A. Source quality-control test reports.

1. Certified summary of prototype-unit test report. See requirements in Part 2 "Source Quality Control" Article Part A. Include statement indicating torsional compatibility of components.
2. Certified Test Report: Provide certified test report documenting factory test per the requirements of this specification, as well as certified factory test of generator set sensors per NFPA110 level 1.
3. List of factory tests to be performed on units to be shipped for this Project.
4. Report of exhaust emissions and compliance statement certifying compliance with applicable regulations.

B. Warranty:

1. Submit manufacturer’s warranty statement to be provided for this Project per Part 1.11.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 35 miles of El Paso Water main offices, 1154 Hawkins Blvd, El Paso, TX 79925, a service center capable of providing training, parts, and emergency maintenance repairs.

C. The generation set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

D. The manufacturer of this equipment shall have produced similar equipment for a minimum period of ten years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

E. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

F. Comply with NFPA 37 (Standard For the Installation and Use of Stationary Combustion Engines and Gas Turbines).

G. Comply with NFPA 70 (National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702).

H. Comply with NFPA 110 (Emergency and Standby Power Systems) requirements for Level 1 emergency power supply system.

1.9 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: -22.2 deg C (-8 deg F) to 45 deg C (113.0 deg F).
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Refer to Data Sheet.

B. Seismic Hazard Design Loads:
1. Unless otherwise indicated on Contract Documents, specified Work must withstand seismic hazard design loads determined in accordance with requirements specified in this Section, adjusted for installed elevation above or below grade.
    a. The term "withstand" means "unit must remain in place without separation of parts from unit when subjected to specified seismic hazard design loads and unit must be fully operational after seismic event."
2. Perform calculations to obtain force information necessary to properly select seismic-restraint devices, fasteners, and anchorage. Perform calculations using methods acceptable to applicable code authorities and as presented in ASCE/SEI 7-16. Where "ASCE/SEI 7" is used throughout this Section, it must be understood that the edition referred to in this subparagraph is the edition intended as reference throughout the Section Text.
    a. Data indicated below to be determined by Delegated Design Contractor must be obtained by Contractor and must be included in individual component submittal packages.
    b. Coordinate seismic design calculations with wind-load calculations for equipment mounted outdoors.
    c. Building Occupancy Category: IV.
    d. Building Risk Category: IV.
    e. Building Site Classification: D.
3. Calculation Factors, ASCE/SEI 7-16, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-16 unless otherwise indicated.
    a. Horizontal Seismic Design Force F_p: Value must be calculated by Delegated Design Contractor using Equation 13.3-1. Factors below must be obtained for this calculation:
        1) Spectral Acceleration (S_{DS}): .339. Value applies to all components on Project.
        2) Component Amplification Factor (a_p): See Drawing Schedule for each component.
        3) Component Importance Factor (I_p): 1.5.

4) Component Operating Weight (W_p): For each component. Obtain by Delegated Design Contractor from each component submittal.
5) Height in Structure of Point of Attachment of Component for Base (z): Determine from Project Drawings for each component by Delegated Design Contractor. For items at or below the base, "z" must be taken as zero.
6) Average Roof Height of Structure for Base (h): Determine from Project Drawings by Delegated Design Contractor.

b. Vertical Seismic Design Force: Calculated by Delegated Design Contractor using method explained in ASCE/SEI 7-16, Paragraph 13.3.1.2.

c. Seismic Relative Displacement (D_{pl}): Calculated by Delegated Design Contractor using methods explained in ASCE/SEI 7-16, Paragraph 13.3.2. Factors below must be obtained for this calculation:
1) Relative Seismic Displacement that Each Component Must Be Designed to Accommodate (D_p): Calculated by Delegated Design Contractor in accordance with ASCE/SEI 7-16, Paragraph 13.3.2.
2) Structure Importance Factor (I_e): 1.5. Value applies to all components on Project.

C. Wind Hazard Design Loads:
1. Perform calculations to obtain force information necessary to properly select wind-load restraint devices, fasteners, and anchorage. Perform calculations using methods acceptable to applicable code authorities and as presented in ASCE/SEI 7-16. Where "ASCE/SEI 7" is used throughout this Section, it must be understood that the edition referred to in this subparagraph is intended as referenced throughout the Section Text unless otherwise indicated.
a. Data indicated below that are specific to individual pieces of equipment must be obtained by Contractor and must be included in individual component submittal packages.
b. Coordinate design wind-load calculations with seismic-load calculations for equipment requiring both seismic- and wind-load reinforcement. Comply with requirements in other Sections in addition to those in this Section.
2. Design wind pressure "p" for external sidewall-mounted equipment must be calculated by Delegated Design Contractor using methods in ASCE/SEI 7-16, Ch. 30.

1.10 HANDLING AND STORAGE OF MATERIALS

A. All materials and equipment to be incorporated into the Work shall be handled and stored by Contractor in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.

B. Provide low-boy type, flat, air suspension freight lines when transporting equipment. Use minimum Marine grade vinyl wrap to protect switchgear, generators, generator components and enclosures.

C. In accordance with manufacturers' recommended procedures, rotating equipment shall be manually rotated while in storage.

D. All mechanical equipment subject to corrosive damage from exposure shall be stored in a building. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to Engineer.

1.11 WARRANTY

A. Special Warranty: Manufacturer shall provide base special warranty coverage on the material, auxiliary components and workmanship of the generator set for a minimum of twenty-four (24) months for generator, enclosure and components and 5 years for fuel tank from registered commissioning and start-up and substantial completion date. Warranty shall include travel, parts and labor at no additional cost to the owner.

1.12 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning on the date of Substantial Completion, provide 12-month full maintenance by skilled employees of Engine Generator Manufacturer's Local Representative. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide at least one service to change oil and replace coolant, fuel and oil filters. Provide parts and supplies same as those used in the manufacture and installation of original equipment. See data sheet for additional requirements.

1.13 FACTORY INSPECTION AND TESTS

A. TESTS
   1. GENERAL
      a. Equipment furnished under these specifications shall be subject to inspection during manufacturing by representatives of the Owner who shall be afforded proper facilities for determining compliance with the specifications.
      b. The Owner may, at his option, elect to have the factory test witnessed by the Owner, or a designated representative of the Owner. If the option is taken to witness the test, then payment will be in accordance with the appropriate item of the Proposal. The costs for a maximum of two representatives for the Factory Inspection and Test shall be included in the base bid.
      c. If tests are to be witnessed by the Owner or Owner's representative, the manufacturer shall notify the Owner at least 30 days in advance of the dates that tests will be made, so that the Owner can make arrangements for his representative to be present. The cost for the travel, lodging expenses, meals and transportation for Owner/Engineer or CMAR personnel (two maximum) to witness the factory generator inspections and tests shall also be included in the bid price. The Manufacturer or Vendor will pay for the cost of the representative's (travel lodging, meals and other expenses for the tests, for a maximum of one trip. The manufacturer shall bear all other costs for performing the witnessed test. If a test must be re-run due to failure in meeting the specified requirements, then the witness expenses for the re-test shall be borne by the manufacturer.
      d. Witness tests shall be conducted in continental United States. No testing shall be conducted in Mexico nor any other foreign country.
      e. Testing shall take place at the factory where the generators were assembled and manufactured.
      f. All travel arrangements are subject to approval by the Owner and Engineer. The Equipment Manufacturer shall be responsible for making all travel arrangements.

g. Generator manufacturer shall provide to the Engineer a complete list of all tests to be performed on the generator as a formal submittal to the Engineer prior to the generator being tested.

h. The Contractor shall notify the Owner/Engineer a minimum of one month in advance of the dates when equipment is scheduled for inspections and tests so that the Owner/Engineer can schedule accordingly.

1) A detailed testing package shall be submitted at bid time listing dates and times of each component of the test with copies of all relevant standards used during the testing. A Manufacturer's technical representative shall be present throughout the testing period to aid the Engineer in performing and verifying all calculations. The technical representative shall be fully versed in the testing methods and calculations and shall be capable of certifying test results.

i. The costs to perform the factory inspections and tests shall be included in the bid price. The travel, transportation, and lodging expenses for Owner/Engineer personnel (two maximum) to witness the tests shall also be included in the bid price.

j. If an inspection and/or test must be re-run due to failure in meeting the specified requirements, then the witness labor and travel expenses for the re-test shall be borne by the Manufacturer or Vendor.

2. Witnessed factory tests shall include a test and demonstration of all equipment functions, per manufacturer's standard testing procedures. The purpose of the test shall be to verify the functionality, performance, and stability of each generator. The test shall include, but not be limited to, a complete operational test demonstrating all controls, inputs, outputs, etc., shown per the plans and specifications. The manufacturer shall submit two weeks in advance of the day that test will be made a detailed testing plan. This plan shall be subject to the Engineer's approval.

3. The generator manufacturer shall provide the actual test data, observations, and certification that the tests have been completed prior to shipment to the Engineer for approval.

B. FACTORY TESTING

1. The generator set manufacturer shall perform a complete operational test on the generator set prior to shipping from the factory. All testing shall be conducted at the factory. No exceptions. A certified test report shall be provided. All testing shall be performed with calibrated metering.

2. Factory testing may be witnessed by two representatives from the Owner/Engineer. Travel expenses for two attendees shall be the responsibility of the generator manufacturer.

3. Generator set factory tests on the equipment shall be performed at rated load and rated power factor. Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include.

a. Reactive Load Bank Testing, 20 minutes at 25% load, 20 minutes at 50% load, 20 minutes at 75% load, 4 hours at 100% load.

b. Transient testing, 0-25-0%, 0-50-0%, 0-75-0%, 0-100-0%.

c. Standard factory test procedures" maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and function of safety shutdowns.

d. Provide a certified copy of the testing report to the engineer after shipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: The basis for this specification is Cummins Power Generation equipment. Each engine-generator shall be a current production model from the same manufacturer, and each model shall be identical. The entire generator package shall be designed, engineered, manufactured, prototype tested and warranted by the original engine manufacturer. Each complete engine-generator package shall be assembled by the Engine-Generator manufacturer or their representative.

B. Acceptable Manufacturer:
   1. Cummins
   2. Caterpillar

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

   1. Rigging Information: Indicate location of each lifting attachment, generator-set center of gravity, and total package weight in submittal drawings.

C. Capacities and Characteristics:

   1. Power Output Ratings: Electrical output power rating per ISO8528 for Standby operation at 80 percent lagging power factor, 13800 Volts, Series Wye, Three phase, 4 -wire, 60 hertz.
   2. Alternator shall be capable of recovering to a minimum of 90% of rated no load voltage. Following the application of the specified kVA load at near zero power factor applied to the generator set.
   3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component. The engine-generator nameplate shall include information of the power output rating of the equipment.

D. Generator-Set Performance:

   1. Steady-State Voltage Operational Bandwidth: 0.5 percent of rated output voltage from no load to full load.
   2. Transient Voltage Performance: Not more than 18 percent variation for 100 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 3 seconds. On application of a 100% load step the generator set shall recover to stable voltage within 10 seconds.
   3. Steady-State Frequency Operational Bandwidth: 0.25 percent of rated frequency from no load to full load.

4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Not more than 5 percent variation for 100 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within 3 seconds. On application of a 100% load step the generator set shall recover to stable frequency within 10 seconds.
6. Output Waveform: At full load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for any single harmonic. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.
7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 8 seconds without damage to generator system components. For a 1-phase, bolted short circuit at system output terminals, system shall regulate both voltage and current to prevent over-voltage conditions on the non-faulted phases.
8. Start Time: Comply with NFPA 110, Level 1, Type 10, system requirements.
9. Ambient Condition Performance: Engine generator shall be designed to allow operation at full rated load in an ambient temperature under site conditions, based on highest ambient condition. Ambient temperature shall be as measured at the air inlet to the engine generator for enclosed units, and at the control of the engine generator for machines installed in equipment rooms.
10. Load Sharing: Engine generator shall share real and reactive load proportionally within plus or minus 3 percent with all other engine generators in the system.
11. Generator manufacturer shall provide a detailed sizing analysis to the Engineer for approval. Detailed sizing analysis shall clearly identify assumptions made for loads being started/operated by the generator. When conducting the generator sizing analysis, the voltage dip of the generator shall be set at a maximum of 15%. The generator manufacturer and Contractor shall be responsible for obtaining all information to run the generator sizing analysis. Any changes to the generator size shall be brought to the Engineer's attention. Sizing analysis shall be submitted to the Engineer with the generator's initial submittal. Refer to attached generator data sheet and load list.

2.3 ENGINE

A. Fuel: ASTM D975 #2 Ultra-low Sulfur Diesel Fuel and HVO fuels.

B. Rated Engine Speed: 1800RPM.

C. Lubrication System: The following items are mounted on engine or skid:

1. Lube oil pump: shall be positive displacement, mechanical, full pressure pump.
2. Filter and Strainer: Provided by the engine manufacturer of record to provide adequate filtration for the prime mover to be used.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
4. Thermostatic Control Valve: Controls flow in system to maintain optimum oil temperature. Unit is capable of full flow and is designed to be fail safe.

D. Engine Fuel System: The engine fuel system shall be installed in strict compliance to the engine manufacturer's instructions.

1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
2. Relief/Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
3. Fueling system shall be designed to allow adequate flow from upstream fuel tank sources to the generator engine.

E. Stainless steel flexible connectors shall be provided for the fuel supply and return lines and at a minimum shall be located at each connection to the engine, upstream of the combination fuel filter/separator, and in the fuel return line to the sub-base fuel tank. The stainless steel flexible connectors shall be US Hose "Model 401M" or equal.

F. A dual type fuel filter/separator shall be located inside the enclosure and installed on the fuel supply line between the sub-base fuel storage tank and the engine driven fuel pump, upstream of the flexible connectors. The combination fuel filter/separator shall be a manifold unit with shut off valves and shall permit servicing the filter/separator without engine shutdown. This shall permit valving off of the filter/separator and bypassing the fuel to the other filter/separator. Filter/separator shall be manufactured by Racor, or equal.

G. Fuel oil cooler shall be provided if the engine fuel system absorbs heat from the unit injectors and surrounding jacket water. The fuel cooler shall be a radiator mounted, air cooled unit that uses the air flow from the radiator fan for cooling air flow. To prevent overheating of the fuel in the sub-base fuel storage tank, the fuel oil cooler shall be adequately sized to cool the return fuel from the engine to the required fuel inlet temperature.

H. All fuel piping shall be suitable for the specified fuel and shall meet all NFPA, state, and local requirements.

I. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and performance.

1. Designed for operation on a single 208 VAC, Single phase, 60Hz power connection. Heater voltage shall be shown on the project drawings.
2. Installed with isolation valves to isolate the heater for replacement of the element without draining the engine cooling system or significant coolant loss.
3. Provided with a 24VDC thermostat, installed at the engine thermostat housing.

J. Governor: Adjustable isochronous, with speed sensing. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate as appropriate to the state of the engine generator. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous states.

K. Cooling System: Closed loop, air/liquid cooled, high ambient radiator.

1. The generator set manufacturer shall provide prototype test data for the specific hardware proposed demonstrating that the machine will operate at rated standby load in an outdoor ambient condition plus oversized with spare capacity to meet an outdoor ambient condition of 45 deg C.

2. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
3. Size of Radiator overflow tank: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
4. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
5. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
6. Duct Flange: Generator sets installed indoors shall be provided with a flexible radiator duct adapter flange.
7. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging, ultraviolet, and abrasion resistant fabric.
    a. Rating: 50 psig (345 kPa) maximum working pressure with 180 deg F (82 deg C) coolant, and non-collapsible under vacuum.
    b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

L. Muffler/Silencer: Selected with performance as required to meet sound requirements of the application, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements. Provide silencer inside the enclosure.

M. Air-Intake Filter: Engine-mounted air cleaner with replaceable dry-filter element and restriction indicator.

N. Starting System: 24VDC, as recommended by the engine manufacturer; electric, with negative ground.

1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
2. Cranking Cycle: As required by NFPA 110 for level 1 systems.
3. Electric starters capable of three complete cranking cycles without overheating.
4. Battery Cable: Size as recommended by engine manufacturer for cable length as required. Include required interconnecting conductors and connection accessories.
5. Battery Compartment: Factory fabricated of metal with acid-resistant finish.
6. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation. The battery charging alternator shall have sufficient capacity to recharge the batteries with all parasitic loads connected within 4 hours after a normal engine starting sequence.
7. Battery Charger: Unit shall comply with UL 1236, provide fully regulated, constant voltage, current limited, battery charger for battery bank. It will include the following features:

    a. Operation: Equalizing-charging rate based on generator set manufacturer's recommendations shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature as specified in Part 1 "Project Conditions" Article

to prevent overcharging at high temperatures and undercharging at low temperatures.

c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.

d. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

e. Provide LED indication of general charger condition, including charging, faults, and modes. Provide a LCD display to indicate charge rate and battery voltage. Charger shall provide relay contacts for fault conditions as required by NFPA110.

f. Enclosure and Mounting: NEMA, Type 1, wall-mounted cabinet.

2.4 DIESEL FUEL STORAGE

A. Refer to data sheet for storage required.

B. Comply with NFPA 30.

C. The tank shall be clearly labeled indicating the type of product, the volume capacity, the top loading capacity, and the manufacturer.

D. Updraft and emergency venting systems shall be provided by tank manufacturer per UL 142 requirements. The primary vent shall be extended through the roof of the enclosure.

E. Sub Base-Mounted diesel Tank: Provide a double wall secondary containment type sub base fuel storage tank. The tank shall be constructed of corrosion resistant steel and shall be UL 142 listed and labeled. The fuel tank shall include the following features:

1. Capacity: Refer to generator DATA sheet included at the end of this specification.
2. Tank rails and lifting eyes shall be rated for the full dry weight of the tank, genset, and enclosure.
3. Electrical stub up(s) openings
4. Normal & emergency vents
5. Lockable fuel fill
6. Mechanical fuel level gauge
7. High and low level switches to indicate fuel level wired to generator control panel.
8. High level alarm at tank fill with audible and visual alarms at 90% and 95% capacity.
9. Continuous level sensor 4-20mA on a 10-30VDC loop powered for 0% - 100% fuel level indication on the HMI.
10. Leak detector switch installed in interstitial space and wired to generator control panel.
11. Sub base tank shall include a welded steel containment basin, sized at a minimum of 110% of the tank capacity to prevent escape of fuel into the environment in the event of a tank rupture.
12. Fill port with overfill prevention valve (OFPV)
13. 5 gallon fill/spill dam or bucket.
14. Fuel Polishing system connected to subbase tank and powered and wired from generator load center with filter alarms sent to HMI. FM approved, NFPA compliant automated fuel maintenance system. The complete system shall be located inside the enclosure. The fuel maintenance system shall remove particulate through 1 micron and 99.5% water from

stored diesel fuel. Pump shall be rated for 5 GPM, with a ½ HP TEFC motor. Filtration shall be a 5 stage process consisting of a strainer, two stages of filtration, water separation, and a final particulate removal stage. Controller shall be UL listed, have audible alarms, and two dry contacts for general alarm status. Fuel maintenance system shall be manufactured by Fuel Technologies International LLC, or equal. Provide NEMA 4X 316 stainless steel enclosure.

15. Provide two 2" NPT accessible ports on at each end of tank for future use of immersion heaters.
16. Temperature switch for annunciating low fuel temperature on the engine control panel.
17. Temperature switch for annunciating high fuel temperature on the engine control panel and to de-energize the heater if the product reaches high temperature setting.
18. One common, isolated, dry contact to close for any fuel system alarm.
19. All electrical components that are furnished as part of the fuel system shall be wired by the engine-generator supplier to either the fuel system control and/or engine-generator control panel. The fuel system controls, fuel maintenance system if required, and fuel tank immersion heater shall be powered from the power center specified in the section.
20. A ground stud for the fuel supply truck shall also be supplied.

F. Day Tank (Indoor) : Comply with UL 142, freestanding, factory-fabricated fuel tank assembly and the following features:
   1. Allocation: A separate day tank shall be provided for each engine generator
   2. Containment: Integral rupture basin with a capacity of 130 percent of nominal capacity of day tank.
      a. Leak Detector: Locate in rupture basin and connect to provide audible and visual alarm in the event of day-tank leak.
   3. Tank Capacity: 400 Gallons
   4. Pump Capacity: Provided by fueling contractor under separate section.
   5. Control: Provided with On/Off/Emergency run switch, Test/Reset Switch, AC Circuit Breaker, DC Circuit Breaker, and the following indicator lamps:
      a. Ready (Green) – AC Supply and DC Control Power Available.
      b. High Fuel (Red) – Latching fault, indicates fuel level near overflow, shuts down pump, and closes N/O dry contacts.
      c. Low Fuel (Red) – Latching fault, indicates pump failure or operating float switch failure, closes N/O dry contacts.
      d. Low Fuel Shutdown (Red) – Latching fault, indicates near empty tank, closes N/O contacts which may be used to shutdown engine generator to avoid air in the injection system.
      e. Overflow To Basin (Red) – Latching fault, indicates fuel in overflow/rupture basin, shuts down pump, closes N/O dry contacts
      f. Spare (Red) – with N/O and N/C dry contacts
      g. Pump Running (Green)
   6. Piping Connections: Factory-installed fuel supply and return lines from tank to engine; local fuel fill, and vent lines in compliance with local code requirements.

2.5 CONTROL AND MONITORING

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

B. Environmental: The generator set control shall be tested and certified to the following environmental conditions:
   1. –40°C to +70°C Operating Range
   2. 95% humidity non-condensing, -32°C to 60°C
   3. IP22 protection
   4. 5% salt spray, 48 hours, +38°C, 36.8V system voltage
   5. Sinusoidal vibration 4.3G's RMS, 24-1000Hz.
   6. Electromagnetic Capability (89/336/EEC, 91/368/EEC, 93/44/EEC, 93/68/EEC, BS EN 50081-2, 50082-2)

C. Functional Requirements: The following functionality shall be integral to the control panel:
   1. The control shall include a minimum 64 x 240 pixel, 28mm x 100mm, white backlight graphical display with text-based alarm/event descriptions.
   2. The control shall include a minimum of 3-line data display.
   3. Audible horn for alarm and shutdown with horn silence switch.
   4. Standard ISO labeling
   5. Multiple language capability
   6. Remote start/stop control
   7. Local run/off/auto control integral to system microprocessor
   8. Cooldown timer
   9. Lamp test
   10. Push button emergency stop button.
   11. Voltage adjust
   12. Voltage regulator V/Hz slope – adjustable
   13. Password protected system programming

D. 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.

E. 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.

F. 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.

G. 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 (3-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. Total kW-hr
8. Total kVAR-hr
9. % kW
10. % kVA
11. % kVAR
12. Ammeter-voltmeter displays shall simultaneously display conditions for all three phases.
13. Emergency Stop Switch: Switch shall be a red "mushroom head" pushbutton device complete with lock-out/tag-out provisions. Mount outside on generator enclosure by control panel door. Depressing switch shall cause the generator set to immediately stop the generator set and prevent it from operating.
14. Fault Reset Switch: Supply a dedicated control switch to reset/clear fault conditions.
15. DC voltmeter (alternator battery charging).
16. Engine-coolant temperature gauge.
17. Engine lubricating-oil pressure gauge.
18. Engine oil temperature
19. Engine RPM
20. Engine crank attempt counter
21. Engine successful start counter
22. Service maintenance interval
23. Real time clock
24. Running-time meter.
25. 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 plus or minus 5% 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.
26. Fuel tank derangement alarm.
27. Fuel tank high-level shutdown of fuel supply alarm.
28. Excitation voltage
29. Excitation current
30. 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 shut down protection. There shall be a ground fault alarm for generator sets rated over 1000 amps, overload warning, and overcurrent warning alarm.
31. 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.
32. 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.
33. Panel lighting system to allow viewing and operation of the control when the generator room or enclosure is not lighted.
34. Data Logging: The control system shall log the latest 20 different alarm and shut down 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.

a. Engine Alarm/Shutdown
   1) Low oil pressure alarm/shutdown.
   2) High coolant temperature alarm/shutdown.
   3) Loss of coolant shutdown.
   4) Overspeed shutdown
   5) Overcrank shutdown
   6) Emergency stop depressed shutdown
   7) Low coolant temperature alarm
   8) Low battery voltage alarm
   9) High battery voltage alarm
   10) Control switch not in auto position alarm
   11) Battery charger failure alarm

b. Generator Alarm/Shutdown
   1) Generator over voltage
   2) Generator under voltage
   3) Generator over frequency
   4) Generator under frequency
   5) Generator reverse power
   6) Generator overcurrent

c. Voltage Regulator Alarm/Shutdown
   1) Loss of excitation alarm/shutdown
   2) Instantaneous over excitation alarm/shutdown
   3) Time over excitation alarm/shutdown
   4) Rotating diode failure
   5) Loss of sensing
   6) Loss of PMG

35. 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).
36. Paralleling Generator Breaker control switches: The control shall include manual open and close provisions for the paralleling generator breaker located in switchgear, and LED status lamps indicating whether the breaker is open or closed.

H. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.
1. Remote Communications: The control shall include Modbus RTU and Ethernet communications as standard via RS-485 half duplex with configurable baud rates from 2.4k to 57.6k. The remote communications shall also be capable of communicating Modbus RTU and Ethernet.
2. Remote Indication: Provide a remote indication to SCADA
   a. Provide the following individual digital outputs for the following indications for protection and diagnostics.
      1) Overcrank shutdown.
      2) Coolant low-temperature alarm.
      3) High coolant temperature warning
      4) High coolant temperature shutdown
      5) Control switch not in auto position.
      6) Loss of AC to battery Charger.
      7) Battery-charger malfunction alarm.

8) Battery high and low-voltage alarm.
9) Low oil pressure warning
10) Low oil pressure shutdown
11) Overspeed
12) Low coolant level
13) EPS supplying load
14) Emergency stop
15) Low Fuel Level
16) Fuel Leak

b. The following additional metering shall be provided via Ethernet Communication protocol and Modbus RTU for each Engine
1) Generator kW, kVA, kVAR, PF, Volts, Amps, and frequency
2) Generator AC Amperes – Phase A, Phase B and Phase C
3) Generator AC Voltage – Phase A-B, Phase B-C, Phase C-A, Phase A, Phase B and Phase C (verify phase rotation)
4) Engine RPM Meter
5) Engine Battery Voltage Meter
6) Engine Oil Pressure Gauge
7) Engine Coolant Temperature Gauge
8) Engine Running Hour Meter
9) Engine Start Counter
10) Atmospheric Pressure
11) Boost Pressure
12) Air Filter Restriction
13) Left Turbo Inlet Pressure
14) Right Turbo Inlet Pressure
15) Engine Hour meter
16) Total Fuel Burned
17) Engine Coolant Level Status
18) Local Engine Control Switch Position
19) Overspeed Switch Status
20) Remote Emergency Stop Actuated
21) Percent Engine Load
22) Oil Filter Pressure Differential
23) Fuel Filter Pressure Differential
24) After-coolant Temperature
25) Right Exhaust Temperature
26) Left Exhaust Temperature
27) Crankcase Air Pressure
28) Filtered Fuel Pressure
29) Right Air Filter Restriction
30) Left Air Filter Restriction
31) Fuel Consumption Rate
32) Engine Oil Temperature

I. Remote Emergency-Stop Switch: Surface wall mounted outside switchgear enclosure, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

J. Inputs and Outputs

1. Digital Inputs: The Controller shall include the ability to accept six (6) to eighteen (18) programmable digital input signals. The signals may be programmed for either high or low activation using programmable Normally Open or Normally Closed contacts.
2. Digital Outputs: The control shall include the ability to operate six (6) programmable relay output signals, integral to the controller. The output relays shall be rated for 2A @ 30VDC and consist of six (6) Form A (Normally Open) contacts and two (10) Form C (Normally Open & Normally Closed) contacts.
3. Discrete Outputs: The control shall include the ability to operate two (2) discrete outputs, integral to the controller, which are capable of sinking up to 300mA.

2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. A differential current relay, located in each generator cubicle at the 13.8kV main switchgear, shall be used to detect a fault in the feeder from each generator to it's respective breaker. Mount differential CT's in the generator terminal box as recommended by the generator manufacturer and wire to shorting terminal blocks for connections to switchgear.

B. Instrument current transformers: Substantial and well built. Insulation shall meet the requirements of the IEEE standards. At normal rated amperes, under usual service conditions, no part of the transformer shall exceed the heating limits specified in the IEEE standards. Each current transformer shall be capable of carrying continuously, its rated primary amperes, under conditions of accidental open secondary circuit, without damage to the primary insulation. Accuracy shall meet or exceed requirements of ANSI C37.20.2, Table 5. Current Transformers shall be metering accuracy rated to power meter. Accuracy shall be 0.2% ANSI Accuracy Class with a B0.1 Meter Burden. Current transformers for relays shall have an ANSI accuracy classification.

C. 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.
2. 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% of rated current for more than 10 seconds.
3. Under single phase or multiple phase fault conditions, operates to switch off alternator excitation at the appropriate time to prevent damage to the alternator.
4. The operator panel shall indicate the nature of the fault condition as either a short circuit or an overload.
5. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot greater than 120% of nominal voltage.
6. The protective system provided shall not include an instantaneous trip function.

2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Protect uninsulated bearings with reliable shaft grounding ring, PRO Series AEGIS or manufacture's standard method to reduce harmful bearing currents shall be submitted.

C. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

D. Electrical Insulation: Class H

E. Temperature Rise: 105°C Class H environment.

F. 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.

G. Permanent Magnet Generator (PMG) shall provide excitation power for optimum motor starting and short circuit performance. Excitation system shall enable the alternator to sustain 300% of rated current for ten seconds during a fault condition and shall improve the immunity of the voltage regulator to non-linear distorting load.

H. Enclosure: Manufacturer standard.

I. 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. The regulator shall maintain generator output voltage within +/- 0.25% for any constant load between no load and full load. The system shall also include integral transient voltage suppression. The voltage regulator shall communicate with the Generator Control Panel via a communication network with generator voltage adjustments made via the controller keypad. Additionally, the controller shall allow system parameter setup and monitoring, and provide fault alarm and shutdown information through the controller. No exceptions or deviations to these requirements will be permitted.

J. The alternator shall be provided with anti-condensation heater.

K. The control system shall annunciate high alternator temperature as a fault condition.

L. 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.

M. Subtransient Reactance: 15 percent maximum, based on the rating of the engine generator set.

N. Each alternator conduit box shall be sized to accommodate the separate phase leads, neutral leads, current transformers, voltage surge arrestors and capacitors, and other required connections under Alternate. Manufacturer shall provide surge arrestors and capacitors in this conduit box in accordance with transient study specified in the switchgear specification and shall submit equipment dimension changes that may be impacted by housing these components on the generator.

2.8 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description: Weather protective, sound Attenuated enclosure. Reduce the sound level of the engine generator while operating at full rated load to a maximum of 75 dBA measured at any location 7 m from the engine generator in a free field environment. Instruments, control, and battery system shall be mounted within enclosure. Acceptable manufacturers are ACS, EK Machines or Fidelity Enclosures.

B. 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, enclosure, and sub-base fuel tank shall be designed to be lifted into place using spreader bars.

C. Enclosure shall provide ample airflow for generator set operation at rated load and ambient temperature. The enclosure shall have hinged access doors as required to maintain easy access for all operating and service functions. All doors shall be lockable, tamper resistant, and include retainers to hold the door open during service. Enclosure roof shall be designed to prevent rainwater accumulation. 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.

D. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a powder coat paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted.

E. Enclosure material shall be aluminum. Aluminum enclosure shall be wind rated for 150 mph conditions. Generator enclosure shall include external NEMA 2-hole stainless steel grounding pads on all four corners of the enclosure for customer's use. All enclosure hardware and hinges shall be stainless steel.

F. Walls shall be constructed of marine grade 0.080 minimum formed aluminum panels. Roof shall be constructed of marine grade mill finish 0.125 minimum thickness formed aluminum panels using an interlocking standing seam design capable of supporting 75 pounds per square foot. All external attaching hardware shall be stainless steel screw type mechanical fasteners. Enclosure shall be equipped with 4-point lifting means to remove the enclosure from the tank.

G. Provide a minimum of two entrance doors on each side. Doors shall be strategically located to provide easy access and serviceability. One door shall be located directly in front of the generator terminal box. Another door shall be located directly in front of the generator control panel. Maximum door width shall be 3'. Door handles shall be two-point pad lockable type. Provide drip rails above each door opening. Include door latches plus lock plates to prevent tampering.

H. Provide OSHA approved aluminum stairs, rails and platforms on each side of generator at height flush with bottom of access door elevation with adequate platform length to allow for full 180 degrees swing of access doors and width to allow removal/replacement of generator components. the platform shall extend the full length of the generator enclosure with access stairs on each end of each platform.

1. Construction shall consist of A-36 structural frame members, stairs on one end, and hand rails. Walk area shall have surface grating, with safety treads, shall consist of 1" x 1/8" type 19-W-4 Aluminum, which shall be fastened to the frame with galvanize steel clips and plated bolts. The service platform shall be configured as shown on the plans

2. Finish: Platform surfaces shall be cleaned, primed and painted with two coats of epoxy and two coats of polane polyurethane
3. Platforms shall ship for field assembly. The configuration shall be as shown on the contract plans. Platforms shall be anchored to the foundation with ½" adhesive anchors with a minimum of 4 ½" embedment.
4. The design of the access platforms around the generator enclosure shall be designed and sealed by a Licensed Professional Engineer in the state of Texas. Sealed drawings shall be provided as a formal submittal.

I. A factory-mounted exhaust silencer shall be installed inside the enclosure and insulated as necessary to allow generator set to operate at rated load in the maximum specified ambient temperature. Exhaust connections to the generator set shall be through seamless flexible connections. Space Heater: Thermostatically controlled and sized to prevent condensation.

J. Intake air shall enter the enclosure through an acoustic baffle section or hood located in the rear wall of the enclosure and shall include aluminum bird screen. Air intake shall be 1250 feet per minute or less to minimize water intrusion. The radiator discharge air shall pass through a horizontal discharge plenum section, which incorporates a motorized damper and aluminum bird screen. The air handling system shall be engineered and constructed so as not to exceed a total of 0.50 inches of water gauge static pressure drop with minimal water intrusion.

K. The enclosure shall include the following maintenance provisions:
1. Flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure, with internal drain valves
2. External radiator fill provision port on enclosure roof.

L. Provide motorized fail-open louvers on inlet to minimize air flow through the enclosure when generator set is not operating and gravity dampers on the discharge. Louvers shall include provisions to prevent accumulation of ice or snow that might prevent operation.

M. Inlet ducts shall include rain hoods.

N. Provide a mounted and wired electrical distribution panel to serve the generator set and enclosure lighting receptacles and generator components. Arrange for external connection. No mini-power centers shall be allowed.
1. Acceptable Manufacturers:
    a. Eaton
    b. Square D
2. The provisions required include:
    a. Minimum 24 pole, 100-amp, 3 pole main breaker distribution panelboard connected to a 120/208VAC, 3-phase, 4-wire service by the installer in a NEMA 3Renclosure, have bolt-on breakers with a minimum 10,000 AIC rating and tin-plated copper bus.
    b. Generator manufacturer shall be responsible for providing panelboard, Surge Protection Device (SPD), circuit breakers and all associated cabling and conduits to devices requiring power in the generator and the generator enclosure.
    c. The Manufacturer shall provide the minimum number and ampacity of circuit breakers as follows:
        1) One 20A/1P Circuit Breaker for Interior Lights
        2) One 20A/1P Circuit Breaker for Exterior Lights
        3) One 20A/1P Circuit Breaker for Receptacles
        4) One 20A/1P Circuit Breaker for Battery Charger

5) One 20A/1P Circuit Breaker for Generator Control Panel
6) One 20A/1P Circuit Breaker for Fuel Maintenance System
7) One Circuit Breaker sized as required for each block heater

O. Two duplex GFCI receptacles, one inside the enclosure, and a weatherproof receptacle on the outside of the enclosure.

P. Two three-way switches controlling Factory-wired, vaporproof-type LED battery pack fixtures within housing; arranged to illuminate controls and accessible interior. The switch for the light fixture shall be located near each main door for the generator unit. The light fixture shall be located such that the light illuminates the control panel in the generator. The light fixture shall be Holophane catalog number Holophane EVT4-6000LM-FST-MD-MVOLT-GZ10-30K-80CRI-BAA-STSL-MSI10NWL-BSL722C, or equals from Kennel, Crouse Hinds or Cooper. The manufacturer shall be responsible for all controls and wiring as required for a complete and operational system.

Q. Minimum of two (2) LED light fixtures, one exterior light mounted in the center of the main exit door on each side of the generator enclosure. The exterior lights shall be controlled via a photocell and the controls shall be equipped with an On/Off/Auto selector switch to allow for manual or automatic operation of the exterior lights. The light fixture shall be Holophane HLWPC2-P20-40K-MVOLT-ASYDF-GYSPD-80CRI-PCLL-10KV-EM, or equals from Kennel, Crouse Hinds or Cooper. The manufacturer shall be responsible for all controls and wiring as required for a complete and operational system.

R. Provide normal AC service from the panelboard to the engine coolant and alternator heaters, and battery charger.

S. Interior Enclosures and Components: Powder-coated and baked over corrosion-resistant pretreatment and compatible primer.

T. Exterior Enclosure Color: Exterior, Desert Sand (Beige). Owner will review and approve final color during submittal review.

U. Wiring Devices (receptacles, lighting toggle switches, motor rated switches, device covers, etc), shall be industrial grade, 20amp rated
1. Receptacles
a. Indoor: industrial grade, duplex, grounding type, 20 A, 125 VAC, side wired, screw-type terminals, GFCI duplex receptacle.
b. Outdoor: industrial grade, duplex, GFCI type, 20 A, 125 VAC, side wired, screw-type terminals, with spring-loaded hinged flap cover outlet box hood installed must be listed and identified as "Extra-Duty."

V. Conductors:
1. Tinned copper, complying with NEMA WC 70/ICEA S-95-658.
2. Conductor with thermoplastic insulation rated at 600 volts. Type XHHW-2.

W. Conduits and Outlet Boxes:
1. All wiring shall be in conduit unless noted otherwise.
2. Aluminum Rigid Conduit (ARC): Comply with ANSI C80.5 and UL 6A.
3. Comply with NEMA FB 1 and UL 514B.

4. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
5. Fittings, General: Listed and labeled for type of conduit, location, and use.
6. Joint Compound for ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.
7. Expansion Fittings: To match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
8. Liquid Tight Flexible Metal Conduit: Flexible conduit used for motors, or other equipment locations shall be liquid tight flexible metal conduit UL listed.
    a. Conduit shall have a spiraled, flexible galvanized steel inner core and an outer jacket of neoprene.
    b. Liquid tight connectors which shall be galvanized steel or malleable iron with neoprene sealing gasket and insulated throats.
9. Cast-Metal Outlet and Device Boxes: Material: Aluminum.

X. Low Voltage Transformer
1. Acceptable Manufacturers:
    a. Eaton
    b. Square D
2. No mini-power centers shall be allowed.
3. Comply with 10 CFR 431 (DOE 2016) efficiency levels.
4. Marked as compliant with DOE 2016 efficiency levels by an NRTL.
5. Comply with NFPA 70, and list and label as complying with UL 1561.
6. All bussing shall be tin-plated.
7. Core and Coil Assemblies: Continuous windings except for taps.
    a. The core and coil assembly shall be completely encapsulated in a proportioned mixture of epoxy or resin and aggregate to provide a moisture proof, shock-resistant seal.
    b. Coil Material: Copper.
8. Taps:
    a. Three-phase transformers shall be provided with six 2-1/2% taps, two above and four below rated primary voltage.
9. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 80 deg C rise above 40 deg C ambient temperature.
10. Low-Sound-Level Requirements: Minimum or 3 dBA less than NEMA ST20 standard sound levels when factory tested according to IEEE c57.12.91.S

2.9 LOAD BANK TAP BOX

A. Provide one (1) load bank tap box for connection to portable load bank with features as follows:
1. 480Y/277V, 3 phase, 4 wire, refer to data sheet for ampacity, Powertron Standard Series, Power Temp Systems pad mounted or approved equal.
2. Stainless steel NEMA 3R Enclosure.
3. Removable bottom plate for conduit entry
4. Utility side doors
5. Trapped load bank cable door.

2.10 GENERATOR TERMINAL BOX

A. Generator Terminal box shall be oversized to accept conductors per phase as shown in the table below without exceeding the minimum bending radius of the conductors per the National Electrical Code. Generator terminal box shall be NEMA 3R with leads landing on three-phase, insulated bus drilled with NEMA 2-hole pads to terminate the generator cables. Direct cable-to-cable connections shall not be permitted. Terminal box shall be provided with standoff insulators and suitable for terminations using a NEMA two-hole lug. Generator terminal box shall be of adequate size to accommodate stress cones to make up cable terminations for 15,000 volt shielded cable. The front of box shall be removable and shall be equipped with an infrared inspection window. Generator terminal box shall receive motor cables from the bottom. Terminal box shall be adequately insulated to prevent excessive vibration. The Generator terminal box shall be suitable for terminating conductors as shown in the table below without exceeding the minimum bending radius of the cables as required by the National Electrical Code.

B. INFRARED INSPECTION WINDOWS: The terminal box shall be provided with an infrared inspection window. The window shall be permanently fitted into the indicated electrical equipment to give permanent access for infrared inspections. Window material must be transparent to visual, infrared and ultraviolet energy (corona) bands. Window shall be manufactured by IRISS and shall be Platinum Series CAP-CT-12 model. The infrared inspection window shall be strategically located for inspection of all three phase connections.

2.11 NEUTRAL GROUNDING RESISTORS (NGR)

A. Each generator set shall be provided with an outdoor rated, stainless steel neutral grounding resistor for grounding the XO neutral bushing. The resistors shall be rated for operation at the line to neutral voltage as specified in the data sheet (minimum) limit the ground current on the X winding to approximately 200 amperes and have a 10 second thermal rating. Neutral bushing shall be provided with a 600:5 MR CT-C200 accuracy wired out to shorting terminal blocks. The neutral grounding resistors shall be mounted and wired in NEMA 3R enclosure mounted on enclosure roof. Neutral grounding resistor enclosure and all supporting hardware shall be 304 stainless steel.

2.12 VIBRATION ISOLATION DEVICES

A. Vibration Isolation: Generators installed on grade shall be provided with elastomeric isolator pads integral to the generator, unless the engine manufacturer requires use of spring isolation.

2.13 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with NFPA 110, Level 1 Energy Converters. In addition, the equipment engine, skid, cooling system, and alternator shall have been subjected to actual prototype tests to validate the capability of the design under the abnormal conditions noted in NFPA110. Calculations and testing on similar equipment which are allowed under NFPA110 are not sufficient to meet this requirement.

2. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.

B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test engine generator set manufactured for this Project to demonstrate compatibility and functionality.
2. Full load run.
3. Maximum power.
4. Voltage regulation.
5. Transient and Steady-state governing.
6. Single-step load pickup.
7. Simulated safety shutdowns.
8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.

PART 3 - EXECUTION

3.1 CONCRETE BASES

A. Coordinate sizes and locations of concrete bases. Verify structural requirements with structural engineer.

B. Install concrete bases of dimensions indicated for packaged engine generators.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 404.

B. Comply with packaged engine-generator manufacturers' written installation, application, and alignment instructions and with NFPA 110.

C. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

D. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.

E. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site. Refer to structural drawings for anchor and grout requirements.

F. Equipment shall be initially started and operated by representatives of the manufacturer. All protective settings shall be adjusted in accordance with results in Section 26 05 73 "Power System Studies".

G. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

H. On completion of the installation by the electrical contractor, the generator set supplier shall conduct a site evaluation to verify that the equipment is installed per manufacturer's recommended practice.

I. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.
   1. Verify that electrical wiring is installed according to manufacturers' submittal and installation requirements in Division 26 Sections. Proceed with equipment startup only after wiring installation is satisfactory.

3.3 CONNECTIONS

A. Ground Equipment
   1. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 ON-SITE ACCEPTANCE TEST

A. Testing Agency:
   1. Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

   1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in first two subparagraphs below, as specified in NETA ATS. Certify compliance with test parameters.

      a. Visual and Mechanical Inspection:
         1) Compare equipment nameplate data with Drawings and the Specifications.
         2) Inspect physical and mechanical condition.
         3) Inspect anchorage, alignment, and grounding.
         4) Verify that the unit is clean.

      b. Electrical and Mechanical Tests:

1) Perform insulation-resistance tests according to IEEE 43.

a) Test duration shall be 10 minutes. Calculate polarization index.

2) Test protective relay devices.
3) Verify phase rotation, phasing, and synchronized operation as required by the application.
4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
5) Perform vibration test for each main bearing cap.
6) Verify correct functioning of the governor and regulator.

2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.
3. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.

C. The complete installation shall be tested to verify compliance with the performance requirements of this specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by the owner. The Engineer shall be notified in advance and shall have the option to witness the tests. The generator set manufacturer shall provide a site test specification covering the entire system. Tests shall include:
1. Prior to start of active testing, all field connections for wiring, power conductors, and bus bar connections shall be checked for proper tightening torque.
2. Installation acceptance tests to be conducted on site shall include a "cold start" test, a two hour full load (resistive) test, and a one-step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary.
3. Battery Tests:
   a. Test batteries per manufactures recommendations.
   b. Verify that measurements are within manufacturer's specifications.
4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
6. Noise Level Tests: Test for compliance with the City of El Paso noise ordinance at the property line. Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four different locations on the property line and where shown on electrical site plan, and compare measured levels with required values. Measurements shall be adjusted for ambient noise levels.
7. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.
8. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
9. Perform a system load bank test with the generator connected to the 13.8kV main switchgear and operating at full load for 4 hours.
10. Perform a load test with actual designed connected loads at the site with the generator connected to the 13.8kV main switchgear and operating at designed load for 4 hours.

11. All Generator Testing Report(s) shall be submitted to Engineer for approval no later than two weeks after testing has been conducted.

D. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Remove and replace malfunctioning units and retest as specified above.
3. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
4. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

E. Infrared Scanning: After Substantial Completion, and during Final Acceptance testing of fully functional generator plant, perform an infrared scan of each power wiring termination and each bus connection. Remove all access panels so terminations and connections are accessible to portable scanner and utilize IR scanning windows on paralleling switchgear.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan 11 months after date of Substantial Completion.
2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
3. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 8 hours in duration. Training date shall be coordinated with the facility owner.

B. Training shall include theory of operation, application and trouble shooting. A training outline and manual of training course material shall be provided to the Owner two weeks in advance of the course. Each eight-hour training session shall be broken up into two segments each of 4-hours with a 15 minute break every two hours. Lunch break will be one hour. Training session shall be conducted by Generator manufacturer personnel. Training session shall be scheduled and coordinated with the Owner.

C. Engage a factory authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators as specified below:
1. Coordinate this training with the 13.8kV main switchgear training.
2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
3. Review data in maintenance manuals. Review data in maintenance manuals.
4. Schedule training with Owner, with at least seven days advance notice.
5. Training shall not take place until construction is complete and the generator is online and fully operational.

D. Include in the maintenance agreement an additional training session from that indicated above for the Owner's Representative at the jobsite or other office location chosen by the Owner. Each eight-hour training session shall be broken up into two segments each of 4-hours with a 15-minute break every two hours. Lunch break will be one hour. Training sessions shall be scheduled and coordinated with the Owner.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing. Provide onsite field service for start-up.

B. Furnish the services of a competent manufacturer's service representative who shall be experienced in the assembly and wiring of the generator units of similar size and character. He shall direct the installation of the equipment and shall assist and advise with the electricians or other workmen who are performing the actual work of installing the generator units. He also shall assist in the adjustment and testing of the equipment.

C. Startup procedures, testing and troubleshooting of the generator shall be performed under the supervision of the manufacturer's representative. Energization of the generators shall not be permitted without the manufacturer's representative permission.

D. Time spent on the job by the service representative shall be adequate for performing all functions described herein.

E. All costs (travel expenses, testing equipment, etc.) required for testing start-up, and training shall be the responsibility of the equipment manufacturer/Contractor.

3.7 SERVICE AND SUPPORT

A. The generator set supplier shall maintain service parts inventory for the entire power system at a central location which is accessible to the service location 24 hours per day, 365 days per year. The inventory shall have a commercial value of $3 million or more. The manufacturer of the generator set shall maintain a central parts inventory to support the supplier, covering all the major components of the power system, including engines, alternators, control systems, paralleling electronics, and power transfer equipment.

B. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical power system replacement parts in the local service location. Service vehicles shall be stocked with critical replacement parts. The service organization shall be on call 24 hours per day, 365 days per year. The service organization shall be physically located within 35 miles from El Paso Water main offices, 1154 Hawkins Blvd, El Paso, TX 79925.

C. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

END OF SECTION 26 32 13.13

HASKELL STREET
ENGINE GENERATOR DATA SHEET

DESCRIPTION		DATA	UNITS
GENERAL			
	EQUIPMENT DESIGNATION	HS-1, HS-2 & HS-3	
	SITE NAME	HASKELL STREET WASTE WATER TREATMENT PLANT	
	SITE ADDRESS	4100 DELTA DR, EL PASO TEXAS, 79905	
	QUANTITY	2, PLUS 1 BACKUP	
DESIGN CONDITIONS			
	DESIGN AMBIENT TEMPERATURE SUMMER	45	°C
	DESIGN AMBIENT TEMPERATURE WINTER	-22.2	°C
	MAXIMUM ALTERNATOR TEMP RISE	105	°C
	PROJECT VOLTAGE DISTORSION LIMIT	10	%
PROJECT REQUIREMENTS			
	NAMEPLATE RATING	2000	KW/PER GENSET
	RUNNING KW	1480.6	KW/PER GENSET
	GENERATOR OUTPUT FREQUENCY	60	HZ
	GENERATOR OUTPUT VOLTAGE	13800	V
	GENERATOR POWER FACTOR	80	%
	GENERATOR TERMINAL PHASE	3, WYE	
	CLOSE TRANSITION GEAR	YES	
	NEUTRAL TO GROUND RESISTOR	100	A
ENGINE			
	FUEL SUPPLY	LOW SULFUR #2 DIESEL FUEL/HVO FUEL	
	MAXIMUM ENGINE SPEED	1800	RPM
	MINIMUM PISTON DISPLACEMENT	60.2	LT
	BLACK START REQUIRED	YES	
	MINIMUM GUARATEED EMISSIONS	TIER II	
FUEL SYSTEM			
	FUEL SUPPLY	SUB-BASE DOUBLE WALL TANK UL 142	
	FUEL TANK CAPACITY AT PERCENT RATED CAPACITY	48	HR
	TANK HEATER	NO	
	INTERGRAL FUEL MAINTANCE SYSTEM	YES	
EXAHUST SYSTEM			
	SILENCER AND EXAHUST PIPE MATERIAL	STAINLESS STEEL	
ENCLOSURE			
	MAXIMUM NOISE LIMIT AT 23 FEET	75	Dba
SET PERFORMANCE			
	MAX STEP VOLTAGE DIP	12	%
	MAX STEP FREQUENCY DIP	4	%
	SITE RATED STANDBY	1790/2237	KW/KVA
	SITE RATED MAX SURGE	1810	KW
	MAX SURGE KVA	7993	KVA
	TEMP RISE AT FULL LOAD	105	°C
	ALTERNATOR MAXIMUM KVA THAT RESULTS IN A MIN OF 90% RATED SUSTAINED VOLTAGE	6062	KVA/PER GENSET
	VOLTAGE DISTORSION	3.2	%
LOAD BANK TAP BOX			
	VOLTAGE RATING	480/277V, 3phase, 4 wire	
	BUS RATING	2400	Amps

EP Water- Haskell Street Plant Load List

Loads Summary List

***Note: Detailed Loads and Step Report available below**

Step No.	Load Name	Quantity	Running		Starting		Peak		Dip Limits, %		VTHD% Limit
			kW	kVA	kW	kVA	kW	kVA	Vdip	Fdip	
Step01	LOAD-A/C UNIT	1	6.64	8.3	19.93	24.91	None	None	30.0	10.0	0.0
Step01	LOAD-ADMIN-BLDG	1	26.58	33.22	83.04	103.8	None	None	30.0	10.0	0.0
Step01	LOAD-AHU-4601	1	1.06	1.33	3.99	4.98	None	None	30.0	10.0	0.0
Step01	LOAD-COMP-BLDG	1	2.4	3.0	8.0	10.0	None	None	30.0	10.0	0.0
Step01	LOAD-DISOL	1	6.4	8.0	20.0	25.0	None	None	30.0	10.0	0.0
Step01	LOAD-EXHAUST- COMP-BLDG	1	3.32	4.15	9.96	12.46	None	None	30.0	10.0	0.0
Step01	LOAD-EXT-LIGHTING	1	3.98	4.98	13.29	16.61	None	None	30.0	10.0	0.0
Step01	LOAD-HW	1	11.2	14.0	36.0	45.0	None	None	30.0	10.0	0.0
Step01	LOAD-LIGHT-MCC-5	1	6.64	8.3	19.93	24.91	None	None	30.0	10.0	0.0
Step01	LOAD-LP04	1	4.0	5.0	12.0	15.0	None	None	30.0	10.0	0.0
Step01	LOAD-MAINT-BLDG- SW	1	9.97	12.46	33.22	41.52	None	None	30.0	10.0	0.0
Step01	LOAD-MPZ-14	1	2.4	3.0	7.2	9.0	None	None	30.0	10.0	0.0
Step01	LOAD-PANEL-2	1	19.93	24.91	66.43	83.04	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-1	1	19.93	24.91	66.43	83.04	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-105A	1	4.0	5.0	12.0	15.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-21	1	4.0	5.0	12.0	15.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-22	1	4.0	5.0	12.0	15.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-3300	1	8.0	10.0	24.0	30.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-3301	1	2.4	3.0	7.2	9.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-3511	1	5.98	7.47	19.93	24.91	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-3521	1	6.64	8.3	19.93	24.91	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-4300	1	8.0	10.0	24.0	30.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-4301	1	2.4	3.0	7.2	9.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-8300	1	4.0	5.0	12.0	15.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-8301	1	2.4	3.0	8.0	10.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-DF	1	9.6	12.0	30.0	37.5	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-EG	1	29.9	37.37	99.65	124.56	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-FP	1	39.86	49.82	132.86	166.08	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-PC	1	9.97	12.46	33.22	41.52	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LCP12	1	3.98	4.98	13.29	16.61	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-PD1B	1	4.0	5.0	12.0	15.0	None	None	30.0	10.0	0.0
Step01	LOAD-TR-MCC-31	1	8.0	10.0	24.0	30.0	None	None	30.0	10.0	0.0
Step01	LOAD-TX-LP02	1	4.0	5.0	12.0	15.0	None	None	30.0	10.0	0.0
Step01	PANEL DG	1	26.58	33.22	26.57	33.22	None	None	30.0	10.0	0.0
Step01	PNL-3531	1	6.64	8.3	19.93	24.91	None	None	30.0	10.0	0.0
Step01	PNL-3541	1	6.64	8.3	19.93	24.91	None	None	30.0	10.0	0.0
Step01	10Hp load (X6) PRIORITY 1	3	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step01	25HP load (X1) PRIORITY 1	1	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step01	7.5HP load (X1) PRIORITY 1	2	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step01	.75HP Load (X3) PRIORITY 1	4	0.62	0.91	6.81	8.85	None	None	30.0	10.0	0.0
Step01	1.5HP Loads (X1) PRIORITY 1	1	1.16	1.53	10.26	14.25	None	None	30.0	10.0	0.0
Step01	.5HP load (X12) PRIORITY 1	12	0.42	0.62	4.54	5.9	None	None	30.0	10.0	0.0
Step01	1HP motor (X1) PRIORITY 1	1	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0

Step01	20hp load (X2) PRIORITY 1	2	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step01	35HP load (X1) PRIORITY 1	1	23.47	26.08	84.66	206.5	None	None	30.0	10.0	0.0
Step01	3HP load (X1) PRIORITY 1	1	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step Summary			208.0	256.0	729.0	1057.0	None	None	30.0	10.0	0.0
Step02	800HP load (X2) PRIORITY 1	2	444.42	493.8	316.03	1975.2	None	None	30.0	10.0	10.0
Step Summary			444.0	494.0	316.0	1975.0	None	None	30.0	10.0	10.0
Step03	25HP load (X7) PRIORITY 3	2	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step03	.75HP Load (X1) PRIORITY 3	1	0.62	0.91	6.81	8.85	None	None	30.0	10.0	0.0
Step03	.08HP LOAD X1	1	0.06	0.09	0.72	0.94	None	None	30.0	10.0	0.0
Step03	20hp load (X1) PRIORITY 3	1	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step03	150HP load (X2) PRIORITY 2	2	98.38	108.11	121.08	432.44	None	None	30.0	10.0	10.0
Step03	35HP load (X3) PRIORITY 3	3	23.47	26.08	84.66	206.5	None	None	30.0	10.0	0.0
Step03	1HP motor (X7) PRIORITY 3	2	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step03	3HP load (X18) PRIORITY 3 VFD	2	1.99	2.21	2.49	2.77	None	None	30.0	10.0	10.0
Step Summary			155.0	172.0	340.0	928.0	None	None	30.0	10.0	10.0
Step04	LOAD-PNL-6564 STEP4 PRI1	1	5.31	6.64	16.61	20.76	None	None	30.0	10.0	0.0
Step04	25HP load (X7) PRIORITY 3	2	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step04	.5HP load (X2) PRIORITY 3	2	0.42	0.62	4.54	5.9	None	None	30.0	10.0	0.0
Step Summary			20.0	23.0	78.0	164.0	None	None	30.0	10.0	10.0
Step05	LOAD-SLUICE-GATE STEP 5 PRI 1	1	0.24	0.3	0.8	1.0	None	None	30.0	10.0	0.0
Step05	1HP motor (X7) PRIORITY 3	1	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step05	20hp load (X1) PRIORITY 3	1	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step05	3HP load (X18) PRIORITY 3 VFD	4	1.99	2.21	2.49	2.77	None	None	30.0	10.0	10.0
Step05	75HP load (X4) PRIORITY 2	4	49.74	55.27	150.45	442.5	None	None	30.0	10.0	0.0
Step Summary			106.0	118.0	322.0	916.0	None	None	30.0	10.0	10.0
Step06	1.5HP Loads (X2) PRIORITY 3	5	1.16	1.53	10.26	14.25	None	None	30.0	10.0	0.0
Step06	25HP load (X7) PRIORITY 3	4	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step06	3HP load (X18) PRIORITY 3 VFD	1	1.99	2.21	2.49	2.77	None	None	30.0	10.0	10.0
Step Summary			38.0	43.0	157.0	332.0	None	None	30.0	10.0	10.0
Step07	30HP load (X6) PRIORITY 2	4	20.34	22.85	74.34	177.0	None	None	30.0	10.0	0.0
Step Summary			41.0	46.0	149.0	354.0	None	None	30.0	10.0	10.0
Step08	MME-3565 STEP8 PRI1	1	3.0	3.75	8.0	10.0	None	None	30.0	10.0	0.0
Step08	3HP load (X18) PRIORITY 3 VFD	2	1.99	2.21	2.49	2.77	None	None	30.0	10.0	10.0
Step08	7.5HP load (X12) PRIORITY 3	5	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step08	2.5HP motors (X1) PRIORITY 2	1	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0

Step08	2HP motors (X1) PRIORITY 3	1	1.51	1.91	13.3	19.0	None	None	30.0	10.0	0.0
Step08	1HP motor (X7) PRIORITY 3	1	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step Summary			20.0	23.0	99.0	168.0	None	None	30.0	10.0	10.0
Step09	7.5HP load (X12) PRIORITY 3	5	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step09	1HP motor (X7) PRIORITY 3	4	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step Summary			15.0	17.0	88.0	149.0	None	None	30.0	10.0	10.0
Step10	30HP load (X2) PRIORITY 3	2	20.34	22.85	74.34	177.0	None	None	30.0	10.0	0.0
Step10	5HP load (X4) PRIORITY 3	1	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step10	3HP load (X18) PRIORITY 3 VFD	3	1.99	2.21	2.49	2.77	None	None	30.0	10.0	10.0
Step10	1.5HP Loads (X2) PRIORITY 3	1	1.16	1.53	10.26	14.25	None	None	30.0	10.0	0.0
Step10	7.5HP load (X12) PRIORITY 3	1	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step10	15HP load (X2) PRIORITY 3	4	6.25	7.18	32.56	60.3	None	None	30.0	10.0	0.0
Step10	1HP motor (X7) PRIORITY 3	2	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step10	3hp Motors	2	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step Summary			44.0	50.0	200.0	390.0	None	None	30.0	10.0	10.0
Step11	60HP load (X1) PRIORITY 3	1	39.78	44.2	127.44	354.0	None	None	30.0	10.0	0.0
Step Summary			20.0	22.0	64.0	177.0	None	None	30.0	10.0	10.0
Step12	2HP motors (X1) PRIORITY 3	1	1.51	1.91	13.3	19.0	None	None	30.0	10.0	0.0
Step12	25HP load (X7) PRIORITY 3	1	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step12	7.5HP load (X12) PRIORITY 3	1	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step Summary			12.0	14.0	53.0	108.0	None	None	30.0	10.0	10.0
Step13	LOAD-CDR-8103 STEP 13 PRI 1	1	3.32	4.15	9.96	12.46	None	None	30.0	10.0	0.0
Step13	LOAD-PNL-8075	1	0.25	0.31	0.75	0.94	None	None	30.0	10.0	0.0
Step13	15HP load (X2) PRIORITY 3	4	6.25	7.18	32.56	60.3	None	None	30.0	10.0	0.0
Step13	4HP load PRIORITY 3	1	2.88	3.43	18.9	30.0	None	None	30.0	10.0	0.0
Step Summary			16.0	18.0	80.0	142.0	None	None	30.0	10.0	10.0
Step14	30HP load (X2) PRIORITY 3	2	20.34	22.85	74.34	177.0	None	None	30.0	10.0	0.0
Step14	10Hp load (X4) PRIORITY 3	4	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step14	3HP load (X18) PRIORITY 3 VFD	3	1.99	2.21	2.49	2.77	None	None	30.0	10.0	10.0
Step14	50HP load (X1) PRIORITY 3	1	33.53	37.26	109.15	295.0	None	None	30.0	10.0	0.0
Step Summary			54.0	61.0	204.0	463.0	None	None	30.0	10.0	10.0
Step15	50HP load (X1) PRIORITY 3	1	33.53	37.26	109.15	295.0	None	None	30.0	10.0	0.0
Step15	1HP motor (X7) PRIORITY 3	1	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step15	200Hp load (X2) PRIORITY 2	2	132.62	150.7	165.78	188.39	None	None	30.0	10.0	10.0
Step Summary			150.0	170.0	225.0	342.0	None	None	30.0	10.0	10.0
Step16	3HP load (X18) PRIORITY 3 VFD	1	1.99	2.21	2.49	2.77	None	None	30.0	10.0	10.0

Step16	10Hp load (X4) PRIORITY 3	2	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step16	50HP load (X1) PRIORITY 3	1	33.53	37.26	109.15	295.0	None	None	30.0	10.0	0.0
Step16	5HP load (X4) PRIORITY 3	2	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step Summary			28.0	32.0	114.0	253.0	None	None	30.0	10.0	10.0
Step17	3HP load (X18) PRIORITY 3 VFD	2	1.99	2.21	2.49	2.77	None	None	30.0	10.0	10.0
Step17	15HP load (X2) PRIORITY 3	2	6.25	7.18	32.56	60.3	None	None	30.0	10.0	0.0
Step Summary			8.0	9.0	35.0	63.0	None	None	30.0	10.0	10.0
Step18	25HP load (X7) PRIORITY 3	1	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step18	15HP load (X2) PRIORITY 3	1	6.25	7.18	32.56	60.3	None	None	30.0	10.0	0.0
Step Summary			12.0	13.0	49.0	104.0	None	None	30.0	10.0	10.0
Step19	25HP load (X7) PRIORITY 3	2	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step19	10Hp load (X4) PRIORITY 3	2	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step19	7.5HP load (X12) PRIORITY 3	1	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step Summary			27.0	30.0	114.0	240.0	None	None	30.0	10.0	10.0
Step20	10Hp load (X4) PRIORITY 3	3	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step20	7.5HP load (X12) PRIORITY 3	1	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step20	2HP motors (X1) PRIORITY 3	1	1.51	1.91	13.3	19.0	None	None	30.0	10.0	0.0
Step20	40HP LOAD (X3) PRIORITY 2	3	26.82	29.8	92.04	236.0	None	None	30.0	10.0	0.0
Step Summary			54.0	61.0	212.0	489.0	None	None	30.0	10.0	10.0

Project Summary	Running		Max Starting		Cumulative Step		Cumulative Peak		Project VTHD% Limit
	kW	kVA	kW	kVA	kW	kVA	kW	kVA	
	1470.2	1672.1	728.5	1975.2	1628.2	2231.6	0.0	0.0	10.0

***Note: Detailed Loads and Step Report available below**

Step1

Calculated Individual Generator Set Step Load Requirements

Running kW	:	208.0	**Starting kW**	:	729.0	**Cumulative Step kW**	:	729.0
Running kVA	:	256.0	**Starting kVA**	:	1057.0	**Cumulative Step kVA**	:	1057.0
Running Amps	:	21.0	**Starting Non-linear kVA**	:	0.0			
Running Non-linear kVA	:	0.0						
Alternator kW	:	207.99						
Voltage Distortion Limit for	**: step**	0						

LOAD-A/C UNIT Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	6.64	**Starting kW**	:	19.93	**Peak kW**	:	None
Running kVA	:	8.3	**Starting kVA**	:	24.91	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	10.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	6.64				**Voltage**	:	480

LOAD-ADMIN-BLDG Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	26.58	**Starting kW**	:	83.04	**Peak kW**	: None
Running kVA	:	33.22	**Starting kVA**	:	103.8	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	40.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	26.58				**Voltage**	: 480

LOAD-AHU-4601 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	1.06	**Starting kW**	:	3.99	**Peak kW**	: None
Running kVA	:	1.33	**Starting kVA**	:	4.98	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	1.6	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.06				**Voltage**	: 480

LOAD-COMP-BLDG Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.4	**Starting kW**	:	8.0	**Peak kW**	: None
Running kVA	:	3.0	**Starting kVA**	:	10.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	7.23	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.4				**Voltage**	: 240

LOAD-DISOL Single Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	6.4	**Starting kW**	:	20.0	**Peak kW**	: None
Running kVA	:	8.0	**Starting kVA**	:	25.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	33.33	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.4				**Voltage**	: 240

LOAD-EXHAUST-COMP-BLDG Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.32	**Starting kW**	:	9.96	**Peak kW**	: None
Running kVA	:	4.15	**Starting kVA**	:	12.46	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	5.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.32				**Voltage**	: 480

LOAD-EXT-LIGHTING Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.98	**Starting kW**	:	13.29	**Peak kW**	: None
Running kVA	:	4.98	**Starting kVA**	:	16.61	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	6.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.98				**Voltage**	: 480

LOAD-HW Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	11.2	**Starting kW**	:	36.0	**Peak kW**	: None
Running kVA	:	14.0	**Starting kVA**	:	45.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	38.91	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	11.2				**Voltage**	: 208

LOAD-LIGHT-MCC-5					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	: 6.64	**Starting kW**	:	19.93	**Peak kW**	:	None	
Running kVA	: 8.3	**Starting kVA**	:	24.91	**Peak kVA**	:	None	
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No	
Running Amps	: 10.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0	
Alternator kW	: 6.64				**Voltage**	:	480	
LOAD-LP04					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	: 4.0	**Starting kW**	:	12.0	**Peak kW**	:	None	
Running kVA	: 5.0	**Starting kVA**	:	15.0	**Peak kVA**	:	None	
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No	
Running Amps	: 12.04	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0	
Alternator kW	: 4.0				**Voltage**	:	240	
LOAD-MAINT-BLDG-SW					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	: 9.97	**Starting kW**	:	33.22	**Peak kW**	:	None	
Running kVA	: 12.46	**Starting kVA**	:	41.52	**Peak kVA**	:	None	
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No	
Running Amps	: 15.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0	
Alternator kW	: 9.97				**Voltage**	:	480	
LOAD-MPZ-14					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	: 2.4	**Starting kW**	:	7.2	**Peak kW**	:	None	
Running kVA	: 3.0	**Starting kVA**	:	9.0	**Peak kVA**	:	None	
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No	
Running Amps	: 7.23	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0	
Alternator kW	: 2.4				**Voltage**	:	240	
LOAD-PANEL-2					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	: 19.93	**Starting kW**	:	66.43	**Peak kW**	:	None	
Running kVA	: 24.91	**Starting kVA**	:	83.04	**Peak kVA**	:	None	
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No	
Running Amps	: 30.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0	
Alternator kW	: 19.93				**Voltage**	:	480	
LOAD-PNL-1					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	: 19.93	**Starting kW**	:	66.43	**Peak kW**	:	None	
Running kVA	: 24.91	**Starting kVA**	:	83.04	**Peak kVA**	:	None	
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No	
Running Amps	: 30.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0	
Alternator kW	: 19.93				**Voltage**	:	480	
LOAD-PNL-105A					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	: 4.0	**Starting kW**	:	12.0	**Peak kW**	:	None	
Running kVA	: 5.0	**Starting kVA**	:	15.0	**Peak kVA**	:	None	
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No	

Running Amps	:	13.9	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	4.0				**Voltage**	: 208

LOAD-PNL-21 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	4.0	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	5.0	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	13.9	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	4.0				**Voltage**	: 208

LOAD-PNL-22 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	4.0	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	5.0	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	13.9	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	4.0				**Voltage**	: 208

LOAD-PNL-3300 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	8.0	**Starting kW**	:	24.0	**Peak kW**	: None
Running kVA	:	10.0	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	27.79	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	8.0				**Voltage**	: 208

LOAD-PNL-3301 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.4	**Starting kW**	:	7.2	**Peak kW**	: None
Running kVA	:	3.0	**Starting kVA**	:	9.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	8.34	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.4				**Voltage**	: 208

LOAD-PNL-3511 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	5.98	**Starting kW**	:	19.93	**Peak kW**	: None
Running kVA	:	7.47	**Starting kVA**	:	24.91	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	9.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.98				**Voltage**	: 480

LOAD-PNL-3521 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	6.64	**Starting kW**	:	19.93	**Peak kW**	: None
Running kVA	:	8.3	**Starting kVA**	:	24.91	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	10.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.64				**Voltage**	: 480

LOAD-PNL-4300 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	8.0	**Starting kW**	:	24.0	**Peak kW**	: None
Running kVA	:	10.0	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	27.79	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	8.0				**Voltage**	: 208

LOAD-PNL-4301 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.4	**Starting kW**	:	7.2	**Peak kW**	: None
Running kVA	:	3.0	**Starting kVA**	:	9.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	8.34	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.4				**Voltage**	: 208

LOAD-PNL-8300 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	4.0	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	5.0	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	13.9	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	4.0				**Voltage**	: 208

LOAD-PNL-8301 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.4	**Starting kW**	:	8.0	**Peak kW**	: None
Running kVA	:	3.0	**Starting kVA**	:	10.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	7.23	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.4				**Voltage**	: 240

LOAD-PNL-DF Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	9.6	**Starting kW**	:	30.0	**Peak kW**	: None
Running kVA	:	12.0	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	33.35	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	9.6				**Voltage**	: 208

LOAD-PNL-EG Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	29.9	**Starting kW**	:	99.65	**Peak kW**	: None
Running kVA	:	37.37	**Starting kVA**	:	124.56	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	45.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	29.9				**Voltage**	: 480

LOAD-PNL-FP Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	39.86	**Starting kW**	:	132.86	**Peak kW**	: None
Running kVA	:	49.82	**Starting kVA**	:	166.08	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	60.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	39.86				**Voltage**	: 480

LOAD-PNL-PC					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	9.97	**Starting kW**	:	33.22	**Peak kW**	:	None
Running kVA	:	12.46	**Starting kVA**	:	41.52	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	15.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	9.97				**Voltage**	:	480
LOAD-PNL-LCP12					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	3.98	**Starting kW**	:	13.29	**Peak kW**	:	None
Running kVA	:	4.98	**Starting kVA**	:	16.61	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	6.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	3.98				**Voltage**	:	480
LOAD-PNL-PD1B					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	4.0	**Starting kW**	:	12.0	**Peak kW**	:	None
Running kVA	:	5.0	**Starting kVA**	:	15.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	12.04	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	4.0				**Voltage**	:	240
LOAD-TR-MCC-31					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	8.0	**Starting kW**	:	24.0	**Peak kW**	:	None
Running kVA	:	10.0	**Starting kVA**	:	30.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	27.79	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	8.0				**Voltage**	:	208
LOAD-TX-LP02					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	4.0	**Starting kW**	:	12.0	**Peak kW**	:	None
Running kVA	:	5.0	**Starting kVA**	:	15.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	12.04	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	4.0				**Voltage**	:	240
PANEL DG					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	26.58	**Starting kW**	:	26.57	**Peak kW**	:	None
Running kVA	:	33.22	**Starting kVA**	:	33.22	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	40.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	26.58				**Voltage**	:	480
PNL-3531					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	6.64	**Starting kW**	:	19.93	**Peak kW**	:	None
Running kVA	:	8.3	**Starting kVA**	:	24.91	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No

Running Amps	:	10.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.64				**Voltage**	: 480

PNL-3541 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	6.64	**Starting kW**	:	19.93	**Peak kW**	: None
Running kVA	:	8.3	**Starting kVA**	:	24.91	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	10.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.64				**Voltage**	: 480

10Hp load (X6) PRIORITY 1 Three Phase Quantity : 3 In this Step

Category : Motor

Running kW	:	6.94	**Starting kW**	:	35.51	**Peak kW**	: None
Running kVA	:	7.98	**Starting kVA**	:	67.0	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.53	**Cyclic**	: No
Running Amps	:	10.03	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.94				**Voltage**	: 460

Shaft Hp	:	10.0	**Method**	:	Across the line
Shaft kW	:	7.46	**Low Inertia**	:	No
Efficiency (%)	:	0.86	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

25HP load (X1) PRIORITY 1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	16.95	**Starting kW**	:	64.9	**Peak kW**	: None
Running kVA	:	19.04	**Starting kVA**	:	147.5	**Peak kVA**	: None
Running PF	:	0.89	**Starting PF**	:	0.44	**Cyclic**	: No
Running Amps	:	23.93	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	16.95				**Voltage**	: 460

Shaft Hp	:	25.0	**Method**	:	Across the line
Shaft kW	:	18.65	**Low Inertia**	:	No
Efficiency (%)	:	0.88	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

7.5HP load (X1) PRIORITY 1 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	5.26	**Starting kW**	:	28.14	**Peak kW**	: None
Running kVA	:	6.05	**Starting kVA**	:	50.25	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	: No
Running Amps	:	7.6	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.26				**Voltage**	: 460

Shaft Hp : 7.5 **Method** : Across the line
Shaft kW : 5.59 **Low Inertia** : No
Efficiency (%) : 0.85 **LRkVA Factor** : 6.7 **Design** : Standard NEMA Design B,C or D
LRkVA Code : H **Load Factor** : 80.0

.75HP Load (X3) PRIORITY 1 Three Phase Quantity : 4 In this Step Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None

Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 1.14	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.62			**Voltage**	: 460

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

1.5HP Loads (X1) PRIORITY 1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 1.16	**Starting kW**	: 10.26	**Peak kW**	: None
Running kVA	: 1.53	**Starting kVA**	: 14.25	**Peak kVA**	: None
Running PF	: 0.76	**Starting PF**	: 0.72	**Cyclic**	: No
Running Amps	: 1.92	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 1.16			**Voltage**	: 460

Shaft Hp	: 1.5	**Method**	: Across the line
Shaft kW	: 1.12	**Low Inertia**	: No
Efficiency (%)	: 0.77	**LRkVA Factor**	: 9.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: L
Load Factor	: 80.0		

.5HP load (X12) PRIORITY 1 Three Phase Quantity : 12 In this Step

Category : Motor

Running kW	: 0.42	**Starting kW**	: 4.54	**Peak kW**	: None
Running kVA	: 0.62	**Starting kVA**	: 5.9	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 0.78	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.42			**Voltage**	: 460

Shaft Hp	: 0.5	**Method**	: Across the line
Shaft kW	: 0.37	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

1HP motor (X1) PRIORITY 1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.82	**Starting kW**	: 8.97	**Peak kW**	: None
Running kVA	: 1.17	**Starting kVA**	: 11.8	**Peak kVA**	: None
Running PF	: 0.7	**Starting PF**	: 0.76	**Cyclic**	: No
Running Amps	: 1.47	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.82			**Voltage**	: 460

Shaft Hp	: 1.0	**Method**	: Across the line
Shaft kW	: 0.75	**Low Inertia**	: No
Efficiency (%)	: 0.73	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

20hp load (X2) PRIORITY 1 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None

Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.25	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 460

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

35HP load (X1) PRIORITY 1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 23.47	**Starting kW**	: 84.66	**Peak kW**	: None
Running kVA	: 26.08	**Starting kVA**	: 206.5	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.41	**Cyclic**	: No
Running Amps	: 32.77	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 23.47			**Voltage**	: 460

Shaft Hp	: 35.0	**Method**	: Across the line
Shaft kW	: 26.11	**Low Inertia**	: No
Efficiency (%)	: 0.89	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

3HP load (X1) PRIORITY 1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 2.18	**Starting kW**	: 16.83	**Peak kW**	: None
Running kVA	: 2.66	**Starting kVA**	: 25.5	**Peak kVA**	: None
Running PF	: 0.82	**Starting PF**	: 0.66	**Cyclic**	: No
Running Amps	: 3.34	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 2.18			**Voltage**	: 460

Shaft Hp	: 3.0	**Method**	: Across the line
Shaft kW	: 2.24	**Low Inertia**	: No
Efficiency (%)	: 0.82	**LRkVA Factor**	: 8.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: K
Load Factor	: 80.0		

Step2

Calculated Individual Generator Set Step Load Requirements

Running kW	: 444.0	**Starting kW**	: 316.0	**Cumulative Step kW**	: 524.0
Running kVA	: 494.0	**Starting kVA**	: 1975.0	**Cumulative Step kVA**	: 2232.0
Running Amps	: 41.0	**Starting Non-linear kVA**	: 1975.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 444.42				
Voltage Distortion Limit for	**: step** 10				

800HP load (X2) PRIORITY 1 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 444.42	**Starting kW**	: 316.03	**Peak kW**	: None
Running kVA	: 493.8	**Starting kVA**	: 1975.2	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.16	**Cyclic**	: No
Running Amps	: 68.61	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 0.0				
Starting NLL kVA	: 1975.2			**Voltage**	: 4160

Alternator kW : 444.42

Shaft Hp	: 800.0	**Method**	: Solid State
Shaft kW	: 596.8	**Current Limit**	: 400.0
Efficiency (%)	: 0.94	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Rectifier Type	: 6 pulse	**THDI %**	: 26
		THDV %	: 10

Load Factor : 70.0

Step3

Calculated Individual Generator Set Step Load Requirements

Running kW	155.0	**Starting kW**	340.0	**Cumulative Step kW**	992.0
Running kVA	172.0	**Starting kVA**	928.0	**Cumulative Step kVA**	1678.0
Running Amps	14.0	**Starting Non-linear kVA**	435.0		
Running Non-linear kVA	2.0				
Alternator kW	157.45				
Voltage Distortion Limit for step	10				

25HP load (X7) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	16.95	**Starting kW**	64.9	**Peak kW**	None
Running kVA	19.04	**Starting kVA**	147.5	**Peak kVA**	None
Running PF	0.89	**Starting PF**	0.44	**Cyclic**	No
Running Amps	23.93	**Max. % Voltage Dip**	30.0	**Max. % Frequency Dip**	10.0
Alternator kW	16.95			**Voltage**	460

Shaft Hp : 25.0		**Method**	: Across the line
Shaft kW : 18.65		**Low Inertia**	: No
Efficiency (%) : 0.88		**LRkVA Factor**	: 5.9 **Design** : Standard NEMA Design B,C or D
LRkVA Code : G **Load Factor** : 80.0			

.75HP Load (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step Category : Motor

Running kW	0.62	**Starting kW**	6.81	**Peak kW**	None
Running kVA	0.91	**Starting kVA**	8.85	**Peak kVA**	None
Running PF	0.68	**Starting PF**	0.77	**Cyclic**	No
Running Amps	1.14	**Max. % Voltage Dip**	30.0	**Max. % Frequency Dip**	10.0
Alternator kW	0.62			**Voltage**	460

Shaft Hp : 0.75		**Method**	: Across the line
Shaft kW : 0.56		**Low Inertia**	: No
Efficiency (%) : 0.72		**LRkVA Factor**	: 11.8
Design : Standard NEMA Design B,C or D		**LRkVA Code**	: N
Load Factor : 80.0			

.08HP LOAD X1 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	0.06	**Starting kW**	0.72	**Peak kW**	None
Running kVA	0.09	**Starting kVA**	0.94	**Peak kVA**	None
Running PF	0.68	**Starting PF**	0.77	**Cyclic**	No
Running Amps	0.11	**Max. % Voltage Dip**	30.0	**Max. % Frequency Dip**	10.0
Alternator kW	0.06			**Voltage**	460

Shaft Hp : 0.08		**Method**	: Across the line
Shaft kW : 0.06		**Low Inertia**	: No

Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N		
Load Factor	: 80.0				

20hp load (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.25	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 460

Shaft Hp	: 5.0	**Method**	: Across the line		
Shaft kW	: 3.73	**Low Inertia**	: No		
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J		
Load Factor	: 80.0				

150HP load (X2) PRIORITY 2 Three Phase Quantity : 2 In this Step
Category : Motor

Running kW	: 98.38	**Starting kW**	: 121.08	**Peak kW**	: None
Running kVA	: 108.11	**Starting kVA**	: 432.44	**Peak kVA**	: None
Running PF	: 0.91	**Starting PF**	: 0.28	**Cyclic**	: No
Running Amps	: 135.85	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 0.0				
Starting NLL kVA	: 432.44			**Voltage**	: 460
Alternator kW	: 98.38				

Shaft Hp	: 150.0	**Method**	: Solid State		
Shaft kW	: 111.9	**Current Limit**	: 400.0		
Efficiency (%)	: 0.91	**LRkVA Factor**	: 5.9		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G		
Rectifier Type	: 6 pulse	**THDI %**	: 26		
		THDV %	: 10		
Load Factor	: 80.0				

35HP load (X3) PRIORITY 3 Three Phase Quantity : 3 In this Step
Category : Motor

Running kW	: 23.47	**Starting kW**	: 84.66	**Peak kW**	: None
Running kVA	: 26.08	**Starting kVA**	: 206.5	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.41	**Cyclic**	: No
Running Amps	: 32.77	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 23.47			**Voltage**	: 460

Shaft Hp	: 35.0	**Method**	: Across the line		
Shaft kW	: 26.11	**Low Inertia**	: No		
Efficiency (%)	: 0.89	**LRkVA Factor**	: 5.9		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G		
Load Factor	: 80.0				

1HP motor (X7) PRIORITY 3 Three Phase Quantity : 2 In this Step
Category : Motor

Running kW	: 0.82	**Starting kW**	: 8.97	**Peak kW**	: None
Running kVA	: 1.17	**Starting kVA**	: 11.8	**Peak kVA**	: None
Running PF	: 0.7	**Starting PF**	: 0.76	**Cyclic**	: No
Running Amps	: 1.47	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0

Alternator kW	: 0.82			**Voltage**	: 460

Shaft Hp	: 1.0	**Method**	: Across the line
Shaft kW	: 0.75	**Low Inertia**	: No
Efficiency (%)	: 0.73	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

3HP load (X18) PRIORITY 3 VFD Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 1.99	**Starting kW**	: 2.49	**Peak kW**	: None
Running kVA	: 2.21	**Starting kVA**	: 2.77	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 2.78	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 2.21				
Starting NLL kVA	: 2.77			**Voltage**	: 460
Alternator kW	: 3.98				

Shaft Hp	: 3.0	**Type**	: Variable Frequency Drive
Shaft kW	: 2.24	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

Step4

Calculated Individual Generator Set Step Load Requirements

Running kW	: 20.0	**Starting kW**	: 78.0	**Cumulative Step kW**	: 886.0
Running kVA	: 23.0	**Starting kVA**	: 164.0	**Cumulative Step kVA**	: 1086.0
Running Amps	: 2.0	**Starting Non-linear kVA**	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 20.03				
Voltage Distortion Limit for	**: step** 10				

LOAD-PNL-6564 STEP4 PRI1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 5.31	**Starting kW**	: 16.61	**Peak kW**	: None
Running kVA	: 6.64	**Starting kVA**	: 20.76	**Peak kVA**	: None
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	: 8.0	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 5.31			**Voltage**	: 480

25HP load (X7) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 16.95	**Starting kW**	: 64.9	**Peak kW**	: None
Running kVA	: 19.04	**Starting kVA**	: 147.5	**Peak kVA**	: None
Running PF	: 0.89	**Starting PF**	: 0.44	**Cyclic**	: No
Running Amps	: 23.93	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 16.95			**Voltage**	: 460

Shaft Hp	: 25.0	**Method**	: Across the line
Shaft kW	: 18.65	**Low Inertia**	: No
Efficiency (%)	: 0.88	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

.5HP load (X2) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	0.42	**Starting kW**	:	4.54	**Peak kW**	: None
Running kVA	:	0.62	**Starting kVA**	:	5.9	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	0.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.42				**Voltage**	: 460

Shaft Hp	:	0.5	**Method**	:	Across the line
Shaft kW	:	0.37	**Low Inertia**	:	No
Efficiency (%)	:	0.72	**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N
Load Factor	:	80.0			

Step5

Calculated Individual Generator Set Step Load Requirements

Running kW	:	106.0	**Starting kW**	:	322.0	**Cumulative Step kW**	: 1150.0
Running kVA	:	118.0	**Starting kVA**	:	916.0	**Cumulative Step kVA**	: 1861.0
Running Amps	:	10.0	**Starting Non-linear kVA**	:	6.0		
Running Non-linear kVA	:	4.0					
Alternator kW	:	109.75					
Voltage Distortion Limit for	**: step**	10					

LOAD-SLUICE-GATE STEP 5 PRI 1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	0.24	**Starting kW**	:	0.8	**Peak kW**	: None
Running kVA	:	0.3	**Starting kVA**	:	1.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	0.36	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.24				**Voltage**	: 480

1HP motor (X7) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.82	**Starting kW**	:	8.97	**Peak kW**	: None
Running kVA	:	1.17	**Starting kVA**	:	11.8	**Peak kVA**	: None
Running PF	:	0.7	**Starting PF**	:	0.76	**Cyclic**	: No
Running Amps	:	1.47	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.82				**Voltage**	: 460

Shaft Hp	:	1.0	**Method**	:	Across the line
Shaft kW	:	0.75	**Low Inertia**	:	No
Efficiency (%)	:	0.73	**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N
Load Factor	:	80.0			

20hp load (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.25	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 460

Shaft Hp	:	5.0	**Method**	:	Across the line
Shaft kW	:	3.73	**Low Inertia**	:	No

Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J		
Load Factor	: 80.0				

3HP load (X18) PRIORITY 3 VFD Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	: 1.99	**Starting kW**	: 2.49	**Peak kW**	: None
Running kVA	: 2.21	**Starting kVA**	: 2.77	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 2.78	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 2.21				
Starting NLL kVA	: 2.77			**Voltage**	: 460
Alternator kW	: 3.98				

Shaft Hp	: 3.0	**Type**	: Variable Frequency Drive
Shaft kW	: 2.24	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

75HP load (X4) PRIORITY 2 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	: 49.74	**Starting kW**	: 150.45	**Peak kW**	: None
Running kVA	: 55.27	**Starting kVA**	: 442.5	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.34	**Cyclic**	: No
Running Amps	: 69.45	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 49.74			**Voltage**	: 460

Shaft Hp	: 75.0	**Method**	: Across the line
Shaft kW	: 55.95	**Low Inertia**	: No
Efficiency (%)	: 0.9	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

Step6

Calculated Individual Generator Set Step Load Requirements

Running kW	: 38.0	**Starting kW**	: 157.0	**Cumulative Step kW**	: 1090.0
Running kVA	: 43.0	**Starting kVA**	: 332.0	**Cumulative Step kVA**	: 1395.0
Running Amps	: 4.0	**Starting Non-linear kVA**	: 1.0		
Running Non-linear kVA	: 1.0				
Alternator kW	: 38.79				
Voltage Distortion Limit for	**: step** 10				

1.5HP Loads (X2) PRIORITY 3 Three Phase Quantity : 5 In this Step

Category : Motor

Running kW	: 1.16	**Starting kW**	: 10.26	**Peak kW**	: None
Running kVA	: 1.53	**Starting kVA**	: 14.25	**Peak kVA**	: None
Running PF	: 0.76	**Starting PF**	: 0.72	**Cyclic**	: No
Running Amps	: 1.92	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 1.16			**Voltage**	: 460

Shaft Hp	: 1.5	**Method**	: Across the line
Shaft kW	: 1.12	**Low Inertia**	: No
Efficiency (%)	: 0.77	**LRkVA Factor**	: 9.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: L
Load Factor	: 80.0		

25HP load (X7) PRIORITY 3 Three Phase Quantity : 4 In this Step

Category :

Running kW	:	16.95	**Starting kW**	:	64.9	**Peak kW**	: None
Running kVA	:	19.04	**Starting kVA**	:	147.5	**Peak kVA**	: None
Running PF	:	0.89	**Starting PF**	:	0.44	**Cyclic**	: No
Running Amps	:	23.93	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	16.95				**Voltage**	: 460

Shaft Hp	:	25.0	**Method**	:	Across the line
Shaft kW	:	18.65	**Low Inertia**	:	No
Efficiency (%)	:	0.88	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

3HP load (X18) PRIORITY 3 VFD Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.99	**Starting kW**	:	2.49	**Peak kW**	: None
Running kVA	:	2.21	**Starting kVA**	:	2.77	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	2.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	2.21					
Starting NLL kVA	:	2.77				**Voltage**	: 460
Alternator kW	:	3.98					

Shaft Hp	:	3.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	2.24	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

Step7

Calculated Individual Generator Set Step Load Requirements

Running kW	:	41.0	**Starting kW**	:	149.0	**Cumulative Step kW**	: 1120.0
Running kVA	:	46.0	**Starting kVA**	:	354.0	**Cumulative Step kVA**	: 1460.0
Running Amps	:	4.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	40.68					
Voltage Distortion Limit for	**: step**	10					

30HP load (X6) PRIORITY 2 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	:	20.34	**Starting kW**	:	74.34	**Peak kW**	: None
Running kVA	:	22.85	**Starting kVA**	:	177.0	**Peak kVA**	: None
Running PF	:	0.89	**Starting PF**	:	0.42	**Cyclic**	: No
Running Amps	:	28.71	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	20.34				**Voltage**	: 460

Shaft Hp	:	30.0	**Method**	:	Across the line
Shaft kW	:	22.38	**Low Inertia**	:	No
Efficiency (%)	:	0.88	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

Step8

Calculated Individual Generator Set Step Load Requirements

Running kW	:	20.0	**Starting kW**	:	99.0	**Cumulative Step kW**	: 1112.0
Running kVA	:	23.0	**Starting kVA**	:	168.0	**Cumulative Step kVA**	: 1319.0
Running Amps	:	2.0	**Starting Non-linear kVA**	:	3.0		
Running Non-linear kVA	:	2.0					
Alternator kW	:	21.57					
Voltage Distortion Limit for step	:	10					

MME-3565 STEP8 PRI1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.0	**Starting kW**	:	8.0	**Peak kW**	: None
Running kVA	:	3.75	**Starting kVA**	:	10.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	4.52	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.0				**Voltage**	: 480

3HP load (X18) PRIORITY 3 VFD Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	1.99	**Starting kW**	:	2.49	**Peak kW**	: None
Running kVA	:	2.21	**Starting kVA**	:	2.77	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	2.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	2.21					
Starting NLL kVA	:	2.77				**Voltage**	: 460
Alternator kW	:	3.98					

Shaft Hp	: 3.0	**Type**	:	Variable Frequency Drive
Shaft kW	: 2.24	**Ramp Details**	:	None
Rectifier Type	: 6 pulse	**THDI %**	:	26
Efficiency (%)	: 0.9	**THDV %**	:	10
Load Factor	: 80.0			

7.5HP load (X12) PRIORITY 3 Three Phase Quantity : 5 In this Step

Category : Motor

Running kW	:	5.26	**Starting kW**	:	28.14	**Peak kW**	: None
Running kVA	:	6.05	**Starting kVA**	:	50.25	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	: No
Running Amps	:	7.6	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.26				**Voltage**	: 460

Shaft Hp	: 7.5	**Method**	:	Across the line
Shaft kW	: 5.59	**Low Inertia**	:	No
Efficiency (%)	: 0.85	**LRkVA Factor**	:	6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	: 80.0			

2.5HP motors (X1) PRIORITY 2 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.25	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 460

Shaft Hp	: 5.0	**Method**	:	Across the line
Shaft kW	: 3.73	**Low Inertia**	:	No
Efficiency (%)	: 0.84	**LRkVA Factor**	:	7.5

Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J		
Load Factor	: 80.0				

2HP motors (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 1.51	**Starting kW**	: 13.3	**Peak kW**	: None
Running kVA	: 1.91	**Starting kVA**	: 19.0	**Peak kVA**	: None
Running PF	: 0.79	**Starting PF**	: 0.7	**Cyclic**	: No
Running Amps	: 2.4	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 1.51			**Voltage**	: 460

Shaft Hp	: 2.0	**Method**	: Across the line		
Shaft kW	: 1.49	**Low Inertia**	: No		
Efficiency (%)	: 0.79	**LRkVA Factor**	: 9.5		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: L		
Load Factor	: 80.0				

1HP motor (X7) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.82	**Starting kW**	: 8.97	**Peak kW**	: None
Running kVA	: 1.17	**Starting kVA**	: 11.8	**Peak kVA**	: None
Running PF	: 0.7	**Starting PF**	: 0.76	**Cyclic**	: No
Running Amps	: 1.47	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.82			**Voltage**	: 460

Shaft Hp	: 1.0	**Method**	: Across the line		
Shaft kW	: 0.75	**Low Inertia**	: No		
Efficiency (%)	: 0.73	**LRkVA Factor**	: 11.8		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N		
Load Factor	: 80.0				

Step9

Calculated Individual Generator Set Step Load Requirements

Running kW	: 15.0	**Starting kW**	: 88.0	**Cumulative Step kW**	: 1120.0
Running kVA	: 17.0	**Starting kVA**	: 149.0	**Cumulative Step kVA**	: 1324.0
Running Amps	: 1.0	**Starting Non-linear kVA**	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 14.79				
Voltage Distortion Limit for step	: 10				

7.5HP load (X12) PRIORITY 3 Three Phase Quantity : 5 In this Step

Category : Motor

Running kW	: 5.26	**Starting kW**	: 28.14	**Peak kW**	: None
Running kVA	: 6.05	**Starting kVA**	: 50.25	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.56	**Cyclic**	: No
Running Amps	: 7.6	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 5.26			**Voltage**	: 460

Shaft Hp	: 7.5	**Method**	: Across the line		
Shaft kW	: 5.59	**Low Inertia**	: No		
Efficiency (%)	: 0.85	**LRkVA Factor**	: 6.7		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H		
Load Factor	: 80.0				

1HP motor (X7) PRIORITY 3 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	:	0.82	**Starting kW**	:	8.97	**Peak kW**	: None
Running kVA	:	1.17	**Starting kVA**	:	11.8	**Peak kVA**	: None
Running PF	:	0.7	**Starting PF**	:	0.76	**Cyclic**	: No
Running Amps	:	1.47	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.82				**Voltage**	: 460

Shaft Hp	:	1.0	**Method**	:	Across the line
Shaft kW	:	0.75	**Low Inertia**	:	No
Efficiency (%)	:	0.73	**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N
Load Factor	:	80.0			

Step10

Calculated Individual Generator Set Step Load Requirements

Running kW	:	44.0	**Starting kW**	:	200.0	**Cumulative Step kW**	: 1246.0
Running kVA	:	50.0	**Starting kVA**	:	390.0	**Cumulative Step kVA**	: 1582.0
Running Amps	:	4.0	**Starting Non-linear kVA**	:	4.0		
Running Non-linear kVA	:	3.0					
Alternator kW	:	46.8					
Voltage Distortion Limit for	**: step**	10					

30HP load (X2) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	20.34	**Starting kW**	:	74.34	**Peak kW**	: None
Running kVA	:	22.85	**Starting kVA**	:	177.0	**Peak kVA**	: None
Running PF	:	0.89	**Starting PF**	:	0.42	**Cyclic**	: No
Running Amps	:	28.71	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	20.34				**Voltage**	: 460

Shaft Hp	:	30.0	**Method**	:	Across the line
Shaft kW	:	22.38	**Low Inertia**	:	No
Efficiency (%)	:	0.88	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

5HP load (X4) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.25	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 460

Shaft Hp	:	5.0	**Method**	:	Across the line
Shaft kW	:	3.73	**Low Inertia**	:	No
Efficiency (%)	:	0.84	**LRkVA Factor**	:	7.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	J
Load Factor	:	80.0			

3HP load (X18) PRIORITY 3 VFD Three Phase Quantity : 3 In this Step

Category : Motor

Running kW	:	1.99	**Starting kW**	:	2.49	**Peak kW**	: None
Running kVA	:	2.21	**Starting kVA**	:	2.77	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	2.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0

Running NLL kVA	: 2.21				
Starting NLL kVA	: 2.77			**Voltage**	: 460
Alternator kW	: 3.98				
Shaft Hp	: 3.0	**Type**	: Variable Frequency Drive		
Shaft kW	: 2.24	**Ramp Details**	: None		
Rectifier Type	: 6 pulse	**THDI %**	: 26		
Efficiency (%)	: 0.9	**THDV %**	: 10		
Load Factor	: 80.0				

1.5HP Loads (X2) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 1.16	**Starting kW**	: 10.26	**Peak kW**	: None
Running kVA	: 1.53	**Starting kVA**	: 14.25	**Peak kVA**	: None
Running PF	: 0.76	**Starting PF**	: 0.72	**Cyclic**	: No
Running Amps	: 1.92	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 1.16			**Voltage**	: 460
Shaft Hp	: 1.5	**Method**	: Across the line		
Shaft kW	: 1.12	**Low Inertia**	: No		
Efficiency (%)	: 0.77	**LRkVA Factor**	: 9.5		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: L		
Load Factor	: 80.0				

7.5HP load (X12) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 5.26	**Starting kW**	: 28.14	**Peak kW**	: None
Running kVA	: 6.05	**Starting kVA**	: 50.25	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.56	**Cyclic**	: No
Running Amps	: 7.6	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 5.26			**Voltage**	: 460
Shaft Hp	: 7.5	**Method**	: Across the line		
Shaft kW	: 5.59	**Low Inertia**	: No		
Efficiency (%)	: 0.85	**LRkVA Factor**	: 6.7		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H		
Load Factor	: 80.0				

15HP load (X2) PRIORITY 3 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	: 6.25	**Starting kW**	: 32.56	**Peak kW**	: None
Running kVA	: 7.18	**Starting kVA**	: 60.3	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.54	**Cyclic**	: No
Running Amps	: 9.02	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.25			**Voltage**	: 460
Shaft Hp	: 9.0	**Method**	: Across the line		
Shaft kW	: 6.71	**Low Inertia**	: No		
Efficiency (%)	: 0.86	**LRkVA Factor**	: 6.7		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H		
Load Factor	: 80.0				

1HP motor (X7) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 0.82	**Starting kW**	: 8.97	**Peak kW**	: None
Running kVA	: 1.17	**Starting kVA**	: 11.8	**Peak kVA**	: None
Running PF	: 0.7	**Starting PF**	: 0.76	**Cyclic**	: No

Running Amps	:	1.47	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.82				**Voltage**	: 460

Shaft Hp	: 1.0		**Method**	:	Across the line
Shaft kW	: 0.75		**Low Inertia**	:	No
Efficiency (%)	: 0.73		**LRkVA Factor**	:	11.8
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	N
Load Factor	: 80.0				

3hp Motors Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.34	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 460

Shaft Hp	: 3.0		**Method**	:	Across the line
Shaft kW	: 2.24		**Low Inertia**	:	No
Efficiency (%)	: 0.82		**LRkVA Factor**	:	8.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	K
Load Factor	: 80.0				

Step11

Calculated Individual Generator Set Step Load Requirements

Running kW	:	20.0	**Starting kW**	:	64.0	**Cumulative Step kW**	: 1154.0
Running kVA	:	22.0	**Starting kVA**	:	177.0	**Cumulative Step kVA**	: 1419.0
Running Amps	:	2.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	19.89					
Voltage Distortion Limit for	**: step**	10					

60HP load (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	127.44	**Peak kW**	: None
Running kVA	:	44.2	**Starting kVA**	:	354.0	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.36	**Cyclic**	: No
Running Amps	:	55.54	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	39.78				**Voltage**	: 460

Shaft Hp	: 60.0		**Method**	:	Across the line
Shaft kW	: 44.76		**Low Inertia**	:	No
Efficiency (%)	: 0.9		**LRkVA Factor**	:	5.9
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	G
Load Factor	: 80.0				

Step12

Calculated Individual Generator Set Step Load Requirements

Running kW	:	12.0	**Starting kW**	:	53.0	**Cumulative Step kW**	: 1163.0
Running kVA	:	14.0	**Starting kVA**	:	108.0	**Cumulative Step kVA**	: 1373.0
Running Amps	:	1.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	11.86					
Voltage Distortion Limit for	**: step**	10					

2HP motors (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.51	**Starting kW**	:	13.3	**Peak kW**	: None
Running kVA	:	1.91	**Starting kVA**	:	19.0	**Peak kVA**	: None
Running PF	:	0.79	**Starting PF**	:	0.7	**Cyclic**	: No
Running Amps	:	2.4	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.51				**Voltage**	: 460

Shaft Hp	: 2.0		**Method**	: Across the line	
Shaft kW	: 1.49		**Low Inertia**	: No	
Efficiency (%)	: 0.79		**LRkVA Factor**	: 9.5	**Design** : Standard NEMA Design B,C or D
LRkVA Code	: L	**Load Factor** : 80.0			

25HP load (X7) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	16.95	**Starting kW**	:	64.9	**Peak kW**	: None
Running kVA	:	19.04	**Starting kVA**	:	147.5	**Peak kVA**	: None
Running PF	:	0.89	**Starting PF**	:	0.44	**Cyclic**	: No
Running Amps	:	23.93	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	16.95				**Voltage**	: 460

Shaft Hp	: 25.0		**Method**	: Across the line	
Shaft kW	: 18.65		**Low Inertia**	: No	
Efficiency (%)	: 0.88		**LRkVA Factor**	: 5.9	
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	: G	
Load Factor	: 80.0				

7.5HP load (X12) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	5.26	**Starting kW**	:	28.14	**Peak kW**	: None
Running kVA	:	6.05	**Starting kVA**	:	50.25	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	: No
Running Amps	:	7.6	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.26				**Voltage**	: 460

Shaft Hp	: 7.5		**Method**	: Across the line	
Shaft kW	: 5.59		**Low Inertia**	: No	
Efficiency (%)	: 0.85		**LRkVA Factor**	: 6.7	
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	: H	
Load Factor	: 80.0				

Step13

Calculated Individual Generator Set Step Load Requirements

Running kW	:	16.0	**Starting kW**	:	80.0	**Cumulative Step kW**	: 1202.0
Running kVA	:	18.0	**Starting kVA**	:	142.0	**Cumulative Step kVA**	: 1420.0
Running Amps	:	2.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	15.73					
Voltage Distortion Limit for	**: step**	10					

LOAD-CDR-8103 STEP 13 PRI 1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.32	**Starting kW**	:	9.96	**Peak kW**	: None
Running kVA	:	4.15	**Starting kVA**	:	12.46	**Peak kVA**	: None

Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	5.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.32				**Voltage**	: 480

LOAD-PNL-8075 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	0.25	**Starting kW**	:	0.75	**Peak kW**	: None
Running kVA	:	0.31	**Starting kVA**	:	0.94	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	0.38	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.25				**Voltage**	: 480

15HP load (X2) PRIORITY 3 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	:	6.25	**Starting kW**	:	32.56	**Peak kW**	: None
Running kVA	:	7.18	**Starting kVA**	:	60.3	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.54	**Cyclic**	: No
Running Amps	:	9.02	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.25				**Voltage**	: 460

Shaft Hp	: 9.0	**Method**	:	Across the line	
Shaft kW	: 6.71	**Low Inertia**	:	No	
Efficiency (%)	: 0.86	**LRkVA Factor**	:	6.7	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	H	
Load Factor	: 80.0				

4HP load PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.88	**Starting kW**	:	18.9	**Peak kW**	: None
Running kVA	:	3.43	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.84	**Starting PF**	:	0.63	**Cyclic**	: No
Running Amps	:	4.31	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.88				**Voltage**	: 460

Shaft Hp	: 4.0	**Method**	:	Across the line	
Shaft kW	: 2.98	**Low Inertia**	:	No	
Efficiency (%)	: 0.83	**LRkVA Factor**	:	7.5	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	J	
Load Factor	: 80.0				

Step14

Calculated Individual Generator Set Step Load Requirements

Running kW	:	54.0	**Starting kW**	:	204.0	**Cumulative Step kW**	: 1341.0
Running kVA	:	61.0	**Starting kVA**	:	463.0	**Cumulative Step kVA**	: 1759.0
Running Amps	:	5.0	**Starting Non-linear kVA**	:	4.0		
Running Non-linear kVA	:	3.0					
Alternator kW	:	56.96					
Voltage Distortion Limit for	**: step**	10					

30HP load (X2) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	20.34	**Starting kW**	:	74.34	**Peak kW**	: None
Running kVA	:	22.85	**Starting kVA**	:	177.0	**Peak kVA**	: None
Running PF	:	0.89	**Starting PF**	:	0.42	**Cyclic**	: No
Running Amps	:	28.71	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	20.34				**Voltage**	: 460

Shaft Hp	30.0	**Method**	Across the line		
Shaft kW	22.38	**Low Inertia**	No		
Efficiency (%)	0.88	**LRkVA Factor**	5.9		
Design	Standard NEMA Design B,C or D	**LRkVA Code**	G		
Load Factor	80.0				

10Hp load (X4) PRIORITY 3 Three Phase Quantity : 4 In this Step
Category : Motor

Running kW	6.94	**Starting kW**	35.51	**Peak kW**	None
Running kVA	7.98	**Starting kVA**	67.0	**Peak kVA**	None
Running PF	0.87	**Starting PF**	0.53	**Cyclic**	No
Running Amps	10.03	**Max. % Voltage Dip**	30.0	**Max. % Frequency Dip**	10.0
Alternator kW	6.94			**Voltage**	460

Shaft Hp	10.0	**Method**	Across the line		
Shaft kW	7.46	**Low Inertia**	No		
Efficiency (%)	0.86	**LRkVA Factor**	6.7		
Design	Standard NEMA Design B,C or D	**LRkVA Code**	H		
Load Factor	80.0				

3HP load (X18) PRIORITY 3 VFD Three Phase Quantity : 3 In this Step
Category : Motor

Running kW	1.99	**Starting kW**	2.49	**Peak kW**	None
Running kVA	2.21	**Starting kVA**	2.77	**Peak kVA**	None
Running PF	0.9	**Starting PF**	0.9	**Cyclic**	No
Running Amps	2.78	**Max. % Voltage Dip**	30.0	**Max. % Frequency Dip**	10.0
Running NLL kVA	2.21				
Starting NLL kVA	2.77			**Voltage**	460
Alternator kW	3.98				

Shaft Hp	3.0	**Type**	Variable Frequency Drive
Shaft kW	2.24	**Ramp Details**	None
Rectifier Type	6 pulse	**THDI %**	26
Efficiency (%)	0.9	**THDV %**	10
Load Factor	80.0		

50HP load (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	33.53	**Starting kW**	109.15	**Peak kW**	None
Running kVA	37.26	**Starting kVA**	295.0	**Peak kVA**	None
Running PF	0.9	**Starting PF**	0.37	**Cyclic**	No
Running Amps	46.82	**Max. % Voltage Dip**	30.0	**Max. % Frequency Dip**	10.0
Alternator kW	33.53			**Voltage**	460

Shaft Hp	50.0	**Method**	Across the line		
Shaft kW	37.3	**Low Inertia**	No		
Efficiency (%)	0.89	**LRkVA Factor**	5.9		
Design	Standard NEMA Design B,C or D	**LRkVA Code**	G		
Load Factor	80.0				

Step15

Calculated Individual Generator Set Step Load Requirements

Running kW	150.0	**Starting kW**	225.0	**Cumulative Step kW**	1417.0
Running kVA	170.0	**Starting kVA**	342.0	**Cumulative Step kVA**	1699.0
Running Amps	14.0	**Starting Non-linear kVA**	188.0		
Running Non-linear kVA	151.0				

Alternator kW	: 282.42				
Voltage Distortion Limit for	**: step** 10				

50HP load (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 33.53	**Starting kW**	: 109.15	**Peak kW**	: None
Running kVA	: 37.26	**Starting kVA**	: 295.0	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.37	**Cyclic**	: No
Running Amps	: 46.82	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 33.53			**Voltage**	: 460

Shaft Hp : 50.0		**Method** :	Across the line
Shaft kW : 37.3		**Low Inertia** :	No
Efficiency (%) : 0.89		**LRkVA Factor** :	5.9
Design : Standard NEMA Design B,C or D		**LRkVA Code** :	G
Load Factor : 80.0			

1HP motor (X7) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.82	**Starting kW**	: 8.97	**Peak kW**	: None
Running kVA	: 1.17	**Starting kVA**	: 11.8	**Peak kVA**	: None
Running PF	: 0.7	**Starting PF**	: 0.76	**Cyclic**	: No
Running Amps	: 1.47	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.82			**Voltage**	: 460

Shaft Hp : 1.0		**Method** :	Across the line
Shaft kW : 0.75		**Low Inertia** :	No
Efficiency (%) : 0.73		**LRkVA Factor** :	11.8
Design : Standard NEMA Design B,C or D		**LRkVA Code** :	N
Load Factor : 80.0			

200Hp load (X2) PRIORITY 2 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 132.62	**Starting kW**	: 165.78	**Peak kW**	: None
Running kVA	: 150.7	**Starting kVA**	: 188.39	**Peak kVA**	: None
Running PF	: 0.88	**Starting PF**	: 0.88	**Cyclic**	: No
Running Amps	: 189.37	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 150.7				
Starting NLL kVA	: 188.39			**Voltage**	: 460
Alternator kW	: 265.24				

Shaft Hp : 200.0		**Type** :	Variable Frequency Drive
Shaft kW : 149.2		**Ramp Details** :	None
Rectifier Type : 6 pulse		**THDI %** :	26
Efficiency (%) : 0.9		**THDV %** :	10
Load Factor : 80.0			

Step16

Calculated Individual Generator Set Step Load Requirements

Running kW	: 28.0	**Starting kW**	: 114.0	**Cumulative Step kW**	: 1456.0
Running kVA	: 32.0	**Starting kVA**	: 253.0	**Cumulative Step kVA**	: 1780.0
Running Amps	: 3.0	**Starting Non-linear kVA**	: 1.0		
Running Non-linear kVA	: 1.0				
Alternator kW	: 29.25				
Voltage Distortion Limit for	**: step** 10				

3HP load (X18) PRIORITY 3 VFD Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 1.99	**Starting kW**	: 2.49	**Peak kW**	: None
Running kVA	: 2.21	**Starting kVA**	: 2.77	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 2.78	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 2.21				
Starting NLL kVA	: 2.77			**Voltage**	: 460
Alternator kW	: 3.98				

Shaft Hp : 3.0	**Type** : Variable Frequency Drive
Shaft kW : 2.24	**Ramp Details** : None
Rectifier Type : 6 pulse	**THDI %** : 26
Efficiency (%) : 0.9	**THDV %** : 10
Load Factor : 80.0	

10Hp load (X4) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 6.94	**Starting kW**	: 35.51	**Peak kW**	: None
Running kVA	: 7.98	**Starting kVA**	: 67.0	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.53	**Cyclic**	: No
Running Amps	: 10.03	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.94			**Voltage**	: 460

Shaft Hp : 10.0	**Method** : Across the line
Shaft kW : 7.46	**Low Inertia** : No
Efficiency (%) : 0.86	**LRkVA Factor** : 6.7
Design : Standard NEMA Design B,C or D	**LRkVA Code** : H
Load Factor : 80.0	

50HP load (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 33.53	**Starting kW**	: 109.15	**Peak kW**	: None
Running kVA	: 37.26	**Starting kVA**	: 295.0	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.37	**Cyclic**	: No
Running Amps	: 46.82	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 33.53			**Voltage**	: 460

Shaft Hp : 50.0	**Method** : Across the line
Shaft kW : 37.3	**Low Inertia** : No
Efficiency (%) : 0.89	**LRkVA Factor** : 5.9
Design : Standard NEMA Design B,C or D	**LRkVA Code** : G
Load Factor : 80.0	

5HP load (X4) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.25	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 460

Shaft Hp : 5.0	**Method** : Across the line
Shaft kW : 3.73	**Low Inertia** : No
Efficiency (%) : 0.84	**LRkVA Factor** : 7.5
Design : Standard NEMA Design B,C or D	**LRkVA Code** : J
Load Factor : 80.0	

Step17

Calculated Individual Generator Set Step Load Requirements

Running kW :	8.0	**Starting kW** :	35.0	**Cumulative Step kW** :	1405.0
Running kVA :	9.0	**Starting kVA** :	63.0	**Cumulative Step kVA** :	1622.0
Running Amps :	1.0	**Starting Non-linear kVA** :	3.0		
Running Non-linear kVA :	2.0				
Alternator kW :	10.23				
Voltage Distortion Limit for : step	10				

3HP load (X18) PRIORITY 3 VFD Three Phase Quantity : 2 In this Step

Category : Motor

Running kW :	1.99	**Starting kW** :	2.49	**Peak kW** :	None
Running kVA :	2.21	**Starting kVA** :	2.77	**Peak kVA** :	None
Running PF :	0.9	**Starting PF** :	0.9	**Cyclic** :	No
Running Amps :	2.78	**Max. % Voltage Dip** :	30.0	**Max. % Frequency Dip** :	10.0
Running NLL kVA :	2.21				
Starting NLL kVA :	2.77			**Voltage** :	460
Alternator kW :	3.98				

Shaft Hp :	3.0	**Type** :	Variable Frequency Drive
Shaft kW :	2.24	**Ramp Details** :	None
Rectifier Type :	6 pulse	**THDI %** :	26
Efficiency (%) :	0.9	**THDV %** :	10
Load Factor :	80.0		

15HP load (X2) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW :	6.25	**Starting kW** :	32.56	**Peak kW** :	None
Running kVA :	7.18	**Starting kVA** :	60.3	**Peak kVA** :	None
Running PF :	0.87	**Starting PF** :	0.54	**Cyclic** :	No
Running Amps :	9.02	**Max. % Voltage Dip** :	30.0	**Max. % Frequency Dip** :	10.0
Alternator kW :	6.25			**Voltage** :	460

Shaft Hp :	9.0	**Method** :	Across the line
Shaft kW :	6.71	**Low Inertia** :	No
Efficiency (%) :	0.86	**LRkVA Factor** :	6.7
Design :	Standard NEMA Design B,C or D	**LRkVA Code** :	H
Load Factor :	80.0		

Step18

Calculated Individual Generator Set Step Load Requirements

Running kW :	12.0	**Starting kW** :	49.0	**Cumulative Step kW** :	1427.0
Running kVA :	13.0	**Starting kVA** :	104.0	**Cumulative Step kVA** :	1672.0
Running Amps :	1.0	**Starting Non-linear kVA** :	0.0		
Running Non-linear kVA :	0.0				
Alternator kW :	11.6				
Voltage Distortion Limit for : step	10				

25HP load (X7) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW :	16.95	**Starting kW** :	64.9	**Peak kW** :	None
Running kVA :	19.04	**Starting kVA** :	147.5	**Peak kVA** :	None
Running PF :	0.89	**Starting PF** :	0.44	**Cyclic** :	No
Running Amps :	23.93	**Max. % Voltage Dip** :	30.0	**Max. % Frequency Dip** :	10.0
Alternator kW :	16.95			**Voltage** :	460

Shaft Hp	: 25.0	**Method**	: Across the line		
Shaft kW	: 18.65	**Low Inertia**	: No		
Efficiency (%)	: 0.88	**LRkVA Factor**	: 5.9		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G		
Load Factor	: 80.0				

15HP load (X2) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 6.25	**Starting kW**	: 32.56	**Peak kW**	: None
Running kVA	: 7.18	**Starting kVA**	: 60.3	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.54	**Cyclic**	: No
Running Amps	: 9.02	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.25			**Voltage**	: 460

Shaft Hp	: 9.0	**Method**	: Across the line
Shaft kW	: 6.71	**Low Inertia**	: No
Efficiency (%)	: 0.86	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H
Load Factor	: 80.0		

Step19

Calculated Individual Generator Set Step Load Requirements

Running kW	: 27.0	**Starting kW**	: 114.0	**Cumulative Step kW**	: 1504.0
Running kVA	: 30.0	**Starting kVA**	: 240.0	**Cumulative Step kVA**	: 1821.0
Running Amps	: 3.0	**Starting Non-linear kVA**	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 26.52				
Voltage Distortion Limit for	**: step** 10				

25HP load (X7) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 16.95	**Starting kW**	: 64.9	**Peak kW**	: None
Running kVA	: 19.04	**Starting kVA**	: 147.5	**Peak kVA**	: None
Running PF	: 0.89	**Starting PF**	: 0.44	**Cyclic**	: No
Running Amps	: 23.93	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 16.95			**Voltage**	: 460

Shaft Hp	: 25.0	**Method**	: Across the line
Shaft kW	: 18.65	**Low Inertia**	: No
Efficiency (%)	: 0.88	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

10Hp load (X4) PRIORITY 3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 6.94	**Starting kW**	: 35.51	**Peak kW**	: None
Running kVA	: 7.98	**Starting kVA**	: 67.0	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.53	**Cyclic**	: No
Running Amps	: 10.03	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.94			**Voltage**	: 460

Shaft Hp	: 10.0	**Method**	: Across the line
Shaft kW	: 7.46	**Low Inertia**	: No
Efficiency (%)	: 0.86	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H
Load Factor	: 80.0		

7.5HP load (X12) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	5.26	**Starting kW**	:	28.14	**Peak kW**	: None
Running kVA	:	6.05	**Starting kVA**	:	50.25	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	: No
Running Amps	:	7.6	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.26				**Voltage**	: 460

Shaft Hp	:	7.5	**Method**	:	Across the line
Shaft kW	:	5.59	**Low Inertia**	:	No
Efficiency (%)	:	0.85	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

Step20

Calculated Individual Generator Set Step Load Requirements

Running kW	:	54.0	**Starting kW**	:	212.0	**Cumulative Step kW**	: 1628.0
Running kVA	:	61.0	**Starting kVA**	:	489.0	**Cumulative Step kVA**	: 2101.0
Running Amps	:	5.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	54.03					
Voltage Distortion Limit for	**: step**	10					

10Hp load (X4) PRIORITY 3 Three Phase Quantity : 3 In this Step

Category : Motor

Running kW	:	6.94	**Starting kW**	:	35.51	**Peak kW**	: None
Running kVA	:	7.98	**Starting kVA**	:	67.0	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.53	**Cyclic**	: No
Running Amps	:	10.03	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.94				**Voltage**	: 460

Shaft Hp	:	10.0	**Method**	:	Across the line
Shaft kW	:	7.46	**Low Inertia**	:	No
Efficiency (%)	:	0.86	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

7.5HP load (X12) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	5.26	**Starting kW**	:	28.14	**Peak kW**	: None
Running kVA	:	6.05	**Starting kVA**	:	50.25	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	: No
Running Amps	:	7.6	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.26				**Voltage**	: 460

Shaft Hp	:	7.5	**Method**	:	Across the line
Shaft kW	:	5.59	**Low Inertia**	:	No
Efficiency (%)	:	0.85	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

2HP motors (X1) PRIORITY 3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.51	**Starting kW**	:	13.3	**Peak kW**	: None
Running kVA	:	1.91	**Starting kVA**	:	19.0	**Peak kVA**	: None
Running PF	:	0.79	**Starting PF**	:	0.7	**Cyclic**	: No

Running Amps	:	2.4	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.51				**Voltage**	: 460

Shaft Hp	:	2.0	**Method**	:	Across the line
Shaft kW	:	1.49	**Low Inertia**	:	No
Efficiency (%)	:	0.79	**LRkVA Factor**	:	9.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	L
Load Factor	:	80.0			

40HP LOAD (X3) PRIORITY 2 Three Phase Quantity : 3 In this Step

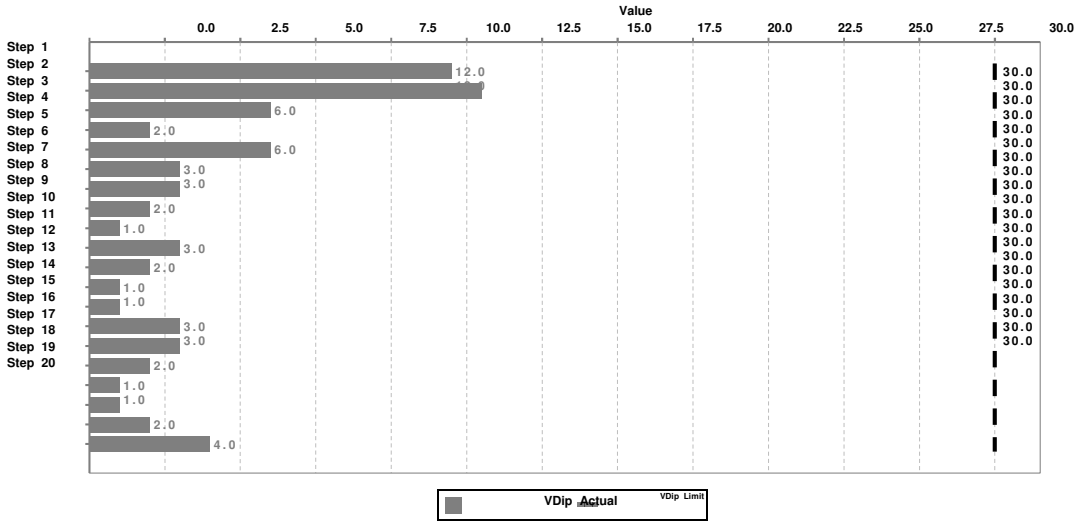
Category : Motor

Running kW	:	26.82	**Starting kW**	:	92.04	**Peak kW**	: None
Running kVA	:	29.8	**Starting kVA**	:	236.0	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.39	**Cyclic**	: No
Running Amps	:	37.45	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	26.82				**Voltage**	: 460

Shaft Hp	:	40.0	**Method**	:	Across the line
Shaft kW	:	29.84	**Low Inertia**	:	No
Efficiency (%)	:	0.89	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

Step Level Dips Summary

Step #	Voltage Dip Limit (%)	Expected Step Voltage Dip (%)	Voltage Recovery Time (s) **	Frequency Dip Limit (%)	Expected Frequency Dip (%)	Frequency recovery Time (s) **
1	30	12	2.1	10	4	2.1
2	30	13	0.8	10	2	0.9
3	30	6	0.9	10	2	1.0
4	30	2	0.2	10	1	0.2
5	30	6	0.8	10	2	1.0
6	30	3	0.4	10	1	0.5
7	30	3	0.4	10	1	0.5
8	30	2	0.3	10	1	0.3
9	30	1	0.2	10	1	0.3
10	30	3	0.5	10	1	0.6
11	30	2	0.2	10	1	0.2
12	30	1	0.1	10	1	0.2
13	30	1	0.2	10	1	0.2
14	30	3	0.5	10	1	0.6
15	30	3	0.6	10	1	0.7
16	30	2	0.3	10	1	0.3
17	30	1	0.1	10	1	0.1
18	30	1	0.1	10	1	0.1
19	30	2	0.3	10	1	0.4
20	30	4	0.6	10	1	0.6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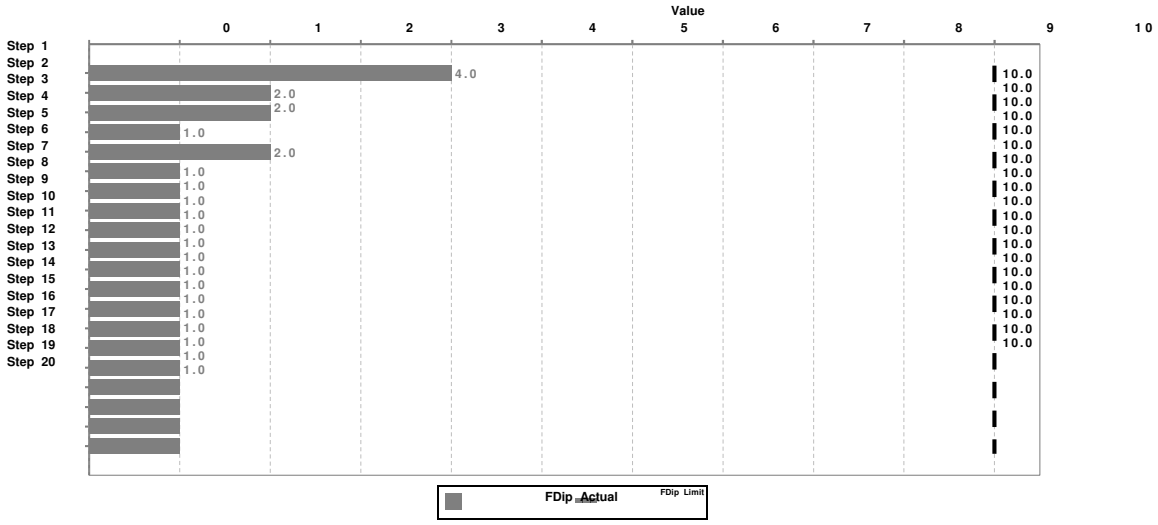
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
25.0
27.5
30.0
Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 8
Step 9
Step 10
Step 11
Step 12
Step 13
Step 14
Step 15
Step 16
Step 17
Step 18
Step 19
Step 20
12.0
6.0
2.0
6.0
3.0
3.0
2.0
1.0
3.0
2.0
1.0
1.0
3.0
3.0
2.0
1.0
1.0
2.0
4.0
30.0
VDip Actual
VDip Limit

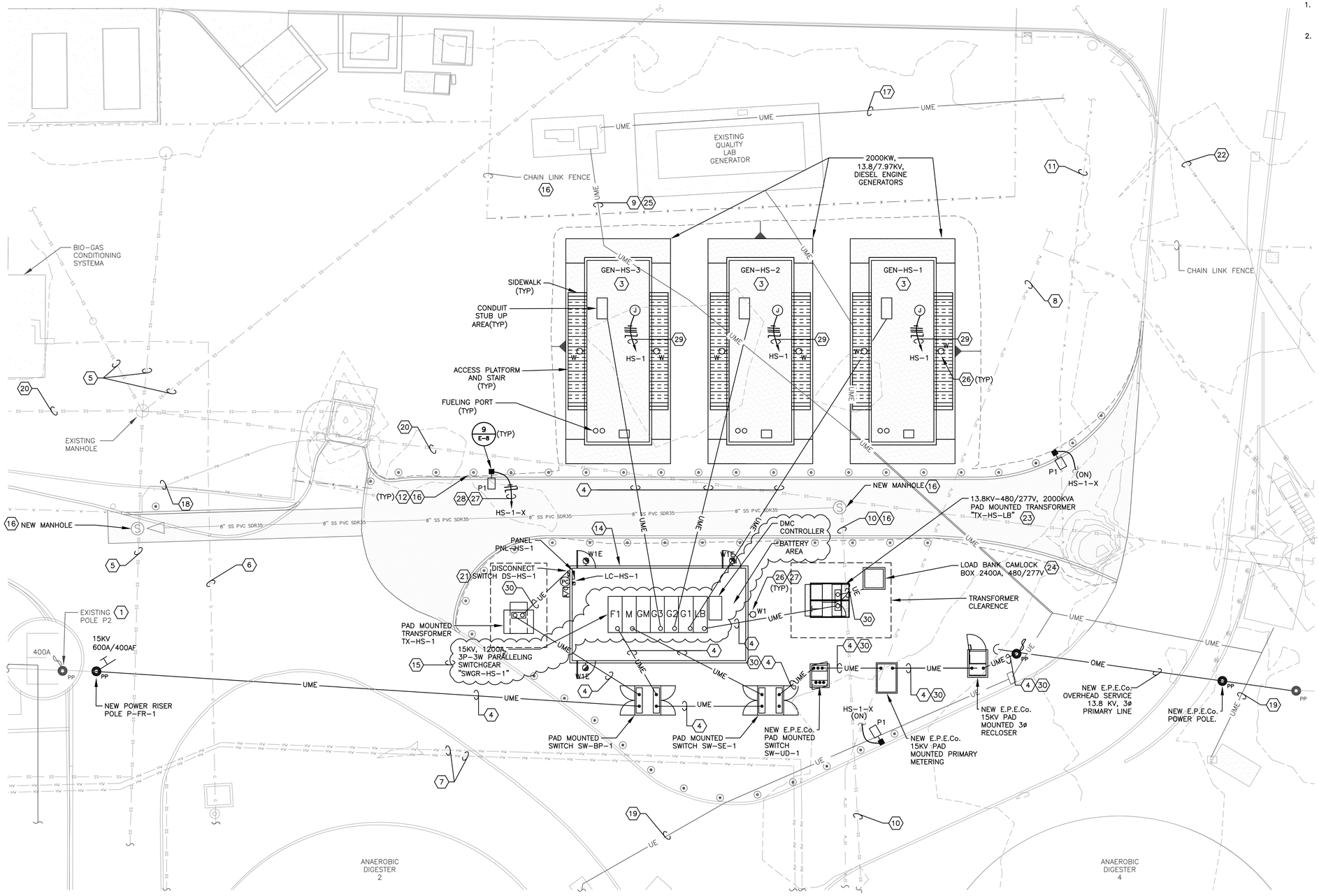

Value
0
1
2
3
4
5
6
7
8
9
10
Step 1
Step 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 8
Step 9
Step 10
Step 11
Step 12
Step 13
Step 14
Step 15
Step 16
Step 17
Step 18
Step 19
Step 20
4.0
2.0
2.0
1.0
2.0
1.0
10.0
FDip Actual
FDip Limit

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.
2. CONDUIT ROUTING IS SHOWN DIAGRAMMATICALLY. CONTRACTOR SHALL ROUTE IN THE MOST DIRECT WAY ALLOWED BY FIELD CONDITIONS AND AS REQUIRED BY EQUIPMENT LAYOUT. NOT ALL REQUIRED CONDUITS AND RACEWAYS ARE SHOWN. REFER TO ADDITIONAL DRAWINGS, CONTRACTOR SHALL FURNISH AND INSTALL ALL CONDUITS AND RACEWAYS AS REQUIRED FOR COMPLETE AND FUNCTIONAL SYSTEMS.
3. CONTRACTOR SHALL FIELD VERIFY ALL UNDERGROUND OBSTRUCTIONS BEFORE EXCAVATION BEGINS.
4. ALL SPARE CONDUITS SHALL BE CAPPED, SEALED AND MARKED AT BOTH ENDS TO PREVENT WATER AND DEBRIS FROM ENTERING THE RACEWAYS.
5. CONTRACTOR SHALL PROVIDE NEW MEDIUM VOLTAGE DISTRIBUTION HARDWARE REQUIRED FOR A FUNCTIONAL AND OPERATION SYSTEM.

KEYED NOTES (THIS SHEET ONLY)

1. EXISTING POLES AND OVERHEAD CONDUCTORS TO REMAIN.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE PRIMARY POWER POLE AND RISER. PROVIDE ALL REQUIRED OVERHEAD POWER DISTRIBUTION HARDWARE. SEE POLE DETAILS FOR ADDITIONAL INFORMATION.
3. NEW 2000KW, 13.8KV, 3P–3W, DIESEL ENGINE GENERATORS, SHALL BE EXERCISED MONTHLY WITH THE PLANT LOADS AND SHALL BE EXERCISED ANNUALLY WITH NOT LESS THAN 1000KW OF THE PLANT LOADS FOR 30 MINUTES AND WITH NOT LESS THAN 1500KW OF THE PLANT LOADS FOR 1 CONTINUOUS HOUR, PER INDICATIONS ON NFPA–110 CHAPTER 8.
4. CONCRETE ENCASED FEEDER. REFER TO ONE LINE DIAGRAMS AND TO DETAILS FOR REQUIREMENTS.
5. EXISTING UNDERGROUND SANITARY SEWER LINE. PER H20 TERRA SUE SURVEY REPORT.
6. EXISTING UNDERGROUND GAS LINE. PER H20 TERRA SUE SURVEY REPORT.
7. EXISTING UNDERGROUND HOT WATER LINE. PER H20 TERRA SUE SURVEY REPORT.
8. EXISTING 12" UNDERGROUND WATER LINE. PER H20 TERRA SUE SURVEY REPORT.
9. EXISTING CONCRETE ENCASED 3" PVC ELECTRICAL LINE. PER H20 TERRA SUE REPORT.
10. EXISTING 8" SANITARY SEWER LINE. PER H20 TERRA SUE SURVEY REPORT.
11. EXISTING 2" IRRIGATION LINE. PER H20 TERRA SUE SURVEY REPORT.
12. FURNISH AND INSTALL BOLLARDS AS INDICATED.
13. NEW 3–37.5 KVA, 1P–3W, 7.96KV–480/277V, POLE MOUNTED TRANSFORMERS.
14. REFER TO SHEET E–10 DETAIL 1.
15. GMP 1 EARLY EQUIPMENT PACKAGE.
16. REFER TO CIVIL DRAWINGS FOR WORK REQUIREMENTS.
17. EXISTING PRIMARY EPECO UNDERGROUND ELECTRIC LINE. PER H2O TERRA SUE REPORT.
18. EXISTING 1" UNDERGROUND WATER LINE. PER H20 TERRA SUE SURVEY REPORT.
19. EXISTING 3" PVC ELECTRICAL LINE PER H20 TERRA SUE REPORT.
20. EXISTING 36" RCP LINE PER H20 TERRA SUE REPORT.
21. NEW HEAVY DUTY DISCONNECT SWITCH 400A/300AF, 3P–4W, 600V IN NEMA 4X ENCLOSURE.
22. EXISTING 24" UNDERGROUND WATER LINE. PER AS–BUILT DRAWINGS.
23. NEW 2000KVA PAD MOUNTED TRANSFORMER 13.8KV/480–277V, 3P–4W.
24. 2400A, 480V, 3P–4W, LOAD BANK TAP BOX IN NEMA 4X STAINLESS STEEL ENCLOSURE.
25. APPROXIMATE LOCATION OF EXISTING UNDERGROUND ELECTRICAL LINE THAT COULD NOT BE VERIFIED DURING SITE VISITS. CONTRACTOR SHALL COORDINATE WITH EPW SUPERINTEND AND EPECO, TO IDENTIFY, SPOT AND RELOCATE AS REQUIRED.
26. LIGHT FIXTURE TO BE PROVIDED, WIRED AND CONNECTED WITH PREFABRICATED GENERATOR/E–HOUSE ENCLOSURE.
27. EXTEND TO CIRCUIT INDICATED THROUGH LIGHTING CONTACTOR. REFER TO LIGHTING CONTROL DIAGRAM.
28. FOR POLE LIGHTS, PROVIDE 2#12, 1#12G IN 3/4"C, WITH A 1 POLE, 20AMP CIRCUIT BREAKER.
29. ELECTRICAL FEEDER FOR 120/208V GENERATOR LOAD CENTER. COORDINATE EXACT LOCATION PRIOR TO ROUGH–IN. PROVIDE 4#2, 1#8G IN 1–1/4"C, FED FROM 3P/600A CIRCUIT BREAKER IN PANEL HS–1.
30. REFER TO ONE LINE DIAGRAMS FOR REQUIREMENTS.



N

1 / E–3 PARTIAL ELECTRICAL REVISED SITE PLAN

0 4' 8' 16'

SCALE: 3/32"=1'–0"

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REV.	DATE	BY	DESCRIPTION

DESIGNED: SZ
DRAWN: CAD
CHECKED: JLC
DATE: 06–02–23

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4110 RIO BRAVO SUITE 102
EL PASO, TX 79902
TEL: 915-313-7200

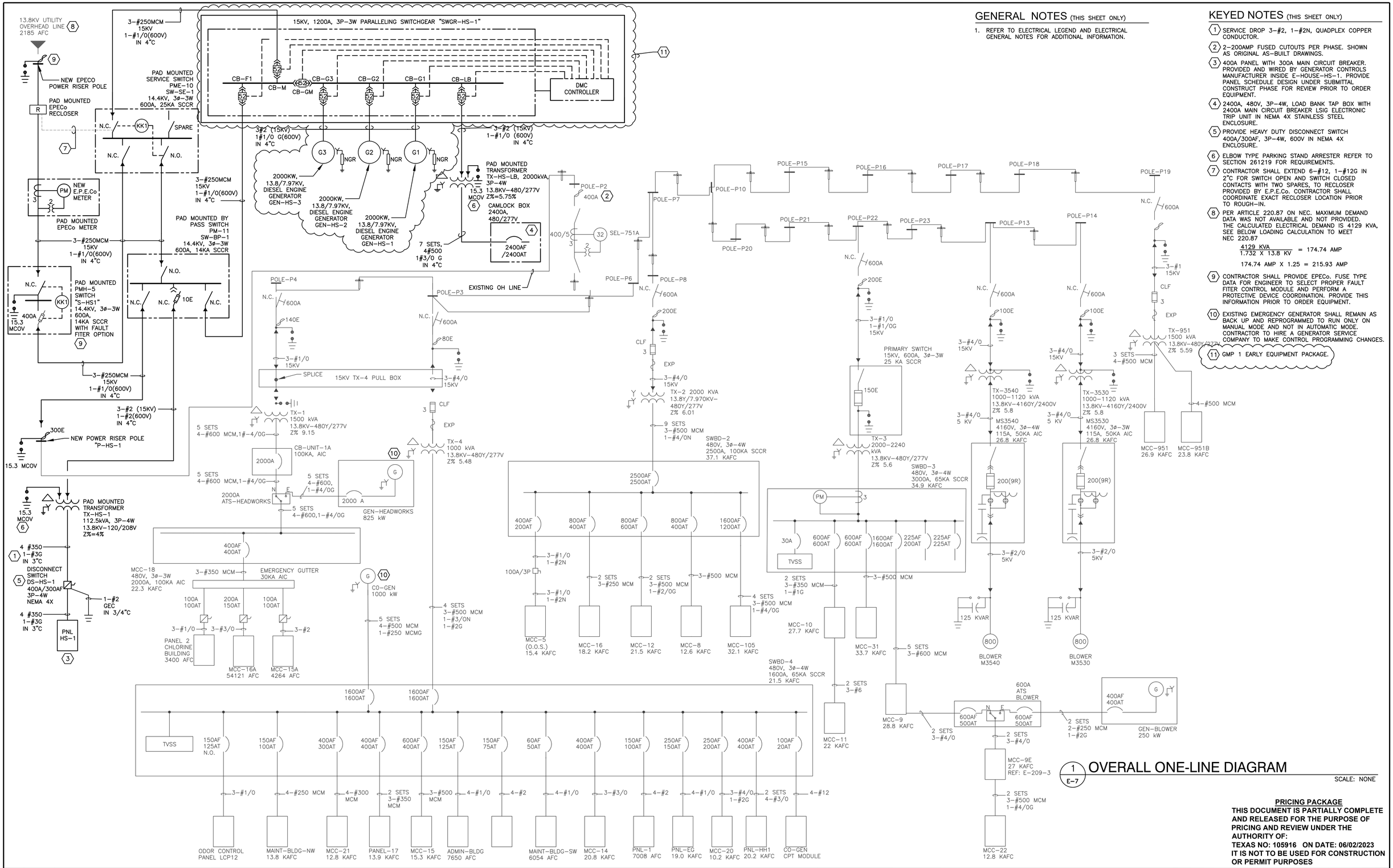
el paso WATER

HASKELL STREET WWTP BACKUP GENERATORS
EL PASO, TX

PARTIAL ELECTRICAL REVISED SITE PLAN

JOB NO. 3977B
DRAWING NO. E–3
SEQUENCE NO. 20 OF 34

J:\3977B EPW Haskell Generators\CAD\3977B EPW Haskell Generators\Sheets\E–3 PARTIAL ELECTRICAL REVISED SITE PLAN.dwg



GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.

KEYED NOTES (THIS SHEET ONLY)

1. SERVICE DROP 3-#2, 1-#2N, QUADPLEX COPPER CONDUCTOR.
2. 2-200AMP FUSED CUTOUTS PER PHASE. SHOWN AS ORIGINAL AS-BUILT DRAWINGS.
3. 400A PANEL WITH 300A MAIN CIRCUIT BREAKER. PROVIDED AND WIRED BY GENERATOR CONTROLS MANUFACTURER INSIDE E-HOUSE-HS-1. PROVIDE PANEL SCHEDULE DESIGN UNDER SUBMITTAL CONSTRUCT PHASE FOR REVIEW PRIOR TO ORDER EQUIPMENT.
4. 2400A, 480V, 3P-4W, LOAD BANK TAP BOX WITH 2400A MAIN CIRCUIT BREAKER LSIG ELECTRONIC TRIP UNIT IN NEMA 4X STAINLESS STEEL ENCLOSURE.
5. PROVIDE HEAVY DUTY DISCONNECT SWITCH 400A/300AF, 3P-4W, 600V IN NEMA 4X ENCLOSURE.
6. ELBOW TYPE PARKING STAND ARRESTER REFER TO SECTION 261219 FOR REQUIREMENTS.
7. CONTRACTOR SHALL EXTEND 6-#12, 1-#12G IN 2"C FOR SWITCH OPEN AND SWITCH CLOSED CONTACTS WITH TWO SPARES, TO RECLOSER PROVIDED BY E.P.E.Co. CONTRACTOR SHALL COORDINATE EXACT RECLOSER LOCATION PRIOR TO ROUGH-IN.
8. PER ARTICLE 220.87 ON NEC. MAXIMUM DEMAND DATA WAS NOT AVAILABLE AND NOT PROVIDED. THE CALCULATED ELECTRICAL DEMAND IS 4129 KVA, SEE BELOW LOADING CALCULATION TO MEET NEC 220.87

   $\frac{4129\ KVA}{1.732 \times 13.8\ KV} = 174.74\ AMP$

   174.74 AMP X 1.25 = 215.93 AMP
9. CONTRACTOR SHALL PROVIDE EPECo. FUSE TYPE DATA FOR ENGINEER TO SELECT PROPER FAULT FITER CONTROL MODULE AND PERFORM A PROTECTIVE DEVICE COORDINATION. PROVIDE THIS INFORMATION PRIOR TO ORDER EQUIPMENT.
10. EXISTING EMERGENCY GENERATOR SHALL REMAIN AS BACK UP AND REPROGRAMMED TO RUN ONLY ON MANUAL MODE AND NOT IN AUTOMATIC MODE. CONTRACTOR TO HIRE A GENERATOR SERVICE COMPANY TO MAKE CONTROL PROGRAMMING CHANGES.
11. GMP 1 EARLY EQUIPMENT PACKAGE.

1 E-7 OVERALL ONE-LINE DIAGRAM

SCALE: NONE

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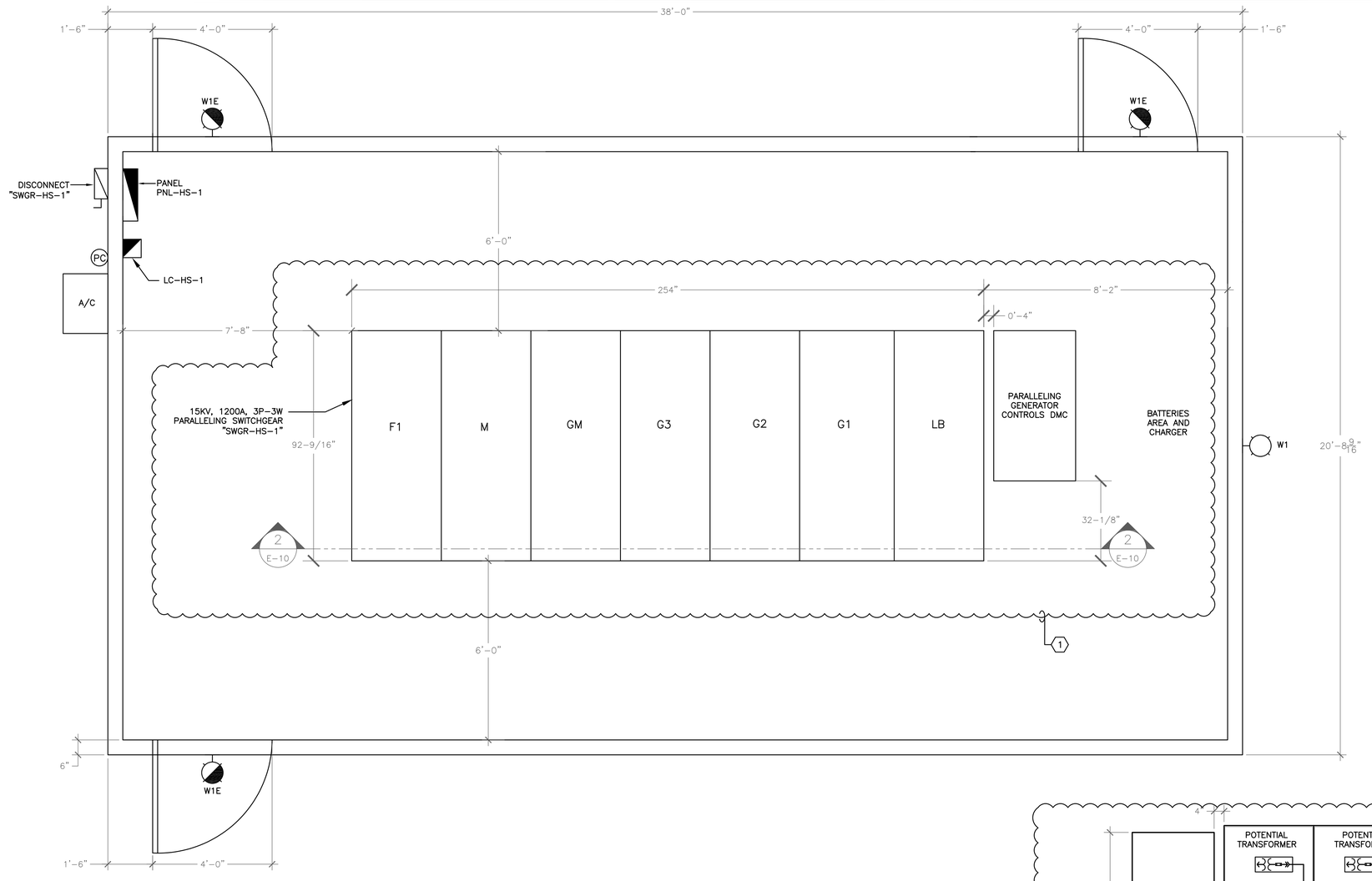
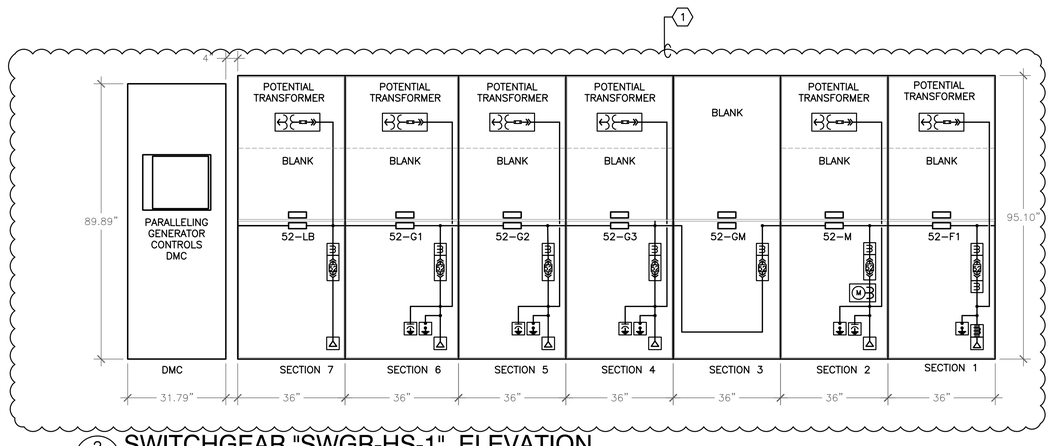
OVERALL ONE-LINE DIAGRAM

JOB NO. 3977B
DRAWING NO. E-7
SEQUENCE NO. 24 OF 34



1 E-10 ENLARGED BUILDING LAYOUT

SCALE: 1/2"=1'-0"



2 E-10 SWITCHGEAR "SWGR-HS-1" ELEVATION

SCALE: NONE

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.

KEYED NOTES (THIS SHEET ONLY)

1. GMP 1 EARLY EQUIPMENT PACKAGE.

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ENLARGED BUILDING LAYOUT AND SWITCHGEAR ELEVATION

JOB NO. 3977B
DRAWING NO. E-10
SEQUENCE NO. 27 OF 34

POWER COMMAND CONTROLS ANSI DEVICE NUMBERS

ANSI DEVICE NUMBERS	ANSI FUNCTION
15	SYNCHRONIZER
25	SYNC CHECK RELAY
27	UNDERVOLTAGE RELAY
32	DIRECTIONAL POWER RELAY (REVERSE KW)
40	LOSS OF FIELD RELAY (REVERSE kVAR) / UNDER EXCITATION (REVERSE kVAR)
46	PHASE BALANCE CURRENT RELAY (NEGATIVE SEQUENCE)
47	PHASE SEQUENCE RELAY
50	INSTANTANEOUS OVERCURRENT RELAY (AMPSENTRY) MAINTENANCE MODE)
51	TIME OVERCURRENT RELAY (AMPSENTRY)
59	OVERVOLTAGE RELAY
65	GOVERNOR
81	OVER/UNDER FREQUENCY RELAY
86	LOCKOUT
90	VOLTAGE REGULATOR

ANSI DEVICE NUMBERS

M	MOTOR OR METERING
27	UNDERVOLTAGE RELAY
32	DIRECTIONAL POWER RELAY
40	FIELD RELAY / LOSS OF EXCITATION
49	MACHINE OR TRANSFORMER THERMAL RELAY / THERMAL OVERLOAD
50	INSTANTANEOUS OVERCURRENT RELAY
50P	PHASE INSTANTANEOUS OVERCURRENT
51	OVERLOAD
51G	GROUND TIME OVERCURRENT
51N	NEUTRAL TIME OVERCURRENT
59	OVERVOLTAGE RELAY
67G	GROUND DIRECTIONAL OVERCURRENT
81	FREQUENCY RELAY
86	LOCKING-OUT RELAY
87	DIFFERENTIAL PROTECTIVE RELAY
87N	NEUTRAL DIFFERENTIAL PROTECTIVE RELAY

SEL DEVICE NUMBERS

50PAF	ARC FLASH PHASE OVERCURRENT
50NAF	ARC FLASH NEUTRAL OVERCURRENT
AFD	ARC FLASH DETECTOR WITH LIGHT SENSOR
BF	BREAKER FAILURE

KEYED NOTES (THIS SHEET ONLY)

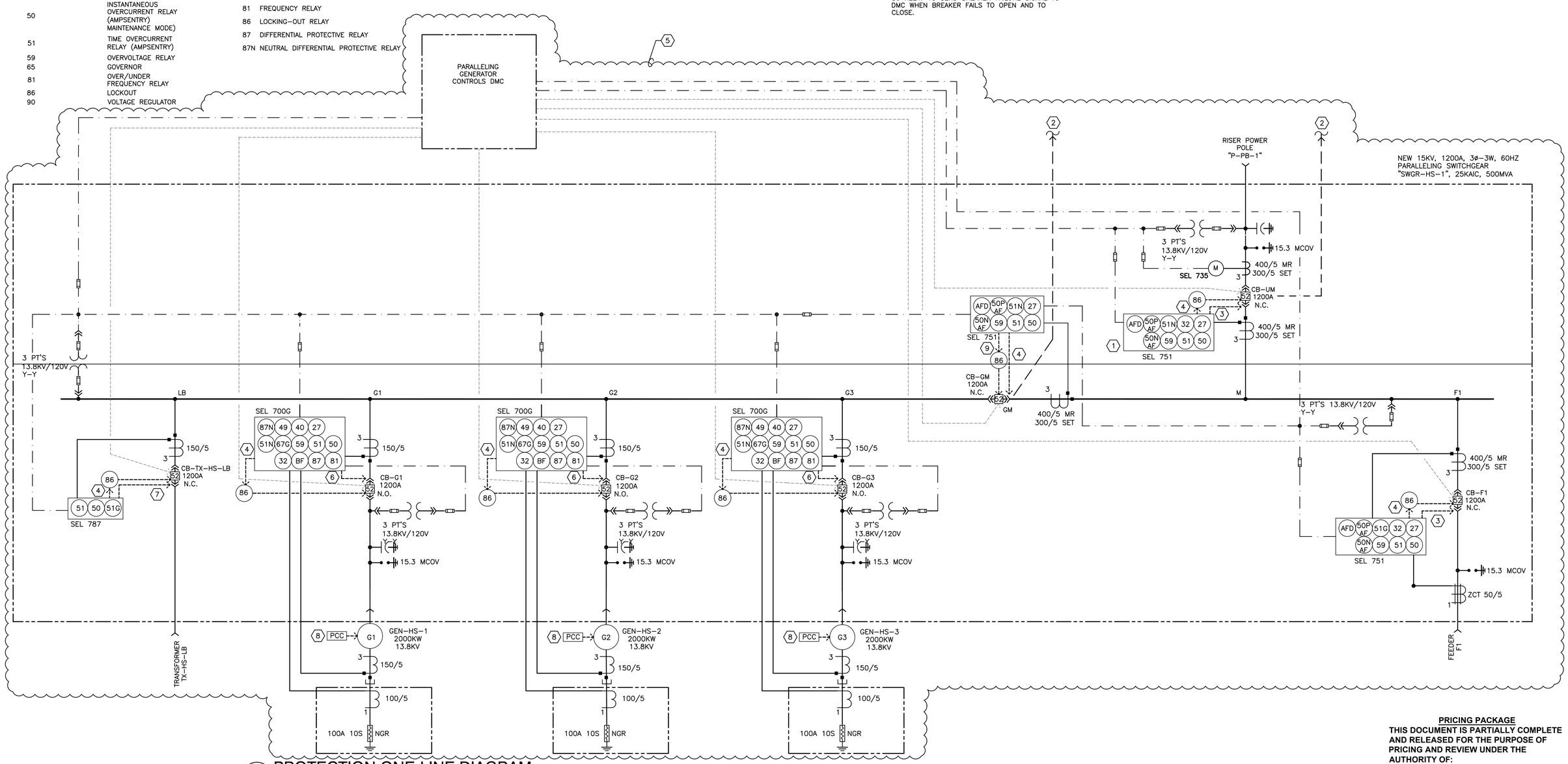
1. SEL-751 SHALL BE PROGRAMMED WITH DIRECTIONAL PROTECTION (32) RELAY AND OPEN UTILITY MAIN BREAKER ON THIS SWITCHGEAR FOR REVERSED POWER DETECTION.
2. CONTRACTOR SHALL EXTEND 10-#12, 1-#12G IN 1-1/4"C FOR BREAKER OPEN, BREAKER CLOSED, BREAKER TRIPPED, BREAKER FAIL TO CLOSE AND BREAKER FAIL TO OPEN, TO RECLOSER PROVIDED BY E.P.E.Co. CONTRACTOR SHALL COORDINATE EXACT RECLOSER LOCATION PRIOR TO ROUGH-IN.
3. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51, 51N/51G, 50PAF, 50NAF, 27, 32 AND 59 DEVICES ACTIVATE.
4. RELAY OUTPUT TO TRIP 86 RELAY AND LOCKOUT WHEN 52 TRIPS, AFD ACTIVATES AND 52 CLOSES. 86 RELAY TO SEND BREAKER FAILURE SIGNAL TO DMC WHEN BREAKER FAILS TO OPEN AND TO CLOSE.
5. GMP 1 EARLY EQUIPMENT PACKAGE.
6. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 27, 40, 49, 87N, 50, 51, 59, 67G, 51N, 81, 87 AND 32 DEVICES ACTIVATE.
7. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51 AND 51G ACTIVATE.
8. REFER TO POWER COMMAND CONTROLS (PCC) DEVICE NUMBERS ON THIS SHEET.
9. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51, 51N/51G, 50PAF, 50NAF, 27 AND 59 DEVICES ACTIVATE.

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.
2. ALL RELAYS SHALL BE POWERED WITH 125 VDC.

LEGEND (THIS SHEET ONLY)

- BUS
- VOLTAGE CONNECTION
- CURRENT CONNECTION
- COMMUNICATION
- DIGITAL (DISCRETE) SIGNAL



1 E-11 PROTECTION ONE-LINE DIAGRAM

SCALE: N.T.S.

PRICING PACKAGE

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el paso WATER

HASKELL STREET WWTP BACKUP GENERATORS
EL PASO, TX

PROTECTION ONE-LINE DIAGRAM

JOB NO. 3977B
DRAWING NO. E-11
SEQUENCE NO. 28 OF 34

J:\3977B EPW Haskell Generators\CAD\3977B EPW Haskell Generators\Sheets\E-11 PROTECTION ONE-LINE DIAGRAM.dwg

FRED HERVEY
ENGINE GENERATOR DATA SHEET

DESCRIPTION		DATA	UNITS
GENERAL			
	EQUIPMENT DESIGNATION	FH-1, FH-2 & FH-3	
	SITE NAME	FRED HERVEY WATER RECLAMATION PLANT	
	SITE ADDRESS	11700 RAIL DR DR, EL PASO TEXAS, 79934	
	QUANTITY	2, PLUS 1 BACKUP	
DESIGN CONDITIONS			
	DESIGN AMBIENT TEMPERATURE SUMMER	45	°C
	DESIGN AMBIENT TEMPERATURE WINTER	-22.2	°C
	MAXIMUM ALTERNATOR TEMP RISE	105	°C
	PROJECT VOLTAGE DISTORSION LIMIT	10	%
PROJECT REQUIREMENTS			
	NAMEPLATE RATING	2000	KW/PER GENSET
	RUNNING KW	1470.1	KW/PER GENSET
	GENERATOR OUTPUT FREQUENCY	60	HZ
	GENERATOR OUTPUT VOLTAGE	13800	V
	GENERATOR POWER FACTOR	80	%
	GENERATOR TERMINAL PHASE	3, WYE	
	CLOSE TRANSITION GEAR	YES	
	NEUTRAL TO GROUND RESISTOR	100	A
ENGINE			
	FUEL SUPPLY	LOW SULFUR #2 DIESEL FUEL/HVO FUELS	
	MAXIMUM ENGINE SPEED	1800	RPM
	MINIMUM PISTON DISPLACEMENT	60.2	LT
	BLACK START REQUIRED	YES	
	MINIMUM GUARATEED EMISSIONS	TIER II	
FUEL SYSTEM			
	FUEL SUPPLY	SUB-BASE DOUBLE WALL TANK UL 142	
	FUEL TANK CAPACITY AT PERCENT RATED CAPACITY	48	HR
	TANK HEATER	NO	
	INTERGRAL FUEL MAINTANCE SYSTEM	YES	
EXAHUST SYSTEM			
	SILENCER AND EXAHUST PIPE MATERIAL	STAINLESS STEEL	
ENCLOSURE			
	MAXIMUM NOISE LIMIT AT 23 FEET	75	Dba
SET PERFORMANCE			
	MAX STEP VOLTAGE DIP	9	%
	MAX STEP FREQUENCY DIP	3	%
	SITE RATED STANDBY	1790/2237	KW/KVA
	SITE RATED MAX SURGE	1810	KW
	MAX SURGE KVA	7993	KVA
	TEMP RISE AT FULL LOAD	105	°C
	ALTERNATOR MAXIMUM KVA THAT RESULTS IN A MIN OF 90% RATED SUSTAINED VOLTAGE	6062	KVA/PER GENSET
	VOLTAGE DISTORSION	2.7	%
LOAD BANK TAP BOX			
	VOLTAGE RATING	480/277V, 3phase, 4 wire	
	BUS RATING	2400	Amps

EPWater: Fred Hervey Load List
Loads Summary List
***Note: Detailed Loads and Step Report available below**

Step No.	Load Name	Quantity	Running		Starting		Peak		Dip Limits, %		VTHD% Limit
			kW	kVA	kW	kVA	kW	kVA	Vdip	Fdip	
Step01	LOAD-ACU-3370 PR1	1	5.98	7.47	19.93	24.91	None	None	30.0	10.0	0.0
Step01	LOAD-ACU-3375 PR1	1	5.98	7.47	19.93	24.91	None	None	30.0	10.0	0.0
Step01	LOAD-LP-100 PR1	1	10.8	13.5	36.0	45.0	None	None	30.0	10.0	0.0
Step01	LOAD-LP10A PR1	1	9.0	11.25	30.0	37.5	None	None	30.0	10.0	0.0
Step01	LOAD-LP10B PR1	1	9.0	11.25	30.0	37.5	None	None	30.0	10.0	0.0
Step01	LOAD-LTG PR1	1	2.99	3.74	9.96	12.46	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-15-LP PR1	1	3.6	4.5	12.0	15.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-22 PR1	1	7.2	9.0	24.0	30.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-9A-LP PR1	1	6.0	7.5	20.0	25.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-ELP1 PR1	1	1.2	1.5	4.0	5.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-ELP2 PR1	1	2.4	3.0	8.0	10.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-FL1 PR1	1	7.2	9.0	24.0	30.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-GEN PR1	1	6.0	7.5	20.0	25.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP-23 PR1	1	7.2	9.0	24.0	30.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP1 PR1	1	1.2	1.5	4.0	5.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP10 PR1	1	3.6	4.5	12.0	15.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP2 PR1	1	1.2	1.5	4.0	5.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP3 PR1	1	1.2	1.5	4.0	5.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP5B PR1	1	6.0	7.5	20.0	25.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP6 PR1	1	6.0	7.5	20.0	25.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP7 PR1	1	6.0	7.5	20.0	25.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-LP9 PR1	1	2.4	3.0	8.0	10.0	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-PP15 PR1	1	19.93	24.91	66.43	83.04	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-PP16 PR1	1	19.93	24.91	66.43	83.04	None	None	30.0	10.0	0.0
Step01	LOAD-PNL-PPN PR1	1	79.72	99.65	265.73	332.16	None	None	30.0	10.0	0.0
Step01	LOAD-RCPT-1 PR1	1	3.98	4.98	13.29	16.61	None	None	30.0	10.0	0.0
Step01	LOAD-RCPT-2 PR1	1	3.98	4.98	13.29	16.61	None	None	30.0	10.0	0.0
Step01	1.5HP LOAD PR1	1	1.16	1.53	10.26	14.25	None	None	30.0	10.0	0.0
Step01	2HP LOAD (X4) PR1	4	1.51	1.91	13.3	19.0	None	None	30.0	10.0	0.0
Step01	3HP LOAD (X2) PR1	2	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step01	5HP M-4185	1	4.44	5.22	22.88	37.5	None	None	30.0	10.0	0.0
Step Summary			128.0	160.0	460.0	589.0	None	None	30.0	10.0	0.0
Step02	LOAD-BOILER-1 PR2	2	2.99	3.74	9.96	12.46	None	None	30.0	10.0	0.0
Step02	.5HP LOAD (X3) PR2	3	0.42	0.62	4.54	5.9	None	None	30.0	10.0	0.0
Step02	.75HP LOAD (X2) PR2	2	0.62	0.91	6.81	8.85	None	None	30.0	10.0	0.0
Step02	1.5HP LOAD PR2	1	1.16	1.53	10.26	14.25	None	None	30.0	10.0	0.0
Step02	15HP LOAD PR2	1	10.29	11.69	43.37	88.5	None	None	30.0	10.0	0.0
Step02	1HP LOAD (X3) PR2	3	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step02	3HP LOAD (X2) PR2	3	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step02	5HP (X5) PR2	4	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step02	Flare - MOV 1.5kW	1	1.5	1.88	1.5	1.88	None	None	30.0	10.0	0.0
Step Summary			22.0	27.0	136.0	213.0	None	None	30.0	10.0	0.0
Step03	100HP LOAD PR3	1	66.31	73.68	82.89	92.1	None	None	30.0	10.0	10.0
Step03	10HP LOAD PR3	1	6.63	7.37	8.29	9.21	None	None	30.0	10.0	10.0
Step03	25HP LOAD (X2) PR3	2	16.58	18.42	20.72	23.02	None	None	30.0	10.0	10.0
Step03	20HP LOAD PR3	1	13.26	14.73	16.58	18.42	None	None	30.0	10.0	10.0
Step03	7.5HP LOAD PR3	1	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step03	LOAD-POLYMER PR3	1	4.98	6.23	16.61	20.76	None	None	30.0	10.0	0.0
Step Summary			65.0	72.0	97.0	118.0	None	None	30.0	10.0	10.0

Step04	450HP PR4	1	288.78	313.89	251.11	1255.56	None	None	30.0	10.0	10.0
Step04	LOAD-CP-202C PR4	1	5.98	7.47	19.93	24.91	None	None	30.0	10.0	0.0
Step04	LOAD-FCV-202A PR4	1	5.98	7.47	19.93	24.91	None	None	30.0	10.0	0.0
Step04	LOAD-FCV-202B PR4	1	5.98	7.47	19.93	24.91	None	None	30.0	10.0	0.0
Step04	LOAD-PNL-LP-25 PR4	1	7.2	9.0	24.0	30.0	None	None	30.0	10.0	0.0
	Step Summary		157.0	173.0	167.0	680.0	None	None	30.0	10.0	10.0
Step05	800HP PR4-1	1	634.89	690.1	441.66	2760.4	None	None	30.0	10.0	10.0
	Step Summary		317.0	345.0	221.0	1380.0	None	None	30.0	10.0	10.0
Step06	800HP PR4-2	1	634.89	690.1	441.66	2760.4	None	None	30.0	10.0	10.0
	Step Summary		317.0	345.0	221.0	1380.0	None	None	30.0	10.0	10.0
Step07	.3HP LOAD PR5	1	0.25	0.37	2.73	3.54	None	None	30.0	10.0	0.0
Step07	30HP LOAD PR5	1	19.9	22.11	24.87	27.63	None	None	30.0	10.0	10.0
	Step Summary		10.0	11.0	14.0	16.0	None	None	30.0	10.0	10.0
Step08	10HP LOAD PR6	1	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step08	1HP LOAD (X2) PR6	2	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step08	2HP LOAD PR6	1	1.51	1.91	13.3	19.0	None	None	30.0	10.0	0.0
Step08	30HP LOAD PR6	1	19.9	22.11	24.87	27.63	None	None	30.0	10.0	10.0
Step08	50HP LOAD PR6	1	33.15	36.83	41.44	46.04	None	None	30.0	10.0	10.0
Step08	5HP LOAD PR6	1	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step08	LOAD-CV-3010 PR6	1	2.99	3.74	9.96	12.46	None	None	30.0	10.0	0.0
Step08	LOAD-CV-3015 PR6	1	2.99	3.74	9.96	12.46	None	None	30.0	10.0	0.0
	Step Summary		36.0	41.0	88.0	123.0	None	None	30.0	10.0	10.0
Step09	1HP LOAD (X4) PR7	4	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step09	20HP LOAD (X2) PR7	2	13.56	15.24	54.28	118.0	None	None	30.0	10.0	0.0
Step09	25HP LOAD (X4) PR7	4	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step09	30HP LOAD (X2) PR7	2	19.9	22.11	24.87	27.63	None	None	30.0	10.0	10.0
Step09	3HP LOAD (X2) PR7	2	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step09	7.5HP LOAD (X2) PR7	2	4.97	5.52	6.21	6.9	None	None	30.0	10.0	10.0
	Step Summary		76.0	86.0	250.0	497.0	None	None	30.0	10.0	10.0
Step10	15HP LOAD (X4) PR8	4	10.29	11.69	43.37	88.5	None	None	30.0	10.0	0.0
Step10	1HP LOAD (X2) PR8	2	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step10	25HP LOAD PR8	1	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
	Step Summary		30.0	34.0	128.0	263.0	None	None	30.0	10.0	10.0
Step11	50HP LOAD (X4) PR9	4	33.15	36.83	41.44	46.04	None	None	30.0	10.0	10.0
Step11	LOAD-CP-22L PR9	1	5.98	7.47	19.93	24.91	None	None	30.0	10.0	0.0
Step11	LOAD-CP-3500A PR9	1	3.98	4.98	13.29	16.61	None	None	30.0	10.0	0.0
Step11	LOAD-SG-3600 PR9	1	3.98	4.98	13.29	16.61	None	None	30.0	10.0	0.0
	Step Summary		73.0	82.0	106.0	121.0	None	None	30.0	10.0	10.0
Step12	.5HP LOAD PR10	1	0.42	0.62	4.54	5.9	None	None	30.0	10.0	0.0
Step12	1.5HP LOAD PR10	1	0.99	1.1	1.24	1.38	None	None	30.0	10.0	10.0
Step12	10HP LOAD PR10	1	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step12	1HP LOAD (X2) PR10	2	0.82	1.17	8.97	11.8	None	None	30.0	10.0	0.0
Step12	2HP LOAD PR10	1	1.51	1.91	13.3	19.0	None	None	30.0	10.0	0.0
Step12	5HP LOAD PR10	1	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step12	CO2-STORAGE-2 PR10	1	13.95	17.44	46.5	58.13	None	None	30.0	10.0	0.0
	Step Summary		15.0	18.0	71.0	106.0	None	None	30.0	10.0	10.0
Step13	.5HP LOAD PR11	1	0.42	0.62	4.54	5.9	None	None	30.0	10.0	0.0
Step13	1.5HP LOAD (X2) PR11	2	0.99	1.1	1.24	1.38	None	None	30.0	10.0	10.0
Step13	10HP LOAD PR11	1	6.63	7.37	8.29	9.21	None	None	30.0	10.0	10.0
Step13	2HP LOAD (X2) PR11	2	1.51	1.91	13.3	19.0	None	None	30.0	10.0	0.0
Step13	3HP LOAD (X2) PR11	2	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step13	5HP LOAD PR11	1	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step13	7.5HP LOAD PR11	1	4.97	5.52	6.21	6.9	None	None	30.0	10.0	10.0

Step13	CO2-STORAGE-1 PR11	1	19.93	24.91	66.43	83.04	None	None	30.0	10.0	0.0
Step Summary			22.0	27.0	86.0	117.0	None	None	30.0	10.0	10.0
Step14	150HP LOAD (X2) PR12	2	99.46	110.51	124.33	138.14	None	None	30.0	10.0	10.0
Step14	25HP LOAD PR12	1	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step14	3HP LOAD PR12	1	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step Summary			109.0	121.0	165.0	225.0	None	None	30.0	10.0	10.0
Step15	LOAD-HOIST FEED. PR13	1	3.98	4.98	13.29	16.61	None	None	30.0	10.0	0.0
Step Summary			2.0	2.0	7.0	8.0	None	None	30.0	10.0	10.0
Step16	.75HP LOAD PR14	1	0.62	0.91	6.81	8.85	None	None	30.0	10.0	0.0
Step16	25HP LOAD PR14	1	16.95	19.04	64.9	147.5	None	None	30.0	10.0	0.0
Step16	3HP LOAD PR14	2	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step16	5HP LOAD PR14	1	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step16	7.5HP LOAD PR14	1	6.58	7.56	28.14	50.25	None	None	30.0	10.0	0.0
Step Summary			16.0	19.0	78.0	148.0	None	None	30.0	10.0	10.0
Step17	10HP LOAD PR15	1	6.63	7.37	8.29	9.21	None	None	30.0	10.0	10.0
Step17	25HP LOAD PR15	1	16.58	18.42	20.72	23.02	None	None	30.0	10.0	10.0
Step17	7.5HP LOAD PR15	1	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step Summary			14.0	16.0	29.0	41.0	None	None	30.0	10.0	10.0
Step18	10HP LOAD PR17	1	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step18	LOAD-LCP-5545 PR17	1	19.93	24.91	66.43	83.04	None	None	30.0	10.0	0.0
Step18	LOAD-PNL-LCP5540 PR17	1	19.93	24.91	66.43	83.04	None	None	30.0	10.0	0.0
Step Summary			23.0	29.0	84.0	117.0	None	None	30.0	10.0	10.0
Step19	.5HP LOAD PR18	1	0.42	0.62	4.54	5.9	None	None	30.0	10.0	0.0
Step19	.75HP LOAD (X3) PR18	3	0.62	0.91	6.81	8.85	None	None	30.0	10.0	0.0
Step19	1.5HP LOAD PR18	1	1.16	1.53	10.26	14.25	None	None	30.0	10.0	0.0
Step19	10HP LOAD PR18	1	6.94	7.98	35.51	67.0	None	None	30.0	10.0	0.0
Step19	15HP LOAD PR18	1	9.94	11.04	12.43	13.81	None	None	30.0	10.0	10.0
Step19	3HP LOAD PR18	1	2.18	2.66	16.83	25.5	None	None	30.0	10.0	0.0
Step19	5HP LOAD (X4) PR18	4	3.55	4.18	22.88	37.5	None	None	30.0	10.0	0.0
Step19	7.5HP LOAD PR18	1	5.26	6.05	28.14	50.25	None	None	30.0	10.0	0.0
Step Summary			21.0	25.0	110.0	177.0	None	None	30.0	10.0	10.0
Step20	PNL-PPE PR19	1	29.9	37.37	99.65	124.56	None	None	30.0	10.0	0.0
Step Summary			15.0	19.0	50.0	62.0	None	None	30.0	10.0	10.0
Step Summary			0.0	0.0	0.0	0.0	None	None	0.0	0.0	0.0
Step Summary			0.0	0.0	0.0	0.0	None	None	0.0	0.0	0.0

Project Summary	Running		Max Starting		Cumulative Step		Cumulative Peak		Project VTHD% Limit
	kW	kVA	kW	kVA	kW	kVA	kW	kVA	
	1470.1	1652.5	459.5	1380.2	1544.0	2157.2	0.0	0.0	10.0

Step1

Calculated Individual Generator Set Step Load Requirements

Running kW	:	128.0	**Starting kW**	:	460.0	**Cumulative Step kW**	:	460.0
Running kVA	:	160.0	**Starting kVA**	:	589.0	**Cumulative Step kVA**	:	589.0
Running Amps	:	13.0	**Starting Non-linear kVA**	:	0.0			
Running Non-linear kVA	:	0.0						
Alternator kW	:	127.85						
Voltage Distortion Limit for	**: step**	0						

LOAD-ACU-3370 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	5.98	**Starting kW**	:	19.93	**Peak kW**	: None
Running kVA	:	7.47	**Starting kVA**	:	24.91	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	9.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.98				**Voltage**	: 480

LOAD-ACU-3375 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	5.98	**Starting kW**	:	19.93	**Peak kW**	: None
Running kVA	:	7.47	**Starting kVA**	:	24.91	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	9.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.98				**Voltage**	: 480

LOAD-LP-100 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	10.8	**Starting kW**	:	36.0	**Peak kW**	: None
Running kVA	:	13.5	**Starting kVA**	:	45.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	37.52	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	10.8				**Voltage**	: 208

LOAD-LP10A PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	9.0	**Starting kW**	:	30.0	**Peak kW**	: None
Running kVA	:	11.25	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	31.26	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	9.0				**Voltage**	: 208

LOAD-LP10B PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	9.0	**Starting kW**	:	30.0	**Peak kW**	: None
Running kVA	:	11.25	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	31.26	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	9.0				**Voltage**	: 208

LOAD-LTG PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.99	**Starting kW**	:	9.96	**Peak kW**	: None
Running kVA	:	3.74	**Starting kVA**	:	12.46	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	4.5	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.99				**Voltage**	: 480

LOAD-PNL-15-LP PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.6	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	4.5	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	10.84	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.6				**Voltage**	: 240

LOAD-PNL-22 PR1					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	:	None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	7.2				**Voltage**	:	208
LOAD-PNL-9A-LP PR1					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	6.0	**Starting kW**	:	20.0	**Peak kW**	:	None
Running kVA	:	7.5	**Starting kVA**	:	25.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	18.06	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	6.0				**Voltage**	:	240
LOAD-PNL-ELP1 PR1					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	1.2	**Starting kW**	:	4.0	**Peak kW**	:	None
Running kVA	:	1.5	**Starting kVA**	:	5.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	3.61	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	1.2				**Voltage**	:	240
LOAD-PNL-ELP2 PR1					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	2.4	**Starting kW**	:	8.0	**Peak kW**	:	None
Running kVA	:	3.0	**Starting kVA**	:	10.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	7.23	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	2.4				**Voltage**	:	240
LOAD-PNL-FL1 PR1					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	:	None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	7.2				**Voltage**	:	208
LOAD-PNL-GEN PR1					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	6.0	**Starting kW**	:	20.0	**Peak kW**	:	None
Running kVA	:	7.5	**Starting kVA**	:	25.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	18.06	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	6.0				**Voltage**	:	240
LOAD-PNL-LP-23 PR1					Three Phase	Quantity		: 1 In this Step
Category		: User Defined						
Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	:	None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0

Alternator kW	:	7.2				**Voltage**	: 208

LOAD-PNL-LP1 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	1.2	**Starting kW**	:	4.0	**Peak kW**	: None
Running kVA	:	1.5	**Starting kVA**	:	5.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	3.61	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.2				**Voltage**	: 240

LOAD-PNL-LP10 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.6	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	4.5	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	10.84	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.6				**Voltage**	: 240

LOAD-PNL-LP2 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	1.2	**Starting kW**	:	4.0	**Peak kW**	: None
Running kVA	:	1.5	**Starting kVA**	:	5.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	3.61	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.2				**Voltage**	: 240

LOAD-PNL-LP3 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	1.2	**Starting kW**	:	4.0	**Peak kW**	: None
Running kVA	:	1.5	**Starting kVA**	:	5.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	3.61	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.2				**Voltage**	: 240

LOAD-PNL-LP5B PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	6.0	**Starting kW**	:	20.0	**Peak kW**	: None
Running kVA	:	7.5	**Starting kVA**	:	25.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	18.06	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.0				**Voltage**	: 240

LOAD-PNL-LP6 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	6.0	**Starting kW**	:	20.0	**Peak kW**	: None
Running kVA	:	7.5	**Starting kVA**	:	25.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	18.06	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.0				**Voltage**	: 240

LOAD-PNL-LP7 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	6.0	**Starting kW**	:	20.0	**Peak kW**	: None

Running kVA	:	7.5	**Starting kVA**	:	25.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	18.06	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.0				**Voltage**	: 240

LOAD-PNL-LP9 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.4	**Starting kW**	:	8.0	**Peak kW**	: None
Running kVA	:	3.0	**Starting kVA**	:	10.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	7.23	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.4				**Voltage**	: 240

LOAD-PNL-PP15 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	19.93	**Starting kW**	:	66.43	**Peak kW**	: None
Running kVA	:	24.91	**Starting kVA**	:	83.04	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	30.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	19.93				**Voltage**	: 480

LOAD-PNL-PP16 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	19.93	**Starting kW**	:	66.43	**Peak kW**	: None
Running kVA	:	24.91	**Starting kVA**	:	83.04	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	30.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	19.93				**Voltage**	: 480

LOAD-PNL-PPN PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	79.72	**Starting kW**	:	265.73	**Peak kW**	: None
Running kVA	:	99.65	**Starting kVA**	:	332.16	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	120.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	79.72				**Voltage**	: 480

LOAD-RCPT-1 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.98	**Starting kW**	:	13.29	**Peak kW**	: None
Running kVA	:	4.98	**Starting kVA**	:	16.61	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	6.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.98				**Voltage**	: 480

LOAD-RCPT-2 PR1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.98	**Starting kW**	:	13.29	**Peak kW**	: None
Running kVA	:	4.98	**Starting kVA**	:	16.61	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	6.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.98				**Voltage**	: 480

1.5HP LOAD PR1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.16	**Starting kW**	:	10.26	**Peak kW**	: None
Running kVA	:	1.53	**Starting kVA**	:	14.25	**Peak kVA**	: None
Running PF	:	0.76	**Starting PF**	:	0.72	**Cyclic**	: No
Running Amps	:	1.92	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.16				**Voltage**	: 460

Shaft Hp	: 1.5		**Method**	:	Across the line
Shaft kW	: 1.12		**Low Inertia**	:	No
Efficiency (%)	: 0.77		**LRkVA Factor**	:	9.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	L
Load Factor	: 80.0				

2HP LOAD (X4) PR1 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	:	1.51	**Starting kW**	:	13.3	**Peak kW**	: None
Running kVA	:	1.91	**Starting kVA**	:	19.0	**Peak kVA**	: None
Running PF	:	0.79	**Starting PF**	:	0.7	**Cyclic**	: No
Running Amps	:	2.4	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.51				**Voltage**	: 460

Shaft Hp	: 2.0		**Method**	:	Across the line
Shaft kW	: 1.49		**Low Inertia**	:	No
Efficiency (%)	: 0.79		**LRkVA Factor**	:	9.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	L
Load Factor	: 80.0				

3HP LOAD (X2) PR1 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.34	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 460

Shaft Hp	: 3.0		**Method**	:	Across the line
Shaft kW	: 2.24		**Low Inertia**	:	No
Efficiency (%)	: 0.82		**LRkVA Factor**	:	8.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	K
Load Factor	: 80.0				

5HP M-4185 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	4.44	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	5.22	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	6.56	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	4.44				**Voltage**	: 460

Shaft Hp	: 5.0		**Method**	:	Across the line
Shaft kW	: 3.73		**Low Inertia**	:	No
Efficiency (%)	: 0.84		**LRkVA Factor**	:	7.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	J
Load Factor	: 100.0				

Step2

Calculated Individual Generator Set Step Load Requirements

Running kW	:	22.0	**Starting kW**	:	136.0	**Cumulative Step kW**	: 263.0
Running kVA	:	27.0	**Starting kVA**	:	213.0	**Cumulative Step kVA**	: 373.0
Running Amps	:	2.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	22.32					
Voltage Distortion Limit for : step		0					

LOAD-BOILER-1 PR2 Three Phase Quantity : 2 In this Step

Category : User Defined

Running kW	:	2.99	**Starting kW**	:	9.96	**Peak kW**	: None
Running kVA	:	3.74	**Starting kVA**	:	12.46	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	4.5	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.99				**Voltage**	: 480

.5HP LOAD (X3) PR2 Three Phase Quantity : 3 In this Step

Category : Motor

Running kW	:	0.42	**Starting kW**	:	4.54	**Peak kW**	: None
Running kVA	:	0.62	**Starting kVA**	:	5.9	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	0.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.42				**Voltage**	: 460

Shaft Hp	: 0.5	**Method**	:	Across the line	
Shaft kW	: 0.37	**Low Inertia**	:	No	
Efficiency (%)	: 0.72	**LRkVA Factor**	:	11.8	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	N	
Load Factor	: 80.0				

.75HP LOAD (X2) PR2 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.14	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 460

Shaft Hp	: 0.75	**Method**	:	Across the line	
Shaft kW	: 0.56	**Low Inertia**	:	No	
Efficiency (%)	: 0.72	**LRkVA Factor**	:	11.8	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	N	
Load Factor	: 80.0				

1.5HP LOAD PR2 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.16	**Starting kW**	:	10.26	**Peak kW**	: None
Running kVA	:	1.53	**Starting kVA**	:	14.25	**Peak kVA**	: None
Running PF	:	0.76	**Starting PF**	:	0.72	**Cyclic**	: No
Running Amps	:	1.92	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.16				**Voltage**	: 460

Shaft Hp	: 1.5	**Method**	:	Across the line	
Shaft kW	: 1.12	**Low Inertia**	:	No	
Efficiency (%)	: 0.77	**LRkVA Factor**	:	9.5	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	L	

Load Factor : 80.0

15HP LOAD PR2 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	10.29	**Starting kW**	:	43.37	**Peak kW**	: None
Running kVA	:	11.69	**Starting kVA**	:	88.5	**Peak kVA**	: None
Running PF	:	0.88	**Starting PF**	:	0.49	**Cyclic**	: No
Running Amps	:	14.69	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	10.29				**Voltage**	: 460

Shaft Hp : 15.0 **Method** : Across the line
Shaft kW : 11.19 **Low Inertia** : No
Efficiency (%) : 0.87 **LRkVA Factor** : 5.9
Design : Standard NEMA Design B,C or D **LRkVA Code** : G
Load Factor : 80.0

1HP LOAD (X3) PR2 Three Phase Quantity : 3 In this Step
Category : Motor

Running kW	:	0.82	**Starting kW**	:	8.97	**Peak kW**	: None
Running kVA	:	1.17	**Starting kVA**	:	11.8	**Peak kVA**	: None
Running PF	:	0.7	**Starting PF**	:	0.76	**Cyclic**	: No
Running Amps	:	1.47	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.82				**Voltage**	: 460

Shaft Hp : 1.0 **Method** : Across the line
Shaft kW : 0.75 **Low Inertia** : No
Efficiency (%) : 0.73 **LRkVA Factor** : 11.8
Design : Standard NEMA Design B,C or D **LRkVA Code** : N
Load Factor : 80.0

3HP LOAD (X2) PR2 Three Phase Quantity : 3 In this Step
Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.34	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 460

Shaft Hp : 3.0 **Method** : Across the line
Shaft kW : 2.24 **Low Inertia** : No
Efficiency (%) : 0.82 **LRkVA Factor** : 8.5
Design : Standard NEMA Design B,C or D **LRkVA Code** : K
Load Factor : 80.0

5HP (X5) PR2 Three Phase Quantity : 4 In this Step
Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.25	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 460

Shaft Hp : 5.0 **Method** : Across the line
Shaft kW : 3.73 **Low Inertia** : No
Efficiency (%) : 0.84 **LRkVA Factor** : 7.5 **Design** : Standard NEMA Design B,C or D **LRkVA Code** : J **Load Factor** : 80.0

Flare - MOV 1.5kW Three Phase Quantity : 1 In this Step Category : User Defined

Running kW	: 1.5	**Starting kW**	: 1.5	**Peak kW**	: None
Running kVA	: 1.88	**Starting kVA**	: 1.88	**Peak kVA**	: None

Running PF	:	0.8	**Starting PF**	: 0.8	**Cyclic**	:	No
Running Amps	:	2.26	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	1.5			**Voltage**	:	480

Step3

Calculated Individual Generator Set Step Load Requirements

Running kW	:	65.0	**Starting kW**	: 97.0	**Cumulative Step kW**	:	247.0
Running kVA	:	72.0	**Starting kVA**	: 118.0	**Cumulative Step kVA**	:	305.0
Running Amps	:	6.0	**Starting Non-linear kVA**	: 83.0			
Running Non-linear kVA	:	66.0					
Alternator kW	:	124.48					
Voltage Distortion Limit for	**: step**	10					

100HP LOAD PR3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	66.31	**Starting kW**	: 82.89	**Peak kW**	:	None
Running kVA	:	73.68	**Starting kVA**	: 92.1	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	: 0.9	**Cyclic**	:	No
Running Amps	:	92.59	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	:	73.68					
Starting NLL kVA	:	92.1			**Voltage**	:	460
Alternator kW	:	132.62					

Shaft Hp	: 100.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 74.6	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

10HP LOAD PR3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.63	**Starting kW**	: 8.29	**Peak kW**	:	None
Running kVA	:	7.37	**Starting kVA**	: 9.21	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	: 0.9	**Cyclic**	:	No
Running Amps	:	9.26	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	:	7.37					
Starting NLL kVA	:	9.21			**Voltage**	:	460
Alternator kW	:	13.26					

Shaft Hp	: 10.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 7.46	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

25HP LOAD (X2) PR3 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	16.58	**Starting kW**	: 20.72	**Peak kW**	:	None
Running kVA	:	18.42	**Starting kVA**	: 23.02	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	: 0.9	**Cyclic**	:	No
Running Amps	:	23.15	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	:	10.0

Running NLL kVA	: 18.42				
Starting NLL kVA	: 23.02			**Voltage**	: 460
Alternator kW	: 33.16				
Shaft Hp	: 25.0	**Type**	: Variable Frequency Drive		
Shaft kW	: 18.65	**Ramp Details**	: None		
Rectifier Type	: 6 pulse	**THDI %**	: 26		
Efficiency (%)	: 0.9	**THDV %**	: 10		
Load Factor	: 80.0				

20HP LOAD PR3 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 13.26	**Starting kW**	: 16.58	**Peak kW**	: None		
Running kVA	: 14.73	**Starting kVA**	: 18.42	**Peak kVA**	: None		
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No		
Running Amps	: 18.51	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0		
Running NLL kVA	: 14.73						
Starting NLL kVA	: 18.42			**Voltage**	: 460		
Alternator kW	: 26.52						
Shaft Hp	: 20.0	**Type**	: Variable Frequency Drive				
Shaft kW	: 14.92	**Ramp Details**	: None				
Rectifier Type	: 6 pulse	**THDI %**	: 26				
Efficiency (%)	: 0.9	**THDV %**	: 10				
Load Factor	: 80.0						

7.5HP LOAD PR3 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 5.26	**Starting kW**	: 28.14	**Peak kW**	: None		
Running kVA	: 6.05	**Starting kVA**	: 50.25	**Peak kVA**	: None		
Running PF	: 0.87	**Starting PF**	: 0.56	**Cyclic**	: No		
Running Amps	: 7.6	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 5.26			**Voltage**	: 460		
Shaft Hp	: 7.5	**Method**	: Across the line				
Shaft kW	: 5.59	**Low Inertia**	: No				
Efficiency (%)	: 0.85	**LRkVA Factor**	: 6.7				
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H				
Load Factor	: 80.0						

LOAD-POLYMER PR3 Three Phase Quantity : 1 In this Step
Category : User Defined

Running kW	: 4.98	**Starting kW**	: 16.61	**Peak kW**	: None		
Running kVA	: 6.23	**Starting kVA**	: 20.76	**Peak kVA**	: None		
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No		
Running Amps	: 7.5	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 4.98			**Voltage**	: 480		

Step4

Calculated Individual Generator Set Step Load Requirements

Running kW	: 157.0	**Starting kW**	167.0	**Cumulative Step kW**	: 382.0
Running kVA	: 173.0	**Starting kVA**	680.0	**Cumulative Step kVA**	: 939.0
Running Amps	: 14.0	**Starting Non-linear kVA**	628.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 156.96				

Voltage Distortion Limit for : step 10

450HP PR4				Three Phase	Quantity	:	1 In this Step
Category	: Motor						
Running kW	: 288.78	**Starting kW**		251.11	**Peak kW**	:	None
Running kVA	: 313.89	**Starting kVA**		1255.56	**Peak kVA**	:	None
Running PF	: 0.92	**Starting PF**		0.2	**Cyclic**	:	No
Running Amps	: 394.43	**Max. % Voltage Dip**		30.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	: 0.0						
Starting NLL kVA	: 1255.56				**Voltage**	:	460
Alternator kW	: 288.78						

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Shaft Hp	: 450.0	**Method**	: Solid State
Shaft kW	: 335.7	**Current Limit**	: 400.0
Efficiency (%)	: 0.93	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Rectifier Type	: 6 pulse	**THDI %**	: 26
		THDV %	: 10

Load Factor : 80.0

LOAD-CP-202C PR4				Three Phase	Quantity	:	1 In this Step
Category	: User Defined						
Running kW	: 5.98	**Starting kW**	:	19.93	**Peak kW**	:	None
Running kVA	: 7.47	**Starting kVA**	:	24.91	**Peak kVA**	:	None
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	: 9.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	: 5.98				**Voltage**	:	480

LOAD-FCV-202A PR4				Three Phase	Quantity	:	1 In this Step
Category	: User Defined						
Running kW	: 5.98	**Starting kW**	:	19.93	**Peak kW**	:	None
Running kVA	: 7.47	**Starting kVA**	:	24.91	**Peak kVA**	:	None
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	: 9.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	: 5.98				**Voltage**	:	480

LOAD-FCV-202B PR4				Three Phase	Quantity	:	1 In this Step
Category	: User Defined						
Running kW	: 5.98	**Starting kW**	:	19.93	**Peak kW**	:	None
Running kVA	: 7.47	**Starting kVA**	:	24.91	**Peak kVA**	:	None
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	: 9.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	: 5.98				**Voltage**	:	480

LOAD-PNL-LP-25 PR4				Three Phase	Quantity	:	1 In this Step
Category	: User Defined						
Running kW	: 7.2	**Starting kW**	:	24.0	**Peak kW**	:	None
Running kVA	: 9.0	**Starting kVA**	:	30.0	**Peak kVA**	:	None
Running PF	: 0.8	**Starting PF**	:	0.8	**Cyclic**	:	No

Running Amps	:	25.01	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.2				**Voltage**	: 208

Step5

Calculated Individual Generator Set Step Load Requirements

Running kW	:	317.0	**Starting kW**	:	221.0	**Cumulative Step kW**	: 593.0
Running kVA	:	345.0	**Starting kVA**	:	1380.0	**Cumulative Step kVA**	: 1812.0
Running Amps	:	29.0	**Starting Non-linear kVA**	:	1380.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	317.45					
Voltage Distortion Limit for	**: step**	10					

800HP PR4-1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	634.89	**Starting kW**	:	441.66	**Peak kW**	: None
Running kVA	:	690.1	**Starting kVA**	:	2760.4	**Peak kVA**	: None
Running PF	:	0.92	**Starting PF**	:	0.16	**Cyclic**	: No
Running Amps	:	95.89	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	0.0					
Starting NLL kVA	:	2760.4				**Voltage**	: 4160
Alternator kW	:	634.89					

Shaft Hp	: 800.0	**Method**	: Solid State
Shaft kW	: 596.8	**Current Limit**	: 400.0
Efficiency (%)	: 0.94	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Rectifier Type	: 6 pulse	**THDI %**	: 26
		THDV %	: 10

Load Factor : 100.0

Step6

Calculated Individual Generator Set Step Load Requirements

Running kW	:	317.0	**Starting kW**	:	221.0	**Cumulative Step kW**	: 910.0
Running kVA	:	345.0	**Starting kVA**	:	1380.0	**Cumulative Step kVA**	: 2157.0
Running Amps	:	29.0	**Starting Non-linear kVA**	:	1380.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	317.45					
Voltage Distortion Limit for	**: step**	10					

800HP PR4-2 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	634.89	**Starting kW**	:	441.66	**Peak kW**	: None
Running kVA	:	690.1	**Starting kVA**	:	2760.4	**Peak kVA**	: None
Running PF	:	0.92	**Starting PF**	:	0.16	**Cyclic**	: No
Running Amps	:	95.89	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	0.0					
Starting NLL kVA	:	2760.4				**Voltage**	: 4160
Alternator kW	:	634.89					

Shaft Hp	: 800.0	**Method**	: Solid State
Shaft kW	: 596.8	**Current Limit**	: 400.0
Efficiency (%)	: 0.94	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Rectifier Type	: 6 pulse	**THDI %**	: 26
		THDV %	: 10

Load Factor : 100.0

Step7

Calculated Individual Generator Set Step Load Requirements

Running kW	:	10.0	**Starting kW**	:	14.0	**Cumulative Step kW**	:	1021.0
Running kVA	:	11.0	**Starting kVA**	:	16.0	**Cumulative Step kVA**	:	1138.0
Running Amps	:	1.0	**Starting Non-linear kVA**	:	14.0			
Running Non-linear kVA	:	11.0						
Alternator kW	:	20.03						
Voltage Distortion Limit for	**: step**	10						

.3HP LOAD PR5 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.25	**Starting kW**	:	2.73	**Peak kW**	:	None
Running kVA	:	0.37	**Starting kVA**	:	3.54	**Peak kVA**	:	None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	:	No
Running Amps	:	0.46	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	0.25				**Voltage**	:	460

Shaft Hp	:	0.3	**Method**	:	Across the line
Shaft kW	:	0.22	**Low Inertia**	:	No
Efficiency (%)	:	0.72	**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N
Load Factor	:	80.0			

30HP LOAD PR5 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	19.9	**Starting kW**	:	24.87	**Peak kW**	:	None
Running kVA	:	22.11	**Starting kVA**	:	27.63	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	:	No
Running Amps	:	27.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	:	22.11						
Starting NLL kVA	:	27.63				**Voltage**	:	460
Alternator kW	:	39.8						

Shaft Hp	:	30.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	22.38	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

Step8

Calculated Individual Generator Set Step Load Requirements

Running kW	:	36.0	**Starting kW**	:	88.0	**Cumulative Step kW**	:	1105.0
Running kVA	:	41.0	**Starting kVA**	:	123.0	**Cumulative Step kVA**	:	1256.0
Running Amps	:	3.0	**Starting Non-linear kVA**	:	37.0			
Running Non-linear kVA	:	29.0						
Alternator kW	:	62.86						
Voltage Distortion Limit for	**: step**	10						

10HP LOAD PR6 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.94	**Starting kW**	:	35.51	**Peak kW**	:	None
Running kVA	:	7.98	**Starting kVA**	:	67.0	**Peak kVA**	:	None
Running PF	:	0.87	**Starting PF**	:	0.53	**Cyclic**	:	No
Running Amps	:	10.03	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0

Alternator kW	:	6.94				**Voltage**	: 460
Shaft Hp	:	10.0			**Method**	:	Across the line
Shaft kW	:	7.46			**Low Inertia**	:	No
Efficiency (%)	:	0.86			**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D			**LRkVA Code**	:	H
Load Factor	:	80.0					

1HP LOAD (X2) PR6 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	0.82	**Starting kW**	:	8.97	**Peak kW**	:	None
Running kVA	:	1.17	**Starting kVA**	:	11.8	**Peak kVA**	:	None
Running PF	:	0.7	**Starting PF**	:	0.76	**Cyclic**	:	No
Running Amps	:	1.47	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	0.82				**Voltage**	:	460

Shaft Hp	:	1.0			**Method**	:	Across the line
Shaft kW	:	0.75			**Low Inertia**	:	No
Efficiency (%)	:	0.73			**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D			**LRkVA Code**	:	N
Load Factor	:	80.0					

2HP LOAD PR6 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.51	**Starting kW**	:	13.3	**Peak kW**	:	None
Running kVA	:	1.91	**Starting kVA**	:	19.0	**Peak kVA**	:	None
Running PF	:	0.79	**Starting PF**	:	0.7	**Cyclic**	:	No
Running Amps	:	2.4	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	1.51				**Voltage**	:	460

Shaft Hp	:	2.0			**Method**	:	Across the line
Shaft kW	:	1.49			**Low Inertia**	:	No
Efficiency (%)	:	0.79			**LRkVA Factor**	:	9.5
Design	:	Standard NEMA Design B,C or D			**LRkVA Code**	:	L
Load Factor	:	80.0					

30HP LOAD PR6 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	19.9	**Starting kW**	:	24.87	**Peak kW**	:	None
Running kVA	:	22.11	**Starting kVA**	:	27.63	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	:	No
Running Amps	:	27.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	:	22.11						
Starting NLL kVA	:	27.63				**Voltage**	:	460
Alternator kW	:	39.8						

Shaft Hp	: 30.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 22.38	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

50HP LOAD PR6 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	33.15	**Starting kW**	:	41.44	**Peak kW**	:	None
Running kVA	:	36.83	**Starting kVA**	:	46.04	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	:	No
Running Amps	:	46.28	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0

Running NLL kVA	: 36.83				
Starting NLL kVA	: 46.04			**Voltage**	: 460
Alternator kW	: 66.3				
Shaft Hp	: 50.0	**Type**	: Variable Frequency Drive		
Shaft kW	: 37.3	**Ramp Details**	: None		
Rectifier Type	: 6 pulse	**THDI %**	: 26		
Efficiency (%)	: 0.9	**THDV %**	: 10		
Load Factor	: 80.0				

5HP LOAD PR6 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.25	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 460

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

LOAD-CV-3010 PR6 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 2.99	**Starting kW**	: 9.96	**Peak kW**	: None
Running kVA	: 3.74	**Starting kVA**	: 12.46	**Peak kVA**	: None
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	: 4.5	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 2.99			**Voltage**	: 480

LOAD-CV-3015 PR6 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 2.99	**Starting kW**	: 9.96	**Peak kW**	: None
Running kVA	: 3.74	**Starting kVA**	: 12.46	**Peak kVA**	: None
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	: 4.5	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 2.99			**Voltage**	: 480

Step9

Calculated Individual Generator Set Step Load Requirements

Running kW	: 76.0	**Starting kW**	: 250.0	**Cumulative Step kW**	: 1303.0
Running kVA	: 86.0	**Starting kVA**	: 497.0	**Cumulative Step kVA**	: 1671.0
Running Amps	: 7.0	**Starting Non-linear kVA**	: 35.0		
Running Non-linear kVA	: 28.0				
Alternator kW	: 101.02				
Voltage Distortion Limit for	**: step** 10				

1HP LOAD (X4) PR7 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	: 0.82	**Starting kW**	: 8.97	**Peak kW**	: None
Running kVA	: 1.17	**Starting kVA**	: 11.8	**Peak kVA**	: None
Running PF	: 0.7	**Starting PF**	: 0.76	**Cyclic**	: No
Running Amps	: 1.47	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0

Alternator kW	: 0.82			**Voltage**	: 460
Shaft Hp	: 1.0	**Method**	: Across the line		
Shaft kW	: 0.75	**Low Inertia**	: No		
Efficiency (%)	: 0.73	**LRkVA Factor**	: 11.8		

Design : Standard NEMA Design B,C or D **LRkVA Code** : N
Load Factor : 80.0

20HP LOAD (X2) PR7 Three Phase Quantity : 2 In this Step
Category : Motor

Running kW	: 13.56	**Starting kW**	: 54.28	**Peak kW**	: None
Running kVA	: 15.24	**Starting kVA**	: 118.0	**Peak kVA**	: None
Running PF	: 0.89	**Starting PF**	: 0.46	**Cyclic**	: No
Running Amps	: 19.15	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 13.56			**Voltage**	: 460

Shaft Hp	: 20.0	**Method**	: Across the line
Shaft kW	: 14.92	**Low Inertia**	: No
Efficiency (%)	: 0.88	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

25HP LOAD (X4) PR7 Three Phase Quantity : 4 In this Step
Category : Motor

Running kW	: 16.95	**Starting kW**	: 64.9	**Peak kW**	: None
Running kVA	: 19.04	**Starting kVA**	: 147.5	**Peak kVA**	: None
Running PF	: 0.89	**Starting PF**	: 0.44	**Cyclic**	: No
Running Amps	: 22.93	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 16.95			**Voltage**	: 480

Shaft Hp	: 25.0	**Method**	: Across the line
Shaft kW	: 18.65	**Low Inertia**	: No
Efficiency (%)	: 0.88	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

30HP LOAD (X2) PR7 Three Phase Quantity : 2 In this Step
Category : Motor

Running kW	: 19.9	**Starting kW**	: 24.87	**Peak kW**	: None
Running kVA	: 22.11	**Starting kVA**	: 27.63	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 27.78	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 22.11				
Starting NLL kVA	: 27.63			**Voltage**	: 460
Alternator kW	: 39.8				

Shaft Hp	: 30.0	**Type**	: Variable Frequency Drive
Shaft kW	: 22.38	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

3HP LOAD (X2) PR7 Three Phase Quantity : 2 In this Step
Category : Motor

Running kW	: 2.18	**Starting kW**	: 16.83	**Peak kW**	: None
Running kVA	: 2.66	**Starting kVA**	: 25.5	**Peak kVA**	: None

Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.34	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 460

Shaft Hp	:	3.0	**Method**	:	Across the line
Shaft kW	:	2.24	**Low Inertia**	:	No
Efficiency (%)	:	0.82	**LRkVA Factor**	:	8.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	K
Load Factor	:	80.0			

7.5HP LOAD (X2) PR7 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	4.97	**Starting kW**	:	6.21	**Peak kW**	: None
Running kVA	:	5.52	**Starting kVA**	:	6.9	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	6.94	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	5.52					
Starting NLL kVA	:	6.9				**Voltage**	: 460
Alternator kW	:	9.94					

Shaft Hp	:	7.5	**Type**	:	Variable Frequency Drive
Shaft kW	:	5.59	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

Step10

Calculated Individual Generator Set Step Load Requirements

Running kW	:	30.0	**Starting kW**	:	128.0	**Cumulative Step kW**	: 1258.0
Running kVA	:	34.0	**Starting kVA**	:	263.0	**Cumulative Step kVA**	: 1523.0
Running Amps	:	3.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	29.88					
Voltage Distortion Limit for	**: step**	10					

15HP LOAD (X4) PR8 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	:	10.29	**Starting kW**	:	43.37	**Peak kW**	: None
Running kVA	:	11.69	**Starting kVA**	:	88.5	**Peak kVA**	: None
Running PF	:	0.88	**Starting PF**	:	0.49	**Cyclic**	: No
Running Amps	:	14.69	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	10.29				**Voltage**	: 460

Shaft Hp	:	15.0	**Method**	:	Across the line
Shaft kW	:	11.19	**Low Inertia**	:	No
Efficiency (%)	:	0.87	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

1HP LOAD (X2) PR8 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	**:**	0.82	**Starting kW**	:	8.97	**Peak kW**	: None
Running kVA	**:**	1.17	**Starting kVA**	:	11.8	**Peak kVA**	: None
Running PF	**:**	0.7	**Starting PF**	:	0.76	**Cyclic**	: No
Running Amps	**:**	1.47	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	**:**	0.82				**Voltage**	: 460

Shaft Hp	: 1.0	**Method**	:	Across the line	
Shaft kW	: 0.75	**Low Inertia**	:	No	
Efficiency (%)	: 0.73	**LRkVA Factor**	:	11.8	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	N	
Load Factor	: 80.0				

25HP LOAD PR8 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 16.95	**Starting kW**	: 64.9	**Peak kW**	: None
Running kVA	: 19.04	**Starting kVA**	: 147.5	**Peak kVA**	: None
Running PF	: 0.89	**Starting PF**	: 0.44	**Cyclic**	: No
Running Amps	: 22.93	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 16.95			**Voltage**	: 480

Shaft Hp	: 25.0	**Method**	:	Across the line	
Shaft kW	: 18.65	**Low Inertia**	:	No	
Efficiency (%)	: 0.88	**LRkVA Factor**	:	5.9	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	G	
Load Factor	: 80.0				

Step11

Calculated Individual Generator Set Step Load Requirements

Running kW	: 73.0	**Starting kW**	: 106.0	**Cumulative Step kW**	: 1265.0
Running kVA	: 82.0	**Starting kVA**	: 121.0	**Cumulative Step kVA**	: 1416.0
Running Amps	: 7.0	**Starting Non-linear kVA**	: 92.0		
Running Non-linear kVA	: 74.0				
Alternator kW	: 139.57				
Voltage Distortion Limit for	**: step** 10				

50HP LOAD (X4) PR9 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	: 33.15	**Starting kW**	: 41.44	**Peak kW**	: None
Running kVA	: 36.83	**Starting kVA**	: 46.04	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 46.28	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 36.83				
Starting NLL kVA	: 46.04			**Voltage**	: 460
Alternator kW	: 66.3				

Shaft Hp	: 50.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 37.3	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

LOAD-CP-22L PR9 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 5.98	**Starting kW**	: 19.93	**Peak kW**	: None
Running kVA	: 7.47	**Starting kVA**	: 24.91	**Peak kVA**	: None
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	: 9.0	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 5.98			**Voltage**	: 480

LOAD-CP-3500A PR9 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 3.98	**Starting kW**	: 13.29	**Peak kW**	: None

Running kVA	:	4.98	**Starting kVA**	:	16.61	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	6.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.98				**Voltage**	: 480

LOAD-SG-3600 PR9 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.98	**Starting kW**	:	13.29	**Peak kW**	: None
Running kVA	:	4.98	**Starting kVA**	:	16.61	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	6.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.98				**Voltage**	: 480

Step12

Calculated Individual Generator Set Step Load Requirements

Running kW	:	15.0	**Starting kW**	:	71.0	**Cumulative Step kW**	: 1303.0
Running kVA	:	18.0	**Starting kVA**	:	106.0	**Cumulative Step kVA**	: 1483.0
Running Amps	:	1.0	**Starting Non-linear kVA**	:	1.0		
Running Non-linear kVA	:	1.0					
Alternator kW	:	15.0					
Voltage Distortion Limit for	**: step**	10					

.5HP LOAD PR10 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.42	**Starting kW**	:	4.54	**Peak kW**	: None
Running kVA	:	0.62	**Starting kVA**	:	5.9	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	0.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.42				**Voltage**	: 460

Shaft Hp	: 0.5	**Method**	:	Across the line	
Shaft kW	: 0.37	**Low Inertia**	:	No	
Efficiency (%)	: 0.72	**LRkVA Factor**	:	11.8	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	N	
Load Factor	: 80.0				

1.5HP LOAD PR10 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.99	**Starting kW**	:	1.24	**Peak kW**	: None
Running kVA	:	1.1	**Starting kVA**	:	1.38	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	1.38	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	1.1					
Starting NLL kVA	:	1.38				**Voltage**	: 460
Alternator kW	:	1.98					

Shaft Hp	: 1.5	**Type**	:	Variable Frequency Drive	
Shaft kW	: 1.12	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

10HP LOAD PR10 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.94	**Starting kW**	:	35.51	**Peak kW**	: None

Running kVA	: 7.98	**Starting kVA**	: 67.0	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.53	**Cyclic**	: No
Running Amps	: 10.03	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.94			**Voltage**	: 460

Shaft Hp	: 10.0	**Method**	: Across the line
Shaft kW	: 7.46	**Low Inertia**	: No
Efficiency (%)	: 0.86	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H
Load Factor	: 80.0		

1HP LOAD (X2) PR10 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	: 0.82	**Starting kW**	: 8.97	**Peak kW**	: None
Running kVA	: 1.17	**Starting kVA**	: 11.8	**Peak kVA**	: None
Running PF	: 0.7	**Starting PF**	: 0.76	**Cyclic**	: No
Running Amps	: 1.47	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.82			**Voltage**	: 460

Shaft Hp	: 1.0	**Method**	: Across the line
Shaft kW	: 0.75	**Low Inertia**	: No
Efficiency (%)	: 0.73	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

2HP LOAD PR10 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 1.51	**Starting kW**	: 13.3	**Peak kW**	: None
Running kVA	: 1.91	**Starting kVA**	: 19.0	**Peak kVA**	: None
Running PF	: 0.79	**Starting PF**	: 0.7	**Cyclic**	: No
Running Amps	: 2.4	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 1.51			**Voltage**	: 460

Shaft Hp	: 2.0	**Method**	: Across the line
Shaft kW	: 1.49	**Low Inertia**	: No
Efficiency (%)	: 0.79	**LRkVA Factor**	: 9.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: L
Load Factor	: 80.0		

5HP LOAD PR10 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.25	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 460

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

CO2-STORAGE-2 PR10 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 13.95	**Starting kW**	: 46.5	**Peak kW**	: None
Running kVA	: 17.44	**Starting kVA**	: 58.13	**Peak kVA**	: None

Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	21.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	13.95				**Voltage**	: 480

Step13

Calculated Individual Generator Set Step Load Requirements

Running kW	:	22.0	**Starting kW**	:	86.0	**Cumulative Step kW**	: 1333.0
Running kVA	:	27.0	**Starting kVA**	:	117.0	**Cumulative Step kVA**	: 1512.0
Running Amps	:	2.0	**Starting Non-linear kVA**	:	9.0		
Running Non-linear kVA	:	8.0					
Alternator kW	:	29.22					
Voltage Distortion Limit for	**: step**	10					

.5HP LOAD PR11 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.42	**Starting kW**	:	4.54	**Peak kW**	: None
Running kVA	:	0.62	**Starting kVA**	:	5.9	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	0.78	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.42				**Voltage**	: 460

Shaft Hp	: 0.5	**Method**	:	Across the line	
Shaft kW	: 0.37	**Low Inertia**	:	No	
Efficiency (%)	: 0.72	**LRkVA Factor**	:	11.8	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	N	
Load Factor	: 80.0				

1.5HP LOAD (X2) PR11 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	0.99	**Starting kW**	:	1.24	**Peak kW**	: None
Running kVA	:	1.1	**Starting kVA**	:	1.38	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	1.38	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	1.1					
Starting NLL kVA	:	1.38				**Voltage**	: 460
Alternator kW	:	1.98					

Shaft Hp	: 1.5	**Type**	:	Variable Frequency Drive	
Shaft kW	: 1.12	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

10HP LOAD PR11 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.63	**Starting kW**	:	8.29	**Peak kW**	: None
Running kVA	:	7.37	**Starting kVA**	:	9.21	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	9.26	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	7.37					
Starting NLL kVA	:	9.21				**Voltage**	: 460
Alternator kW	:	13.26					

Shaft Hp	: 10.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 7.46	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	

Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

2HP LOAD (X2) PR11 Three Phase Quantity : 2 In this Step
Category : Motor

Running kW	: 1.51	**Starting kW**	: 13.3	**Peak kW**	: None
Running kVA	: 1.91	**Starting kVA**	: 19.0	**Peak kVA**	: None
Running PF	: 0.79	**Starting PF**	: 0.7	**Cyclic**	: No
Running Amps	: 2.4	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 1.51			**Voltage**	: 460

Shaft Hp	: 2.0	**Method**	: Across the line
Shaft kW	: 1.49	**Low Inertia**	: No
Efficiency (%)	: 0.79	**LRkVA Factor**	: 9.5
Design	: Standard NEMA Design B,C or D 80.0	**LRkVA Code**	: L
Load Factor	:		

3HP LOAD (X2) PR11 Three Phase Quantity : 2 In this Step
Category : Motor

Running kW	: 2.18	**Starting kW**	: 16.83	**Peak kW**	: None
Running kVA	: 2.66	**Starting kVA**	: 25.5	**Peak kVA**	: None
Running PF	: 0.82	**Starting PF**	: 0.66	**Cyclic**	: No
Running Amps	: 3.34	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 2.18			**Voltage**	: 460

Shaft Hp	: 3.0	**Method**	: Across the line
Shaft kW	: 2.24	**Low Inertia**	: No
Efficiency (%)	: 0.82	**LRkVA Factor**	: 8.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: K
Load Factor	: 80.0		

5HP LOAD PR11 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.25	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 460

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

7.5HP LOAD PR11 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 4.97	**Starting kW**	: 6.21	**Peak kW**	: None
Running kVA	: 5.52	**Starting kVA**	: 6.9	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 6.94	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 5.52				
Starting NLL kVA	: 6.9			**Voltage**	: 460
Alternator kW	: 9.94				

Shaft Hp	7.5	**Type**	: Variable Frequency Drive
Shaft kW	5.59	**Ramp Details**	: None
Rectifier Type	6 pulse	**THDI %**	: 26

:
:
:

Efficiency (%) : 0.9 **THDV %** : 10
Load Factor : 80.0

CO2-STORAGE-1 PR11 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	19.93	**Starting kW**	:	66.43	**Peak kW**	: None
Running kVA	:	24.91	**Starting kVA**	:	83.04	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	30.0	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	19.93				**Voltage**	: 480

Step14

Calculated Individual Generator Set Step Load Requirements

Running kW	:	109.0	**Starting kW**	:	165.0	**Cumulative Step kW**	: 1435.0
Running kVA	:	121.0	**Starting kVA**	:	225.0	**Cumulative Step kVA**	: 1647.0
Running Amps	:	10.0	**Starting Non-linear kVA**	:	138.0		
Running Non-linear kVA	:	111.0					
Alternator kW	:	208.49					
Voltage Distortion Limit for	: step	10					

150HP LOAD (X2) PR12 Three Phase Quantity : 2 In this Step

Category : Motor

Running kW	:	99.46	**Starting kW**	:	124.33	**Peak kW**	: None
Running kVA	:	110.51	**Starting kVA**	:	138.14	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	138.87	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	110.51					
Starting NLL kVA	:	138.14				**Voltage**	: 460
Alternator kW	:	198.92					

Shaft Hp	: 150.0	**Type**	:	Variable Frequency Drive
Shaft kW	: 111.9	**Ramp Details**	:	None
Rectifier Type	: 6 pulse	**THDI %**	:	26
Efficiency (%)	: 0.9	**THDV %**	:	10
Load Factor	: 80.0			

25HP LOAD PR12 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	16.95	**Starting kW**	:	64.9	**Peak kW**	: None
Running kVA	:	19.04	**Starting kVA**	:	147.5	**Peak kVA**	: None
Running PF	:	0.89	**Starting PF**	:	0.44	**Cyclic**	: No
Running Amps	:	23.93	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	16.95				**Voltage**	: 460

Shaft Hp	: 25.0	**Method**	:	Across the line
Shaft kW	: 18.65	**Low Inertia**	:	No
Efficiency (%)	: 0.88	**LRkVA Factor**	:	5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	: 80.0			

3HP LOAD PR12 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 2.18	**Starting kW**	:	16.83	**Peak kW**	: None

Running kVA	: 2.66	**Starting kVA**	: 25.5	**Peak kVA**	: None
Running PF	: 0.82	**Starting PF**	: 0.66	**Cyclic**	: No
Running Amps	: 3.34	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 2.18			**Voltage**	: 460

Shaft Hp	: 3.0	**Method**	: Across the line
Shaft kW	: 2.24	**Low Inertia**	: No
Efficiency (%)	: 0.82	**LRkVA Factor**	: 8.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: K
Load Factor	: 80.0		

Step15

Calculated Individual Generator Set Step Load Requirements

Running kW	: 2.0	**Starting kW**	: 7.0	**Cumulative Step kW**	: 1385.0
Running kVA	: 2.0	**Starting kVA**	: 8.0	**Cumulative Step kVA**	: 1552.0
Running Amps	: 0.0	**Starting Non-linear kVA**	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 1.99				
Voltage Distortion Limit for	**: step** 10				

LOAD-HOIST FEED. PR13 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 3.98	**Starting kW**	: 13.29	**Peak kW**	: None
Running kVA	: 4.98	**Starting kVA**	: 16.61	**Peak kVA**	: None
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	: 6.0	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.98			**Voltage**	: 480

Step16

Calculated Individual Generator Set Step Load Requirements

Running kW	: 16.0	**Starting kW**	: 78.0	**Cumulative Step kW**	: 1459.0
Running kVA	: 19.0	**Starting kVA**	: 148.0	**Cumulative Step kVA**	: 1693.0
Running Amps	: 2.0	**Starting Non-linear kVA**	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 16.03				
Voltage Distortion Limit for	**: step** 10				

.75HP LOAD PR14 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 1.14	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.62			**Voltage**	: 460

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D 80.0	**LRkVA Code**	: N
Load Factor	:		

25HP LOAD PR14 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 16.95	**Starting kW**	: 64.9	**Peak kW**	: None
Running kVA	: 19.04	**Starting kVA**	: 147.5	**Peak kVA**	: None

Running PF	:	0.89	**Starting PF**	:	0.44	**Cyclic**	: No
Running Amps	:	22.93	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	16.95				**Voltage**	: 480

Shaft Hp	:	25.0	**Method**	:	Across the line
Shaft kW	:	18.65	**Low Inertia**	:	No
Efficiency (%)	:	0.88	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

3HP LOAD PR14 Three Phase Quantity : 2 In this Step
Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.34	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 460

Shaft Hp	:	3.0	**Method**	:	Across the line
Shaft kW	:	2.24	**Low Inertia**	:	No
Efficiency (%)	:	0.82	**LRkVA Factor**	:	8.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	K
Load Factor	:	80.0			

5HP LOAD PR14 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.25	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 460

Shaft Hp	:	5.0	**Method**	:	Across the line
Shaft kW	:	3.73	**Low Inertia**	:	No
Efficiency (%)	:	0.84	**LRkVA Factor**	:	7.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	J
Load Factor	:	80.0			

7.5HP LOAD PR14 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	6.58	**Starting kW**	:	28.14	**Peak kW**	: None
Running kVA	:	7.56	**Starting kVA**	:	50.25	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	: No
Running Amps	:	9.1	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	6.58				**Voltage**	: 480

Shaft Hp	:	7.5	**Method**	:	Across the line
Shaft kW	:	5.59	**Low Inertia**	:	No
Efficiency (%)	:	0.85	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	100.0			

Step17

Calculated Individual Generator Set Step Load Requirements

Running kW	:	14.0	**Starting kW**	:	29.0	**Cumulative Step kW**	: 1425.0
Running kVA	:	16.0	**Starting kVA**	:	41.0	**Cumulative Step kVA**	: 1606.0
Running Amps	:	1.0	**Starting Non-linear kVA**	:	16.0		

Running Non-linear kVA	:	13.0					
Alternator kW	:	25.84					
Voltage Distortion Limit for	**: step**	10					

10HP LOAD PR15 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.63	**Starting kW**	:	8.29	**Peak kW**	:	None
Running kVA	:	7.37	**Starting kVA**	:	9.21	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	:	No
Running Amps	:	9.26	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	:	7.37						
Starting NLL kVA	:	9.21				**Voltage**	:	460
Alternator kW	:	13.26						

Shaft Hp	: 10.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 7.46	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

25HP LOAD PR15 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	16.58	**Starting kW**	:	20.72	**Peak kW**	:	None
Running kVA	:	18.42	**Starting kVA**	:	23.02	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	:	No
Running Amps	:	22.18	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	:	18.42						
Starting NLL kVA	:	23.02				**Voltage**	:	480
Alternator kW	:	33.16						

Shaft Hp	: 25.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 18.65	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

7.5HP LOAD PR15 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	5.26	**Starting kW**	:	28.14	**Peak kW**	:	None
Running kVA	:	6.05	**Starting kVA**	:	50.25	**Peak kVA**	:	None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	:	No
Running Amps	:	7.6	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	5.26				**Voltage**	:	460

Shaft Hp	: 7.5	**Method**	:	Across the line	
Shaft kW	: 5.59	**Low Inertia**	:	No	
Efficiency (%)	: 0.85	**LRkVA Factor**	:	6.7	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	H	
Load Factor	: 80.0				

Step18

Calculated Individual Generator Set Step Load Requirements

Running kW	:	23.0	**Starting kW**	:	84.0	**Cumulative Step kW**	:	1495.0
Running kVA	:	29.0	**Starting kVA**	:	117.0	**Cumulative Step kVA**	:	1697.0
Running Amps	:	2.0	**Starting Non-linear kVA**	:	0.0			
Running Non-linear kVA	:	0.0						
Alternator kW	:	23.4						

Voltage Distortion Limit for : step 10

10HP LOAD PR17 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW :	6.94	**Starting kW** :	35.51	**Peak kW** :	None
Running kVA :	7.98	**Starting kVA** :	67.0	**Peak kVA** :	None
Running PF :	0.87	**Starting PF** :	0.53	**Cyclic** :	No
Running Amps :	10.03	**Max. % Voltage Dip** :	30.0	**Max. % Frequency Dip** :	10.0
Alternator kW :	6.94			**Voltage** :	460

Shaft Hp : 10.0 **Method** : Across the line
Shaft kW : 7.46 **Low Inertia** : No
Efficiency (%) : 0.86 **LRkVA Factor** : 6.7 **Design** : Standard NEMA Design B,C or D **LRkVA Code** : H **Load Factor** : 80.0

LOAD-LCP-5545 PR17 Three Phase Quantity : 1 In this Step Category : User Defined

Running kW :	19.93	**Starting kW** :	66.43	**Peak kW** :	None
Running kVA :	24.91	**Starting kVA** :	83.04	**Peak kVA** :	None
Running PF :	0.8	**Starting PF** :	0.8	**Cyclic** :	No
Running Amps :	30.0	**Max. % Voltage Dip** :	30.0	**Max. % Frequency Dip** :	10.0
Alternator kW :	19.93			**Voltage** :	480

LOAD-PNL-LCP5540 PR17 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW :	19.93	**Starting kW** :	66.43	**Peak kW** :	None
Running kVA :	24.91	**Starting kVA** :	83.04	**Peak kVA** :	None
Running PF :	0.8	**Starting PF** :	0.8	**Cyclic** :	No
Running Amps :	30.0	**Max. % Voltage Dip** :	30.0	**Max. % Frequency Dip** :	10.0
Alternator kW :	19.93			**Voltage** :	480

Step19

Calculated Individual Generator Set Step Load Requirements

Running kW :	21.0	**Starting kW** :	110.0	**Cumulative Step kW** :	1544.0
Running kVA :	25.0	**Starting kVA** :	177.0	**Cumulative Step kVA** :	1786.0
Running Amps :	2.0	**Starting Non-linear kVA** :	7.0		
Running Non-linear kVA :	6.0				
Alternator kW :	25.95				
Voltage Distortion Limit for : step	10				

.5HP LOAD PR18 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW :	0.42	**Starting kW** :	4.54	**Peak kW** :	None
Running kVA :	0.62	**Starting kVA** :	5.9	**Peak kVA** :	None
Running PF :	0.68	**Starting PF** :	0.77	**Cyclic** :	No
Running Amps :	0.78	**Max. % Voltage Dip** :	30.0	**Max. % Frequency Dip** :	10.0
Alternator kW :	0.42			**Voltage** :	460

Shaft Hp :	0.5	**Method** :	Across the line
Shaft kW :	0.37	**Low Inertia** :	No
Efficiency (%) :	0.72	**LRkVA Factor** :	11.8
Design :	Standard NEMA Design B,C or D	**LRkVA Code** :	N
Load Factor :	80.0		

.75HP LOAD (X3) PR18 Three Phase Quantity : 3 In this Step

Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 1.14	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.62			**Voltage**	: 460

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

1.5HP LOAD PR18 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 1.16	**Starting kW**	: 10.26	**Peak kW**	: None
Running kVA	: 1.53	**Starting kVA**	: 14.25	**Peak kVA**	: None
Running PF	: 0.76	**Starting PF**	: 0.72	**Cyclic**	: No
Running Amps	: 1.92	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 1.16			**Voltage**	: 460

Shaft Hp	: 1.5	**Method**	: Across the line
Shaft kW	: 1.12	**Low Inertia**	: No
Efficiency (%)	: 0.77	**LRkVA Factor**	: 9.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: L
Load Factor	: 80.0		

10HP LOAD PR18 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 6.94	**Starting kW**	: 35.51	**Peak kW**	: None
Running kVA	: 7.98	**Starting kVA**	: 67.0	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.53	**Cyclic**	: No
Running Amps	: 10.03	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.94			**Voltage**	: 460

Shaft Hp	: 10.0	**Method**	: Across the line
Shaft kW	: 7.46	**Low Inertia**	: No
Efficiency (%)	: 0.86	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H
Load Factor	: 80.0		

15HP LOAD PR18 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 9.94	**Starting kW**	: 12.43	**Peak kW**	: None
Running kVA	: 11.04	**Starting kVA**	: 13.81	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 13.87	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 11.04				
Starting NLL kVA	: 13.81			**Voltage**	: 460
Alternator kW	: 19.88				

Shaft Hp	: 15.0	**Type**	: Variable Frequency Drive
Shaft kW	: 11.19	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10

Load Factor : 80.0

3HP LOAD PR18 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.34	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 460

Shaft Hp	:	3.0	**Method**	:	Across the line
Shaft kW	:	2.24	**Low Inertia**	:	No
Efficiency (%)	:	0.82	**LRkVA Factor**	:	8.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	K
Load Factor	:	80.0			

5HP LOAD (X4) PR18 Three Phase Quantity : 4 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.25	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 460

Shaft Hp	:	5.0	**Method**	:	Across the line
Shaft kW	:	3.73	**Low Inertia**	:	No
Efficiency (%)	:	0.84	**LRkVA Factor**	:	7.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	J
Load Factor	:	80.0			

7.5HP LOAD PR18 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	5.26	**Starting kW**	:	28.14	**Peak kW**	: None
Running kVA	:	6.05	**Starting kVA**	:	50.25	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	: No
Running Amps	:	7.6	**Max. % Voltage Dip**	:	30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.26				**Voltage**	: 460

Shaft Hp	:	7.5	**Method**	:	Across the line
Shaft kW	:	5.59	**Low Inertia**	:	No
Efficiency (%)	:	0.85	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

Step20

Calculated Individual Generator Set Step Load Requirements

Running kW	:	15.0	**Starting kW**	:	50.0	**Cumulative Step kW**	: 1505.0
Running kVA	:	19.0	**Starting kVA**	:	62.0	**Cumulative Step kVA**	: 1696.0
Running Amps	:	2.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	14.95					
Voltage Distortion Limit for step	:	10					

PNL-PPE PR19 Three Phase Quantity : 1 In this Step

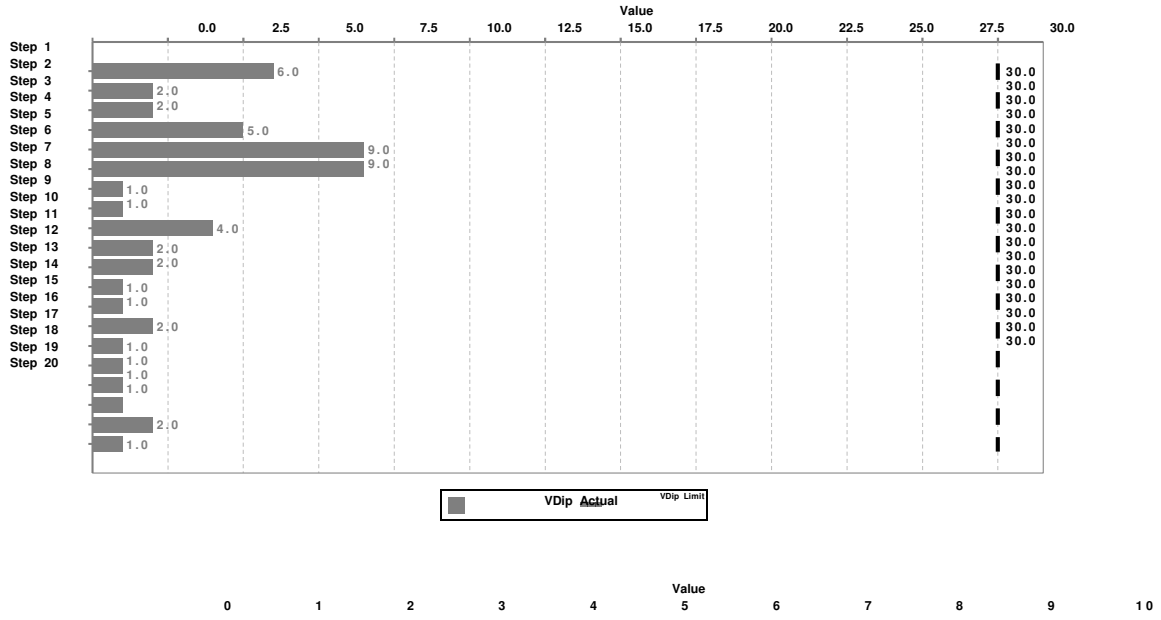
Category : User Defined

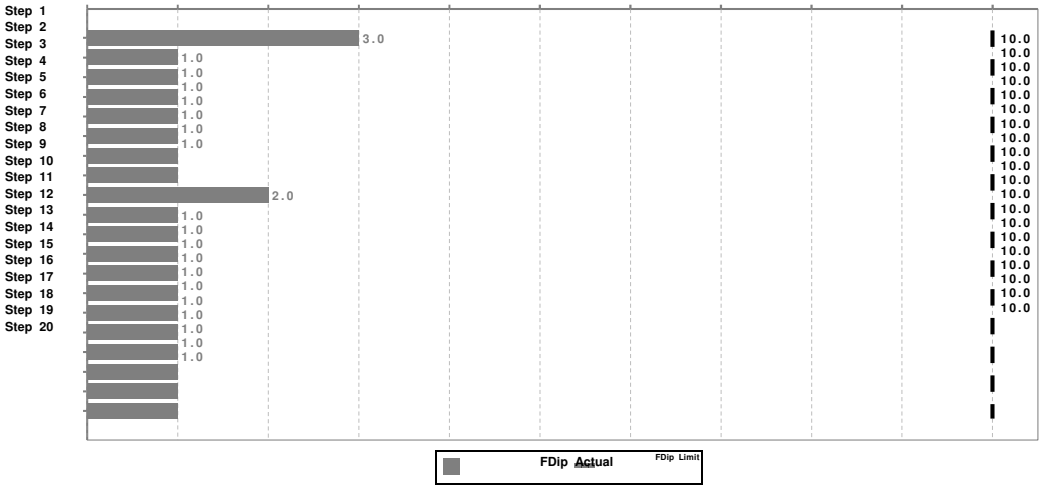
Running kW	:	29.9	**Starting kW**	:	99.65	**Peak kW**	: None
Running kVA	:	37.37	**Starting kVA**	:	124.56	**Peak kVA**	: None

Running PF	:	0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	:	45.0	**Max. % Voltage Dip**	: 30.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	29.9			**Voltage**	: 480

Step Level Dips Summary

Step #	Voltage Dip Limit (%)	Expected Step Voltage Dip (%)	Voltage Recovery Time (s) **	Frequency Dip Limit (%)	Expected Frequency Dip (%)	Frequency recovery Time (s) **
1	30	6	1.1	10	3	1.3
2	30	2	0.4	10	1	0.4
3	30	2	0.3	10	1	0.3
4	30	5	0.4	10	1	0.5
5	30	9	0.6	10	1	0.7
6	30	9	0.6	10	1	0.7
7	30	1	0.1	10	1	0.1
8	30	1	0.2	10	1	0.3
9	30	4	0.7	10	2	0.8
10	30	2	0.3	10	1	0.4
11	30	2	0.3	10	1	0.3
12	30	1	0.2	10	1	0.2
13	30	1	0.2	10	1	0.3
14	30	2	0.4	10	1	0.5
15	30	1	0.1	10	1	0.1
16	30	1	0.2	10	1	0.2
17	30	1	0.1	10	1	0.1
18	30	1	0.2	10	1	0.3
19	30	2	0.3	10	1	0.3
20	30	1	0.1	10	1	0.2




Step 1
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Step 17
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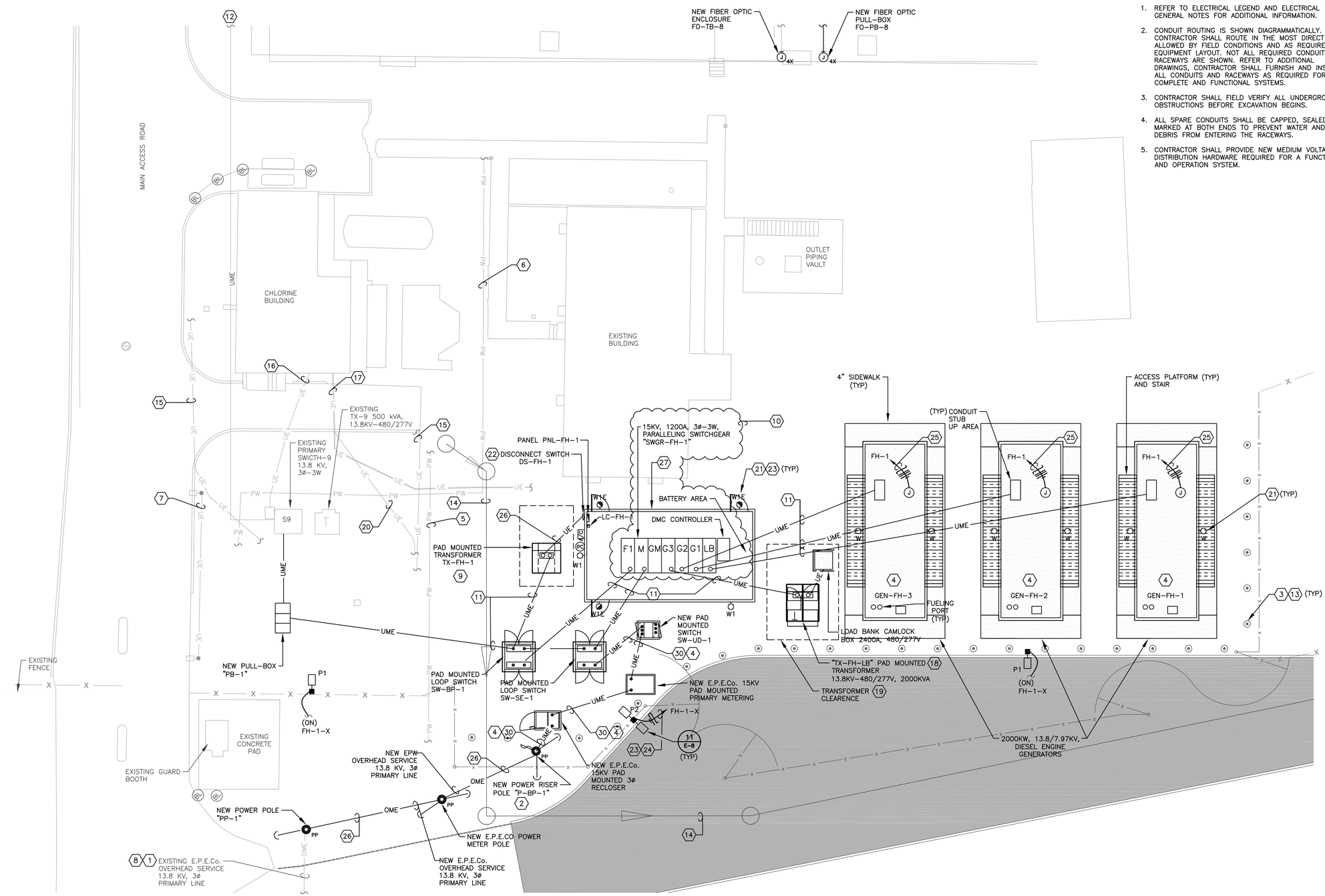
FDip Actual
FDip Limit

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.
2. CONDUIT ROUTING IS SHOWN DIAGRAMMATICALLY. CONTRACTOR SHALL ROUTE IN THE MOST DIRECT WAY ALLOWED BY FIELD CONDITIONS AND AS REQUIRED BY EQUIPMENT LAYOUT. NOT ALL REQUIRED CONDUITS AND RACEWAYS ARE SHOWN. REFER TO ADDITIONAL DRAWINGS, CONTRACTOR SHALL FURNISH AND INSTALL ALL CONDUITS AND RACEWAYS AS REQUIRED FOR COMPLETE AND FUNCTIONAL SYSTEMS.
3. CONTRACTOR SHALL FIELD VERIFY ALL UNDERGROUND OBSTRUCTIONS BEFORE EXCAVATION BEGINS.
4. ALL SPARE CONDUITS SHALL BE CAPPED, SEALED AND MARKED AT BOTH ENDS TO PREVENT WATER AND DEBRIS FROM ENTERING THE RACEWAYS.
5. CONTRACTOR SHALL PROVIDE NEW MEDIUM VOLTAGE DISTRIBUTION HARDWARE REQUIRED FOR A FUNCTIONAL AND OPERATION SYSTEM.

KEYED NOTES (THIS SHEET ONLY)

1. EXISTING OVERHEAD CONDUCTORS TO REMAIN.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE PRIMARY POWER POLE AND RISER. PROVIDE ALL REQUIRED OVERHEAD POWER DISTRIBUTION HARDWARE. SEE POLE DETAILS FOR ADDITIONAL INFORMATION.
3. FURNISH AND INSTALL BOLLARDS AS INDICATED.
4. NEW 2000KW, 13.8KV, 3P–3W, DIESEL ENGINE GENERATORS, SHALL BE EXERCISED MONTHLY WITH THE PLANT LOADS AND SHALL BE EXERCISED ANNUALLY WITH NOT LESS THAN 1000KW OF THE PLANT LOADS FOR 30 MINUTES AND WITH NOT LESS THAN 1500KW OF THE PLANT LOADS FOR 1 CONTINUOUS HOUR, PER INDICATIONS ON NFPA–110 CHAPTER 8.
5. EXISTING 22" WATER LINE PER H20 TERRA SUE SURVEY REPORT TO REMAIN IN SERVICE.
6. EXISTING 1" WATER LINE, TO REMAIN IN SERVICE, PER H20 TERRA SUE SURVEY REPORT.
7. EXISTING UNDERGROUND ELECTRICAL LINE, PER H20 TERRA SUE SURVEY REPORT AND RECORD DRAWINGS.
8. OVERHEAD LINE MODIFICATIONS, HARDWIRED AND GUY WIRES TO BE PROVIDED BY E.P.E.Co, AS REQUIRED.
9. NEW 112.5 KVA, 13.8KV/120–208V, 3P–4W, PAD MOUNTED TRANSFORMER.
10. GMP 1 EARLY EQUIPMENT PACKAGE.
11. CONCRETE ENCASED FEEDER. REFER TO ONE LINE DIAGRAMS AND TO DETAILS FOR REQUIREMENTS.
12. TO EXISTING PRIMARY SWITCH 8.
13. REFER TO CIVIL DRAWINGS FOR WORK REQUIREMENTS.
14. PROPOSED FUTURE WATER LINE UNDER DESIGN BY PARKILL.
15. EXISTING 3" UNDERGROUND ELECTRICAL LINE PER H20 TERRA SUE SURVEY.
16. EXISTING 1–1/2" UNDERGROUND ELECTRICAL LINE PER H20 TERRA SUE SURVEY.
17. EXISTING 2" UNDERGROUND ELECTRICAL LINE PER H20 TERRA SUE SURVEY.
18. NEW 2000KVA PAD MOUNTED TRANSFORMER 13.8KV/480–277V, 3P–4W.
19. 2400A, 480V, 3P–4W, LOAD BANK TAP BOX IN NEMA 4X STAINLESS STEEL ENCLOSURE.
20. EXISTING 1" UNDERGROUND ELECTRICAL LINE PER H20 TERRA SUE SURVEY.
21. LIGHT FIXTURE TO BE PROVIDED, WIRED AND CONNECTED WITH PREFABRICATED GENERATOR/E–HOUSE ENCLOSURE.
22. NEW HEAVY DUTY DISCONNECT SWITCH 400A/300AF, 3P–4W, 600V IN NEMA 4X ENCLOSURE.
23. EXTEND TO CIRCUIT INDICATED THROUGH LIGHTING CONTACTOR. REFER TO LIGHTING CONTROL DIAGRAM.
24. FOR POLE LIGHTS, PROVIDE 2#12, 1#12G IN 3/4"C, WITH A 1 POLE, 20AMP CIRCUIT BREAKER.
25. ELECTRICAL FEEDER FOR 120/208V GENERATOR LOAD CENTER. COORDINATE EXACT LOCATION PRIOR TO ROUGH–IN. PROVIDE 4#2, 1#8G IN 1–1/4"C, FED FROM 3P/600A CIRCUIT BREAKER IN PANEL FH–1.
26. REFER TO ONE LINE DIAGRAMS FOR REQUIREMENTS.
27. REFER TO SHEET E–12 DETAIL 1.



1 E–3 PARTIAL ELECTRICAL REVISED SITE PLAN

SCALE: 3/32"=1'–0"

0 4' 8' 16'

PRICING PACKAGE

THIS DOCUMENT IS PARTIALLY COMPLETE AND RELEASED FOR THE PURPOSE OF PRICING AND REVIEW UNDER THE AUTHORITY OF:
TEXAS NO: 105916 ON DATE: 06/02/2023
IT IS NOT TO BE USED FOR CONSTRUCTION OR PERMIT PURPOSES

REV.	DATE	BY	DESCRIPTION

DESIGNED JLC
DRAWN CAD
CHECKED JLC
DATE 06–02–23

PRELIMINARY - FOR GMP 1 EARLY EQUIPMENT PACKAGE 1 ONLY - NOT FOR CONSTRUCTION

"This preliminary drawing is released for the purpose of owner review under the authority of José L. Castrejón, P.E., Texas Professional Engineer Number 105916 on June 2, 2023. This drawing is not to be used for construction, or permitting purposes. Alteration of this document is an offense under the Texas Engineering Practice Act."

Bath ENGINEERING
TEXAS FIRM REGISTRATION NO. 829
4110 RIO BRAVO SUITE 102
EL PASO, TX 79902
TEL: 915-313-7200

el paso WATER

FRED HERVEY WRP BACKUP GENERATORS
EL PASO, TX

PARTIAL ELECTRICAL REVISED SITE PLAN

JOB NO. 3977C
DRAWING NO. E–3
SEQUENCE NO. 19 OF 36

J:\3977C EPW Fred Hervey Generators\CAD\3977C EPW Fred Hervey Generators\Sheets\E–3 PARTIAL ELECTRICAL REVISED SITE PLAN.dwg

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.

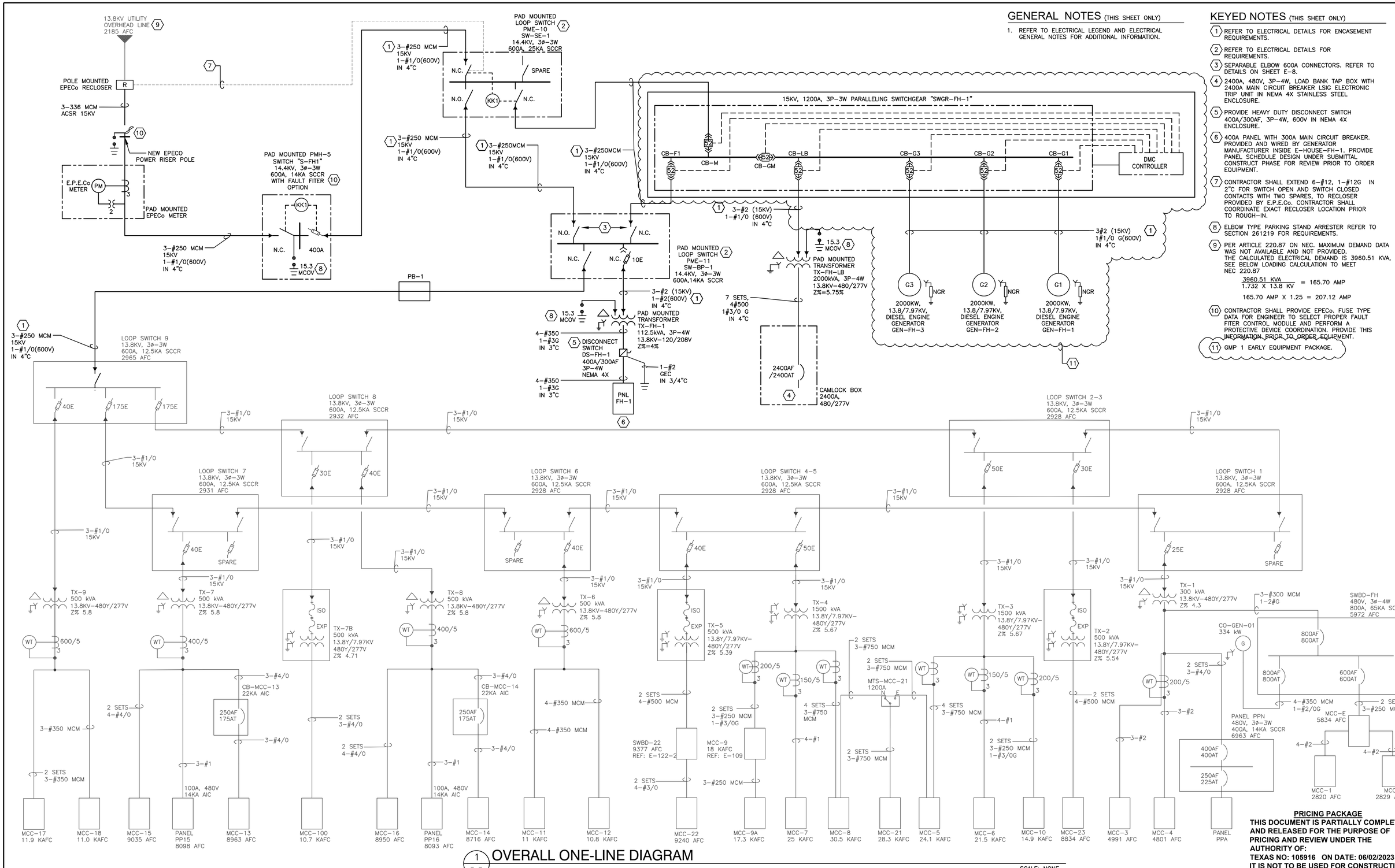
KEYED NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL DETAILS FOR ENCASEMENT REQUIREMENTS.
2. REFER TO ELECTRICAL DETAILS FOR REQUIREMENTS.
3. SEPARABLE ELBOW 600A CONNECTORS. REFER TO DETAILS ON SHEET E-8.
4. 2400A, 480V, 3P-4W, LOAD BANK TAP BOX WITH 2400A MAIN CIRCUIT BREAKER LSIG ELECTRONIC TRIP UNIT IN NEMA 4X STAINLESS STEEL ENCLOSURE.
5. PROVIDE HEAVY DUTY DISCONNECT SWITCH 400A/300AF, 3P-4W, 600V IN NEMA 4X ENCLOSURE.
6. 400A PANEL WITH 300A MAIN CIRCUIT BREAKER. PROVIDED AND WIRED BY GENERATOR MANUFACTURER INSIDE E-HOUSE-FH-1. PROVIDE PANEL SCHEDULE DESIGN UNDER SUBMITTAL CONSTRUCT PHASE FOR REVIEW PRIOR TO ORDER EQUIPMENT.
7. CONTRACTOR SHALL EXTEND 6-#12, 1-#12G IN 2"C FOR SWITCH OPEN AND SWITCH CLOSED CONTACTS WITH TWO SPARES, TO RECLOSER PROVIDED BY E.P.E.Co. CONTRACTOR SHALL COORDINATE EXACT RECLOSER LOCATION PRIOR TO ROUGH-IN.
8. ELBOW TYPE PARKING STAND ARRESTER REFER TO SECTION 261219 FOR REQUIREMENTS.
9. PER ARTICLE 220.87 ON NEC. MAXIMUM DEMAND DATA WAS NOT AVAILABLE AND NOT PROVIDED. THE CALCULATED ELECTRICAL DEMAND IS 3960.51 KVA, SEE BELOW LOADING CALCULATION TO MEET NEC 220.87

$$\frac{3960.51\ \text{KVA}}{1.732 \times 13.8\ \text{KV}} = 165.70\ \text{AMP}$$

$$165.70\ \text{AMP} \times 1.25 = 207.12\ \text{AMP}$$

10. CONTRACTOR SHALL PROVIDE EPECo. FUSE TYPE DATA FOR ENGINEER TO SELECT PROPER FAULT FITER CONTROL MODULE AND PERFORM A PROTECTIVE DEVICE COORDINATION. PROVIDE THIS INFORMATION PRIOR TO ORDER EQUIPMENT.
11. GMP 1 EARLY EQUIPMENT PACKAGE.



1 / E-7 OVERALL ONE-LINE DIAGRAM

SCALE: NONE

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REV.	DATE	BY	DESCRIPTION

DESIGNED JLC
DRAWN CAD
CHECKED JLC
DATE 06-02-23

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EL PASO, TX 79902
TEL: 915-313-7200

el paso WATER

FRED HERVEY WRP BACKUP GENERATORS
EL PASO, TX

OVERALL ONE-LINE DIAGRAM

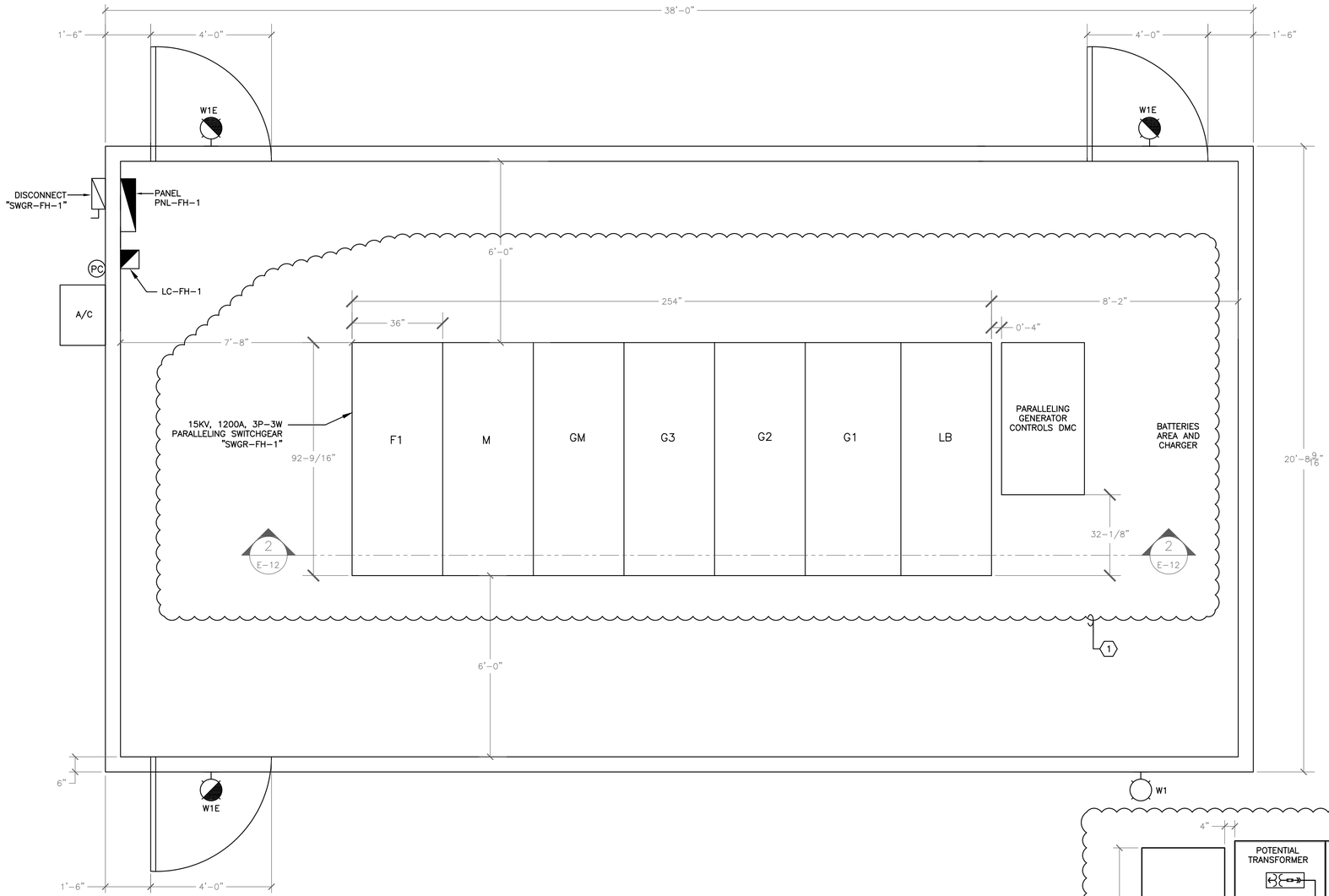
JOB NO. 3977C
DRAWING NO. E-7
SEQUENCE NO. 23 OF 36

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.

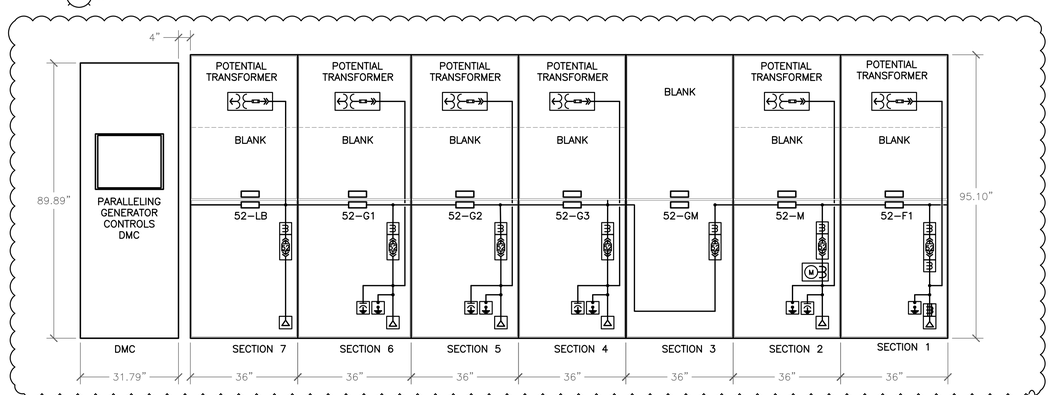
KEYED NOTES (THIS SHEET ONLY)

(1) GMP 1 EARLY EQUIPMENT PACKAGE.



1 E-12 ENLARGED BUILDING LAYOUT

SCALE: 1/2"=1'-0"



2 E-12 SWITCHGEAR "SWGR-FH-1" ELEVATION

SCALE: NONE

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ENLARGED BUILDING LAYOUT AND SWITCHGEAR ELEVATION

JOB NO. 3977C
DRAWING NO. E-12
SEQUENCE NO. 28 OF 36

J:\3977C EPW Fred Hervey Generators\CAD\3977C EPW Fred Hervey Generators\Sheets\E-12 ENLARGED BUILDING LAYOUT AND SWITCHGEAR ELEVATION.dwg

POWER COMMAND CONTROLS ANSI DEVICE NUMBERS

ANSI DEVICE NUMBERS	ANSI FUNCTION
15	SYNCHRONIZER
25	SYNC CHECK RELAY
27	UNDERVOLTAGE RELAY
32	DIRECTIONAL POWER RELAY (REVERSE KW)
40	LOSS OF FIELD RELAY (REVERSE kVAR)
	UNDER EXCITATION (REVERSE kVAR)
46	PHASE BALANCE CURRENT RELAY (NEGATIVE SEQUENCE)
47	PHASE SEQUENCE RELAY
50	INSTANTANEOUS OVERCURRENT RELAY (AMPSENTRY) MAINTENANCE MODE)
51	TIME OVERCURRENT RELAY (AMPSENTRY)
59	OVERVOLTAGE RELAY
65	GOVERNOR
81	OVER/UNDER FREQUENCY RELAY
86	LOCKOUT
90	VOLTAGE REGULATOR

ANSI DEVICE NUMBERS

M	MOTOR OR METERING
27	UNDERVOLTAGE RELAY
32	DIRECTIONAL POWER RELAY
40	FIELD RELAY / LOSS OF EXCITATION
49	MACHINE OR TRANSFORMER THERMAL RELAY / THERMAL OVERLOAD
50	INSTANTANEOUS OVERCURRENT RELAY
50P	PHASE INSTANTANEOUS OVERCURRENT
51	OVERLOAD
51G	GROUND TIME OVERCURRENT
51N	NEUTRAL TIME OVERCURRENT
59	OVERVOLTAGE RELAY
67G	GROUND DIRECTIONAL OVERCURRENT
81	FREQUENCY RELAY
86	LOCKING-OUT RELAY
87	DIFFERENTIAL PROTECTIVE RELAY
87N	NEUTRAL DIFFERENTIAL PROTECTIVE RELAY

SEL DEVICE NUMBERS

50PAF	ARC FLASH PHASE OVERCURRENT
50NAF	ARC FLASH NEUTRAL OVERCURRENT
AFD	ARC FLASH DETECTOR WITH LIGHT SENSOR
BF	BREAKER FAILURE

KEYED NOTES (THIS SHEET ONLY)

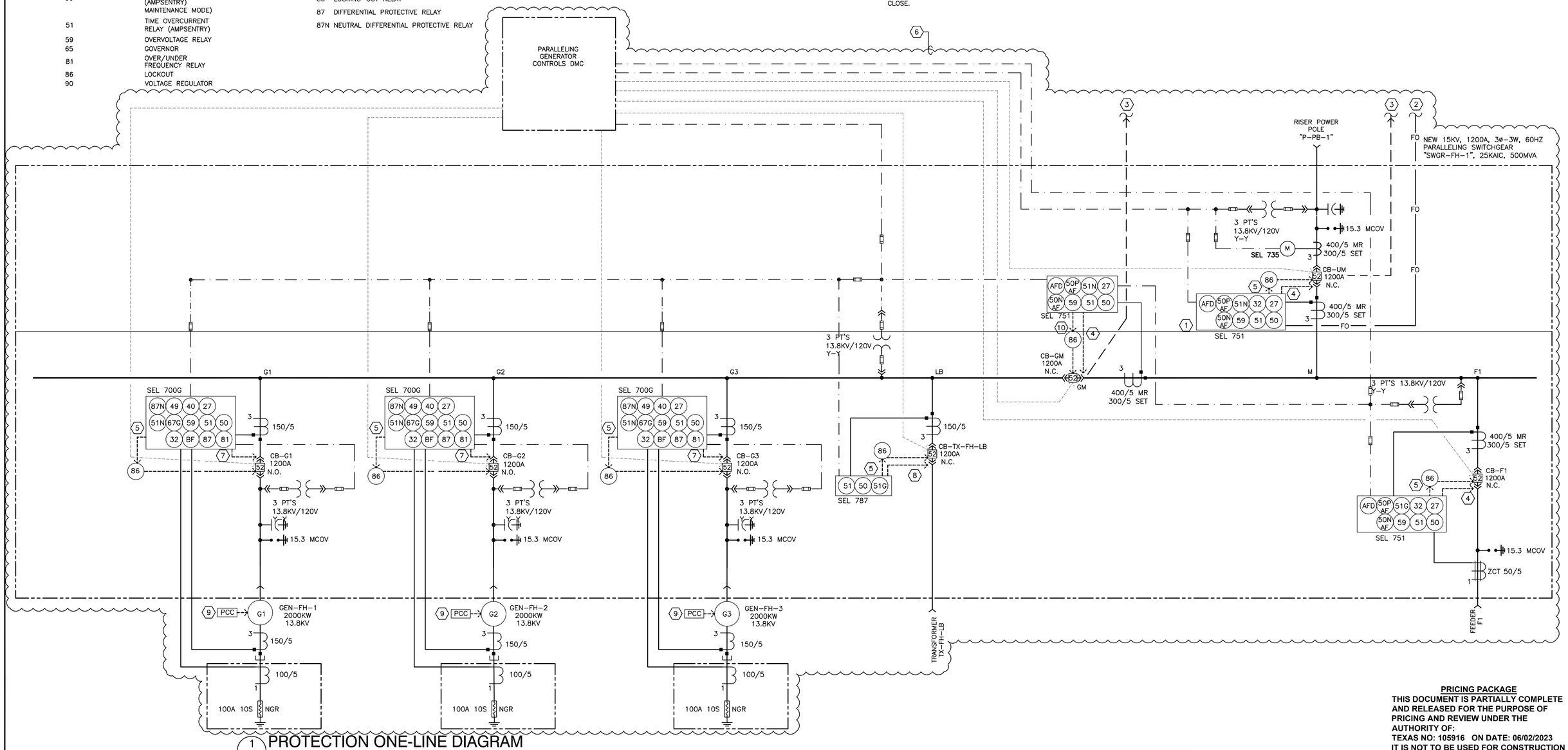
1. SEL-751 SHALL BE PROGRAMMED WITH DIRECTIONAL PROTECTION (32) RELAY AND OPEN UTILITY MAIN BREAKER ON THIS SWITCHGEAR FOR REVERSED POWER DETECTION.
2. NEW FIBER OPTIC FROM SPLICE BOX FO-PB-8.
3. CONTRACTOR SHALL EXTEND 10-#12, 1-#12G IN 1-1/4"C FOR BREAKER OPEN, BREAKER CLOSED, BREAKER TRIPPED, BREAKER FAIL TO CLOSE AND BREAKER FAIL TO OPEN, TO RECLOSER PROVIDED BY E.P.E.Co. CONTRACTOR SHALL COORDINATE EXACT RECLOSER LOCATION PRIOR TO ROUGH-IN.
4. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51, 51N/51G, 50PAF, 50NAF, 27, 32 AND 59 DEVICES ACTIVATE.
5. RELAY OUTPUT TO TRIP 86 RELAY AND LOCKOUT WHEN 52 TRIPS, AFD ACTIVATES AND 52 CLOSES. 86 RELAY TO SEND BREAKER FAILURE SIGNAL TO DMC WHEN BREAKER FAILS TO OPEN AND TO CLOSE.
6. GMP 1 EARLY EQUIPMENT PACKAGE.
7. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 27, 40, 49, 87N, 50, 51, 59, 67G, 51N, 81, 87 AND 32 DEVICES ACTIVATE.
8. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51 AND 51G ACTIVATE.
9. REFER TO POWER COMMAND CONTROLS (PCC) DEVICE NUMBERS ON THIS SHEET.
10. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51, 51N/51G, 50PAF, 50NAF, 27 AND 59 DEVICES ACTIVATE.

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.
2. ALL RELAYS SHALL BE POWERED WITH 125 VDC.

LEGEND (THIS SHEET ONLY)

- BUS
- VOLTAGE CONNECTION
- CURRENT CONNECTION
- COMMUNICATION
- DIGITAL (DISCRETE) SIGNAL



1 PROTECTION ONE-LINE DIAGRAM
E-13

SCALE: N.T.S.

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PROTECTION ONE-LINE DIAGRAM

JOB NO. 3977C
DRAWING NO. E-13
SEQUENCE NO. 29 OF 36

JRWTP

ENGINE GENERATOR DATA SHEET

DESCRIPTION		DATA	UNITS
GENERAL			
	EQUIPMENT DESIGNATION	G-1, G-2 & G-3	
	SITE NAME	JOHNATHAN ROGERS WATER TREATMENT PLANT	
	SITE ADDRESS	10000 SOUTHSIDE RD, EL PASO TEXAS, 79927	
	QUANTITY	2, PLUS 1 BACKUP	
DESIGN CONDITIONS			
	DESIGN AMBIENT TEMPERATURE SUMMER	45	°C
	DESIGN AMBIENT TEMPERATURE WINTER	-22.2	°C
	MAXIMUM ALTERNATOR TEMP RISE	105	°C
	PROJECT VOLTAGE DISTORSION LIMIT	10	%
PROJECT REQUIREMENTS			
	NAMEPLATE RATING	3250	KW/PER GENSET
	RUNNING KW	2825.7	KW/PER GENSET
	GENERATOR OUTPUT FREQUENCY	60	HZ
	GENERATOR OUTPUT VOLTAGE	13800	V
	GENERATOR POWER FACTOR	80	%
	GENERATOR TERMINAL PHASE	3, WYE	
	CLOSE TRANSITION GEAR	YES	
	NEUTRAL TO GROUND RESISTOR	100	A
ENGINE			
	FUEL SUPPLY	LOW SULFUR #2 DIESEL FUEL/HVO FUELS	
	MAXIMUM ENGINE SPEED	1800	RPM
	MINIMUM PISTON DISPLACEMENT	60.2	LT
	BLACK START REQUIRED	YES	
	MINIMUM GUARATEED EMISSIONS	TIER II	
FUEL SYSTEM			
	FUEL SUPPLY	DAY TANK	
		TANK UL 142	
	FUEL TANK CAPACITY	SIZED BY MANUFACTURER	GAL
	TANK HEATER	NO	
	INTERGRAL FUEL MAINTANCE SYSTEM	NO	
EXAHUST SYSTEM			
	SILENCER AND EXAHUST PIPE MATERIAL	STAINLESS STEEL	
ENCLOSURE			
	OPEN FOR INDOOR INSTALLATION		
SET PERFORMANCE			
	MAX STEP VOLTAGE DIP	7	%
	MAX STEP FREQUENCY DIP	1	%
	SITE RATED STANDBY	3249/4061	KW/KVA
	SITE RATED MAX SURGE	3670	KW
	MAX SURGE KVA	15810	KVA
	TEMP RISE AT FULL LOAD	105	°C
	ALTERNATOR MAXIMUM KVA THAT RESULTS	15180	KVA/PER GENSET
	IN A MIN OF 90% RATED SUSTAINED VOLTAGE		
	VOLTAGE DISTORSION	5.5	%
LOAD BANK TAP BOX			
	VOLTAGE RATING	480/277V, 3phase, 4 wire	
	BUS RATING	4000	Amps

EPWater - JRWTP Load List

Loads Summary List

***Note: Detailed Loads and Step Report available below**

Step No.	Load Name	Quantity	Running		Starting		Peak		Dip Limits, %		VTHD% Limit
			kW	kVA	kW	kVA	kW	kVA	Vdip	Fdip	
Step01	AIR-COMPRESSOR (AC-1001)	1	7.97	9.96	26.57	33.22	None	None	20.0	10.0	0.0
Step01	CBP TOWER XFMR	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	EXT-LIGHTING-CONTACTOR	1	3.98	4.98	13.29	16.61	None	None	20.0	10.0	0.0
Step01	EXT. LIGHTING CONT.	1	3.98	4.98	13.29	16.61	None	None	20.0	10.0	0.0
Step01	LIGHTING CONTACTOR-PA	1	3.98	4.98	13.29	16.61	None	None	20.0	10.0	0.0
Step01	LIGHTING CONTACTOR-PB- 1+PB-2	1	3.98	4.98	13.29	16.61	None	None	20.0	10.0	0.0
Step01	LOAD PNL-L3	1	3.6	4.5	12.0	15.0	None	None	20.0	10.0	0.0
Step01	LOAD-LCP-ODR-301	1	7.97	9.96	26.57	33.22	None	None	20.0	10.0	0.0
Step01	LOAD-LCP-ODR-302	1	7.97	9.96	26.57	33.22	None	None	20.0	10.0	0.0
Step01	LOAD-LCP-ODR-303	1	7.97	9.96	26.57	33.22	None	None	20.0	10.0	0.0
Step01	LOAD-LCP-ODR-304	1	7.97	9.96	26.57	33.22	None	None	20.0	10.0	0.0
Step01	LOAD-LCP-ODR-305	1	7.97	9.96	26.57	33.22	None	None	20.0	10.0	0.0
Step01	LOAD-LP-3	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-A & PNL-B	1	8.0	10.0	120.0	150.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-L-1	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-L-13	1	3.6	4.5	12.0	15.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-L-14	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-L-5	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-L12	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-PA	1	3.6	4.5	12.0	15.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-PB & PNL- PB2	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-PC & PNL-PC2	1	10.8	13.5	36.0	45.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-PC3	1	3.6	4.5	12.0	15.0	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-PC4	1	11.96	14.95	39.86	49.82	None	None	20.0	10.0	0.0
Step01	LOAD-PNL-PD	1	3.6	4.5	12.0	15.0	None	None	20.0	10.0	0.0
Step01	LOAD-T-27	1	36.0	45.0	120.0	150.0	None	None	20.0	10.0	0.0
Step01	MPC-1A	1	3.6	4.5	12.0	15.0	None	None	20.0	10.0	0.0
Step01	PNL-L-10	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	PNL-L-11	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	PNL-L-9	1	7.2	9.0	24.0	30.0	None	None	20.0	10.0	0.0
Step01	RTU-SW1-99	1	3.98	4.98	13.29	16.61	None	None	20.0	10.0	0.0
Step01	STADIUM LIGHTS	1	2.99	3.74	9.96	12.46	None	None	20.0	10.0	0.0
Step01	MTR CLCWS-1600	1	6.94	7.98	35.51	67.0	None	None	20.0	10.0	0.0
Step01	MTR CLCWS-1610	1	6.94	7.98	35.51	67.0	None	None	20.0	10.0	0.0
Step01	MTR CLCWS-1620	1	6.94	7.98	35.51	67.0	None	None	20.0	10.0	0.0
Step01	MTR EF-1	1	1.16	1.53	10.26	14.25	None	None	20.0	10.0	0.0
Step01	MTR EF-2	1	10.29	11.69	43.37	88.5	None	None	20.0	10.0	0.0
Step01	MTR OLCWP-1300	1	6.94	7.98	35.51	67.0	None	None	20.0	10.0	0.0
Step01	MTR OLCWP-1320	1	6.94	7.98	35.51	67.0	None	None	20.0	10.0	0.0
Step01	MVA-1-99	1	5.26	6.05	28.14	50.25	None	None	20.0	10.0	0.0
Step01	AHU - 2	1	50.49	63.11	50.49	63.11	None	None	20.0	10.0	0.0
Step Summary			166.0	206.0	587.0	815.0	None	None	20.0	10.0	0.0
Step02	BSC-M101	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
Step02	BSC-M102	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0

Step02	BSC-M103	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
Step02	RWP P-101	1	81.98	90.09	128.32	442.5	None	None	20.0	10.0	0.0
Step02	RWP P-102	1	81.98	90.09	128.32	442.5	None	None	20.0	10.0	0.0
Step02	RWP P-103	1	81.98	90.09	128.32	442.5	None	None	20.0	10.0	0.0
Step02	RWP P-107	1	81.98	90.09	128.32	442.5	None	None	20.0	10.0	0.0
	Step Summary		167.0	184.0	282.0	923.0	None	None	20.0	10.0	0.0
Step03	FCG-100	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
	Step Summary		2.0	2.0	11.0	19.0	None	None	20.0	10.0	0.0
Step04	FCG-210	1	0.42	0.62	4.54	5.9	None	None	20.0	10.0	0.0
Step04	FCP-202	1	49.74	55.27	62.17	69.08	None	None	20.0	10.0	10.0
Step04	P-203	1	49.74	55.27	90.27	265.5	None	None	20.0	10.0	0.0
	Step Summary		50.0	56.0	78.0	170.0	None	None	20.0	10.0	10.0
Step05	FCG-220	1	0.42	0.62	4.54	5.9	None	None	20.0	10.0	0.0
Step05	FCP-201	1	49.74	55.27	62.17	69.08	None	None	20.0	10.0	10.0
Step05	P-205	1	49.74	55.27	150.45	442.5	None	None	20.0	10.0	0.0
	Step Summary		50.0	56.0	109.0	259.0	None	None	20.0	10.0	10.0
Step06	P-206	1	49.74	55.27	150.45	442.5	None	None	20.0	10.0	0.0
Step06	P-207	1	49.74	55.27	150.45	442.5	None	None	20.0	10.0	0.0
	Step Summary		50.0	55.0	150.0	443.0	None	None	20.0	10.0	10.0
Step07	FCG-230	1	0.42	0.62	4.54	5.9	None	None	20.0	10.0	0.0
	Step Summary		0.0	0.0	2.0	3.0	None	None	20.0	10.0	10.0
	Step Summary		0.0	0.0	0.0	0.0	None	None	0.0	0.0	0.0
Step08	NOT USED										
Step09	PSU-1241	1	79.72	99.65	265.73	332.16	None	None	20.0	10.0	0.0
Step09	PSU-1243	1	79.72	99.65	265.73	332.16	None	None	20.0	10.0	0.0
	Step Summary		80.0	100.0	266.0	332.0	None	None	20.0	10.0	10.0
Step10	MTR OLCWP-1310	1	6.94	7.98	35.51	67.0	None	None	20.0	10.0	0.0
	Step Summary		3.0	4.0	18.0	34.0	None	None	20.0	10.0	10.0
Step11	FCG-421	1	0.42	0.62	4.54	5.9	None	None	20.0	10.0	0.0
Step11	FLC-424	1	6.21	6.9	6.21	6.9	None	None	20.0	10.0	10.0
Step11	FLC-425	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
Step11	FLC-426	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
Step11	M-427	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step11	M-428A	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step11	M-428B	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step11	MIX-421	1	10.29	11.69	43.37	88.5	None	None	20.0	10.0	0.0
Step11	MIX-422	1	5.26	6.05	28.14	50.25	None	None	20.0	10.0	0.0
Step11	MIX-423	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
Step11	P-310	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
	Step Summary		18.0	22.0	94.0	158.0	None	None	20.0	10.0	10.0
Step12	FCG-411	1	0.42	0.62	4.54	5.9	None	None	20.0	10.0	0.0
Step12	FLC-414	1	5.26	6.05	28.14	50.25	None	None	20.0	10.0	0.0
Step12	FLC-415	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
Step12	FLC-416	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
Step12	M-417	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step12	M-418A	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step12	M-418B	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step12	MIX-411	1	13.56	15.24	54.28	118.0	None	None	20.0	10.0	0.0
Step12	MIX-412	1	5.26	6.05	28.14	50.25	None	None	20.0	10.0	0.0
Step12	P-411	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
Step12	P-412	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
Step12	P-413	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
Step12	P-610	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
	Step Summary		23.0	27.0	133.0	232.0	None	None	20.0	10.0	10.0

Step13	FLC-444	1	4.97	5.52	6.21	6.9	None	None	20.0	10.0	10.0
Step13	FLC-445	1	3.31	3.68	4.14	4.6	None	None	20.0	10.0	10.0
Step13	FLC-446	1	1.99	2.21	2.49	2.77	None	None	20.0	10.0	10.0
Step13	M-447	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step13	M-448A	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step13	M-448B	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step13	MIX-441	1	9.94	11.04	12.43	13.81	None	None	20.0	10.0	10.0
Step13	MIX-442	1	4.97	5.52	6.21	6.9	None	None	20.0	10.0	10.0
Step13	P-320	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
	Step Summary		15.0	17.0	37.0	50.0	None	None	20.0	10.0	10.0
Step14	FCG-431	1	0.42	0.62	4.54	5.9	None	None	20.0	10.0	0.0
Step14	FLC-434	1	4.97	5.52	6.21	6.9	None	None	20.0	10.0	10.0
Step14	FLC-435	1	3.31	3.68	4.14	4.6	None	None	20.0	10.0	10.0
Step14	FLC-436	1	1.99	2.21	2.49	2.77	None	None	20.0	10.0	10.0
Step14	M-437	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step14	M-438A	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step14	M-438B	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step14	MIX-431	1	9.94	11.04	12.43	13.81	None	None	20.0	10.0	10.0
Step14	MIX-432	1	4.97	5.52	6.21	6.9	None	None	20.0	10.0	10.0
Step14	MIX-433	1	3.31	3.68	4.14	4.6	None	None	20.0	10.0	10.0
Step14	P-421	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
Step14	P-422	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
Step14	P-423	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
	Step Summary		21.0	24.0	65.0	92.0	None	None	20.0	10.0	10.0
Step15	FCG-451	1	0.42	0.62	4.54	5.9	None	None	20.0	10.0	0.0
Step15	M-452	1	4.97	5.52	6.21	6.9	None	None	20.0	10.0	10.0
Step15	M-453	1	3.31	3.68	4.14	4.6	None	None	20.0	10.0	10.0
Step15	M-454	1	4.97	5.52	6.21	6.9	None	None	20.0	10.0	10.0
Step15	M-455	1	3.31	3.68	4.14	4.6	None	None	20.0	10.0	10.0
Step15	M-456	1	1.99	2.21	2.49	2.77	None	None	20.0	10.0	10.0
Step15	M-457	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step15	M-458A	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step15	M-458B	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step15	P-330	1	3.55	4.18	22.88	37.5	None	None	20.0	10.0	0.0
	Step Summary		12.0	14.0	36.0	48.0	None	None	20.0	10.0	10.0
Step16	FCG-461	1	0.42	0.62	4.54	5.9	None	None	20.0	10.0	0.0
Step16	M-462	1	4.97	5.52	6.21	6.9	None	None	20.0	10.0	10.0
Step16	M-463	1	3.31	3.68	4.14	4.6	None	None	20.0	10.0	10.0
Step16	M-464	1	4.97	5.52	6.21	6.9	None	None	20.0	10.0	10.0
Step16	M-465	1	3.31	3.68	4.14	4.6	None	None	20.0	10.0	10.0
Step16	M-466	1	1.99	2.21	2.49	2.77	None	None	20.0	10.0	10.0
Step16	M-467	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step16	M-468A	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step16	M-468B	1	0.62	0.91	6.81	8.85	None	None	20.0	10.0	0.0
Step16	P-431	1	10.29	11.69	43.37	88.5	None	None	20.0	10.0	0.0
Step16	P-432	1	10.29	11.69	43.37	88.5	None	None	20.0	10.0	0.0
Step16	P-433	1	10.29	11.69	43.37	88.5	None	None	20.0	10.0	0.0
	Step Summary		26.0	30.0	89.0	162.0	None	None	20.0	10.0	10.0
Step17	DP-1100	1	6.94	7.98	35.51	67.0	None	None	20.0	10.0	0.0
Step17	SLP-1102	1	9.94	11.04	12.43	13.81	None	None	20.0	10.0	10.0
Step17	TD-1100	1	1.16	1.53	10.26	14.25	None	None	20.0	10.0	0.0
Step17	SLP-1101	1	9.94	11.04	12.43	13.81	None	None	20.0	10.0	10.0
	Step Summary		14.0	16.0	35.0	54.0	None	None	20.0	10.0	10.0
Step18	FPNL-1300	1	2.99	3.74	9.96	12.46	None	None	20.0	10.0	0.0
Step18	PNL-P-9A	1	2.1	2.62	7.0	8.75	None	None	20.0	10.0	0.0

Step18	PNL-P-9B	1	2.1	2.62	7.0	8.75	None	None	20.0	10.0	0.0
Step18	PNL-P-9C	1	2.1	2.62	7.0	8.75	None	None	20.0	10.0	0.0
Step18	FCP-711	1	39.78	44.2	127.44	354.0	None	None	20.0	10.0	0.0
Step18	FCP-712	1	39.78	44.2	127.44	354.0	None	None	20.0	10.0	0.0
Step18	FCP-713	1	39.78	44.2	127.44	354.0	None	None	20.0	10.0	0.0
Step18	SF-1	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
Step18	SF-2	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
	Step Summary		67.0	75.0	223.0	576.0	None	None	20.0	10.0	10.0
Step19	PANEL-10A	1	1.68	2.1	5.6	7.0	None	None	20.0	10.0	0.0
Step19	PANEL-10B	1	1.68	2.1	5.6	7.0	None	None	20.0	10.0	0.0
Step19	PANEL-10C	1	1.68	2.1	5.6	7.0	None	None	20.0	10.0	0.0
Step19	BLM-802	1	129.74	142.57	177.0	708.0	None	None	20.0	10.0	0.0
Step19	FCP-721	1	39.78	44.2	127.44	354.0	None	None	20.0	10.0	0.0
Step19	FCP-722	1	39.78	44.2	127.44	354.0	None	None	20.0	10.0	0.0
Step19	FCP-723	1	39.78	44.2	127.44	354.0	None	None	20.0	10.0	0.0
Step19	SF-3	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
Step19	SF-4	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
	Step Summary		129.0	143.0	305.0	921.0	None	None	20.0	10.0	10.0
Step20	PNL-PB3	1	11.96	14.95	39.86	49.82	None	None	20.0	10.0	0.0
Step20	PNL-PB5	1	11.96	14.95	39.86	49.82	None	None	20.0	10.0	0.0
Step20	FCP-731	1	39.78	44.2	49.73	55.26	None	None	20.0	10.0	10.0
Step20	FCP-732	1	39.78	44.2	49.73	55.26	None	None	20.0	10.0	10.0
	Step Summary		52.0	59.0	90.0	105.0	None	None	20.0	10.0	10.0
Step21	F1P1-99	1	5.98	7.47	19.93	24.91	None	None	20.0	10.0	0.0
Step21	PNL-PB4	1	8.0	10.0	149.47	186.84	None	None	20.0	10.0	0.0
Step21	FCP-733	1	39.78	44.2	49.73	55.26	None	None	20.0	10.0	10.0
Step21	SF-1-32B	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
Step21	SF-2-32B	1	2.18	2.66	16.83	25.5	None	None	20.0	10.0	0.0
	Step Summary		29.0	34.0	126.0	159.0	None	None	20.0	10.0	10.0
Step22	EVA-1282	1	5.4	6.75	18.0	22.5	None	None	20.0	10.0	0.0
	Step Summary		3.0	3.0	9.0	11.0	None	None	20.0	10.0	10.0
Step23	48IN-VALVE (CV-1000)	1	2.99	3.74	9.96	12.46	None	None	20.0	10.0	0.0
Step23	SWBD-3 UNKNOWN	1	2.99	3.74	9.96	12.46	None	None	20.0	10.0	0.0
Step23	M-1	1	331.55	368.39	414.44	460.49	None	None	20.0	10.0	10.0
Step23	P-1003	1	320.86	348.76	336.3	1770.0	None	None	20.0	10.0	0.0
Step23	P-1004	1	320.86	348.76	336.3	1770.0	None	None	20.0	10.0	0.0
	Step Summary		490.0	537.0	553.0	2013.0	None	None	20.0	10.0	10.0
Step24	SWBD-4 UNKNOWN	1	2.99	3.74	9.96	12.46	None	None	20.0	10.0	0.0
Step24	M-2	1	331.55	368.39	414.44	460.49	None	None	20.0	10.0	10.0
Step24	P-1005	1	331.55	368.39	414.44	460.49	None	None	20.0	10.0	10.0
Step24	P-1006	1	331.55	368.39	414.44	460.49	None	None	20.0	10.0	10.0
Step24	P-1007	1	331.55	368.39	414.44	460.49	None	None	20.0	10.0	10.0
	Step Summary		665.0	739.0	834.0	927.0	None	None	20.0	10.0	10.0
Step25	PNL-H	1	24.91	31.14	83.04	103.8	None	None	20.0	10.0	0.0
Step25	P-1008	1	320.86	348.76	560.5	2950.0	None	None	20.0	10.0	0.0
	Step Summary		173.0	190.0	322.0	1527.0	None	None	20.0	10.0	10.0
Step26	P-1009	1	320.86	348.76	560.5	2950.0	None	None	20.0	10.0	0.0
	Step Summary		160.0	174.0	280.0	1475.0	None	None	20.0	10.0	10.0
Step27	P-4	1	265.25	294.72	331.56	368.4	None	None	20.0	10.0	10.0
Step27	P-2	1	265.25	294.72	331.56	368.4	None	None	20.0	10.0	10.0
	Step Summary		265.0	295.0	332.0	368.0	None	None	20.0	10.0	10.0
Step28	EVA-1281	1	5.4	6.75	18.0	22.5	None	None	20.0	10.0	0.0
Step28	FCP-801	1	162.18	178.22	354.0	1475.0	None	None	20.0	10.0	0.0
Step28	P-910	1	23.47	26.08	84.66	206.5	None	None	20.0	10.0	0.0
	Step Summary		96.0	106.0	228.0	852.0	None	None	20.0	10.0	10.0

Project Summary	Running		Max Starting		Cumulative Step		Cumulative Peak		Project VTHD% Limit
	kW	kVA	kW	kVA	kW	kVA	kW	kVA	
	2825.7	3165.7	833.9	2012.7	2958.5	4066.0	0.0	0.0	10.0

***Note: Detailed Loads and Step Report available below**

Step1

Calculated Individual Generator Set Step Load Requirements

Running kW	: 166.0	**Starting kW**	: 587.0	**Cumulative Step kW**	: 587.0		
Running kVA	: 206.0	**Starting kVA**	: 815.0	**Cumulative Step kVA**	: 815.0		
Running Amps	: 17.0	**Starting Non-linear kVA**	: 0.0				
Running Non-linear kVA	: 0.0						
Alternator kW	: 166.49						
Voltage Distortion Limit for	**: step** 0						

AIR-COMPRESSOR (AC-1001) — Three Phase — Quantity : 1 In this Step

Category : User Defined

Running kW	: 7.97	**Starting kW**	: 26.57	**Peak kW**	: None		
Running kVA	: 9.96	**Starting kVA**	: 33.22	**Peak kVA**	: None		
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No		
Running Amps	: 12.0	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 7.97			**Voltage**	: 480		

CBP TOWER XFMR — Three Phase — Quantity : 1 In this Step

Category : User Defined

Running kW	: 7.2	**Starting kW**	: 24.0	**Peak kW**	: None		
Running kVA	: 9.0	**Starting kVA**	: 30.0	**Peak kVA**	: None		
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No		
Running Amps	: 10.84	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 7.2			**Voltage**	: 480		

EXT-LIGHTING-CONTACTOR — Three Phase — Quantity : 1 In this Step

Category : User Defined

Running kW	: 3.98	**Starting kW**	: 13.29	**Peak kW**	: None		
Running kVA	: 4.98	**Starting kVA**	: 16.61	**Peak kVA**	: None		
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No		
Running Amps	: 6.0	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 3.98			**Voltage**	: 480		

EXT. LIGHTING CONT. — Three Phase — Quantity : 1 In this Step

Category : User Defined

Running kW	: 3.98	**Starting kW**	: 13.29	**Peak kW**	: None		
Running kVA	: 4.98	**Starting kVA**	: 16.61	**Peak kVA**	: None		
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No		
Running Amps	: 6.0	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 3.98			**Voltage**	: 480		

LIGHTING CONTACTOR-PA — Three Phase — Quantity : 1 In this Step

Category : User Defined

Running kW	: 3.98	**Starting kW**	: 13.29	**Peak kW**	: None		
Running kVA	: 4.98	**Starting kVA**	: 16.61	**Peak kVA**	: None		
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No		
Running Amps	: 6.0	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		

Alternator kW	:	3.98				**Voltage**	: 480

LIGHTING CONTACTOR-PB-1+PB-2 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.98	**Starting kW**	:	13.29	**Peak kW**	: None
Running kVA	:	4.98	**Starting kVA**	:	16.61	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	6.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.98				**Voltage**	: 480

LOAD PNL-L3 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.6	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	4.5	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.51	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.6				**Voltage**	: 208

LOAD-LCP-ODR-301 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.97	**Starting kW**	:	26.57	**Peak kW**	: None
Running kVA	:	9.96	**Starting kVA**	:	33.22	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.97				**Voltage**	: 480

LOAD-LCP-ODR-302 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.97	**Starting kW**	:	26.57	**Peak kW**	: None
Running kVA	:	9.96	**Starting kVA**	:	33.22	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.97				**Voltage**	: 480

LOAD-LCP-ODR-303 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.97	**Starting kW**	:	26.57	**Peak kW**	: None
Running kVA	:	9.96	**Starting kVA**	:	33.22	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.97				**Voltage**	: 480

LOAD-LCP-ODR-304 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.97	**Starting kW**	:	26.57	**Peak kW**	: None
Running kVA	:	9.96	**Starting kVA**	:	33.22	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.97				**Voltage**	: 480

LOAD-LCP-ODR-305 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.97	**Starting kW**	:	26.57	**Peak kW**	: None
Running kVA	:	9.96	**Starting kVA**	:	33.22	**Peak kVA**	: None

Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.97				**Voltage**	: 480

LOAD-LP-3 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	: None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.2				**Voltage**	: 208

LOAD-PNL-A & PNL-B Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	8.0	**Starting kW**	:	120.0	**Peak kW**	: None
Running kVA	:	10.0	**Starting kVA**	:	150.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	27.79	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	8.0				**Voltage**	: 208

LOAD-PNL-L-1 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	: None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.2				**Voltage**	: 208

LOAD-PNL-L-13 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.6	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	4.5	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.51	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.6				**Voltage**	: 208

LOAD-PNL-L-14 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	: None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.2				**Voltage**	: 208

LOAD-PNL-L-5 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	: None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.2				**Voltage**	: 208

LOAD-PNL-L12 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	: None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	43.35	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.2				**Voltage**	: 120

LOAD-PNL-PA Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.6	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	4.5	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.51	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.6				**Voltage**	: 208

LOAD-PNL-PB & PNL-PB2 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	: None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	7.2				**Voltage**	: 208

LOAD-PNL-PC & PNL-PC2 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	10.8	**Starting kW**	:	36.0	**Peak kW**	: None
Running kVA	:	13.5	**Starting kVA**	:	45.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	37.52	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	10.8				**Voltage**	: 208

LOAD-PNL-PC3 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.6	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	4.5	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	5.42	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.6				**Voltage**	: 480

LOAD-PNL-PC4 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	11.96	**Starting kW**	:	39.86	**Peak kW**	: None
Running kVA	:	14.95	**Starting kVA**	:	49.82	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	18.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	11.96				**Voltage**	: 480

LOAD-PNL-PD Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	3.6	**Starting kW**	:	12.0	**Peak kW**	: None
Running kVA	:	4.5	**Starting kVA**	:	15.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.51	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.6				**Voltage**	: 208

LOAD-T-27					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	:	36.0	**Starting kW**	:	120.0	**Peak kW**	:	None
Running kVA	:	45.0	**Starting kVA**	:	150.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	125.06	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	36.0				**Voltage**	:	208
MPC-1A					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	:	3.6	**Starting kW**	:	12.0	**Peak kW**	:	None
Running kVA	:	4.5	**Starting kVA**	:	15.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	12.51	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	3.6				**Voltage**	:	208
PNL-L-10					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	:	None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	7.2				**Voltage**	:	208
PNL-L-11					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	:	None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	7.2				**Voltage**	:	208
PNL-L-9					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	:	7.2	**Starting kW**	:	24.0	**Peak kW**	:	None
Running kVA	:	9.0	**Starting kVA**	:	30.0	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	25.01	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	7.2				**Voltage**	:	208
RTU-SW1-99					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	:	3.98	**Starting kW**	:	13.29	**Peak kW**	:	None
Running kVA	:	4.98	**Starting kVA**	:	16.61	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	6.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	3.98				**Voltage**	:	480
STADIUM LIGHTS					Three Phase	Quantity	:	1 In this Step
Category	: User Defined							
Running kW	:	2.99	**Starting kW**	:	9.96	**Peak kW**	:	None
Running kVA	:	3.74	**Starting kVA**	:	12.46	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No

Running Amps	:	4.5	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	2.99				**Voltage**	:	480

MTR CLCWS-1600 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.94	**Starting kW**	:	35.51	**Peak kW**	:	None
Running kVA	:	7.98	**Starting kVA**	:	67.0	**Peak kVA**	:	None
Running PF	:	0.87	**Starting PF**	:	0.53	**Cyclic**	:	No
Running Amps	:	9.61	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	6.94				**Voltage**	:	480

Shaft Hp	:	10.0	**Method**	:	Across the line
Shaft kW	:	7.46	**Low Inertia**	:	No
Efficiency (%)	:	0.86	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

MTR CLCWS-1610 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.94	**Starting kW**	:	35.51	**Peak kW**	:	None
Running kVA	:	7.98	**Starting kVA**	:	67.0	**Peak kVA**	:	None
Running PF	:	0.87	**Starting PF**	:	0.53	**Cyclic**	:	No
Running Amps	:	9.61	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	6.94				**Voltage**	:	480

Shaft Hp	:	10.0	**Method**	:	Across the line
Shaft kW	:	7.46	**Low Inertia**	:	No
Efficiency (%)	:	0.86	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

MTR CLCWS-1620 Three Phase Quantity : 1 In this Step Category : Motor

Running kW	:	6.94	**Starting kW**	:	35.51	**Peak kW**	:	None
Running kVA	:	7.98	**Starting kVA**	:	67.0	**Peak kVA**	:	None
Running PF	:	0.87	**Starting PF**	:	0.53	**Cyclic**	:	No
Running Amps	:	9.61	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	6.94				**Voltage**	:	480

Shaft Hp	:	10.0	**Method**	:	Across the line
Shaft kW	:	7.46	**Low Inertia**	:	No
Efficiency (%)	:	0.86	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

MTR EF-1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.16	**Starting kW**	:	10.26	**Peak kW**	:	None
Running kVA	:	1.53	**Starting kVA**	:	14.25	**Peak kVA**	:	None
Running PF	:	0.76	**Starting PF**	:	0.72	**Cyclic**	:	No
Running Amps	:	1.84	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	1.16				**Voltage**	:	480

Shaft Hp	:	1.5	**Method**	:	Across the line
Shaft kW	:	1.12	**Low Inertia**	:	No
Efficiency (%)	:	0.77	**LRkVA Factor**	:	9.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	L
Load Factor	:	80.0			

MTR EF-2 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 10.29	**Starting kW**	: 43.37	**Peak kW**	: None
Running kVA	: 11.69	**Starting kVA**	: 88.5	**Peak kVA**	: None
Running PF	: 0.88	**Starting PF**	: 0.49	**Cyclic**	: No
Running Amps	: 14.08	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 10.29			**Voltage**	: 480

Shaft Hp	: 15.0	**Method**	: Across the line
Shaft kW	: 11.19	**Low Inertia**	: No
Efficiency (%)	: 0.87	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

MTR OLCWP-1300 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 6.94	**Starting kW**	: 35.51	**Peak kW**	: None
Running kVA	: 7.98	**Starting kVA**	: 67.0	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.53	**Cyclic**	: No
Running Amps	: 9.61	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.94			**Voltage**	: 480

Shaft Hp	: 10.0	**Method**	: Across the line
Shaft kW	: 7.46	**Low Inertia**	: No

Efficiency (%) : 0.86 **LRkVA Factor** : 6.7 **Design** : Standard NEMA Design B,C or D **LRkVA Code** : H **Load Factor** : 80.0

MTR OLCWP-1320 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 6.94	**Starting kW**	: 35.51	**Peak kW**	: None
Running kVA	: 7.98	**Starting kVA**	: 67.0	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.53	**Cyclic**	: No
Running Amps	: 9.61	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.94			**Voltage**	: 480

Shaft Hp	: 10.0	**Method**	: Across the line
Shaft kW	: 7.46	**Low Inertia**	: No
Efficiency (%)	: 0.86	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H
Load Factor	: 80.0		

MVA-1-99 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 5.26	**Starting kW**	: 28.14	**Peak kW**	: None
Running kVA	: 6.05	**Starting kVA**	: 50.25	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.56	**Cyclic**	: No
Running Amps	: 7.29	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 5.26			**Voltage**	: 480

Shaft Hp	: 7.5	**Method**	: Across the line
Shaft kW	: 5.59	**Low Inertia**	: No
Efficiency (%)	: 0.85	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H

Load Factor	:	80.0					

AHU - 2 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	50.49	**Starting kW**	:	50.49	**Peak kW**	: None
Running kVA	:	63.11	**Starting kVA**	:	63.11	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	76.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	50.49				**Voltage**	: 480

Step2

Calculated Individual Generator Set Step Load Requirements

Running kW	:	167.0	**Starting kW**	:	282.0	**Cumulative Step kW**	: 448.0
Running kVA	:	184.0	**Starting kVA**	:	923.0	**Cumulative Step kVA**	: 1129.0
Running Amps	:	15.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	167.23					
Voltage Distortion Limit for	**: step**	0					

BSC-M101 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.2	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 480

Shaft Hp	:	3.0	**Method**	:	Across the line
Shaft kW	:	2.24	**Low Inertia**	:	No
Efficiency (%)	:	0.82	**LRkVA Factor**	:	8.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	K
Load Factor	:	80.0			

BSC-M102 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.2	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 480

Shaft Hp	:	3.0	**Method**	:	Across the line
Shaft kW	:	2.24	**Low Inertia**	:	No
Efficiency (%)	:	0.82	**LRkVA Factor**	:	8.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	K
Load Factor	:	80.0			

BSC-M103 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.2	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 480

Shaft Hp	3.0	**Method**	Across the line		
Shaft kW	2.24	**Low Inertia**	No		
Efficiency (%)	0.82	**LRkVA Factor**	8.5		
Design	Standard NEMA Design B,C or D	**LRkVA Code**	K		
Load Factor	80.0				

RWP P-101 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	81.98	**Starting kW**	128.32	**Peak kW**	None
Running kVA	90.09	**Starting kVA**	442.5	**Peak kVA**	None
Running PF	0.91	**Starting PF**	0.29	**Cyclic**	No
Running Amps	108.49	**Max. % Voltage Dip**	20.0	**Max. % Frequency Dip**	10.0
Alternator kW	81.98			**Voltage**	480

Shaft Hp	125.0	**Method**	Part Winding
Shaft kW	93.25		
Efficiency (%)	0.91	**LRkVA Factor**	5.9
Design	Standard NEMA Design B,C or D	**LRkVA Code**	G
Load Factor	80.0		

RWP P-102 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	81.98	**Starting kW**	128.32	**Peak kW**	None
Running kVA	90.09	**Starting kVA**	442.5	**Peak kVA**	None
Running PF	0.91	**Starting PF**	0.29	**Cyclic**	No
Running Amps	108.49	**Max. % Voltage Dip**	20.0	**Max. % Frequency Dip**	10.0
Alternator kW	81.98			**Voltage**	480

Shaft Hp	125.0	**Method**	Part Winding
Shaft kW	93.25		
Efficiency (%)	0.91	**LRkVA Factor**	5.9
Design	Standard NEMA Design B,C or D	**LRkVA Code**	G
Load Factor	80.0		

RWP P-103 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	81.98	**Starting kW**	128.32	**Peak kW**	None
Running kVA	90.09	**Starting kVA**	442.5	**Peak kVA**	None
Running PF	0.91	**Starting PF**	0.29	**Cyclic**	No
Running Amps	108.49	**Max. % Voltage Dip**	20.0	**Max. % Frequency Dip**	10.0
Alternator kW	81.98			**Voltage**	480

Shaft Hp	125.0	**Method**	Part Winding
Shaft kW	93.25		
Efficiency (%)	0.91	**LRkVA Factor**	5.9
Design	Standard NEMA Design B,C or D	**LRkVA Code**	G
Load Factor	80.0		

RWP P-107 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	81.98	**Starting kW**	128.32	**Peak kW**	None
Running kVA	90.09	**Starting kVA**	442.5	**Peak kVA**	None
Running PF	0.91	**Starting PF**	0.29	**Cyclic**	No
Running Amps	108.49	**Max. % Voltage Dip**	20.0	**Max. % Frequency Dip**	10.0
Alternator kW	81.98			**Voltage**	480

Shaft Hp	125.0	**Method**	Part Winding

Shaft kW	:	93.25			
Efficiency (%)	:	0.91	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

Step3

Calculated Individual Generator Set Step Load Requirements

Running kW	:	2.0	**Starting kW**	:	11.0	**Cumulative Step kW**	:	345.0
Running kVA	:	2.0	**Starting kVA**	:	19.0	**Cumulative Step kVA**	:	408.0
Running Amps	:	0.0	**Starting Non-linear kVA**	:	0.0			
Running Non-linear kVA	:	0.0						
Alternator kW	:	1.78						
Voltage Distortion Limit for	**: step**	0						

FCG-100 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	:	None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	:	None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	:	No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	3.55				**Voltage**	:	480

Shaft Hp	:	5.0	**Method**	:	Across the line
Shaft kW	:	3.73	**Low Inertia**	:	No
Efficiency (%)	:	0.84	**LRkVA Factor**	:	7.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	J
Load Factor	:	80.0			

Step4

Calculated Individual Generator Set Step Load Requirements

Running kW	:	50.0	**Starting kW**	:	78.0	**Cumulative Step kW**	:	414.0
Running kVA	:	56.0	**Starting kVA**	:	170.0	**Cumulative Step kVA**	:	562.0
Running Amps	:	5.0	**Starting Non-linear kVA**	:	35.0			
Running Non-linear kVA	:	28.0						
Alternator kW	:	74.82						
Voltage Distortion Limit for	**: step**	10						

FCG-210 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.42	**Starting kW**	:	4.54	**Peak kW**	:	None
Running kVA	:	0.62	**Starting kVA**	:	5.9	**Peak kVA**	:	None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	:	No
Running Amps	:	0.75	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	0.42				**Voltage**	:	480

Shaft Hp	: 0.5		**Method**	:	Across the line
Shaft kW	: 0.37		**Low Inertia**	:	No
Efficiency (%)	: 0.72		**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N
Load Factor	:	80.0			

FCP-202 Three Phase Quantity : 1 In this Step

Category

: Motor

Running kW	:	49.74	**Starting kW**	:	62.17	**Peak kW**	:	None
Running kVA	:	55.27	**Starting kVA**	:	69.08	**Peak kVA**	:	None

Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 69.45	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 55.27				
Starting NLL kVA	: 69.08			**Voltage**	: 460
Alternator kW	: 99.48				

Shaft Hp	: 75.0	**Type**	: Variable Frequency Drive
Shaft kW	: 55.95	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

P-203 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 49.74	**Starting kW**	: 90.27	**Peak kW**	: None
Running kVA	: 55.27	**Starting kVA**	: 265.5	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.34	**Cyclic**	: No
Running Amps	: 66.56	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 49.74			**Voltage**	: 480

Shaft Hp	: 75.0	**Method**	: Part Winding
Shaft kW	: 55.95		
Efficiency (%)	: 0.9	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

Step5

Calculated Individual Generator Set Step Load Requirements

Running kW	: 50.0	**Starting kW**	: 109.0	**Cumulative Step kW**	: 494.0
Running kVA	: 56.0	**Starting kVA**	: 259.0	**Cumulative Step kVA**	: 706.0
Running Amps	: 5.0	**Starting Non-linear kVA**	: 35.0		
Running Non-linear kVA	: 28.0				
Alternator kW	: 74.82				
Voltage Distortion Limit for : step	10				

FCG-220 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.42	**Starting kW**	: 4.54	**Peak kW**	: None
Running kVA	: 0.62	**Starting kVA**	: 5.9	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 0.75	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.42			**Voltage**	: 480

Shaft Hp	: 0.5	**Method**	: Across the line
Shaft kW	: 0.37	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

FCP-201 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 49.74	**Starting kW**	: 62.17	**Peak kW**	: None
Running kVA	: 55.27	**Starting kVA**	: 69.08	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 69.45	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 55.27				
Starting NLL kVA	: 69.08			**Voltage**	: 460

Alternator kW	: 99.48				
Shaft Hp	: 75.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 55.95	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

P-205 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 49.74	**Starting kW**	:	150.45	**Peak kW**	:	None
Running kVA	: 55.27	**Starting kVA**	:	442.5	**Peak kVA**	:	None
Running PF	: 0.9	**Starting PF**	:	0.34	**Cyclic**	:	No
Running Amps	: 66.56	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	: 49.74				**Voltage**	:	480

Shaft Hp	: 75.0	**Method**	:	Across the line
Shaft kW	: 55.95	**Low Inertia**	:	No
Efficiency (%)	: 0.9	**LRkVA Factor**	:	5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	: 80.0			

Step6

Calculated Individual Generator Set Step Load Requirements

Running kW	: 50.0	**Starting kW**	:	150.0	**Cumulative Step kW**	:	586.0
Running kVA	: 55.0	**Starting kVA**	:	443.0	**Cumulative Step kVA**	:	945.0
Running Amps	: 5.0	**Starting Non-linear kVA**	:	0.0			
Running Non-linear kVA	: 0.0						
Alternator kW	: 49.74						
Voltage Distortion Limit for	**: step** 10						

P-206 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 49.74	**Starting kW**	:	150.45	**Peak kW**	:	None
Running kVA	: 55.27	**Starting kVA**	:	442.5	**Peak kVA**	:	None
Running PF	: 0.9	**Starting PF**	:	0.34	**Cyclic**	:	No
Running Amps	: 66.56	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	: 49.74				**Voltage**	:	480

Shaft Hp	: 75.0	**Method**	:	Across the line
Shaft kW	: 55.95	**Low Inertia**	:	No
Efficiency (%)	: 0.9	**LRkVA Factor**	:	5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	: 80.0			

P-207 Three Phase Quantity : 1 In this Step

Category

: Motor

Running kW	: 49.74	**Starting kW**	:	150.45	**Peak kW**	:	None
Running kVA	: 55.27	**Starting kVA**	:	442.5	**Peak kVA**	:	None
Running PF	: 0.9	**Starting PF**	:	0.34	**Cyclic**	:	No
Running Amps	: 66.56	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	: 49.74				**Voltage**	:	480

Shaft Hp	: 75.0	**Method**	:	Across the line
Shaft kW	: 55.95	**Low Inertia**	:	No
Efficiency (%)	: 0.9	**LRkVA Factor**	:	5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	G

Load Factor : 80.0

Step7

Calculated Individual Generator Set Step Load Requirements

Running kW	:	0.0	**Starting kW**	:	2.0	**Cumulative Step kW**	: 487.0
Running kVA	:	0.0	**Starting kVA**	:	3.0	**Cumulative Step kVA**	: 561.0
Running Amps	:	0.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	0.21					
Voltage Distortion Limit for step	:	10					

FCG-230 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.42	**Starting kW**	:	4.54	**Peak kW**	: None
Running kVA	:	0.62	**Starting kVA**	:	5.9	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	0.75	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.42				**Voltage**	: 480

Shaft Hp	:	0.5	**Method**	:	Across the line
Shaft kW	:	0.37	**Low Inertia**	:	No
Efficiency (%)	:	0.72	**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N
Load Factor	:	80.0			

Step8

Calculated Individual Generator Set Step Load Requirements

Running kW	:	0.0	**Starting kW**	:	0.0	**Cumulative Step kW**	: 0.0
Running kVA	:	0.0	**Starting kVA**	:	0.0	**Cumulative Step kVA**	: 0.0
Running Amps	:	0.0	**Starting Non-linear kVA**	:	0.0		

Running Non-linear kVA : 0.0
Alternator kW : 0.0

Voltage Distortion Limit for step : 0

Step9

Calculated Individual Generator Set Step Load Requirements

Running kW	:	80.0	**Starting kW**	:	266.0	**Cumulative Step kW**	: 751.0
Running kVA	:	100.0	**Starting kVA**	:	332.0	**Cumulative Step kVA**	: 891.0
Running Amps	:	8.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	79.72					
Voltage Distortion Limit for step	:	10					

PSU-1241 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	79.72	**Starting kW**	:	265.73	**Peak kW**	: None
Running kVA	:	99.65	**Starting kVA**	:	332.16	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	120.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	79.72				**Voltage**	: 480

PSU-1243 Three Phase Quantity : 1 In this Step

Category	: User Defined						
Running kW	: 79.72	**Starting kW**	: 265.73	**Peak kW**	: None		
Running kVA	: 99.65	**Starting kVA**	: 332.16	**Peak kVA**	: None		
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No		
Running Amps	: 120.0	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 79.72			**Voltage**	: 480		

Step10

Calculated Individual Generator Set Step Load Requirements

Running kW	: 3.0	**Starting kW**	: 18.0	**Cumulative Step kW**	: 583.0
Running kVA	: 4.0	**Starting kVA**	: 34.0	**Cumulative Step kVA**	: 692.0
Running Amps	: 0.0	**Starting Non-linear kVA**	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 3.47				
Voltage Distortion Limit for	**: step** 10				

MTR OLCWP-1310 Three Phase Quantity : 1 In this Step

Category	: Motor				
Running kW	: 6.94	**Starting kW**	: 35.51	**Peak kW**	: None
Running kVA	: 7.98	**Starting kVA**	: 67.0	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.53	**Cyclic**	: No
Running Amps	: 9.61	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 6.94			**Voltage**	: 480

Shaft Hp	: 10.0	**Method**	: Across the line
Shaft kW	: 7.46	**Low Inertia**	: No
Efficiency (%)	: 0.86	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H
Load Factor	: 80.0		

Step11

Calculated Individual Generator Set Step Load Requirements

Running kW	: 18.0	**Starting kW**	: 94.0	**Cumulative Step kW**	: 663.0
Running kVA	: 22.0	**Starting kVA**	: 158.0	**Cumulative Step kVA**	: 820.0
Running Amps	: 2.0	**Starting Non-linear kVA**	: 3.0		
Running Non-linear kVA	: 3.0				
Alternator kW	: 21.54				
Voltage Distortion Limit for	**: step** 10				

FCG-421 Three Phase Quantity : 1 In this Step

Category	: Motor				
Running kW	: 0.42	**Starting kW**	: 4.54	**Peak kW**	: None
Running kVA	: 0.62	**Starting kVA**	: 5.9	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 0.75	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.42			**Voltage**	: 480

Shaft Hp	: 0.5	**Method**	: Across the line
Shaft kW	: 0.37	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

FLC-424 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.21	**Starting kW**	:	6.21	**Peak kW**	: None
Running kVA	:	6.9	**Starting kVA**	:	6.9	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	8.31	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	6.9					
Starting NLL kVA	:	6.9				**Voltage**	: 480
Alternator kW	:	12.42					

Shaft Hp	: 7.5	**Type**	: Variable Frequency Drive
Shaft kW	: 5.59	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 100.0		

FLC-425 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 480

Shaft Hp	: 5.0	**Method**	: Across the line		
Shaft kW	: 3.73	**Low Inertia**	: No		
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J		
Load Factor	: 80.0				

FLC-426 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.2	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 480

Shaft Hp	: 3.0	**Method**	: Across the line		
Shaft kW	: 2.24	**Low Inertia**	: No		
Efficiency (%)	: 0.82	**LRkVA Factor**	: 8.5		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: K		
Load Factor	: 80.0				

M-427 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.1	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line		
Shaft kW	: 0.56	**Low Inertia**	: No		
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N		
Load Factor	: 80.0				

M-428A Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.1	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 480

Shaft Hp : 0.75 **Method** : Across the line
Shaft kW : 0.56 **Low Inertia** : No
Efficiency (%) : 0.72 **LRkVA Factor** : 11.8
Design : Standard NEMA Design B,C or D **LRkVA Code** : N
Load Factor : 80.0

M-428B Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.1	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 480

Shaft Hp : 0.75 **Method** : Across the line
Shaft kW : 0.56 **Low Inertia** : No
Efficiency (%) : 0.72 **LRkVA Factor** : 11.8
Design : Standard NEMA Design B,C or D **LRkVA Code** : N
Load Factor : 80.0

MIX-421 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	10.29	**Starting kW**	:	43.37	**Peak kW**	: None
Running kVA	:	11.69	**Starting kVA**	:	88.5	**Peak kVA**	: None
Running PF	:	0.88	**Starting PF**	:	0.49	**Cyclic**	: No
Running Amps	:	14.08	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	10.29				**Voltage**	: 480

Shaft Hp : 15.0 **Method** : Across the line
Shaft kW : 11.19 **Low Inertia** : No
Efficiency (%) : 0.87 **LRkVA Factor** : 5.9
Design : Standard NEMA Design B,C or D **LRkVA Code** : G
Load Factor : 80.0

MIX-422 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	5.26	**Starting kW**	:	28.14	**Peak kW**	: None
Running kVA	:	6.05	**Starting kVA**	:	50.25	**Peak kVA**	: None
Running PF	:	0.87	**Starting PF**	:	0.56	**Cyclic**	: No
Running Amps	:	7.29	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.26				**Voltage**	: 480

Shaft Hp : 7.5 **Method** : Across the line
Shaft kW : 5.59 **Low Inertia** : No
Efficiency (%) : 0.85 **LRkVA Factor** : 6.7 **Design** : Standard NEMA Design B,C or D **LRkVA Code** : H **Load Factor** : 80.0

MIX-423 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None

Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.03	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 480

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

P-310 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.03	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 480

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

Step12

Calculated Individual Generator Set Step Load Requirements

Running kW	: 23.0	**Starting kW**	: 133.0	**Cumulative Step kW**	: 720.0
Running kVA	: 27.0	**Starting kVA**	: 232.0	**Cumulative Step kVA**	: 916.0
Running Amps	: 2.0	**Starting Non-linear kVA**	: 0.0		
Running Non-linear kVA	: 0.0				
Alternator kW	: 23.15				
Voltage Distortion Limit for	**: step** 10				

FCG-411 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.42	**Starting kW**	: 4.54	**Peak kW**	: None
Running kVA	: 0.62	**Starting kVA**	: 5.9	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 0.75	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.42			**Voltage**	: 480

Shaft Hp	: 0.5	**Method**	: Across the line
Shaft kW	: 0.37	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

FLC-414 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 5.26	**Starting kW**	: 28.14	**Peak kW**	: None
Running kVA	: 6.05	**Starting kVA**	: 50.25	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.56	**Cyclic**	: No

Running Amps	: 7.29	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 5.26			**Voltage**	: 480		

Shaft Hp	: 7.5	**Method**	: Across the line
Shaft kW	: 5.59	**Low Inertia**	: No
Efficiency (%)	: 0.85	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H
Load Factor	: 80.0		

FLC-415 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None		
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None		
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No		
Running Amps	: 5.03	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 3.55			**Voltage**	: 480		

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

FLC-416 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 2.18	**Starting kW**	: 16.83	**Peak kW**	: None		
Running kVA	: 2.66	**Starting kVA**	: 25.5	**Peak kVA**	: None		
Running PF	: 0.82	**Starting PF**	: 0.66	**Cyclic**	: No		
Running Amps	: 3.2	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 2.18			**Voltage**	: 480		

Shaft Hp	: 3.0	**Method**	: Across the line
Shaft kW	: 2.24	**Low Inertia**	: No
Efficiency (%)	: 0.82	**LRkVA Factor**	: 8.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: K
Load Factor	: 80.0		

M-417 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None		
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None		
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No		
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 0.62			**Voltage**	: 480		

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

M-418A Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None		
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None		
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No		
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		

Alternator kW	: 0.62			**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

M-418B Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.62			**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

MIX-411 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 13.56	**Starting kW**	: 54.28	**Peak kW**	: None
Running kVA	: 15.24	**Starting kVA**	: 118.0	**Peak kVA**	: None
Running PF	: 0.89	**Starting PF**	: 0.46	**Cyclic**	: No
Running Amps	: 18.35	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 13.56			**Voltage**	: 480

Shaft Hp : 20.0 **Method** : Across the line
Shaft kW : 14.92 **Low Inertia** : No
Efficiency (%) : 0.88 **LRkVA Factor** : 5.9 **Design** : Standard NEMA Design B,C or D **LRkVA Code** : G **Load Factor** : 80.0

MIX-412 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 5.26	**Starting kW**	: 28.14	**Peak kW**	: None
Running kVA	: 6.05	**Starting kVA**	: 50.25	**Peak kVA**	: None
Running PF	: 0.87	**Starting PF**	: 0.56	**Cyclic**	: No
Running Amps	: 7.29	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 5.26			**Voltage**	: 480

Shaft Hp	: 7.5	**Method**	: Across the line
Shaft kW	: 5.59	**Low Inertia**	: No
Efficiency (%)	: 0.85	**LRkVA Factor**	: 6.7
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: H
Load Factor	: 80.0		

P-411 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.03	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 480

Shaft Hp	: 5.0		**Method**	:	Across the line
Shaft kW	: 3.73		**Low Inertia**	:	No
Efficiency (%)	: 0.84		**LRkVA Factor**	:	7.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	J
Load Factor	: 80.0				

P-412 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 480

Shaft Hp	: 5.0		**Method**	:	Across the line
Shaft kW	: 3.73		**Low Inertia**	:	No
Efficiency (%)	: 0.84		**LRkVA Factor**	:	7.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	J
Load Factor	: 80.0				

P-413 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 480

Shaft Hp	: 5.0		**Method**	:	Across the line
Shaft kW	: 3.73		**Low Inertia**	:	No
Efficiency (%)	: 0.84		**LRkVA Factor**	:	7.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	J
Load Factor	: 80.0				

P-610 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 480

Shaft Hp	: 5.0		**Method**	:	Across the line
Shaft kW	: 3.73		**Low Inertia**	:	No
Efficiency (%)	: 0.84		**LRkVA Factor**	:	7.5
Design	: Standard NEMA Design B,C or D		**LRkVA Code**	:	J
Load Factor	: 80.0				

Step13

Calculated Individual Generator Set Step Load Requirements

Running kW	:	15.0	**Starting kW**	:	37.0	**Cumulative Step kW**	: 648.0
Running kVA	:	17.0	**Starting kVA**	:	50.0	**Cumulative Step kVA**	: 760.0
Running Amps	:	1.0	**Starting Non-linear kVA**	:	17.0		
Running Non-linear kVA	:	14.0					
Alternator kW	:	27.89					
Voltage Distortion Limit for	**: step**	10					

FLC-444 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	4.97	**Starting kW**	:	6.21	**Peak kW**	: None
Running kVA	:	5.52	**Starting kVA**	:	6.9	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	6.65	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	5.52					
Starting NLL kVA	:	6.9				**Voltage**	: 480
Alternator kW	:	9.94					

Shaft Hp	: 7.5	**Type**	: Variable Frequency Drive
Shaft kW	: 5.59	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

FLC-445 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.31	**Starting kW**	:	4.14	**Peak kW**	: None
Running kVA	:	3.68	**Starting kVA**	:	4.6	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	4.43	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	3.68					
Starting NLL kVA	:	4.6				**Voltage**	: 480
Alternator kW	:	6.62					

Shaft Hp	: 5.0	**Type**	: Variable Frequency Drive
Shaft kW	: 3.73	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

FLC-446 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.99	**Starting kW**	:	2.49	**Peak kW**	: None
Running kVA	:	2.21	**Starting kVA**	:	2.77	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	2.66	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	2.21					
Starting NLL kVA	:	2.77				**Voltage**	: 480
Alternator kW	:	3.98					

Shaft Hp	: 3.0	**Type**	: Variable Frequency Drive
Shaft kW	: 2.24	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

M-447 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.1	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line

Shaft kW	: 0.56	**Low Inertia**	: No		
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8		
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N		
Load Factor	: 80.0				

M-448A Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None		
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None		
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No		
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 0.62			**Voltage**	: 480		

Shaft Hp	0.75	**Method**	: Across the line
Shaft kW	0.56	**Low Inertia**	: No
Efficiency (%)	0.72	**LRkVA Factor**	: 11.8
	:		
	:		
	:		

Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

M-448B Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None		
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None		
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No		
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 0.62			**Voltage**	: 480		

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

MIX-441 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 9.94	**Starting kW**	: 12.43	**Peak kW**	: None		
Running kVA	: 11.04	**Starting kVA**	: 13.81	**Peak kVA**	: None		
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No		
Running Amps	: 13.29	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Running NLL kVA	: 11.04						
Starting NLL kVA	: 13.81			**Voltage**	: 480		
Alternator kW	: 19.88						

Shaft Hp	: 15.0	**Type**	: Variable Frequency Drive
Shaft kW	: 11.19	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

MIX-442 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 4.97	**Starting kW**	: 6.21	**Peak kW**	: None		
Running kVA	: 5.52	**Starting kVA**	: 6.9	**Peak kVA**	: None		
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No		

Running Amps	:	6.65	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	5.52					
Starting NLL kVA	:	6.9				**Voltage**	: 480
Alternator kW	:	9.94					

Shaft Hp	: 7.5	**Type**	: Variable Frequency Drive
Shaft kW	: 5.59	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

P-320 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 480

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

Step14

Calculated Individual Generator Set Step Load Requirements

Running kW	:	21.0	**Starting kW**	:	65.0	**Cumulative Step kW**	: 690.0
Running kVA	:	24.0	**Starting kVA**	:	92.0	**Cumulative Step kVA**	: 821.0
Running Amps	:	2.0	**Starting Non-linear kVA**	:	20.0		
Running Non-linear kVA	:	16.0					
Alternator kW	:	34.96					
Voltage Distortion Limit for	: **step**	10					

FCG-431 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.42	**Starting kW**	:	4.54	**Peak kW**	: None
Running kVA	:	0.62	**Starting kVA**	:	5.9	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	0.75	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.42				**Voltage**	: 480

Shaft Hp	: 0.5	**Method**	: Across the line
Shaft kW	: 0.37	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

FLC-434 Three Phase Quantity : 1 In this Step

Category

: Motor

Running kW	:	4.97	**Starting kW**	:	6.21	**Peak kW**	: None
Running kVA	:	5.52	**Starting kVA**	:	6.9	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	6.65	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	5.52					
Starting NLL kVA	:	6.9				**Voltage**	: 480

Alternator kW	: 9.94				
Shaft Hp	: 7.5	**Type**	: Variable Frequency Drive		
Shaft kW	: 5.59	**Ramp Details**	: None		
Rectifier Type	: 6 pulse	**THDI %**	: 26		
Efficiency (%)	: 0.9	**THDV %**	: 10		
Load Factor	: 80.0				

FLC-435 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 3.31	**Starting kW**	: 4.14	**Peak kW**	: None		
Running kVA	: 3.68	**Starting kVA**	: 4.6	**Peak kVA**	: None		
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No		
Running Amps	: 4.43	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Running NLL kVA	: 3.68						
Starting NLL kVA	: 4.6			**Voltage**	: 480		
Alternator kW	: 6.62						
Shaft Hp	: 5.0	**Type**	: Variable Frequency Drive				
Shaft kW	: 3.73	**Ramp Details**	: None				
Rectifier Type	: 6 pulse	**THDI %**	: 26				
Efficiency (%)	: 0.9	**THDV %**	: 10				
Load Factor	: 80.0						

FLC-436 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 1.99	**Starting kW**	: 2.49	**Peak kW**	: None		
Running kVA	: 2.21	**Starting kVA**	: 2.77	**Peak kVA**	: None		
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No		
Running Amps	: 2.66	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Running NLL kVA	: 2.21						
Starting NLL kVA	: 2.77			**Voltage**	: 480		
Alternator kW	: 3.98						
Shaft Hp	: 3.0	**Type**	: Variable Frequency Drive				
Shaft kW	: 2.24	**Ramp Details**	: None				
Rectifier Type	: 6 pulse	**THDI %**	: 26				
Efficiency (%)	: 0.9	**THDV %**	: 10				
Load Factor	: 80.0						

M-437 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None		
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None		
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No		
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0		
Alternator kW	: 0.62			**Voltage**	: 480		
Shaft Hp	: 0.75	**Method**	: Across the line				
Shaft kW	: 0.56	**Low Inertia**	: No				
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8				
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N				
Load Factor	: 80.0						

M-438A Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None

Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.1	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 480

Shaft Hp	:	0.75	**Method**	:	Across the line
Shaft kW	:	0.56	**Low Inertia**	:	No
Efficiency (%)	:	0.72	**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N
Load Factor	:	80.0			

M-438B Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.1	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 480

Shaft Hp	:	0.75	**Method**	:	Across the line
Shaft kW	:	0.56	**Low Inertia**	:	No
Efficiency (%)	:	0.72	**LRkVA Factor**	:	11.8
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N
Load Factor	:	80.0			

MIX-431 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	9.94	**Starting kW**	:	12.43	**Peak kW**	: None
Running kVA	:	11.04	**Starting kVA**	:	13.81	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	13.29	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	11.04					
Starting NLL kVA	:	13.81				**Voltage**	: 480
Alternator kW	:	19.88					

Shaft Hp	:	15.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	11.19	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

MIX-432 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	4.97	**Starting kW**	:	6.21	**Peak kW**	: None
Running kVA	:	5.52	**Starting kVA**	:	6.9	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	6.65	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	5.52					
Starting NLL kVA Alternator kW	:	6.9 9.94				**Voltage**	: 480

Shaft Hp	:	7.5	**Type**	:	Variable Frequency Drive
Shaft kW	:	5.59	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

MIX-433 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	3.31	**Starting kW**	:	4.14	**Peak kW**	: None
Running kVA	:	3.68	**Starting kVA**	:	4.6	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	4.43	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	3.68					
Starting NLL kVA	:	4.6				**Voltage**	: 480
Alternator kW	:	6.62					

Shaft Hp	: 5.0	**Type**	: Variable Frequency Drive
Shaft kW	: 3.73	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

P-421 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 480

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design : Standard NEMA Design B,C or D		**LRkVA Code**	: J
Load Factor : 80.0			

P-422 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 480

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No

Efficiency (%) : 0.84 **LRkVA Factor** : 7.5 **Design** : Standard NEMA Design B,C or D **LRkVA Code** : J **Load Factor** : 80.0

P-423 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	3.55	**Starting kW**	:	22.88	**Peak kW**	: None
Running kVA	:	4.18	**Starting kVA**	:	37.5	**Peak kVA**	: None
Running PF	:	0.85	**Starting PF**	:	0.61	**Cyclic**	: No
Running Amps	:	5.03	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	3.55				**Voltage**	: 480

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5

Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J		
Load Factor	: 80.0				

Step15

Calculated Individual Generator Set Step Load Requirements

Running kW	: 12.0	**Starting kW**	: 36.0	**Cumulative Step kW**	: 682.0
Running kVA	: 14.0	**Starting kVA**	: 48.0	**Cumulative Step kVA**	: 800.0
Running Amps	: 1.0	**Starting Non-linear kVA**	: 13.0		
Running Non-linear kVA	: 10.0				
Alternator kW	: 21.47				
Voltage Distortion Limit for	**: step** 10				

FCG-451 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.42	**Starting kW**	: 4.54	**Peak kW**	: None
Running kVA	: 0.62	**Starting kVA**	: 5.9	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 0.75	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.42			**Voltage**	: 480

Shaft Hp	: 0.5	**Method**	: Across the line
Shaft kW	: 0.37	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

M-452 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 4.97	**Starting kW**	: 6.21	**Peak kW**	: None
Running kVA	: 5.52	**Starting kVA**	: 6.9	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 6.65	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 5.52				
Starting NLL kVA	: 6.9			**Voltage**	: 480
Alternator kW	: 9.94				

Shaft Hp	: 7.5	**Type**	: Variable Frequency Drive
Shaft kW	: 5.59	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

M-453 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 3.31	**Starting kW**	: 4.14	**Peak kW**	: None
Running kVA	: 3.68	**Starting kVA**	: 4.6	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 4.43	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 3.68				
Starting NLL kVA	: 4.6			**Voltage**	: 480
Alternator kW	: 6.62				

Shaft Hp	: 5.0	**Type**	: Variable Frequency Drive
Shaft kW	: 3.73	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10

Load Factor : 80.0

M-454 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	4.97	**Starting kW**	:	6.21	**Peak kW**	: None
Running kVA	:	5.52	**Starting kVA**	:	6.9	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	6.65	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	5.52					
Starting NLL kVA	:	6.9				**Voltage**	: 480
Alternator kW	:	9.94					

Shaft Hp : 7.5	**Type**	:	Variable Frequency Drive
Shaft kW : 5.59	**Ramp Details**	:	None
Rectifier Type : 6 pulse	**THDI %**	:	26
Efficiency (%) : 0.9	**THDV %**	:	10
Load Factor : 80.0			

M-455 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	3.31	**Starting kW**	:	4.14	**Peak kW**	: None
Running kVA	:	3.68	**Starting kVA**	:	4.6	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	4.43	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	3.68					
Starting NLL kVA	:	4.6				**Voltage**	: 480
Alternator kW	:	6.62					

Shaft Hp : 5.0	**Type**	:	Variable Frequency Drive
Shaft kW : 3.73	**Ramp Details**	:	None
Rectifier Type : 6 pulse	**THDI %**	:	26
Efficiency (%) : 0.9	**THDV %**	:	10
Load Factor : 80.0			

M-456 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	1.99	**Starting kW**	:	2.49	**Peak kW**	: None
Running kVA	:	2.21	**Starting kVA**	:	2.77	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	2.66	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	2.21					
Starting NLL kVA	:	2.77				**Voltage**	: 480
Alternator kW	:	3.98					

Shaft Hp : 3.0	**Type**	:	Variable Frequency Drive
Shaft kW : 2.24	**Ramp Details**	:	None
Rectifier Type : 6 pulse	**THDI %**	:	26
Efficiency (%) : 0.9	**THDV %**	:	10
Load Factor : 80.0			

M-457 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.1	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

M-458A Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.62			**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

M-458B Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.62			**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

P-330 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 3.55	**Starting kW**	: 22.88	**Peak kW**	: None
Running kVA	: 4.18	**Starting kVA**	: 37.5	**Peak kVA**	: None
Running PF	: 0.85	**Starting PF**	: 0.61	**Cyclic**	: No
Running Amps	: 5.03	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 3.55			**Voltage**	: 480

Shaft Hp	: 5.0	**Method**	: Across the line
Shaft kW	: 3.73	**Low Inertia**	: No
Efficiency (%)	: 0.84	**LRkVA Factor**	: 7.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: J
Load Factor	: 80.0		

Step16

Calculated Individual Generator Set Step Load Requirements

Running kW	: 26.0	**Starting kW**	: 89.0	**Cumulative Step kW**	: 747.0
Running kVA	: 30.0	**Starting kVA**	: 162.0	**Cumulative Step kVA**	: 928.0
Running Amps	: 2.0	**Starting Non-linear kVA**	: 13.0		
Running Non-linear kVA	: 10.0				
Alternator kW	: 35.13				

Voltage Distortion Limit for : step 10

FCG-461 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.42	**Starting kW**	:	4.54	**Peak kW**	: None
Running kVA	:	0.62	**Starting kVA**	:	5.9	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	0.75	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.42				**Voltage**	: 480

Shaft Hp	: 0.5	**Method**	: Across the line
Shaft kW	: 0.37	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8

Design : Standard NEMA Design B,C or D **LRkVA Code** : N
Load Factor : 80.0

M-462 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	4.97	**Starting kW**	:	6.21	**Peak kW**	: None
Running kVA	:	5.52	**Starting kVA**	:	6.9	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	6.65	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	5.52					
Starting NLL kVA	:	6.9				**Voltage**	: 480
Alternator kW	:	9.94					

Shaft Hp	: 7.5	**Type**	: Variable Frequency Drive
Shaft kW	: 5.59	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

M-463 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.31	**Starting kW**	:	4.14	**Peak kW**	: None
Running kVA	:	3.68	**Starting kVA**	:	4.6	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	4.43	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	3.68					
Starting NLL kVA	:	4.6				**Voltage**	: 480
Alternator kW	:	6.62					

Shaft Hp	: 5.0	**Type**	: Variable Frequency Drive
Shaft kW	: 3.73	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

M-464 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	4.97	**Starting kW**	:	6.21	**Peak kW**	: None
Running kVA	:	5.52	**Starting kVA**	:	6.9	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	6.65	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0

Running NLL kVA	:	5.52					
Starting NLL kVA	:	6.9			**Voltage**	:	480
Alternator kW	:	9.94					
Shaft Hp	:	7.5	**Type**	:	Variable Frequency Drive		
Shaft kW	:	5.59	**Ramp Details**	:	None		
Rectifier Type	:	6 pulse	**THDI %**	:	26		
Efficiency (%)	:	0.9	**THDV %**	:	10		
Load Factor	:	80.0					

M-465 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	3.31	**Starting kW**	:	4.14	**Peak kW**	: None
Running kVA	:	3.68	**Starting kVA**	:	4.6	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	4.43	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	3.68					
Starting NLL kVA	:	4.6				**Voltage**	: 480
Alternator kW	:	6.62					
Shaft Hp	:	5.0	**Type**	:	Variable Frequency Drive		
Shaft kW	:	3.73	**Ramp Details**	:	None		
Rectifier Type	:	6 pulse	**THDI %**	:	26		
Efficiency (%)	:	0.9	**THDV %**	:	10		
Load Factor	:	80.0					

M-466 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.99	**Starting kW**	:	2.49	**Peak kW**	: None
Running kVA	:	2.21	**Starting kVA**	:	2.77	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	2.66	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	2.21					
Starting NLL kVA	:	2.77				**Voltage**	: 480
Alternator kW	:	3.98					
Shaft Hp	:	3.0	**Type**	:	Variable Frequency Drive		
Shaft kW	:	2.24	**Ramp Details**	:	None		
Rectifier Type	:	6 pulse	**THDI %**	:	26		
Efficiency (%)	:	0.9	**THDV %**	:	10		
Load Factor	:	80.0					

M-467 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	0.62	**Starting kW**	:	6.81	**Peak kW**	: None
Running kVA	:	0.91	**Starting kVA**	:	8.85	**Peak kVA**	: None
Running PF	:	0.68	**Starting PF**	:	0.77	**Cyclic**	: No
Running Amps	:	1.1	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	0.62				**Voltage**	: 480
Shaft Hp	:	0.75	**Method**	:	Across the line		
Shaft kW	:	0.56	**Low Inertia**	:	No		
Efficiency (%)	:	0.72	**LRkVA Factor**	:	11.8		
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	N		
Load Factor	:	80.0					

M-468A Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.62			**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

M-468B Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 0.62	**Starting kW**	: 6.81	**Peak kW**	: None
Running kVA	: 0.91	**Starting kVA**	: 8.85	**Peak kVA**	: None
Running PF	: 0.68	**Starting PF**	: 0.77	**Cyclic**	: No
Running Amps	: 1.1	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 0.62			**Voltage**	: 480

Shaft Hp	: 0.75	**Method**	: Across the line
Shaft kW	: 0.56	**Low Inertia**	: No
Efficiency (%)	: 0.72	**LRkVA Factor**	: 11.8
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: N
Load Factor	: 80.0		

P-431 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 10.29	**Starting kW**	: 43.37	**Peak kW**	: None
Running kVA	: 11.69	**Starting kVA**	: 88.5	**Peak kVA**	: None
Running PF	: 0.88	**Starting PF**	: 0.49	**Cyclic**	: No
Running Amps	: 14.08	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 10.29			**Voltage**	: 480

Shaft Hp	: 15.0	**Method**	: Across the line
Shaft kW	: 11.19	**Low Inertia**	: No
Efficiency (%)	: 0.87	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

P-432 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	: 10.29	**Starting kW**	: 43.37	**Peak kW**	: None
Running kVA	: 11.69	**Starting kVA**	: 88.5	**Peak kVA**	: None
Running PF	: 0.88	**Starting PF**	: 0.49	**Cyclic**	: No
Running Amps	: 14.08	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 10.29			**Voltage**	: 480

Shaft Hp	: 15.0	**Method**	: Across the line
Shaft kW	: 11.19	**Low Inertia**	: No

Efficiency (%) : 0.87 **LRkVA Factor** : 5.9 **Design** : Standard NEMA Design B,C or D **LRkVA Code** : G **Load Factor** : 80.0

P-433 Three Phase Quantity : 1 In this Step
Category : Motor

Running kW	:	10.29	**Starting kW**	:	43.37	**Peak kW**	:	None
Running kVA	:	11.69	**Starting kVA**	:	88.5	**Peak kVA**	:	None
Running PF	:	0.88	**Starting PF**	:	0.49	**Cyclic**	:	No
Running Amps	:	14.08	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	10.29				**Voltage**	:	480

Shaft Hp	:	15.0	**Method**	:	Across the line
Shaft kW	:	11.19	**Low Inertia**	:	No
Efficiency (%)	:	0.87	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

Step17

Calculated Individual Generator Set Step Load Requirements

Running kW	:	14.0	**Starting kW**	:	35.0	**Cumulative Step kW**	:	719.0
Running kVA	:	16.0	**Starting kVA**	:	54.0	**Cumulative Step kVA**	:	850.0
Running Amps	:	1.0	**Starting Non-linear kVA**	:	14.0			
Running Non-linear kVA	:	11.0						
Alternator kW	:	23.93						
Voltage Distortion Limit for step	:	10						

DP-1100 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	6.94	**Starting kW**	:	35.51	**Peak kW**	:	None
Running kVA	:	7.98	**Starting kVA**	:	67.0	**Peak kVA**	:	None
Running PF	:	0.87	**Starting PF**	:	0.53	**Cyclic**	:	No
Running Amps	:	9.61	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	6.94				**Voltage**	:	480

Shaft Hp	:	10.0	**Method**	:	Across the line
Shaft kW	:	7.46	**Low Inertia**	:	No
Efficiency (%)	:	0.86	**LRkVA Factor**	:	6.7
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	H
Load Factor	:	80.0			

SLP-1102 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	9.94	**Starting kW**	:	12.43	**Peak kW**	:	None
Running kVA	:	11.04	**Starting kVA**	:	13.81	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	:	No
Running Amps	:	13.29	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	:	11.04						
Starting NLL kVA	:	13.81				**Voltage**	:	480
Alternator kW	:	19.88						

Shaft Hp	:	15.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	11.19	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

TD-1100 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	1.16	**Starting kW**	:	10.26	**Peak kW**	:	None
Running kVA	:	1.53	**Starting kVA**	:	14.25	**Peak kVA**	:	None
Running PF	:	0.76	**Starting PF**	:	0.72	**Cyclic**	:	No

Running Amps	:	1.84	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	1.16				**Voltage**	:	480

Shaft Hp	:	1.5	**Method**	:	Across the line
Shaft kW	:	1.12	**Low Inertia**	:	No
Efficiency (%)	:	0.77	**LRkVA Factor**	:	9.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	L
Load Factor	:	80.0			

SLP-1101 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	9.94	**Starting kW**	:	12.43	**Peak kW**	:	None
Running kVA	:	11.04	**Starting kVA**	:	13.81	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	:	No
Running Amps	:	13.29	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Running NLL kVA	:	11.04						
Starting NLL kVA	:	13.81				**Voltage**	:	480
Alternator kW	:	19.88						

Shaft Hp	:	15.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	11.19	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

Step18

Calculated Individual Generator Set Step Load Requirements

Running kW	:	67.0	**Starting kW**	:	223.0	**Cumulative Step kW**	:	922.0
Running kVA	:	75.0	**Starting kVA**	:	576.0	**Cumulative Step kVA**	:	1387.0
Running Amps	:	6.0	**Starting Non-linear kVA**	:	0.0			
Running Non-linear kVA	:	0.0						
Alternator kW	:	66.5						
Voltage Distortion Limit for	**: step**	10						

FPNL-1300 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.99	**Starting kW**	:	9.96	**Peak kW**	:	None
Running kVA	:	3.74	**Starting kVA**	:	12.46	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	4.5	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	2.99				**Voltage**	:	480

PNL-P-9A Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.1	**Starting kW**	:	7.0	**Peak kW**	:	None
Running kVA	:	2.62	**Starting kVA**	:	8.75	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No
Running Amps	:	3.16	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	2.1				**Voltage**	:	480

PNL-P-9B Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.1	**Starting kW**	:	7.0	**Peak kW**	:	None
Running kVA	:	2.62	**Starting kVA**	:	8.75	**Peak kVA**	:	None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	:	No

Running Amps	:	3.16	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.1				**Voltage**	: 480

PNL-P-9C Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.1	**Starting kW**	:	7.0	**Peak kW**	: None
Running kVA	:	2.62	**Starting kVA**	:	8.75	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	3.16	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.1				**Voltage**	: 480

FCP-711 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	127.44	**Peak kW**	: None
Running kVA	:	44.2	**Starting kVA**	:	354.0	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.36	**Cyclic**	: No
Running Amps	:	55.54	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	39.78				**Voltage**	: 460

Shaft Hp	:	60.0	**Method**	:	Across the line
Shaft kW	:	44.76	**Low Inertia**	:	No
Efficiency (%)	:	0.9	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

FCP-712 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	127.44	**Peak kW**	: None
Running kVA	:	44.2	**Starting kVA**	:	354.0	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.36	**Cyclic**	: No
Running Amps	:	53.23	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	39.78				**Voltage**	: 480

Shaft Hp	:	60.0	**Method**	:	Across the line
Shaft kW	:	44.76	**Low Inertia**	:	No
Efficiency (%)	:	0.9	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

FCP-713 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	127.44	**Peak kW**	: None
Running kVA	:	44.2	**Starting kVA**	:	354.0	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.36	**Cyclic**	: No
Running Amps	:	53.23	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	39.78				**Voltage**	: 480

Shaft Hp	:	60.0	**Method**	:	Across the line
Shaft kW	:	44.76	**Low Inertia**	:	No
Efficiency (%)	:	0.9	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

SF-1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None

Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.2	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 480

Shaft Hp	:	3.0	**Method**	:	Across the line
Shaft kW	:	2.24	**Low Inertia**	:	No
Efficiency (%)	:	0.82	**LRkVA Factor**	:	8.5
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	K
Load Factor	:	80.0			

SF-2 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.2	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 480

Shaft Hp	:	3.0	**Method**	:	Across the line
Shaft kW	:	2.24	**Low Inertia**	:	No
Efficiency (%)	:	0.82	**LRkVA Factor**	:	8.5
Design	:	Standard NEMA Design B,C or D 80.0	**LRkVA Code**	:	K
Load Factor	:				

Step19

Calculated Individual Generator Set Step Load Requirements

Running kW	:	129.0	**Starting kW**	:	305.0	**Cumulative Step kW**	: 1070.0
Running kVA	:	143.0	**Starting kVA**	:	921.0	**Cumulative Step kVA**	: 1807.0
Running Amps	:	12.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	129.24					
Voltage Distortion Limit for	**: step**	10					

PANEL-10A Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	1.68	**Starting kW**	:	5.6	**Peak kW**	: None
Running kVA	:	2.1	**Starting kVA**	:	7.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	2.53	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.68				**Voltage**	: 480

PANEL-10B Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	1.68	**Starting kW**	:	5.6	**Peak kW**	: None
Running kVA	:	2.1	**Starting kVA**	:	7.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	2.53	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	1.68				**Voltage**	: 480

PANEL-10C Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	1.68	**Starting kW**	:	5.6	**Peak kW**	: None
Running kVA	:	2.1	**Starting kVA**	:	7.0	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	2.53	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0

Alternator kW	:	1.68				**Voltage**	:	480

BLM-802 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	129.74	**Starting kW**	:	177.0	**Peak kW**	:	None
Running kVA	:	142.57	**Starting kVA**	:	708.0	**Peak kVA**	:	None
Running PF	:	0.91	**Starting PF**	:	0.25	**Cyclic**	:	No
Running Amps	:	171.69	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	129.74				**Voltage**	:	480

Shaft Hp : 200.0 **Method** : Part Winding

Shaft kW : 149.2

Efficiency (%) : 0.92 **LRkVA Factor** : 5.9

Design : Standard NEMA Design B,C or D **LRkVA Code** : G

Load Factor : 80.0

FCP-721 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	127.44	**Peak kW**	:	None
Running kVA	:	44.2	**Starting kVA**	:	354.0	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.36	**Cyclic**	:	No
Running Amps	:	55.54	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	39.78				**Voltage**	:	460

Shaft Hp : 60.0 **Method** : Across the line

Shaft kW : 44.76 **Low Inertia** : No

Efficiency (%) : 0.9 **LRkVA Factor** : 5.9

Design : Standard NEMA Design B,C or D **LRkVA Code** : G

Load Factor : 80.0

FCP-722 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	127.44	**Peak kW**	:	None
Running kVA	:	44.2	**Starting kVA**	:	354.0	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.36	**Cyclic**	:	No
Running Amps	:	53.23	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	39.78				**Voltage**	:	480

Shaft Hp : 60.0 **Method** : Across the line

Shaft kW : 44.76 **Low Inertia** : No

Efficiency (%) : 0.9 **LRkVA Factor** : 5.9

Design : Standard NEMA Design B,C or D **LRkVA Code** : G

Load Factor : 80.0

FCP-723 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	127.44	**Peak kW**	:	None
Running kVA	:	44.2	**Starting kVA**	:	354.0	**Peak kVA**	:	None
Running PF	:	0.9	**Starting PF**	:	0.36	**Cyclic**	:	No
Running Amps	:	53.23	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	:	10.0
Alternator kW	:	39.78				**Voltage**	:	480

Shaft Hp : 60.0 **Method** : Across the line

Shaft kW : 44.76 **Low Inertia** : No

Efficiency (%) : 0.9 **LRkVA Factor** : 5.9 **Design** : Standard NEMA Design B,C or D **LRkVA Code** : G **Load Factor** : 80.0

SF-3 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 2.18	**Starting kW**	: 16.83	**Peak kW**	: None
Running kVA	: 2.66	**Starting kVA**	: 25.5	**Peak kVA**	: None

Running PF	: 0.82	**Starting PF**	: 0.66	**Cyclic**	: No
Running Amps	: 3.2	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 2.18			**Voltage**	: 480

Shaft Hp	: 3.0	**Method**	: Across the line
Shaft kW	: 2.24	**Low Inertia**	: No
Efficiency (%)	: 0.82	**LRkVA Factor**	: 8.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: K
Load Factor	: 80.0		

SF-4 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 2.18	**Starting kW**	: 16.83	**Peak kW**	: None
Running kVA	: 2.66	**Starting kVA**	: 25.5	**Peak kVA**	: None
Running PF	: 0.82	**Starting PF**	: 0.66	**Cyclic**	: No
Running Amps	: 3.2	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 2.18			**Voltage**	: 480

Shaft Hp	: 3.0	**Method**	: Across the line
Shaft kW	: 2.24	**Low Inertia**	: No
Efficiency (%)	: 0.82	**LRkVA Factor**	: 8.5
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: K
Load Factor	: 80.0		

Step20

Calculated Individual Generator Set Step Load Requirements

Running kW	: 52.0	**Starting kW**	: 90.0	**Cumulative Step kW**	: 983.0
Running kVA	: 59.0	**Starting kVA**	: 105.0	**Cumulative Step kVA**	: 1135.0
Running Amps	: 5.0	**Starting Non-linear kVA**	: 55.0		
Running Non-linear kVA	: 44.0				
Alternator kW	: 91.52				
Voltage Distortion Limit for : step	10				

PNL-PB3 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 11.96	**Starting kW**	: 39.86	**Peak kW**	: None
Running kVA	: 14.95	**Starting kVA**	: 49.82	**Peak kVA**	: None
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	: 18.0	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 11.96			**Voltage**	: 480

PNL-PB5 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 11.96	**Starting kW**	: 39.86	**Peak kW**	: None
Running kVA	: 14.95	**Starting kVA**	: 49.82	**Peak kVA**	: None
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	: 18.0	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 11.96			**Voltage**	: 480

FCP-731 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	49.73	**Peak kW**	: None
Running kVA	:	44.2	**Starting kVA**	:	55.26	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	53.23	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	44.2					
Starting NLL kVA	:	55.26				**Voltage**	: 480
Alternator kW	:	79.56					

Shaft Hp	:	60.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	44.76	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

FCP-732 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	49.73	**Peak kW**	: None
Running kVA	:	44.2	**Starting kVA**	:	55.26	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	55.54	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	44.2					
Starting NLL kVA	:	55.26				**Voltage**	: 460
Alternator kW	:	79.56					

Shaft Hp	:	60.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	44.76	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

Step21

Calculated Individual Generator Set Step Load Requirements

Running kW	:	29.0	**Starting kW**	:	126.0	**Cumulative Step kW**	: 1072.0
Running kVA	:	34.0	**Starting kVA**	:	159.0	**Cumulative Step kVA**	: 1248.0
Running Amps	:	3.0	**Starting Non-linear kVA**	:	28.0		
Running Non-linear kVA	:	22.0					
Alternator kW	:	48.95					
Voltage Distortion Limit for	**: step**	10					

F1P1-99 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	5.98	**Starting kW**	:	19.93	**Peak kW**	: None
Running kVA	:	7.47	**Starting kVA**	:	24.91	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	9.0	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.98				**Voltage**	: 480

PNL-PB4 Three Phase Quantity : 1 In this Step

Category

: User Defined

Running kW	:	8.0	**Starting kW**	:	149.47	**Peak kW**	: None
Running kVA	:	10.0	**Starting kVA**	:	186.84	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	12.04	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	8.0				**Voltage**	: 480

FCP-733 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	39.78	**Starting kW**	:	49.73	**Peak kW**	: None
Running kVA	:	44.2	**Starting kVA**	:	55.26	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	55.54	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	44.2					
Starting NLL kVA	:	55.26				**Voltage**	: 460
Alternator kW	:	79.56					

Shaft Hp	: 60.0	**Type**	: Variable Frequency Drive
Shaft kW	: 44.76	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

SF-1-32B Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.2	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 480

Shaft Hp	: 3.0	**Method**	: Across the line
Shaft kW	: 2.24	**Low Inertia**	: No
Efficiency (%)	: 0.82	**LRkVA Factor**	: 8.5
Design :	Standard NEMA Design B,C or D	**LRkVA Code**	: K
Load Factor :	80.0		

SF-2-32B Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	2.18	**Starting kW**	:	16.83	**Peak kW**	: None
Running kVA	:	2.66	**Starting kVA**	:	25.5	**Peak kVA**	: None
Running PF	:	0.82	**Starting PF**	:	0.66	**Cyclic**	: No
Running Amps	:	3.2	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.18				**Voltage**	: 480

Shaft Hp :	3.0	**Method**	: Across the line
Shaft kW :	2.24	**Low Inertia**	: No
Efficiency (%) :	0.82	**LRkVA Factor**	: 8.5
Design :	Standard NEMA Design B,C or D	**LRkVA Code**	: K
Load Factor :	80.0		

Step22

Calculated Individual Generator Set Step Load Requirements

Running kW	:	3.0	**Starting kW**	:	9.0	**Cumulative Step kW**	: 984.0
Running kVA	:	3.0	**Starting kVA**	:	11.0	**Cumulative Step kVA**	: 1134.0
Running Amps	:	0.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	2.7					
Voltage Distortion Limit for	**: step**	10					

EVA-1282 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	5.4	**Starting kW**	:	18.0	**Peak kW**	: None
Running kVA	:	6.75	**Starting kVA**	:	22.5	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	8.13	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.4				**Voltage**	: 480

Step23

Calculated Individual Generator Set Step Load Requirements

Running kW	:	490.0	**Starting kW**	:	553.0	**Cumulative Step kW**	: 1531.0
Running kVA	:	537.0	**Starting kVA**	:	2013.0	**Cumulative Step kVA**	: 3138.0
Running Amps	:	45.0	**Starting Non-linear kVA**	:	230.0		
Running Non-linear kVA	:	184.0					
Alternator kW	:	655.4					
Voltage Distortion Limit for	**: step**	10					

48IN-VALVE (CV-1000) Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.99	**Starting kW**	:	9.96	**Peak kW**	: None
Running kVA	:	3.74	**Starting kVA**	:	12.46	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	4.5	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.99				**Voltage**	: 480

SWBD-3 UNKNOWN Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	2.99	**Starting kW**	:	9.96	**Peak kW**	: None
Running kVA	:	3.74	**Starting kVA**	:	12.46	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	4.5	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	2.99				**Voltage**	: 480

M-1 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	331.55	**Starting kW**	:	414.44	**Peak kW**	: None
Running kVA	:	368.39	**Starting kVA**	:	460.49	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	462.92	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	368.39					
Starting NLL kVA	:	460.49				**Voltage**	: 460
Alternator kW	:	663.1					

Shaft Hp	:	500.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	373.0	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

P-1003 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	320.86	**Starting kW**	:	336.3	**Peak kW**	: None
Running kVA	:	348.76	**Starting kVA**	:	1770.0	**Peak kVA**	: None
Running PF	:	0.92	**Starting PF**	:	0.19	**Cyclic**	: No
Running Amps	:	419.99	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	320.86				**Voltage**	: 480

Shaft Hp	: 500.0	**Method**	:	Part Winding	
Shaft kW	: 373.0				
Efficiency (%)	: 0.93	**LRkVA Factor**	:	5.9	
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	:	G	
Load Factor	: 80.0				

P-1004 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 320.86	**Starting kW**	: 336.3	**Peak kW**	: None
Running kVA	: 348.76	**Starting kVA**	: 1770.0	**Peak kVA**	: None
Running PF	: 0.92	**Starting PF**	: 0.19	**Cyclic**	: No
Running Amps	: 419.99	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 320.86			**Voltage**	: 480

Shaft Hp	: 500.0	**Method**	:	Part Winding	
Shaft kW	: 373.0				
Efficiency (%)	: 0.93	**LRkVA Factor**	:	5.9	
Design	: Standard NEMA Design B,C or D 80.0	**LRkVA Code**	:	G	
Load Factor	:				

Step24

Calculated Individual Generator Set Step Load Requirements

Running kW	: 665.0	**Starting kW**	: 834.0	**Cumulative Step kW**	: 2301.0
Running kVA	: 739.0	**Starting kVA**	: 927.0	**Cumulative Step kVA**	: 2590.0
Running Amps	: 62.0	**Starting Non-linear kVA**	: 921.0		
Running Non-linear kVA	: 737.0				
Alternator kW	: 1327.7				
Voltage Distortion Limit for step	: 10				

SWBD-4 UNKNOWN Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	: 2.99	**Starting kW**	: 9.96	**Peak kW**	: None
Running kVA	: 3.74	**Starting kVA**	: 12.46	**Peak kVA**	: None
Running PF	: 0.8	**Starting PF**	: 0.8	**Cyclic**	: No
Running Amps	: 4.5	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 2.99			**Voltage**	: 480

M-2 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	: 331.55	**Starting kW**	: 414.44	**Peak kW**	: None
Running kVA	: 368.39	**Starting kVA**	: 460.49	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.9	**Cyclic**	: No
Running Amps	: 462.92	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	: 368.39				
Starting NLL kVA	: 460.49			**Voltage**	: 460
Alternator kW	: 663.1				

Shaft Hp	: 500.0	**Type**	:	Variable Frequency Drive	
Shaft kW	: 373.0	**Ramp Details**	:	None	
Rectifier Type	: 6 pulse	**THDI %**	:	26	
Efficiency (%)	: 0.9	**THDV %**	:	10	
Load Factor	: 80.0				

P-1005 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	331.55	**Starting kW**	:	414.44	**Peak kW**	: None
Running kVA	:	368.39	**Starting kVA**	:	460.49	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	443.63	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	368.39					
Starting NLL kVA	:	460.49				**Voltage**	: 480
Alternator kW	:	663.1					

Shaft Hp	: 500.0	**Type**	: Variable Frequency Drive
Shaft kW	: 373.0	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

P-1006 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	331.55	**Starting kW**	:	414.44	**Peak kW**	: None
Running kVA	:	368.39	**Starting kVA**	:	460.49	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	443.63	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	368.39					
Starting NLL kVA	:	460.49				**Voltage**	: 480
Alternator kW	:	663.1					

Shaft Hp	: 500.0	**Type**	: Variable Frequency Drive
Shaft kW	: 373.0	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

P-1007 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	331.55	**Starting kW**	:	414.44	**Peak kW**	: None
Running kVA	:	368.39	**Starting kVA**	:	460.49	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	443.63	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	368.39					
Starting NLL kVA	:	460.49				**Voltage**	: 480
Alternator kW	:	663.1					

Shaft Hp	: 500.0	**Type**	: Variable Frequency Drive
Shaft kW	: 373.0	**Ramp Details**	: None
Rectifier Type	: 6 pulse	**THDI %**	: 26
Efficiency (%)	: 0.9	**THDV %**	: 10
Load Factor	: 80.0		

Step25

Calculated Individual Generator Set Step Load Requirements

Running kW	:	173.0	**Starting kW**	:	322.0	**Cumulative Step kW**	: 2453.0
Running kVA	:	190.0	**Starting kVA**	:	1527.0	**Cumulative Step kVA**	: 3928.0
Running Amps	:	16.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	172.89					
Voltage Distortion Limit for	**: step**	10					

PNL-H Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	24.91	**Starting kW**	:	83.04	**Peak kW**	: None
Running kVA	:	31.14	**Starting kVA**	:	103.8	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	37.5	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	24.91				**Voltage**	: 480

P-1008 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	320.86	**Starting kW**	:	560.5	**Peak kW**	: None
Running kVA	:	348.76	**Starting kVA**	:	2950.0	**Peak kVA**	: None
Running PF	:	0.92	**Starting PF**	:	0.19	**Cyclic**	: No
Running Amps	:	438.25	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	320.86				**Voltage**	: 460

Shaft Hp	:	500.0	**Method**	:	Across the line
Shaft kW	:	373.0	**Low Inertia**	:	No
Efficiency (%)	:	0.93	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

Step26

Calculated Individual Generator Set Step Load Requirements

Running kW	:	160.0	**Starting kW**	:	280.0	**Cumulative Step kW**	: 2585.0
Running kVA	:	174.0	**Starting kVA**	:	1475.0	**Cumulative Step kVA**	: 4066.0
Running Amps	:	15.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	160.43					
Voltage Distortion Limit for	**: step**	10					

P-1009 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	320.86	**Starting kW**	:	560.5	**Peak kW**	: None
Running kVA	:	348.76	**Starting kVA**	:	2950.0	**Peak kVA**	: None
Running PF	:	0.92	**Starting PF**	:	0.19	**Cyclic**	: No
Running Amps	:	438.25	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	320.86				**Voltage**	: 460

Shaft Hp	:	500.0	**Method**	:	Across the line
Shaft kW	:	373.0	**Low Inertia**	:	No
Efficiency (%)	:	0.93	**LRkVA Factor**	:	5.9
Design	:	Standard NEMA Design B,C or D	**LRkVA Code**	:	G
Load Factor	:	80.0			

Step27

Calculated Individual Generator Set Step Load Requirements

Running kW	:	265.0	**Starting kW**	:	332.0	**Cumulative Step kW**	: 2796.0
Running kVA	:	295.0	**Starting kVA**	:	368.0	**Cumulative Step kVA**	: 3134.0
Running Amps	:	25.0	**Starting Non-linear kVA**	:	368.0		
Running Non-linear kVA	:	295.0					
Alternator kW	:	530.5					
Voltage Distortion Limit for	**: step**	10					

P-4 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	265.25	**Starting kW**	:	331.56	**Peak kW**	: None

Running kVA	:	294.72	**Starting kVA**	:	368.4	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	370.34	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	294.72					
Starting NLL kVA	:	368.4				**Voltage**	: 460
Alternator kW	:	530.5					

Shaft Hp	:	400.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	298.4	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

P-2 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	265.25	**Starting kW**	:	331.56	**Peak kW**	: None
Running kVA	:	294.72	**Starting kVA**	:	368.4	**Peak kVA**	: None
Running PF	:	0.9	**Starting PF**	:	0.9	**Cyclic**	: No
Running Amps	:	354.91	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Running NLL kVA	:	294.72					
Starting NLL kVA	:	368.4				**Voltage**	: 480
Alternator kW	:	530.5					

Shaft Hp	:	400.0	**Type**	:	Variable Frequency Drive
Shaft kW	:	298.4	**Ramp Details**	:	None
Rectifier Type	:	6 pulse	**THDI %**	:	26
Efficiency (%)	:	0.9	**THDV %**	:	10
Load Factor	:	80.0			

Step28

Calculated Individual Generator Set Step Load Requirements

Running kW	:	96.0	**Starting kW**	:	228.0	**Cumulative Step kW**	: 2959.0
Running kVA	:	106.0	**Starting kVA**	:	852.0	**Cumulative Step kVA**	: 3912.0
Running Amps	:	9.0	**Starting Non-linear kVA**	:	0.0		
Running Non-linear kVA	:	0.0					
Alternator kW	:	95.53					
Voltage Distortion Limit for : step		10					

EVA-1281 Three Phase Quantity : 1 In this Step

Category : User Defined

Running kW	:	5.4	**Starting kW**	:	18.0	**Peak kW**	: None
Running kVA	:	6.75	**Starting kVA**	:	22.5	**Peak kVA**	: None
Running PF	:	0.8	**Starting PF**	:	0.8	**Cyclic**	: No
Running Amps	:	8.13	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	5.4				**Voltage**	: 480

FCP-801 Three Phase Quantity : 1 In this Step

Category : Motor

Running kW	:	162.18	**Starting kW**	:	354.0	**Peak kW**	: None
Running kVA	:	178.22	**Starting kVA**	:	1475.0	**Peak kVA**	: None
Running PF	:	0.91	**Starting PF**	:	0.24	**Cyclic**	: No
Running Amps	:	223.95	**Max. % Voltage Dip**	:	20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	:	162.18				**Voltage**	: 460

Shaft Hp	:	250.0	**Method**	:	Across the line
Shaft kW	:	186.5	**Low Inertia**	:	No
Efficiency (%)	:	0.92	**LRkVA Factor**	:	5.9

Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G		
Load Factor	: 80.0				

P-910
Category : Motor

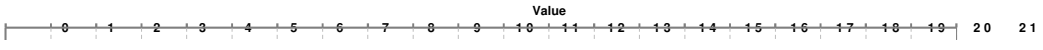
Three Phase Quantity : 1 In this Step

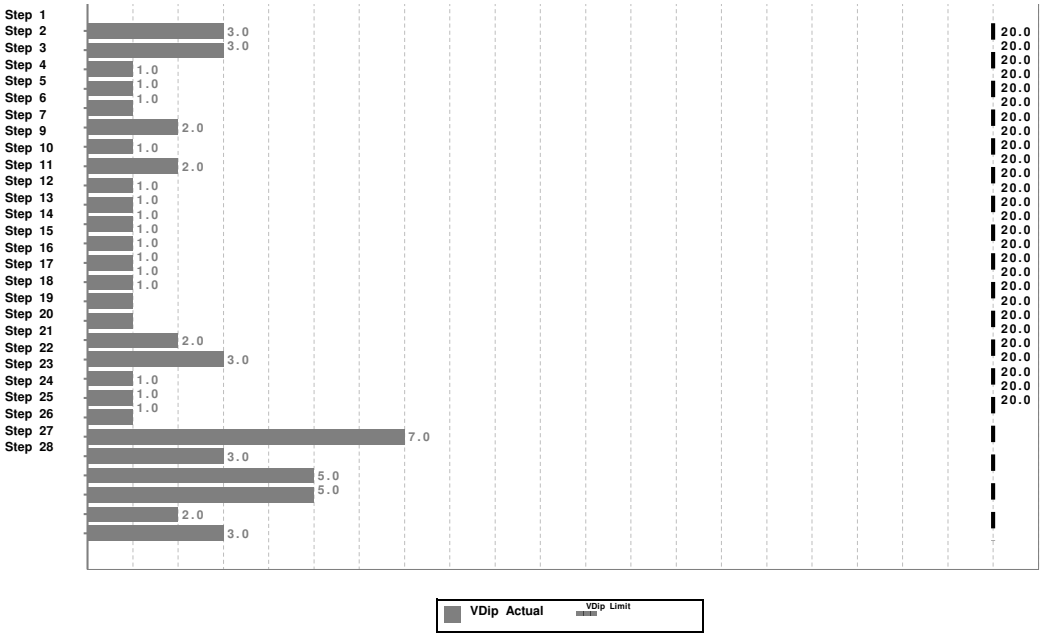
Running kW	: 23.47	**Starting kW**	: 84.66	**Peak kW**	: None
Running kVA	: 26.08	**Starting kVA**	: 206.5	**Peak kVA**	: None
Running PF	: 0.9	**Starting PF**	: 0.41	**Cyclic**	: No
Running Amps	: 31.41	**Max. % Voltage Dip**	: 20.0	**Max. % Frequency Dip**	: 10.0
Alternator kW	: 23.47			**Voltage**	: 480

Shaft Hp	: 35.0	**Method**	: Across the line
Shaft kW	: 26.11	**Low Inertia**	: No
Efficiency (%)	: 0.89	**LRkVA Factor**	: 5.9
Design	: Standard NEMA Design B,C or D	**LRkVA Code**	: G
Load Factor	: 80.0		

Step Level Dips Summary

Step #	Voltage Dip Limit (%)	Expected Step Voltage Dip (%)	Voltage Recovery Time (s) **	Frequency Dip Limit (%)	Expected Frequency Dip (%)	Frequency recovery Time (s) **
1	20	3	0.1	10	1	0.7
2	20	3	0.1	10	1	0.3
3	20	1	0.1	10	1	0.1
4	20	1	0.1	10	1	0.1
5	20	1	0.1	10	1	0.1
6	20	2	0.1	10	1	0.2
7	20	1	0.1	10	1	0.1
9	20	2	0.1	10	1	0.3
10	20	1	0.1	10	1	0.1
11	20	1	0.1	10	1	0.1
12	20	1	0.1	10	1	0.2
13	20	1	0.1	10	1	0.1
14	20	1	0.1	10	1	0.1
15	20	1	0.1	10	1	0.1
16	20	1	0.1	10	1	0.1
17	20	1	0.1	10	1	0.1
18	20	2	0.1	10	1	0.3
19	20	3	0.1	10	1	0.4
20	20	1	0.1	10	1	0.1
21	20	1	0.1	10	1	0.2
22	20	1	0.1	10	1	0.1
23	20	7	0.1	10	1	0.6
24	20	3	0.1	10	1	1.1
25	20	5	0.1	10	1	0.4
26	20	5	0.1	10	1	0.3
27	20	2	0.1	10	1	0.4
28	20	3	0.1	10	1	0.3

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Step 2
Step 3
Step 4
Step 5
Step 6
Step 7
Step 9
Step 10
Step 11
Step 12
Step 13
Step 14
Step 15
Step 16
Step 17
Step 18
Step 19
Step 20
Step 21
Step 22
Step 23
Step 24
Step 25
Step 26
Step 27
Step 28
3.0
3.0
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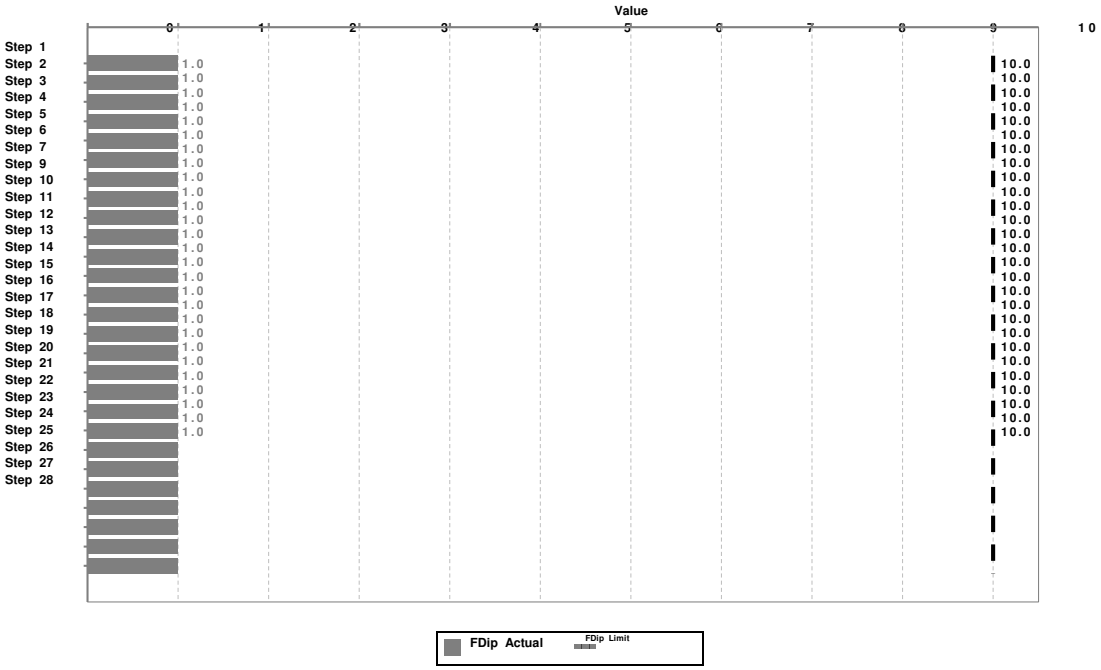
20.0
VDip Actual
VDip Limit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3
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9
10
Step 1
Step 2
Step 3
Step 4
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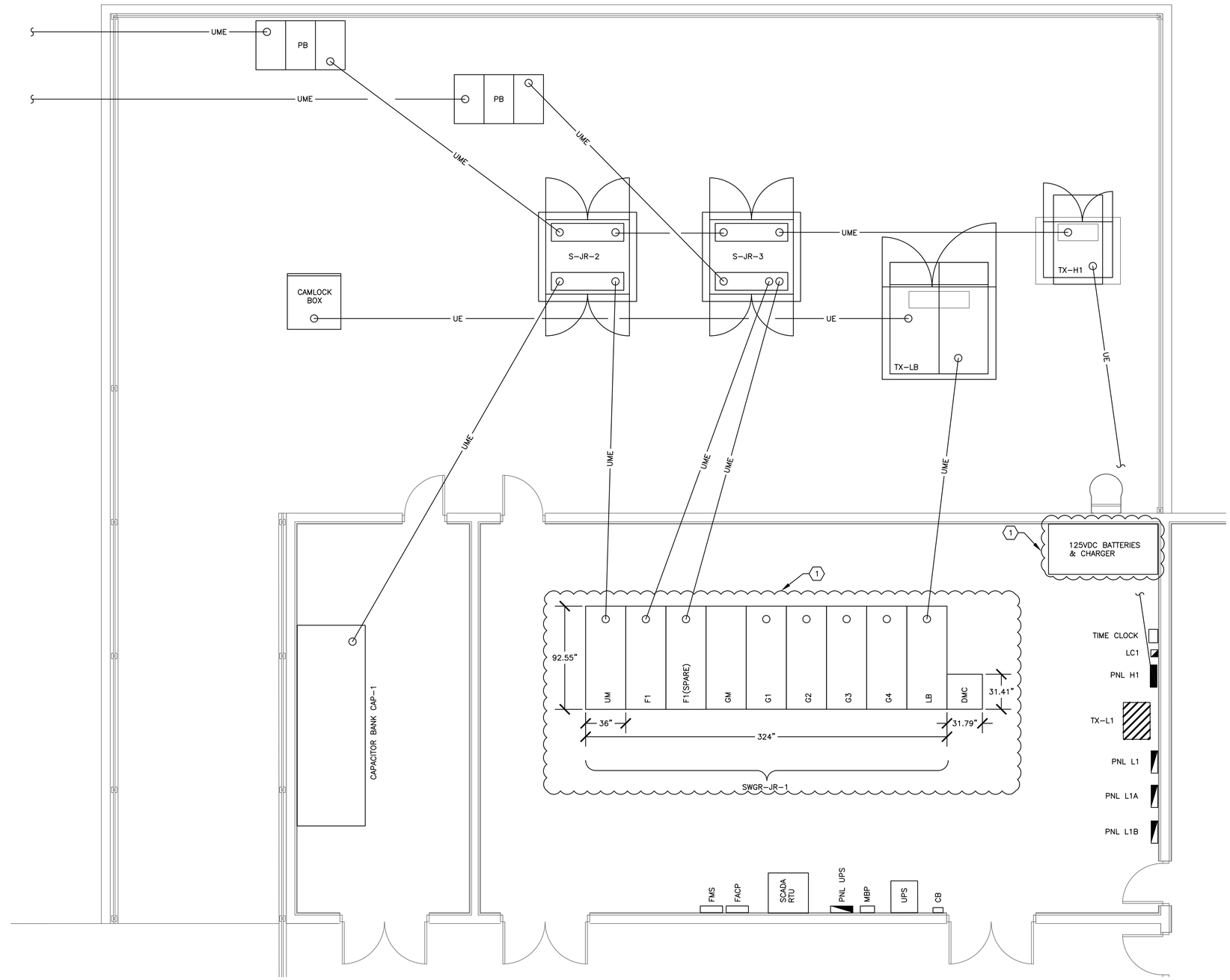
Step 9
Step 10
Step 11
Step 12
Step 13
Step 14
Step 15
Step 16
Step 17
Step 18
Step 19
Step 20
Step 21
Step 22
Step 23
Step 24
Step 25
Step 26
Step 27
Step 28
1.0
10.0
FDip Actual
FDip Limit

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.

KEYED NOTES (THIS SHEET ONLY)

10 GMP 1 EARLY EQUIPMENT PACKAGE.



1 / E-3 ELECTRICAL EQUIPMENT LAYOUT

0 4' 8' 16'

SCALE: 1/4"=1'-0"

PRICING PACKAGE
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TEXAS NO: 105916 ON DATE: 06/02/2023
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REV.	DATE	BY	DESCRIPTION

DESIGNED SG
DRAWN CAD
CHECKED JLC
DATE 06-02-23

PRELIMINARY - FOR GMP 1 EARLY EQUIPMENT PACKAGE 1 ONLY - NOT FOR CONSTRUCTION

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Bath ENGINEERING
TEXAS FIRM REGISTRATION NO. 829
4110 RIO BRAVO SUITE 102
EL PASO, TX 79902
TEL: 915-313-7200

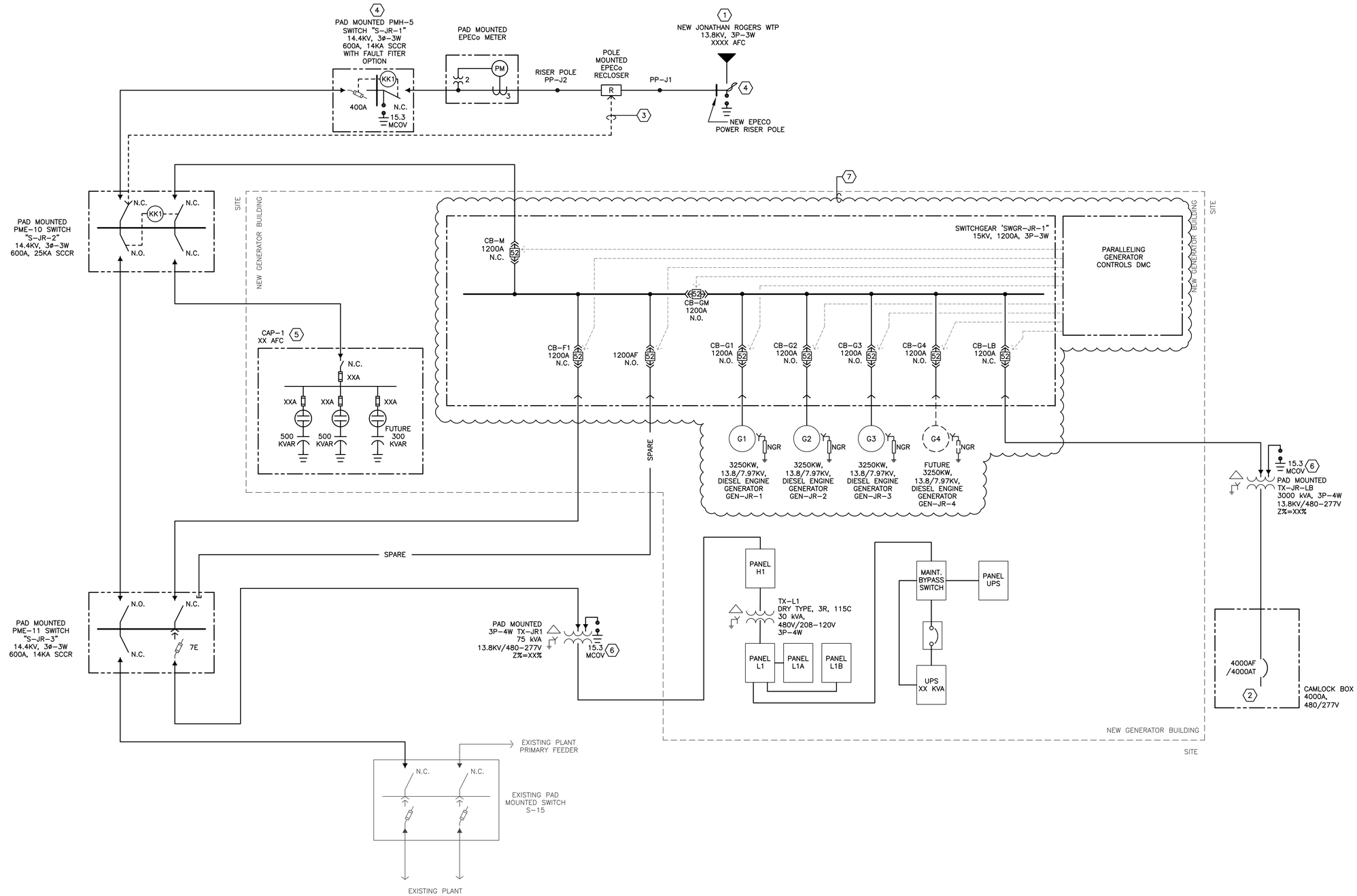
el paso WATER

JONATHAN ROGERS WTP GENERATOR UPGRADES
EL PASO, TX

ELECTRICAL EQUIPMENT LAYOUT

JOB NO. 3289D
DRAWING NO. E-3
SEQUENCE NO. XX OF XX

J:\3289 EPW Open-End MEP (RFQ 20-17)\3289D EPW JR WTP Generator Upgrades\CAD\05-Drawings\E-3 ELECTRICAL FEEDER PLAN.dwg



GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.

KEYED NOTES (THIS SHEET ONLY)

(1) PER ARTICLE 220.87 ON NEC. MAXIMUM DEMAND DATA WAS NOT AVAILABLE AND NOT PROVIDED. THE CALCULATED ELECTRICAL DEMAND IS 9060 KVA, SEE BELOW LOADING CALCULATION TO MEET NEC 220.87

$$\frac{9060\ \text{KVA}}{1.732 \times 13.8\ \text{KV}} = 379.05\ \text{AMP}$$

$$379.05\ \text{AMP} \times 1.25 = 473.81\ \text{AMP}$$

(2) 4000A, 480V, 3P-4W, LOAD BANK TAP BOX WITH 4000A MAIN CIRCUIT BREAKER LSIG ELECTRONIC TRIP UNIT IN NEMA 4X STAINLESS STEEL ENCLOSURE.

(3) CONTRACTOR SHALL EXTEND 6-#12, 1#12G IN 2"C FOR SWITCH OPEN AND SWITCH CLOSED CONTACTS, WITH TWO SPARES, TO RECLOSER PROVIDED BY E.P.E.Co. CONTRACTOR SHALL COORDINATE EXACT RECLOSER LOCATION PRIOR TO ROUGH-IN.

(4) CONTRACTOR SHALL PROVIDE EPECo. FUSE TYPE DATA FOR ENGINEER TO SELECT PROPER FAULT FITER CONTROL MODULE AND PERFORM A PROTECTIVE DEVICE COORDINATION. PROVIDE THIS INFORMATION PRIOR TO ORDER EQUIPMENT.

(5) FUTURE CAPACITOR BANK NOT ON THIS CONTRACT.

(6) ELBOW TYPE PARKING STAND ARRESTER REFER TO SECTION 261219 FOR REQUIREMENTS.

(7) GMP 1 EARLY EQUIPMENT PACKAGE.

1 / E-8 OVERALL ONE-LINE DIAGRAM

SCALE: N.T.S

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REV.	DATE	BY	DESCRIPTION

DESIGNED: SG
DRAWN: CAD
CHECKED: JLC
DATE: 06-02-23

PRELIMINARY - FOR GMP 1 EARLY EQUIPMENT PACKAGE 1 ONLY - NOT FOR CONSTRUCTION

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Bath ENGINEERING
TEXAS FIRM REGISTRATION NO. 829
4110 RIO BRAVO SUITE 102
EL PASO, TX 79902
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el paso WATER

JONATHAN ROGERS WTP GENERATOR UPGRADES
EL PASO, TX

OVERALL ONE-LINE DIAGRAM

JOB NO. 3289D
DRAWING NO. E-8
SEQUENCE NO. XX OF XX

LEGEND (THIS SHEET ONLY)

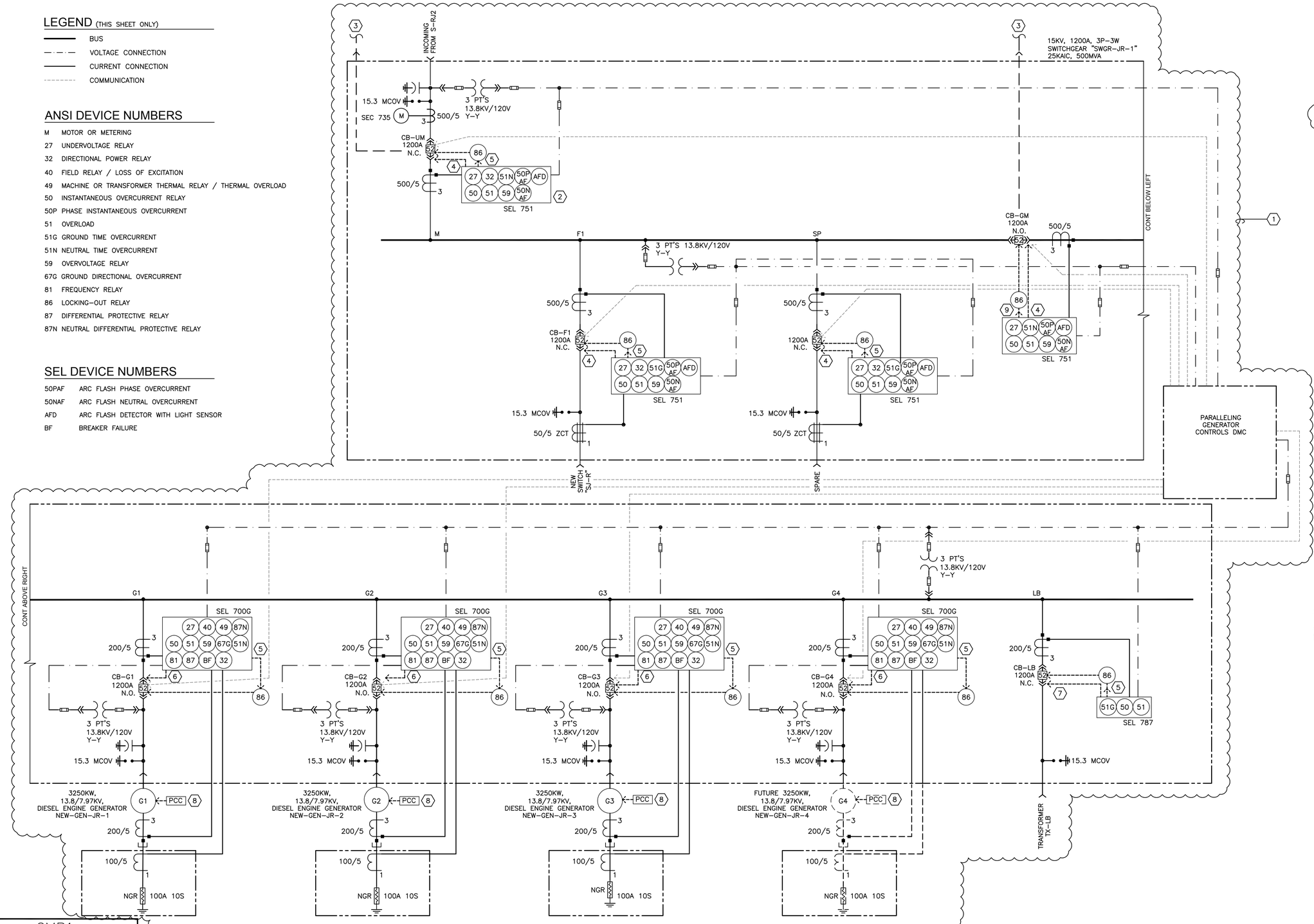
- BUS
- VOLTAGE CONNECTION
- CURRENT CONNECTION
- COMMUNICATION

ANSI DEVICE NUMBERS

M	MOTOR OR METERING
27	UNDERVOLTAGE RELAY
32	DIRECTIONAL POWER RELAY
40	FIELD RELAY / LOSS OF EXCITATION
49	MACHINE OR TRANSFORMER THERMAL RELAY / THERMAL OVERLOAD
50	INSTANTANEOUS OVERCURRENT RELAY
50P	PHASE INSTANTANEOUS OVERCURRENT
51	OVERLOAD
51G	GROUND TIME OVERCURRENT
51N	NEUTRAL TIME OVERCURRENT
59	OVERVOLTAGE RELAY
67G	GROUND DIRECTIONAL OVERCURRENT
81	FREQUENCY RELAY
86	LOCKING-OUT RELAY
87	DIFFERENTIAL PROTECTIVE RELAY
87N	NEUTRAL DIFFERENTIAL PROTECTIVE RELAY

SEL DEVICE NUMBERS

50PAF	ARC FLASH PHASE OVERCURRENT
50NAF	ARC FLASH NEUTRAL OVERCURRENT
AFD	ARC FLASH DETECTOR WITH LIGHT SENSOR
BF	BREAKER FAILURE



GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.
2. ALL RELAYS SHALL BE POWERED WITH 125 VDC.

KEYED NOTES (THIS SHEET ONLY)

1. GMP 1 EARLY EQUIPMENT PACKAGE.
2. SEL-751 SHALL BE PROGRAMMED WITH DIRECTIONAL PROTECTION (32) RELAY AND OPEN UTILITY MAIN BREAKER ON THIS SWITCHGEAR FOR REVERSED POWER DETECTION.
3. CONTRACTOR SHALL EXTEND 10-#12, 1-#12G IN 1-1/4"C FOR BREAKER OPEN, BREAKER CLOSED, BREAKER TRIPPED, BREAKER FAIL TO CLOSE AND BREAKER FAIL TO OPEN, TO RECLOSER PROVIDED BY E.P.E.Co. CONTRACTOR SHALL COORDINATE EXACT RECLOSER LOCATION PRIOR TO ROUGH-IN.
4. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51, 51N/51G, 50PAF, 50NAF, 27, 32 AND 59 DEVICES ACTIVATE.
5. RELAY OUTPUT TO TRIP 86 RELAY AND LOCKOUT WHEN 52 TRIPS, AFD ACTIVATES AND 52 CLOSES. 86 RELAY TO SEND BREAKER FAILURE SIGNAL TO DMC WHEN BREAKER FAILS TO OPEN AND TO CLOSE.
6. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 27, 40, 49, 87N, 50, 51, 59, 67G, 51N, 81, 87 AND 32 DEVICES ACTIVATE.
7. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51 AND 51G ACTIVATE.
8. REFER TO POWER COMMAND CONTROLS (PCC) DEVICE NUMBERS ON THIS SHEET.
9. RELAY OUTPUT TO TRIP 52 BREAKER WHEN 50, 51, 51N/51G, 50PAF, 50NAF, 27 AND 59 DEVICES ACTIVATE.

POWER COMMAND CONTROLS ANSI DEVICE NUMBERS

ANSI DEVICE NUMBERS	ANSI FUNCTION
15	SYNCHRONIZER
25	SYNC CHECK RELAY
27	UNDERVOLTAGE RELAY
32	DIRECTIONAL POWER RELAY (REVERSE KW)
40	LOSS OF FIELD RELAY (REVERSE kVAR) UNDER EXCITATION (REVERSE kVAR)
46	PHASE BALANCE CURRENT RELAY (NEGATIVE SEQUENCE)
47	PHASE SEQUENCE RELAY
50	INSTANTANEOUS OVERCURRENT RELAY (AMPSENTRY) MAINTENANCE MODE)
51	TIME OVERCURRENT RELAY (AMPSENTRY)
59	OVERVOLTAGE RELAY
65	GOVERNOR
81	OVER/UNDER FREQUENCY RELAY
86	LOCKOUT
90	VOLTAGE REGULATOR

PRICING PACKAGE

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GMP1
EARLY EQUIPMENT
PACKAGE 1

1 PROTECTION ONE-LINE DIAGRAM
E-9

SCALE: N.T.S

REV.	DATE	BY	DESCRIPTION

DESIGNED SG
DRAWN CAD
CHECKED JLC
DATE 06-02-23

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Bath ENGINEERING
TEXAS FIRM REGISTRATION NO. 829
4110 RIO BRAVO SUITE 102
EL PASO, TX 79902
TEL: 915-313-7200

el paso WATER

JONATHAN ROGERS WTP GENERATOR UPGRADES
EL PASO, TX

PROTECTION ONE-LINE DIAGRAM

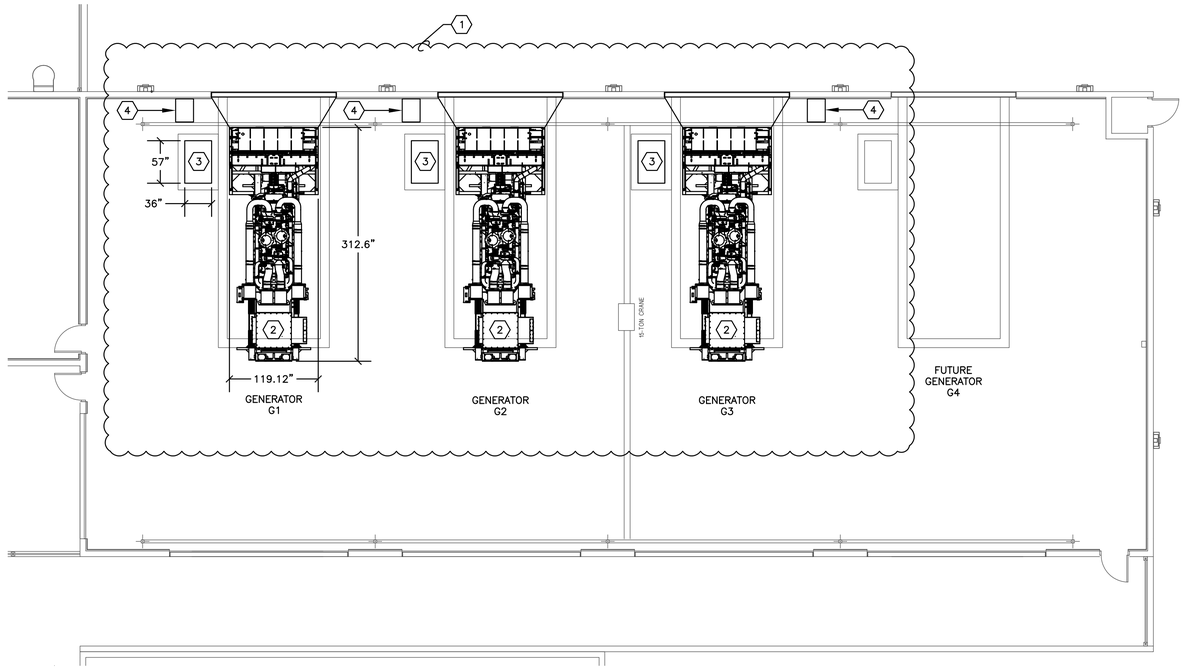
JOB NO. 3289D
DRAWING NO. E-9
SEQUENCE NO. XX OF XX

GENERAL NOTES (THIS SHEET ONLY)

1. REFER TO ELECTRICAL LEGEND AND ELECTRICAL GENERAL NOTES FOR ADDITIONAL INFORMATION.
2. ALL RELAYS SHALL BE POWERED WITH 125 VDC.

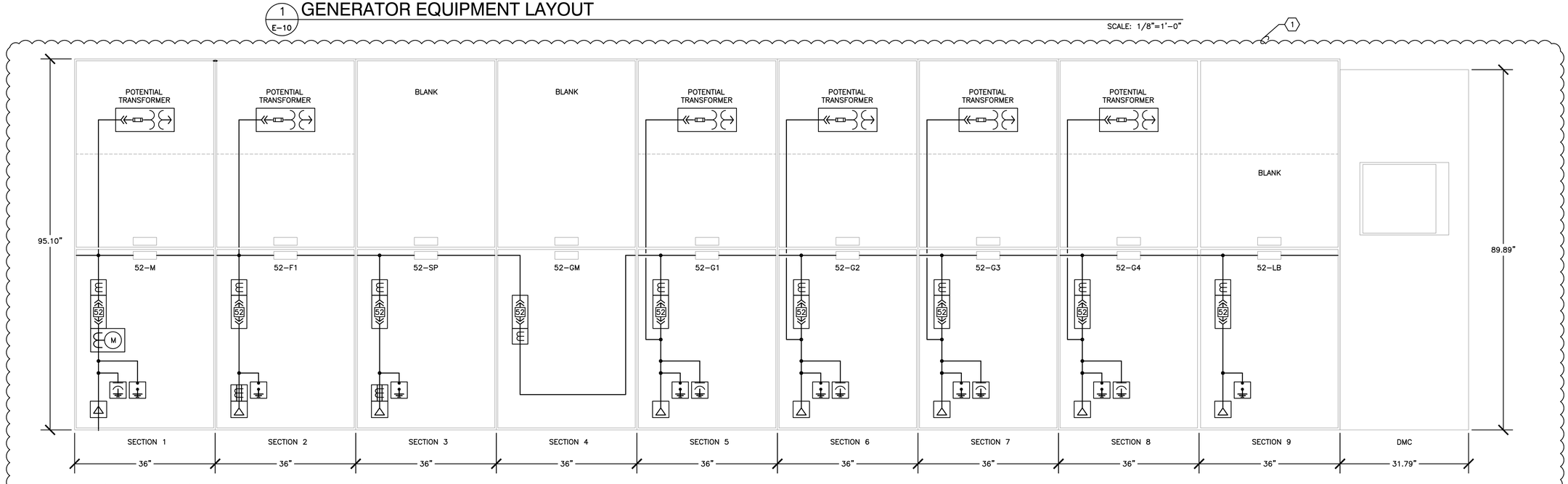
KEYED NOTES (THIS SHEET ONLY)

1. GMP 1 EARLY EQUIPMENT PACKAGE.
2. 3250KW T2 INDOOR GENERATOR (WET WEIGHT: 79,565 LBS.). TOTAL WEIGHT INCLUDING DAY TANK: 80,610 LBS. OWNER FURNISHED AND CONTRACTOR INSTALLED.
3. 400 GAL. DAY TANK.
4. NEUTRAL TO GROUND RESISTOR.



1 E-10 GENERATOR EQUIPMENT LAYOUT

SCALE: 1/8"=1'-0"



2 E-10 SWITCHGEAR "SWGR-JR-1"ELEVATION

SCALE: N.T.S

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REV.	DATE	BY	DESCRIPTION

DESIGNED SG
DRAWN CAD
CHECKED JLC
DATE 06-02-23

PRELIMINARY - FOR GMP 1 EARLY EQUIPMENT PACKAGE 1 ONLY - NOT FOR CONSTRUCTION

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el paso WATER

JONATHAN ROGERS WTP GENERATOR UPGRADES
EL PASO, TX

GENERATOR EQUIPMENT LAYOUT AND SWITCHGEAR ELEVATION

JOB NO. 3289D
DRAWING NO. E-10
SEQUENCE NO. XX OF XX

HICKERSON WRF
ENGINE-GENERATOR
Data Sheet

DESCRIPTION	DATA	UNITS
GENERAL		
EQUIPMENT DESIGNATION	GEN-01, GEN-02, & GEN-03	
SITE NAME	HICKERSON WATER RECLAMATION FACILITY	
SITE ADDRESS	701 EXECUTIVE CENTER BLVD, EL PASO, TX 79936	
QUANTITY REQUIRED	2, PLUS 1 BACK UP	
DESIGN CONDITIONS		
MAXIMUM AMBIENT TEMPERATURE	45	°C
MINIMUM AMBIENT TEMPERATURE	-22.2	°C
MAXIMUM ALTERNATOR TEMP RISE	105	°C
PROJECT VOLTAGE DISTORTION LIMIT	10	%
PERFORMANCE REQUIREMENTS		
NAMEPLATE RATING	2750	KW/GENSET
MINIMUM POWER RATING CAPACITY	2194	KW/GENSET
MINIMUM SITE RATED CAPACITY	2750	KW/GENSET
GENERATOR OUTPUT FREQUENCY	60	HZ
GENERATOR OUTPUT VOLTAGE	13800	V
GENERATOR POWER FACTOR	80	%
GENERATOR TERMINAL PHASE	3, WYE	
CLOSE TRANSITION GEAR	YES	
NEUTRAL TO GROUND RESISTOR	100	A

ENGINE		
FUEL SUPPLY	ULTRA LOW SULFUR #2 DIESEL AND HVO FUEL	
MAXIMUM ENGINE SPEED	1800	RPM
MINIMUM PISTON DISPLACEMENT	60.2	LT
BLACK START REQUIRED	YES	
MINIMUM GUARANTEED EMISSIONS	TIER II	
FUEL SYSTEM		
FUEL SUPPLY	SUB-BASE DOUBLE WALL TANK UL142	
FUEL TANK CAPACITY	48	HR
TANK HEATER	YES	
INTEGRAL FUEL MAINTANCE SYSTEM	YES	
EXHAUST SYSTEM		
SILENCER AND EXHAUST PIPE MATERIAL	STAINLESS STEEL	
ENCLOSURE		
MAXIMUM NOISE LIMIT AT 23 FT	75	DBA
SET PERFORMANCE		
MAX STEP VOLTAGE DROP	15	%
MAX STEP FREQUENCY DIP	1	%
SITE RATED STANDY	2466/3083	KV/KVA
SITE RATED MAX SURGE	2514	KW
MAX SURGE	7993	KVA
VOLTAGE DISTORSION	10	%
LOAD BANK TAP BOX		
VOLTAGE RATING	480Y/277V, 3P, 4W	
BUS RATING	3000	A

Load #	Load	Fed From	Load Step	POWER	POWER UNITS	VOLTAGE	LOAD TYPE	PF	LOAD FACTOR
1	Return Activated Sludge Pump #1	MCC-3	1	20	HP	480V	VFD/MOTOR		100%
2	Clarifier #1 Drive	MCC-3	1	1.5	HP	480V	MOTOR		100%
3	Return Activated Sludge Pump #3	MCC-4	1	20	HP	480V	VFD/MOTOR		100%
4	RAS Pump Room Exhaust Fan	MCC-4	1	1	HP	480V	MOTOR		100%
5	RAS Pump Room Supply Fan	MCC-4	1	1	HP	480V	MOTOR		100%
6	Clarifier #2 Drive	MCC-4	1	1.5	HP	480V	MOTOR		100%
7	ELP4	MCC-4	1	15	kVA	208Y/120V	PANEL	0.8	
8	Secondary Clarifier #3	MCC-8A	1	1	HP	480V	MOTOR		100%
9	Secondary Clarifier #5	MCC-8A	1	1	HP	480V	MOTOR		100%
10	Return Activated Sludge Pump 3A	MCC-8A	1	15	HP	480V	VFD/MOTOR		100%
11	Return Activated Sludge Pump 5A	MCC-8A	1	15	HP	480V	VFD/MOTOR		100%
12	Filter Backwash Pump #1	MCC-8A	1	15	HP	480V	MOTOR		100%
13	Filter Control Panel #1	MCC-8A	1	18	kW	480V	PANEL	0.8	
14	Filter Control Panel #2	MCC-8A	1	18	kW	480V	PANEL	0.8	
15	Filter Control Panel #3	MCC-8A	1	18	kW	480V	PANEL	0.8	
16	Filter Control Panel #4	MCC-8A	1	18	kW	480V	PANEL	0.8	
17	Panel LP8A	MCC-8A	1	30	kVA	208Y/120V	PANEL	0.8	
18	Panel HP8A	MCC-8A	1	112.5	kVA	277Y/480V	PANEL	0.8	
19	Lighting Panel LA	MCC-8A	1	30	kVA	208Y/120V	PANEL	0.8	
20	Motor	MCC-8A	1	3	HP	480V	MOTOR		100%
21	Scum Pump #1	MCC-8A	1	10	HP	480V	MOTOR		100%
22	3W Pump 2	MCC-8A	1	75	HP	480V	MOTOR		100%
23	3W Pump 1	MCC-8A	1	75	HP	480V	MOTOR		100%
24	Filter #3	MCC-8A	1	18	kW	480V	MOTOR		100%
25	Panel HP8B	MCC-8B	1	112.5	kVA	480V	PANEL	0.8	
26	Secondary Clarifier #4	MCC-8B	1	1	HP	480V	MOTOR		100%
27	Secondary Clarifier #6	MCC-8B	1	1	HP	480V	MOTOR		100%
28	Tank Drain Pump #1	MCC-8B	1	35	HP	480V	MOTOR		100%
29	MCC Room A/C	MCC-8B	1	17.5	kW	480V	A/C	0.8	
30	Return Activated Sludge Pump 4A	MCC-8B	1	15	HP	480V	VFD/MOTOR		100%
31	Return Activated Sludge Pump 6A	MCC-8B	1	15	HP	480V	VFD/MOTOR		100%
32	3W Cooling Water Pump #4	MCC-8B	1	15	HP	480V	MOTOR		100%

33	ST Pipe Pumps	MCC-8B	1	75	HP	480V	MOTOR		100%
34	Booster Pump	MCC-8B	1	1.5	HP	480V	MOTOR		100%
35	Panel LP2A	MCC-2C	2	30	kVA	208Y/120V	PANEL	0.8	
36	Panel LP2B MCC2D to MTS2A	MCC-2C	2	2.5	kVA	480V	PANEL	0.8	
37	Belt Filter Press Hydraulic Unit 3	MCC-2C	2	3	HP	480V	MOTOR		100%
38	Belt Filter Press #3	MCC-2C	2	6	HP	480V	VFD/MOTOR		100%
39	Sludge Cake Pump #3	MCC-2C	2	10	HP	480V	VFD/MOTOR		100%
40	Makeup Air Unit	MCC-2C	2	70	Amps	480V	MOTOR		100%
41	Makeup Air Unit	MCC-2C	2	70	Amps	480V	MOTOR		100%
42	Hopper Bottom #3	MCC-2D	2	15	HP	480V	MOTOR		100%
43	Hopper Bottom #4	MCC-2D	2	15	HP	480V	MOTOR		100%
44	Hopper Slide Gate #3	MCC-2D	2	1	HP	480V	MOTOR		100%
45	Hopper Slide Gate #4	MCC-2D	2	1	HP	480V	MOTOR		100%
46	Exhaust Fan	MCC-2D	2	50	HP	480V	MOTOR		100%
47	Makeup Air Unit	MCC-2D	2	70	Amps	480V	MOTOR		100%
48	MLSS Channel Supply Fan		2	2	HP	480V	MOTOR		100%
49	MLSS Channel ExhaUst Fan		2	2	HP	480V	MOTOR		100%
50	Panel LP3A	MCC-3A	3	45	kVA	208Y/120V	PANEL	0.8	
51	Aeration Blower #1 Control Panel	MCC-3A	3	2	HP	480V	MOTOR		100%
52	Aeration Blower #3 Control Panel	MCC-3A	3	2	HP	480V	MOTOR		100%
53	Starting Air Compressor #1	MCC-3A	3	10	HP	480V	MOTOR		100%
54	Supply Fan	MCC-3A	3	1	HP	480V	MOTOR		100%
55	Exhaust Fan	MCC-3A	3	0.5	HP	480V	MOTOR		100%
56	Exhaust Fan	MCC-3A	3	0.5	HP	480V	MOTOR		100%
57	Air Conditioner	MCC-3A	3	22	kVA	480V	MOTOR		100%
58	Air Conditioner	MCC-3A	3	9	kVA	480V	MOTOR		100%
59	Panel LP3B	MCC-3B	3	30	kVA	208Y/120V	PANEL	0.8	
60	Aeration Blower #2 Control Panel	MCC-3B	3	2	HP	480V	MOTOR		100%
61	Aeration Blower #4 Control Panel	MCC-3B	3	2	HP	480V	MOTOR		100%
62	Exhaust Fan	MCC-3B	3	0.5	HP	480V	MOTOR		100%
63	Exhaust Fan	MCC-3B	3	0.5	HP	480V	MOTOR		100%
64	Exhaust Fan	MCC-3B	3	0.5	HP	480V	MOTOR		100%
65	Exhaust Fan	MCC-3B	3	0.5	HP	480V	MOTOR		100%
66	Exhaust Fan	MCC-3B	3	0.5	HP	480V	MOTOR		100%

67	Exhaust Fan	MCC-3B	3	0.5	HP	480V	MOTOR		100%
68	Exhaust Fan	MCC-3B	3	0.5	HP	480V	MOTOR		100%
69	Exhaust Fan	MCC-3B	3	0.5	HP	480V	MOTOR		100%
70	Makeup Air Unit	MCC-3B	3	100	HP	480V	MOTOR		100%
71	Panel LP10A MTS 10A	MCC-10A	4	90	kVA	480V	PANEL	0.8	
72	Grit Removal Unit 1 Vortex	MCC-10A	4	2	HP	480V	MOTOR		100%
73	Grit Separator 1	MCC-10A	4	1	HP	480V	MOTOR		100%
74	Odor Control Panel-PP1	MCC-10A	4	200	Amps	480V	PANEL	0.8	
75	Headworks Exhaust Fan	MCC-10A	4	50	HP	480V	MOTOR		100%
76	Panel LP10B	MCC-10B	4	75	kVA	208Y/120V	PANEL	0.8	
77	Grit Removal Unit 2 Vortex	MCC-10B	4	2	HP	480V	MOTOR		100%
78	Grit Separator #2	MCC-10B	4	1	HP	480V	MOTOR		100%
79	Headworks Makeup Air Unit	MCC-10B	4	50	HP	480V	MOTOR		100%
80	Chemical Solution Recirc. Pump #2	MCC-10B	4	15	HP	480V	MOTOR		100%
81	Chemical Solution Recirc. Pump #1	MCC-10B	4	15	HP	480V	MOTOR		100%
82	Panel LP6A	MCC-6A	5	30	kVA	208Y/120V	PANEL	0.8	
83	DAFT Grinder	MCC-6A	5	5	HP	480V	MOTOR		100%
84	DAFT Collector #1	MCC-6A	5	3	HP	480V	VFD/MOTOR		100%
85	Pressurization Pump #1	MCC-6A	5	100	HP	480V	MOTOR		100%
86	Service Air Compressor	MCC-6A	5	40	HP	480V	MOTOR		100%
87	DAFT Foul Air Fan	MCC-6A	5	15	HP	480V	MOTOR		100%
88	Panel LP6B	MCC-6B	5	30	kVA	208Y/120V	PANEL	0.8	
89	DAFT Collector #2	MCC-6B	5	3	HP	480V	VFD/MOTOR		100%
90	Exhaust Fan	MCC-6B	5	5	HP	480V	MOTOR		100%
91	Exhaust Fan	MCC-6B	5	1.5	HP	480V	MOTOR		100%
92	Exhaust Fan	MCC-6B	5	1.5	HP	480V	MOTOR		100%
93	Exhaust Fan	MCC-6B	5	1	HP	480V	MOTOR		100%
94	Make Up Air Unit	MCC-6B	5	60 kW	HP	480V	MOTOR		100%
95	Reclaim Pump #1	MCC-PS	6	125	HP	480V	RVSS/MOTOR		100%
96	Panel PD-1A	MCC-PS	6	9.5	kVA	480V	PANEL	0.8	
97	Panel PD-1B	MCC-PS	6	5.5	kVA	208Y/120V	PANEL	0.8	
98	Aeration Blower #3	MVMC 35	7	700	HP	4160V	RVSS/MOTOR		100%
99	Plant Lift Station Pump #1	MCC-3	8	5	HP	480V	MOTOR		100%
100	Scum Pump	MCC-3	8	10	HP	480V	MOTOR		100%

101	Plant Lift Station Pump 2	MCC-4	8	5	HP	480V	MOTOR		100%
102	UV Slide Gate #1	MCC-8A	8	0.5	HP	480V	MOTOR		100%
103	UV Slide Gate #2	MCC-8A	8	0.5	HP	480V	MOTOR		100%
104	UV Slide Gate #3	MCC-8A	8	0.5	HP	480V	MOTOR		100%
105	Scum Pump #2	MCC-8B	8	10	HP	480V	MOTOR		100%
106	UV Slide Gate #4	MCC-8B	8	0.5	HP	480V	MOTOR		100%
107	UV Slide Gate #5	MCC-8B	8	0.5	HP	480V	MOTOR		100%
108	Clarifiers 3-6 Lighting	MCC-8B	8	18	kW	480V	NON-MOTOR	0.8	
109	Filter Lighting	MCC-8B	8	15	Amps	480V	NON-MOTOR	0.8	
110	Station 1W Valve	MCC-8B	8	0.5	HP	480V	VALVE MOTOR		100%
111	Belt Press Polymer Prep System #2	MCC-2C	9	7.5	kVA	480V	NON-MOTOR	0.8	
112	Belt Press Polymer Feed Pump #1	MCC-2C	9	2	HP	480V	VFD/MOTOR		100%
113	Belt Press Polymer Feed Pump #3	MCC-2C	9	2	HP	480V	VFD/MOTOR		100%
114	Belt Filter Press Wash Water Pump #3	MCC-2C	9	3	HP	480V	MOTOR		100%
115	Sludge Cake Pump #1	MCC-2C	9	10	HP	480V	VFD/MOTOR		100%
116	Sludge Cake Pump #2	MCC-2C	9	10	HP	480V	VFD/MOTOR		100%
117	Sludge Screw Conveyor #1	MCC-2C	9	10	HP	480V	MOTOR		100%
118	Lime Sludge Mixer #1	MCC-2C	9	10	HP	480V	VFD/MOTOR		100%
119	Stabilized Sludge Conveyor #1	MCC-2C	9	15	HP	480V	MOTOR		100%
120	Hopper Bottom Screw #1	MCC-2C	9	15	HP	480V	MOTOR		100%
121	Hopper Bottom Screw #2	MCC-2C	9	15	HP	480V	MOTOR		100%
122	Hopper Slide Gate #1	MCC-2C	9	1	HP	480V	MOTOR		100%
123	Hopper Slide Gate #2	MCC-2C	9	1	HP	480V	MOTOR		100%
124	Lime Feeder #1	MCC-2C	9	7.5	HP	480V	MOTOR		100%
125	Bin Activator #1	MCC-2C	9	1	HP	480V	MOTOR		100%
126	Dust Collector #1	MCC-2C	9	5	HP	480V	MOTOR		100%
127	Belt Press Polymer Prep System #1	MCC-2D	9	7.5	kVA	480V	NON-MOTOR	0.8	
128	Belt Press Polymer Feed Pump #2	MCC-2D	9	2	HP	480V	VFD/MOTOR		100%
129	Belt Filter Press Wash Water Pump #1	MCC-2D	9	3	HP	480V	MOTOR		100%
130	Belt Filter Press Hydraulic Unit 1	MCC-2D	9	3	HP	480V	MOTOR		100%
131	Belt Filter Press Hydraulic Unit 2	MCC-2D	9	3	HP	480V	MOTOR		100%
132	Belt Filter Press #1	MCC-2D	9	6	HP	480V	VFD/MOTOR		100%
133	Sludge Screw Conveyor #2	MCC-2D	9	10	HP	480V	MOTOR		100%
134	Lime Sludge Mixer #2	MCC-2D	9	10	HP	480V	VFD/MOTOR		100%

135	Stabilized Sludge Conveyor #2	MCC-2D	9	15	HP	480V	MOTOR		100%
136	Lime Feeder #2	MCC-2D	9	7.5	kVA	120/240V	NON-MOTOR	0.8	
137	Bin Activator #2	MCC-2D	9	1	HP	480V	MOTOR		100%
138	Dust Collector #2	MCC-2D	9	5.25	HP	480V	MOTOR		100%
139	Aeration Basin #1 Control Valves	MCC-3A	10	0.3	Amps	480V	VALVE MOTOR		100%
140	Aeration Basin #3 Control Valves	MCC-3A	10	0.3	Amps	480V	VALVE MOTOR		100%
141	Lube Oil Transfer Pump	MCC-3A	10	1	HP	480V	MOTOR		100%
142	Lube Oil Tank Heater	MCC-3A	10	8	kW	480V	MOTOR		100%
143	Groundwater Pump #1	MCC-3A	10	1	HP	480V	MOTOR		100%
144	Aeration Basin #2 Control Valves	MCC-3B	10	0.6	Amps	480V	VALVE MOTOR		100%
145	Groundwater Sump Pump #2	MCC-3B	10	0.3	Amps	480V	MOTOR		100%
146	Bar Screen 1	MCC-10A	11	1.5	HP	480V	MOTOR		100%
147	Screening Dewatering Screw Press	MCC-10A	11	5	HP	480V	MOTOR		100%
148	Grit Room Sump Pump #1	MCC-10A	11	2	HP	480V	MOTOR		100%
149	Grit Hopper Gate	MCC-10A	11	1	HP	480V	MOTOR		100%
150	Bar Screen 2	MCC-10B	11	1.5	HP	480V	MOTOR		100%
151	Grit Room Sump Pump #2	MCC-10B	11	2	HP	480V	MOTOR		100%
152	Odor Control Facility Air unit	MCC-10B	11	3	HP	480V	MOTOR		100%
153	DAFT Polymer Prep System #1	MCC-6A	12	7.5	kVA	120/240	MOTOR		100%
154	DAFT Polymer Feed Pump #1	MCC-6A	12	0.75	HP	480V	VFD/MOTOR		100%
155	DAFT Bottom Sludge Pump #1	MCC-6A	12	5	HP	480V	MOTOR		100%
156	DAFT Level Control Valve	MCC-6A	12	0.5	HP	480V	VALVE MOTOR		100%
157	DAFT Level Control Valve	MCC-6A	12	0.5	HP	480V	VALVE MOTOR		100%
158	Belt Press Feed Pump #1	MCC-6A	12	15	HP	480V	VFD/MOTOR		100%
159	Belt Press Feed Pump #2	MCC-6A	12	15	HP	480V	VFD/MOTOR		100%
160	DAFT Polymer Prep System #2	MCC-6B	12	7.5	HP	480V	MOTOR		100%
161	DAFT Polymer Feed Pump #2	MCC-6B	12	0.75	HP	480V	VFD/MOTOR		100%
162	DAFT Bottom Sludge Pump #2	MCC-6B	12	5	HP	480V	MOTOR		100%
163	Air Conditioning Unit	MCC-6B	12	70	Amps	480V	A/C	0.8	
164	Belt Press Feed Pump #3	MCC-6B	12	15	HP	480V	VFD/MOTOR		100%
165	Reclaim Pump 2	MCC-PS	13	125	HP	480V	RVSS/MOTOR		100%
166	Chlorine Evacuation Blower	MCC-PS	13	5	HP	480V	MOTOR		100%
167	A/C-HTG Unit	MCC-PS	13	3	HP	480V	A/C	0.8	
168	MOV-1	MCC-PS	13	1	HP	480V	MOTOR		100%

169	MOV-2	MCC-PS	13	1	HP	480V	MOTOR		100%
170	MOV-3	MCC-PS	13	1	HP	480V	MOTOR		100%
171	Potable Water FCV	MCC-PS	13	0.5	HP	480V	VALVE MOTOR		100%
172	Aeration Blower #4	MVMC 35	14	700	HP	4160V	RVSS/MOTOR		100%
173	Return Activated Sludge Pump #2	MCC-3	15	20	HP	480V	VFD/MOTOR		100%
174	Tank Drain Pump #2	MCC-8A	15	35	HP	480V	MOTOR		100%
175	Return Activated Sludge Pump 3B	MCC-8A	15	15	HP	480V	VFD/MOTOR		100%
176	Return Activated Sludge Pump 5B	MCC-8A	15	15	HP	480V	VFD/MOTOR		100%
177	3W Pump 5	MCC-8A	15	15	HP	480V	MOTOR		100%
178	Return Activated Sludge Pump 4B	MCC-8B	15	15	HP	480V	VFD/MOTOR		100%
179	Return Activated Sludge Pump 6B	MCC-8B	15	15	HP	480V	VFD/MOTOR		100%
180	Filter Backwash Pump #2	MCC-8B	15	15	HP	480V	MOTOR		100%
181	Filter Backwash Pump #3	MCC-8B	15	15	HP	480V	MOTOR		100%
182	3W Pump 3	MCC-8B	15	75	HP	480V	MOTOR		100%
183	Plant 1 Blower #1	SWBD-M	16	350	HP	480V	RVSS/MOTOR		100%
184	Bridge Crane	MCC-3A	17	7.5	HP	480V	MOTOR		100%
185	Door Operator	MCC-3B	17	1	HP	480V	MOTOR		100%
186	Grit Pump #1	MCC-10A	18	30	HP	480V	MOTOR		100%
187	Grit Pump #2	MCC-10A	18	30	HP	480V	MOTOR		100%
188	DAFT 1 Float Pump 1A	MCC-6A	19	15	HP	480V	MOTOR		100%
189	DAFT 1 Float Pump 1B	MCC-6A	19	15	HP	480V	MOTOR		100%
190	DAFT Float Pump 2A	MCC-6B	19	15	HP	480V	MOTOR		100%
191	DAFT Float Pump 2B	MCC-6B	19	15	HP	480V	MOTOR		100%
192	DAFT Level Control Valve	MCC-6B	19	0.5	HP	480V	MOTOR		100%
193	DAFT Level Control Valve	MCC-6B	19	0.5	HP	480V	MOTOR		100%
194	Hoist	MCC-8B	21	3	HP	480V	MOTOR		100%
195	Plant 1 Blower #2	SWBD-M	22	350	HP	480V	RVSS/MOTOR		100%
196	Roll Up Door	MCC-10A	23	1	HP	480V	MOTOR		100%

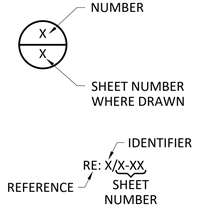
ABBREVIATIONS

AC	ALTERNATING CURRENT
AF	AMP FRAME
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR OR GRADE
AG	ABOVE GRADE
AGSB	ABOVE GROUND SPLICE BOX
AIC	AMPERES INTERRUPTING CAPACITY
AL OR ALUM	ALUMINUM
AMP OR A	AMPERE
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
C.	CONDUIT
CB	CIRCUIT BREAKER
C/C	CENTER TO CENTER
CHH	COMMUNICATION MANHOLE/HANDHOLE
CKT	CIRCUIT
CLF	CURRENT LIMITING FUSE
CONT.	CONTINUATION
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY
CS	CONTROL SWITCH OR COMBINATION STARTER
CT	CURRENT TRANSFORMER
CU	COPPER
DC	DIRECT CURRENT
DI	DOOR INTERLOCK
DIA	DIAMETER
DN	DOWN
DP	DIFFERENTIAL PRESSURE
DWG	DRAWING
EC	EMPTY CONDUIT
EHH	ELECTRICAL MANHOLE
ELEC	ELECTRICAL
ELEV	ELEVATION
EM	EMERGENCY
EMH	ELECTRICAL MANHOLE/HANDHOLE
EO	ELECTRICALLY OPERATED
ETM	ELAPSED TIME METER
EUC	ELECTRIC UTILITY CO.
EXIST.	EXISTING
FBO	FURNISHED BY OTHERS
FO	FIBER OPTIC
FRP	FIBERGLASS REINFORCED POLYESTER
FT	FEET
FU	FUSE
G. OR GRND	GROUND
GA.	GAUGE
GCP	GENERATOR CONTROL PANEL
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GFS	GROUND FAULT SENSING
GO	GATE OPERATOR
GRS	GALVANIZED RIGID STEEL
HH	HANDHOLE
HP	HORSEPOWER
HT	HEIGHT
HTP	HEAT TRACE PANEL
HTR	HEATER
HZ	HERTZ
ID	INTERNAL DIAMETER
IMH	INSTRUMENT MANHOLE
INST	INSTRUMENT
IRP	INTERPOSING RELAY PANEL
JB	JUNCTION BOX
kAIC	KILO AMPERE INTERRUPTING CAPACITY
kVA	KILOVOLT-AMPERE
kW	KILOWATT
LA	LIGHTNING ARRESTER
LC	LIGHTNING CONTACTOR
LED	LIGHT EMITTING DIODE
LP	LIGHTING PANEL
LSI	LONG, SHORT, INSTANTANEOUS
LSIG	LONG, SHORT, INSTANTANEOUS, GROUND
LTG/LTNG	LIGHTS/LIGHTING
MBFV	MOTOR OPERATED BUTTERFLY VALVE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MFR	MANUFACTURER
MFR'S	MANUFACTURER'S
MH	MANHOLE
ML	MULTILIN
MLO	MAIN LUGS ONLY
MOV	MOTOR OPERATED VALVE
MPR	MOTOR PROTECTION RELAY
MR	MULTIRATIO
MTD	MOUNTED
MTG	MOUNTING
MTS	MANUAL TRANSFER SWITCH

ABBREVIATIONS

NC or N.C.	NORMALLY CLOSED
NF	NON-FUSED
NO or N.O.	NORMALLY OPEN OR NUMBER
NO.	NUMBER
OD	OUTSIDE DIAMETER
OHE	OVERHEAD ELECTRIC
OL	OVERLOAD
OLX	OVERLOAD CONTROL RELAY
P	POLE
PB	PULL BOX OR PUSH BUTTON
PC	PHOTOCELL
PCC	PUMP CONTROL CONSOLE
PFCC	POWER FACTOR CORRECTION CAPACITOR
PFR	PHASE FAILURE RELAY
PH	PHASE
PL.	PLATE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PoE	POWER OVER ETHERNET
PPR	PHASE PROTECTIVE RELAY
PQM	POWER QUALITY METER
PR.	PAIR OR PAIR CABLE
PT	POTENTIAL TRANSFORMER
PTT	PUSH TO TEST TYPE
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
RC	REMOTE CONTROL
RCP	RELAY CONTROL PANEL
REC.	CIRCUIT RECLOSURE
RECP	RECEPTACLES
REQ'D	REQUIRED
RTD	RESISTANCE TEMPERATURE DETECTOR
RTU	REMOTE TERMINAL UNIT
SC	SURGE CAPACITOR
SCH	SCHEMATIC
SCTB	SHORT CIRCUIT TERMINAL BLOCK
SEC	SECONDS OR SECONDARY
SHLD. OR SH	SHIELD OR SHIELDED
SHT	SHEET
SN OR S/N	SOLID NEUTRAL
SPD	SURGE PROTECTION DEVICES
SSRVS	SOLID-STATE REDUCED VOLTAGE STARTER
SS	STAINLESS STEEL
ST	STARTER
STA.	STATION
STC	SIGNAL TERMINATION CABINET
SV	SOLENOID VALVE
SW	SWITCH
SWGR	SWITCHGEAR
Sz#	MOTOR STARTER WITH SIZE
TC	TERMINATION CABINET OR TRAY CABLE
TEL	TELEPHONE
TO	TIME DELAY ON OPENING
TR.	TRIAD
TS	TEMPERATURE SWITCH
TW	TWISTED
TYP	TYPICAL
UG	UNDERGROUND
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR CABLE
V	VOLTS
VAR.	VARIABLE
VFD	VARIABLE FREQUENCY DRIVE
VFI	VACUUM FAULT INTERUPTER
VO	VALVE OPERATOR
W	WITH, WIRE OR WATT
WP	WEATHERPROOF
WR	WEATHER RESISTANT
XFMR	TRANSFORMER
XMTR	TRANSMITTER
XP	EXPLOSION PROOF

NOTE:
THIS IS A STANDARD LEGEND. THEREFORE, NOT ALL OF THIS INFORMATION MAY BE USED ON THIS PROJECT.



PLAN SYMBOL	DESCRIPTION
b A	LIGHTING FIXTURE "A" - FIXTURE TYPE "b" - SWITCH NUMBER
A	EMERGENCY BATTERY PACK LIGHT FIXTURE "A" - FIXTURE TYPE
X	CEILING MOUNTED EXIT SIGN "X" - FIXTURE TYPE
X	WALL MOUNTED EXIT SIGN ARROW INDICATES DIRECTION OF EGRESS "X" - FIXTURE TYPE
FACP	FIRE ALARM CONTROL PANEL
F	MANUAL PULL STATION
	CEILING MOUNTED STROBE
	WALL MOUNTED STROBE
	SMOKE DETECTOR
	HEAT DETECTOR
	HORN
	COMBINATION STROBE/HORN
	CONDUIT, EXPOSED/SURFACE MOUNTED
	CONDUIT OR DUCT BANK, CONCEALED
	CONDUIT, EXPOSED/SURFACE MOUNTED, TURNING UP
	CONDUIT, EXPOSED/SURFACE MOUNTED, TURNING DOWN
	CONDUIT STUBBED OUT AND CAPPED
OHE	OVERHEAD ELECTRIC LINE
UGE	UNDERGROUND ELECTRIC LINE
OHP	OVERHEAD PRIMARY LINE
UGP	UNDERGROUND PRIMARY LINE
OHS	OVERHEAD SECONDARY LINE
UGS	UNDERGROUND SECONDARY LINE
OHC	OVERHEAD COMMUNICATION LINE
UGC	UNDERGROUND COMMUNICATION LINE
OHFO	OVERHEAD FIBER OPTIC LINE
UGFO	UNDERGROUND FIBER OPTIC LINE
	FLEXIBLE METAL CONDUIT
	HEAT TRACE
2 (3 #3/0, #2G., 3"C.)	DENOTES A QUANTITY OF TWO (2) 3" CONDUITS EACH CONTAINING THREE (3) NO. 3/0 AWG CONDUCTORS AND ONE (1) NO.2 AWG GROUND CONDUCTOR
2-2/C#16	DENOTES A QUANTITY OF TWO (2) INSTRUMENT CABLES. EACH CONSISTS OF TWO (2) NO.16 AWG CONDUCTORS
3-4"C.	THREE (3) 4" CONDUITS
MC1-XXX 4 #14, #14G., 3/4"C. (2 #14 SPARE)	CABLE TAG FOUR (4) #14 CONTROL OR POWER CONDUCTORS, ONE (1) #14 GROUND CONDUCTOR. ALL CONDUCTORS IN A 3/4" CONDUIT. TWO (2) OF THE FOUR (4) #14 CONTROL OR POWER CONDUCTORS ARE SPARE
LA-1,3	HOMERUN, CIRCUITS 1 AND 3 RUN TO PANEL "LA" 2 #12, #12G., 3/4"C. UNLESS NOTED OTHERWISE
$b	SINGLE POLE SWITCH "b" - INDICATES SWITCH LEG SHALL CONTROL LIGHT FIXTURES WITH "b" - DESIGNATION
$Xc	MULTI POLE SWITCH "x" - INDICATES NUMBER OF POLE "c" - INDICATES SWITCH SHALL CONTROL LIGHT FIXTURES WITH "c" DESIGNATION
$M	MANUAL MOTOR STARTER /DISCONNECT
$3	3 WAY SWITCH
$4	4 WAY SWITCH
$D D	DIMMER LIGHTING CONTROL SWITCH
$TM TM	TIME SWITCH
	DUPLEX RECEPTACLE, 20A, 120V, 2P, 3W "C" - MOUNTED ABOVE COUNTERTOP "GFI" OR "GF" - GROUND FAULT INTERRUPTER TYPE "WP" - WEATHERPROOF
F	FLOOR MOUNTED RECEPTACLE
	SIMPLEX RECEPTACLE, GROUNDED TYPE
	SPECIAL RECEPTACLE
	QUADPLEX RECEPTACLE

PLAN SYMBOL	DESCRIPTION
J J	JUNCTION BOX
PB	PULL BOX
TC	TERMINAL CABINET
OS	OCCUPANCY SENSOR
PC	PHOTOCELL
PW	PREWIRED
MH	MANHOLE
M	UTILITY METER
M	MOTORIZED LOUVER
DAMP	INDICATES THAT ALL ELECTRICAL EQUIPMENT AND MATERIALS INSTALLED WITHIN THE ROOM OR AREA IN WHICH THIS NOTATION APPEARS SHALL BE OF NEMA 12 CONSTRUCTION UNLESS OTHERWISE NOTED
WET	INDICATES THAT ALL ELECTRICAL EQUIPMENT AND MATERIALS INSTALLED WITHIN THE ROOM OR AREA IN WHICH THIS NOTATION APPEARS SHALL BE OF NEMA 4 CONSTRUCTION UNLESS OTHERWISE NOTED
CORROSIVE	INDICATES THAT ALL ELECTRICAL EQUIPMENT AND MATERIALS INSTALLED WITHIN THE ROOM OR AREA IN WHICH THIS NOTATION APPEARS SHALL BE OF NEMA 4X CONSTRUCTION UNLESS OTHERWISE NOTED
CLASS I, DIV.1, GROUP D	INDICATES THAT ALL ELECTRICAL EQUIPMENT AND MATERIALS INSTALLED WITHIN THE ROOM OR AREA IN WHICH THIS NOTATION APPEARS SHALL CONFORM TO N.E.C REQUIREMENTS FOR THE HAZARDOUS AREA CLASSIFICATION SHOWN

ONE-LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
	OR	PANEL
5	M	MOTOR, NUMBER DESIGNATES HORSEPOWER
VM *	-	VOLTMETER (WITH SWITCH IF 3-PHASE)
AM *	-	AMMETER (WITH SWITCH IF 3-PHASE)
*	-	METER * WM - WATTMETER WHM - WATTHOUR METER WHDM - WATTHOUR DEMAND METER WHDR - WATTHOUR DEMAND RECORDER PF - POWER FACTOR METER ETM - ELAPSED TIME METER TRANSDUCER AX - CURRENT TRANSDUCER WX - WATT TRANSDUCER
#	-	RELAY, NO. AS INDICATED 25 - SYNCHRONISM CHECK RELAY 27 - UNDER VOLTAGE RELAY 32 - DIRECTIONAL PROTECTION RELAY 38 - BEARING PROTECTIVE DEVICE 40 - LOSS OF EXCITATION RELAY 42 - RUNNING CONTACTOR/PILOT RELAY 46 - REVERSE PHASE/PHASE BALANCE/CURRENT RELAY 47 - PHASE SEQUENCE VOLTAGE RELAY 49 - MACHINE OR TRANSFORMER THERMAL RELAY 50 - INSTANTANEOUS OVERCURRENT RELAY 50G - INSTANTANEOUS GROUND 51 - TIME OVER CURRENT RELAY, GROUNDING RESISTOR TYPE 51N - TIME OVERCURRENT RELAY, RESIDUAL TYPE 51V - TIME OVERCURRENT RELAY WITH VOLTAGE RESTRAINT 59 - OVER VOLTAGE RELAY 60 - NEGATIVE SEQUENCE VOLTAGE RELAY 62 - TIME DELAY RELAY 63 - OVER PRESSURE RELAY 67 - AC DIRECTIONAL OVERCURRENT RELAY 83 - AUTOMATIC SELECTIVE CONTROL OR TRANSFER RELAY 86 - LOCKING-OUT RELAY 87 - DIFFERENTIAL PROTECTIVE RELAY B - SUFFIX INDICATES "BUS" G - SUFFIX INDICATES "GENERATOR" GF - GROUND FAULT IR - INTERPOSING RELAY PFR - PHASE FAILURE, PHASE REVERSAL, UNDERVOLTAGE, OVERVOLTAGE RELAY ST - SHUNT TRIP T - SUFFIX INDICATES "TRANSFORMER" TRP CAP - CAPACITOR TRIP X - SUFFIX INDICATES "AUXILIARY"

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EL PASO WATER

JOHN T. HICKERSON WRP

ELECTRICAL

LEGEND I

F&N JOB NO.	ELP21641
DATE	JUN 2023
DESIGNED	AM
DRAWN	JTR
REVISED	-
CHECKED	JNH
FILE NAME	EL-ALL-GN-LGND01.dwg

NO.	ISSUE	BY	DATE

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

0 VERIFY SCALE 1

SHEET
BP1-E-1

SEQ.
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GMP 1 – EARLY EQUIPMENT PACKAGE

ACAD Rel: 24.2s (LMS Tech)
Filename: N:\ELEC\EL-ALL-GN-LGND01.dwg
Last Saved: 6/2/2023 11:31 AM Saved By: 04169

Plot Date: 6/2/2023 5:58 PM Plot By: 03616 Filename: N:\ELEC\EL-ALL-GN-LGND01.dwg

ONE-LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
CR#	-	AC INDUSTRIAL CONTROL RELAY COIL, # - NUMBER AS INDICATED
M#	-	MOTOR STARTER COIL, # - NUMBER AS INDICATED
✳	-	SPECIAL CAPACITOR ✳SC - SURGE CAPACITOR PF - POWER FACTOR CORRECTION CAPACITOR
	-	PUSH BUTTON, MOMENTARY CONTACT, SPRING RETURN, NORMALLY CLOSED
	-	PUSH BUTTON, MOMENTARY CONTACT, SPRING RETURN, NORMALLY OPEN
	-	EMERGENCY STOP PUSH BUTTON WITH RED MUSHROOM HEAD OPERATOR (MAINTAINED CONTACT)
OFF ON	-	OFF/ON SELECTOR SWITCH
A B C X00 00X	-	3 POSITION SELECTOR SWITCH, MAINTAINED CONTACT O-OPEN X-CLOSED (A/B/C) HOA - HAND/OFF/AUTO HOR - HAND/OFF/REMOTE LOR - LOCAL/OFF/REMOTE OCS - OPEN/CLOSE/STOP OOA - ON/OFF/AUTO NOTE: 2 POSITION MULTI-CONTACT SWITCH FOLLOWS SAME CONVENTION
PTT	-	INDICATING LAMP, COLOR INDICATED ✳R - RED G - GREEN B - BLUE W - WHITE A - AMBER O - ORANGE PTT - PUSH TO TEST
52	-	MEDIUM VOLTAGE DRAWOUT TYPE POWER CIRCUIT BREAKER
AF AT A P	CB	LOW VOLTAGE CIRCUIT BREAKER, 3 POLE UNLESS OTHERWISE NOTED A - AMP TRIP, P - POLES
MCP		MOTOR CIRCUIT PROTECTOR
MCP ✳ Sz#	⊠	COMBINATION MOTOR CIRCUIT PROTECTOR AND MAGNETIC MOTOR STARTER, FULL VOLTAGE NON-REVERSING UNLESS OTHERWISE NOTED: ✳FVR - FULL VOLTAGE REVERSING FVNR - FULL VOLTAGE, NON REVERSING RVNR - REDUCED VOLTAGE NON-REVERSING 2S1W - TWO SPEED, ONE WINDING 2S2W - TWO SPEED, TWO WINDING Sz# - NEMA SIZE OF STARTER
✳	⊡	NON-FUSIBLE DISCONNECT SWITCH, 600 VOLT, 3 POLE ✳AMPERE RATING NOTED
✳ ✱	⊡	FUSIBLE DISCONNECT SWITCH, 600 VOLT, 3 POLE, AMPERE RATING AND FUSE SIZE AS NOTED ✳AMPERE RATING NOTED ✱ FUSE RATING
	-	DRAWOUT TYPE EQUIPMENT OR DEVICE
	-	MEDIUM VOLTAGE CABLE TERMINATION
	-	MEDIUM VOLTAGE AIR INTERRUPTER SWITCH
	-	MEDIUM VOLTAGE FUSED AIR INTERRUPTER SWITCH
	-	MEDIUM VOLTAGE FUSED MOTOR CONTROLLER FUSED CONTACTOR DRAWOUT TYPE
VAC	-	VACUUM CONTACTOR
	-	SPEED POTENTIOMETER

ONE-LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
TR#	-	TIMING RELAY RANGE AS NOTED, SET POINT AS NOTED #-NUMBER AS INDICATED TDD-TIME DELAY AFTER DE-ENERGIZATION-OFF DELAY TDE-TIME DELAY AFTER ENERGIZATION-ON DELAY
	-	NOTC-NORMALLY OPEN, TIMED CLOSING WHEN ENERGIZED
	-	NCTO-NORMALLY CLOSED, TIMED OPENING WHEN ENERGIZED
	-	NOTO-NORMALLY OPEN, TIMED OPENING WHEN DE-ENERGIZED
	-	NCTC-NORMALLY CLOSED, TIMED CLOSING WHEN DE-ENERGIZED
✳ -##	✳ -##	FIELD INSTRUMENT, TAG NO. OR LOOP NO. AS INDICATED ✳ - INDICATES INSTRUMENT TYPE DEFINED ON LOOP SHEETS ## - INDICATES LOOP NO.
	OR ⊗	LIQUID LEVEL (FLOAT) SWITCH NORMALLY CLOSED, OPENS ON FALLING LEVEL NORMALLY OPEN, CLOSES ON FALLING LEVEL NORMALLY CLOSED, OPENS ON RISING LEVEL NORMALLY OPEN, CLOSES ON RISING LEVEL
	PS OR ⊗	PRESSURE OR VACUUM SWITCH NORMALLY OPEN, CLOSES ON RISING PRESSURE NORMALLY CLOSED, OPENS ON RISING PRESSURE NORMALLY OPEN, CLOSES ON DROPPING PRESSURE NORMALLY CLOSED, OPENS ON DROPPING PRESSURE
	T OR TS OR ⊗	TEMPERATURE SWITCH OR THERMOSTAT NORMALLY OPEN, CLOSES ON RISING TEMPERATURE NORMALLY OPEN, CLOSES ON DROPPING TEMPERATURE NORMALLY CLOSED, OPENS ON RISING TEMPERATURE NORMALLY CLOSED, OPENS ON DROPPING TEMPERATURE
	FS OR ⊗	FLOW SWITCH (AIR, WATER, ETC.) NORMALLY OPEN, CLOSES ON INCREASED FLOW NORMALLY CLOSED, OPENS ON INCREASED FLOW
	ZS OR ⊗	POSITION (LIMIT) SWITCH NORMALLY OPEN NORMALLY OPEN - HELD CLOSED NORMALLY CLOSED NORMALLY CLOSED - HELD OPEN
	TQ OR ⊗	TORQUE SWITCH NORMALLY CLOSED, OPENS ON HIGH TORQUE
	T	TRANSFORMER, RATINGS AND CONNECTIONS AS NOTED
#CT'S A	-	CURRENT TRANSFORMER # - QUANTITY A - RATIO
#PT'S	-	POTENTIAL TRANSFORMER # - QUANTITY
#CT'S A	-	GROUND CURRENT SENSOR TRANSFORMER # - QUANTITY A - RATIO
	-	CONTROL TRANSFORMER
	-	CONTROL POWER TRANSFORMER
G	-	GENERATOR, RATINGS AND CONNECTIONS AS NOTED
#A ATS-1 N S	-	TRANSFER SWITCH ATS - AUTOMATIC TRANSFER SWITCH MTS - MANUAL TRANSFER SWITCH "N" - INDICATES NORMAL SOURCE "S" - INDICATES STANDBY SOURCE #A - INDICATES CONTINUOUS CURRENT RATING
	-	MOTOR OVERLOAD OVERLOAD RELAY HEATER

SYMBOL	DESCRIPTION
▽	DATA
▼	TELEPHONE
▼▽	COMBINATION TELEPHONE/DATA
▼	FLOOR MOUNTED DATA OUTLET
▽	FLOOR MOUNTED TELEPHONE OUTLET
▽▼	POKE-THRU DEVICE COMBINATION POWER/DATA/VOICE OUTLET
▽▼	FLOOR COMBINATION POWER/DATA/VOICE OUTLET
	CATV
✳	SECURITY CAMERA ✳F - FIXED Z - PAN/TILT/ZOOM
##	SECURITY DEVICE SEC - SECURITY PANEL MAG - MAGNETIC LOCK CR - CARD READERS DR - REMOTE DOOR RELEASE MD - MOTION DETECTOR SK - SECURITY KEYPAD ES - ELECTRIC STRIKE DS - DOOR SWITCH IC - INTERCOM STATION SB - SECURITY PANIC BUTTON

NOTE:
~~THIS IS~~ A STANDARD LEGEND. THEREFORE, NOT ALL OF THIS INFORMATION MAY BE USED ON THIS PROJECT.

ONE-LINE OR CONTROL DIAGRAM	PLAN	DESCRIPTION
	-	CONDUCTORS OR CONDUITS CROSSING PATHS BUT NOT CONNECTED
	-	CONDUCTORS ELECTRICALLY CONNECTED
	-	INDICATES LIMITS OF EQUIPMENT OR WIRING ENCLOSURE
LA	-	LIGHTNING ARRESTER
	⊙G ◎	GROUND ROD GROUND ROD TEST WELL
30A	-	FUSE, AMPERE RATING AS NOTED
	-	HEATER
	-	INDUCTOR
	-	CONTACT, NORMALLY OPEN (NO)
	-	CONTACT, NORMALLY CLOSED (NC)
OL	-	OVERLOAD CONTACT
OR K #	-	KIRK KEY INTERLOCK
	-	MECHANICAL INTERLOCK
	-	TERMINAL
	-	NODE
TB	-	TERMINAL OR TEST BLOCK
OR	-	PUSH BUTTON STATION, REFER TO ELECTRICAL SCHEMATIC FOR NUMBER OF DEVICES.
	-	LOCATED AT SCADA RTU
	-	LOCATED REMOTE
	-	LOCATED AT MOTOR
	-	FUSED SWITCH/FUSED CUTOUT
Ⓜ	Ⓜ	UTILITY METER

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Phone - (817) 735-7300
Web - www.freese.com

EL PASO WATER
JOHN T. HICKERSON WRP
ELECTRICAL
LEGEND II

NO.	ISSUE	BY	DATE

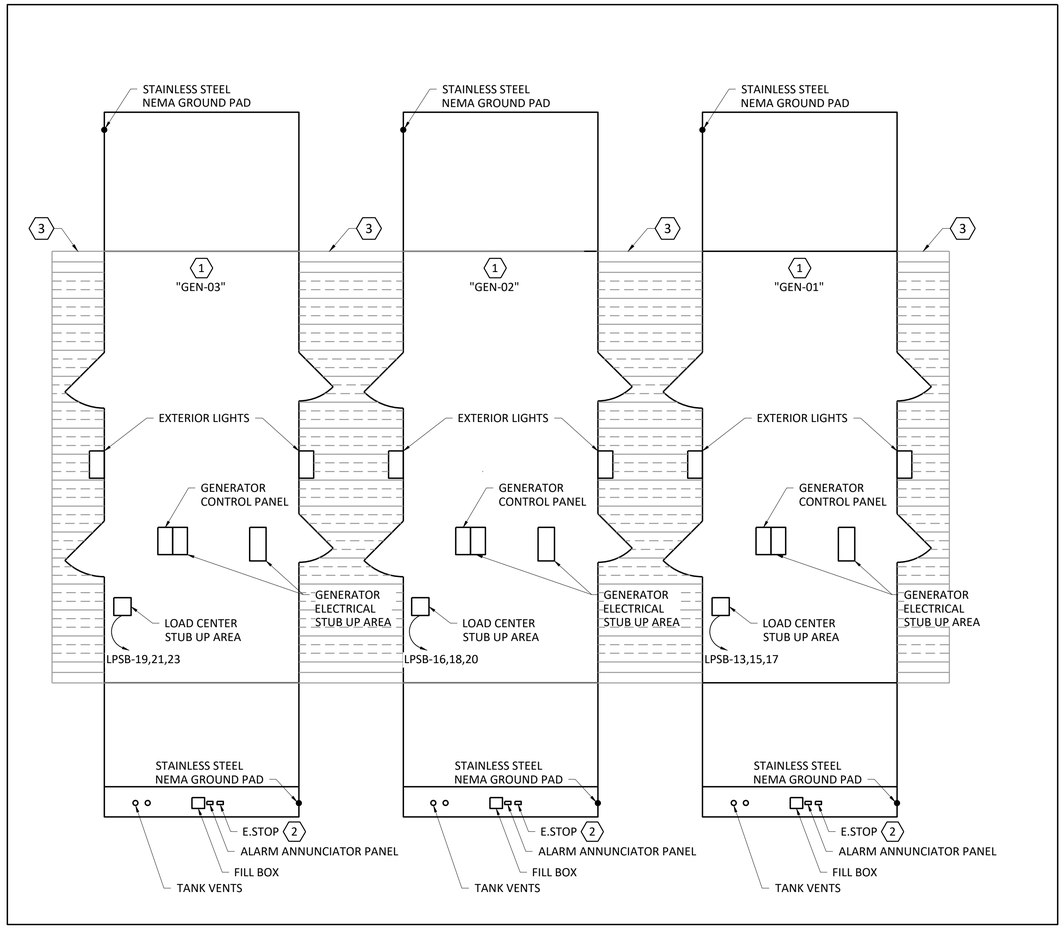
F&N JOB NO. ELP21641
DATE JUN 2023
DESIGNED AM
DRAWN JTR
REVISED -
CHECKED JNH
FILE NAME EL-ALL-GN-LGND02.dwg

VERIFY SCALE Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.
0 1

SHEET BP1-E-2
SEQ. -

GMP 1 – EARLY EQUIPMENT PACKAGE

ACAD Rel: 24.2s (LMS Tech)
Filename: N:\ELEC\EL-ALL-GN-LGND02.dwg
Last Saved: 5/19/2023 6:27 PM Saved By: 04169
Plot Date: 6/2/2023 5:58 PM Plot By: 03616 Filename: N:\ELEC\EL-ALL-GN-LGND02.dwg



1
-

GENERATOR YARD PLAN

3/16" = 1'-0"

GENERAL NOTES:

1. ALL EQUIPMENT SHOWN DARK TO BE PROVIDED UNDER CMAR BID PACKAGE 1.

NOTES BY SYMBOL "3"

1. TIER II, 2750kW STAND-BY GENERATOR IN WEATHERPROOF ENCLOSURE. PROVIDED UNDER CMAR BID PACKAGE 1.
2. COORDINATE EXACT LOCATION TO MOUNT WITH OWNER. E.STOP SHALL BE HOUSED IN A NEMA 4X, 316 STAINLESS STEEL ENCLOSURE AND BE OF THE PUSH/PULL MAINTAINED TYPE.
3. ACCESS PLATFORM AND STAIRS. PROVIDE STAIRS AT BOTH ENDS OF THE PLATFORM.

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EL PASO WATER

JOHN T. HICKERSON WRP

ELECTRICAL

GENERATOR YARD PLAN

F&N JOB NO.	ELP21641
DATE	JUN 2023
DESIGNED	AM
DRAWN	JTR
REVISED	-
CHECKED	JNH
FILE NAME	EL-BP1-PL-POWR02.dwg

NO.	ISSUE	BY	DATE

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0 1"

NORTH

0 4' 8'
3/16"=1'-0"

SHEET
BP1-E-3

SEQ.
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GMP 1 – EARLY EQUIPMENT PACKAGE

ACAD Rel: 24.2s (LMS Tech)
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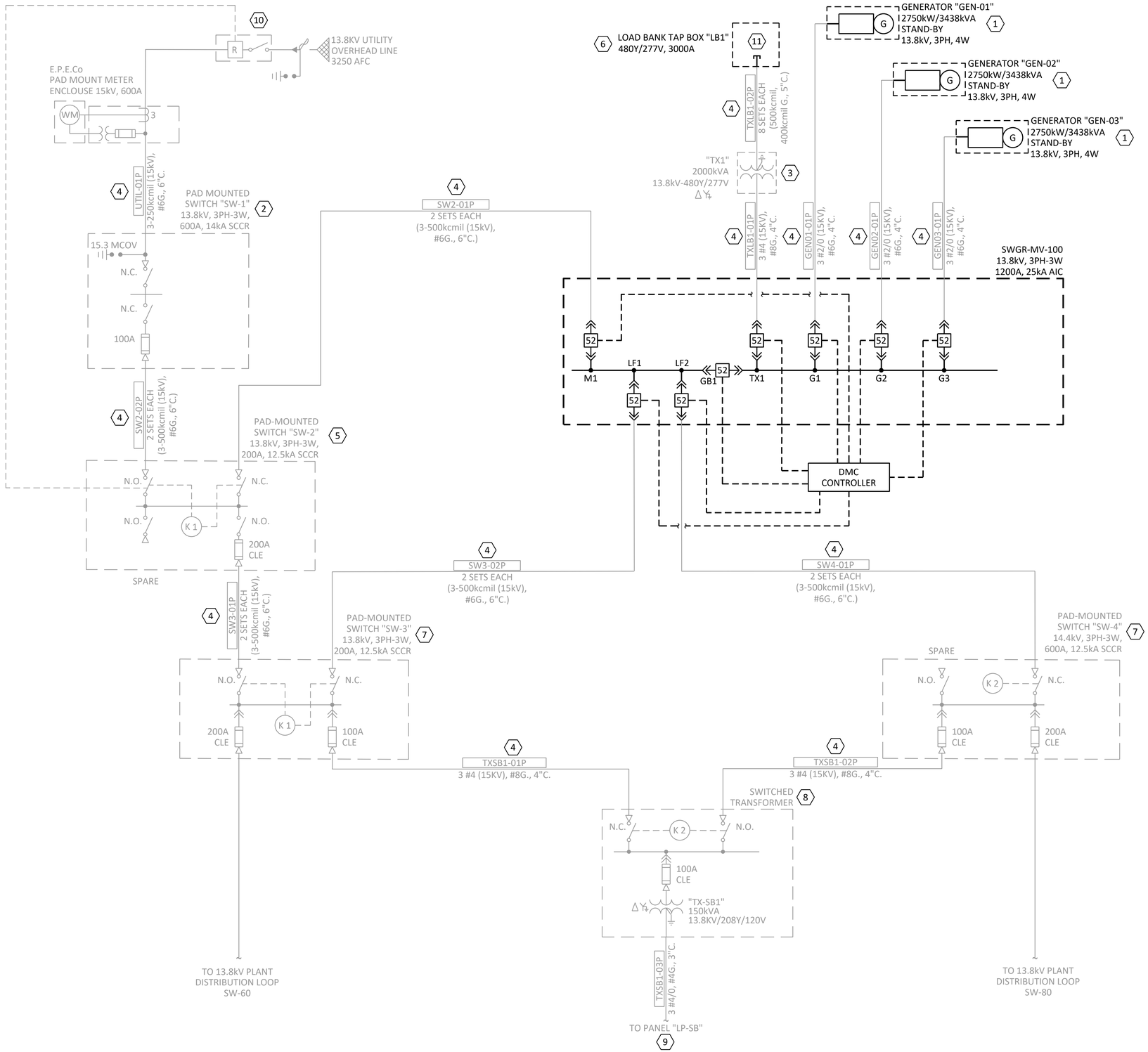

1 ONE-LINE DIAGRAM
NOT TO SCALE

GENERAL NOTES:

1. ALL EQUIPMENT SHOW IN DARK SHALL BE PROVIDED UNDER THIS CONTRACT. ALL EQUIPMENT SHOWN LIGHT SHALL BE PROVIDED UNDER A SEPARATE CMAR BID PACKAGE AS INDICATED.
2. THIS ONE-LINE DIAGRAM IS PARTIAL AND RELATED TO THE INCLUDED PROJECT SCOPE, IT IS NOT INTENDED TO REPRESENT THE ENTIRETY OF EXISTING ELECTRICAL DISTRIBUTION SYSTEM.

NOTES BY SYMBOL "⬡"

1. STAND-BY 2750kW, 13.8kV, 3PH-4W TIER II DIESEL ENGINE GENERATOR. PROVIDED UNDER CMAR BID PACKAGE 1. REFER TO PROTECTION ONE-LINE FOR ADDITIONAL PROTECTION REQUIREMENTS.
2. PAD-MOUNTED SWITCH PMH-5 WITH FAULT FILTER ELECTRONIC FUSE TO BE PROVIDED UNDER CMAR BID PACKAGE 2.
3. MEDIUM VOLTAGE TRANSFORMER TO BE PROVIDED UNDER CMAR BID PACKAGE 2.
4. CONDUITS AND CONDUCTORS TO BE PROVIDED UNDER CMAR BID PACKAGE 4.
5. PAD-MOUNTED SWITCH PME-11 TO BE PROVIDED UNDER CMAR BID PACKAGE 2.
6. 480V LOAD BANK TAP BOX WITH 3000A MAIN CIRCUIT BREAKER LSIG ELECTRONIC TRIP UNIT IN NEMA 4X, 316 STAINLESS STEEL ENCLOSURE TO BE PROVIDED UNDER CMAR BID PACKAGE 1.
7. PAD-MOUNTED SWITCH PME-9 TO BE PROVIDED UNDER CMAR BID PACKAGE 2.
8. MEDIUM VOLTAGE SWITCHED TRANSFORMER TO BE PROVIDED UNDER CMAR BID PACKAGE 2.
9. PANEL "LP-SB" TO BE PROVIDED UNDER A SEPARATE CONTRACT.
10. EL PASO ELECTRIC PROVIDED POLE-MOUNTED RECLOSER.
11. CAMLOCK CONNECTIONS.

KIRK KEY "K1" SEQUENCE OF OPERATIONS:

1. FOUR (4) LOCKS AND THREE (3) KIRK KEY SHALL BE PROVIDED PER SWITCH AS SHOWN.
2. KIRK KEY SHALL BE HELD CAPTIVE IN THE LOCKED POSITION UNTIL THE SWITCH IS OPENED.
3. WITH THE SWITCH OPEN, THE KIRK KEY CAN BE REMOVED. REMOVAL OF THE KEY ENSURES THAT THE SWITCH CANNOT BE UNLOCKED OR RE-CLOSED.
4. AT LEAST TWO (2) SWITCHES SHALL REMAIN OPEN AT ALL TIMES, PREVENTING THE POSSIBILITY OF BACKFEEDING.

KIRK KEY "K2" SEQUENCE OF OPERATIONS:

1. THREE (3) LOCKS AND TWO (2) KIRK KEYS SHALL BE PROVIDED PER SWITCH AS SHOWN.
2. KIRK KEY SHALL BE HELD CAPTIVE IN THE LOCKED POSITION UNTIL THE SWITCH IS OPENED.
3. WITH THE SWITCH OPEN, THE KIRK KEY CAN BE REMOVED. REMOVAL OF THE KEY ENSURES THAT THE SWICH CANNOT BE UNLOCKED OR RECLOSED.
4. AT LEAST ONE (1) SWITCH SHALL REMAIN OPEN AT ALL TIMES, PREVENTING THE POSSIBILITY OF BACKFEEDING.

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EL PASO WATER
JOHN T. HICKERSON WRP
ELECTRICAL
REVISED ONE-LINE DIAGRAM

F&N JOB NO.	ELP21641
DATE	JUN 2023
DESIGNED	AM
DRAWN	JTR
REVISED	-
CHECKED	JNH
FILE NAME	EL-BP1-DG-ONEL01.dwg

NO.	ISSUE	BY	DATE

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0 1

SHEET BP1-E-4
SEQ. .

GMP 1 – EARLY EQUIPMENT PACKAGE

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Last Saved: 6/2/2023 6:40 PM Saved By: 03616
Plot Date: 6/2/2023 6:42 PM Plot By: 03616 Filename: N:\ELEC\EL-BP1-DG-ONEL01.dwg

AVAILABLE FAULT INFORMATION FOR PRIMARY METER		
THREE PHASE FAULT CURRENT	3250 AMPS	
SINGLE PHASE FAULT CURRENT	2400 AMPS	
POSITIVE SEQUENCE (PU ON 100 MVA BASE)	R: 0.3527	X: 1.3029
NEGATIVE SEQUENCE (PU ON 100 MVA BASE):	R: 0.6608	X: 2.7069

ANSI DEVICE NUMBERS

25	SYNCHRONISM CHECK RELAY
27	UNDER VOLTAGE RELAY
32	DIRECTIONAL PROTECTION RELAY
40	LOSS OF EXCITATION RELAY
47	PHASE SEQUENCE VOLTAGE RELAY
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT RELAY
50P	PHASE INSTANTANEOUS OVERCURRENT RELAY
51	TIME OVER CURRENT RELAY, GROUNDING RESISTOR TYPE
51G	GROUND TIME OVER CURRENT RELAY
51N	TIME OVERCURRENT RELAY, RESIDUAL TYPE
51V	VOLTAGE RESTRAINED TIME OVERCURRENT
59	OVER VOLTAGE RELAY
67G	AC GROUND DIRECTIONAL OVERCURRENT RELAY
81	FREQUENCY RELAY
81O	OVER FREQUENCY
81U	UNDER FREQUENCY
86	LOCKING-OUT RELAY
87	DIFFERENTIAL PROTECTIVE RELAY
87N	NEUTRAL DIFFERENTIAL PROTECTIVE RELAY

SEL DEVICE NUMBERS

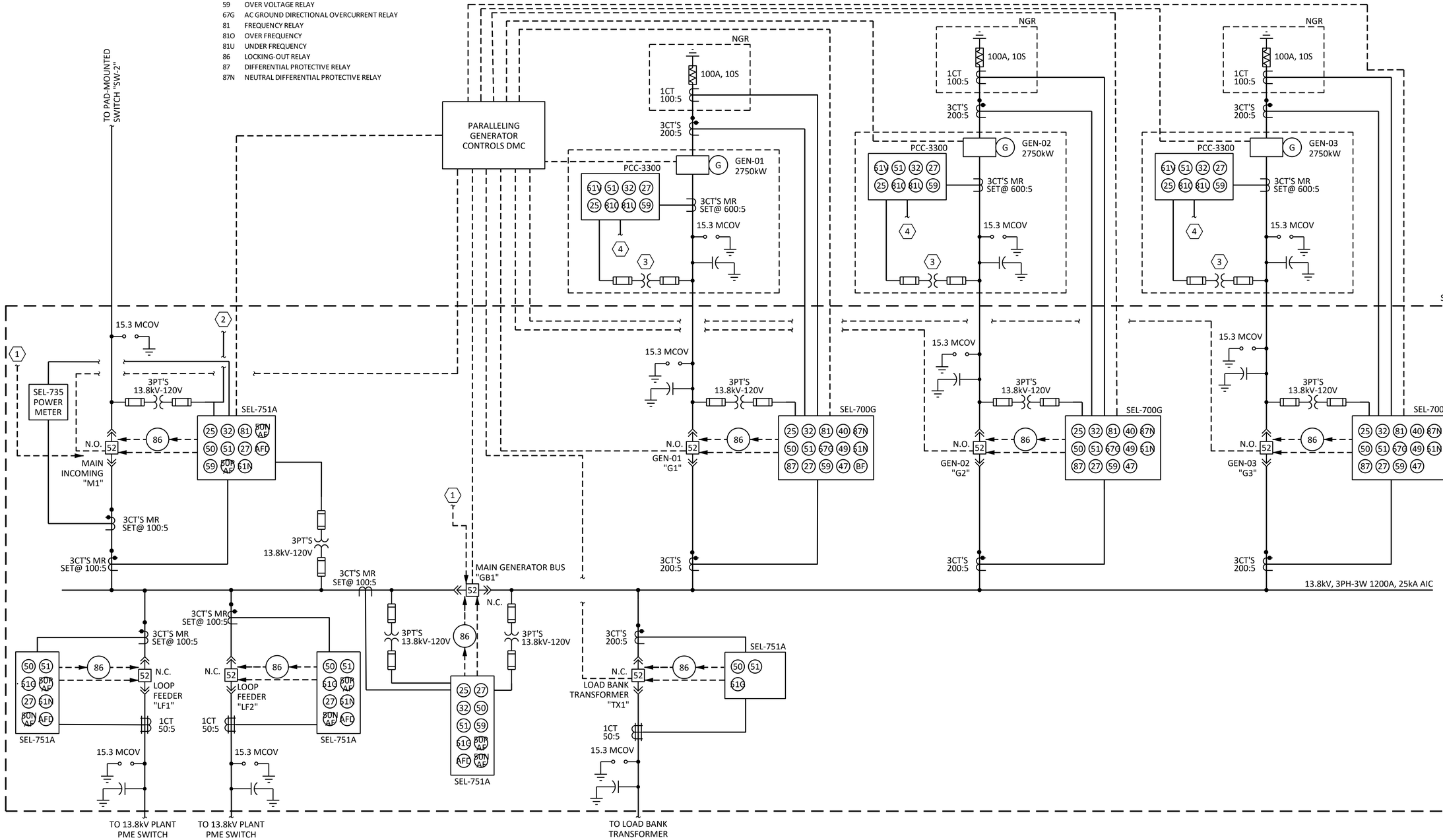
50PAF	ARC FLASH PHASE OVERCURRENT
50NAF	ARC FLASH NEUTRAL OVERCURRENT
AFD	ARC FLASH DETECTOR WITH LIGHT SENSOR
BF	BREAKER FAILURE

GENERAL NOTES:

1. THIS ONE-LINE DIAGRAM IS PARTIAL AND RELATED TO THE INCLUDED PROJECT SCOPE, IT IS NOT INTENDED TO REPRESENT THE ENTIRETY OF EXISTING ELECTRICAL DISTRIBUTION SYSTEM.

NOTES BY SYMBOL "⬡"

1. PROVIDE 10 #12, #12G., 1"C., FOR BREAKER OPEN, BREAKER CLOSED, BREAKER TRIPPED, BREAKER FAILED TO CLOSED, AND BREAKER FAILED TO OPEN, TO RECLOSER CONTROLLER PROVIDED BY EL PASO ELECTRIC.
2. TO PCC-3300 ON EACH GENERATOR, "GEN-01", "GEN-02", "GEN-03".
3. THREE (3) MANUFACTURER PROVIDED POTENTIAL TRANSFORMERS.
4. FROM MAIN INCOMING POTENTIAL TRANSFORMERS.



1 PROTECTION ONE-LINE DIAGRAM
NOT TO SCALE

GMP 1 – EARLY EQUIPMENT PACKAGE

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EL PASO WATER
JOHN T. HICKERSON WRP
ELECTRICAL
PROTECTION ONE-LINE DIAGRAM

F&N JOB NO.	ELP21641
DATE	JUN 2023
DESIGNED	AM
DRAWN	JTR
REVISED	-
CHECKED	JNH
FILE NAME	EL-BP1-DG-ONEL02.dwg

NO. | ISSUE | BY | DATE

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SHEET BP1-E-5
SEQ. .

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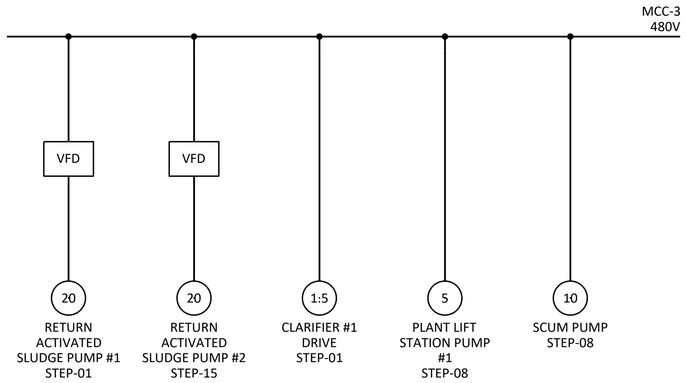
Last Saved: 6/2/2023 1:22 PM Saved By: 03616

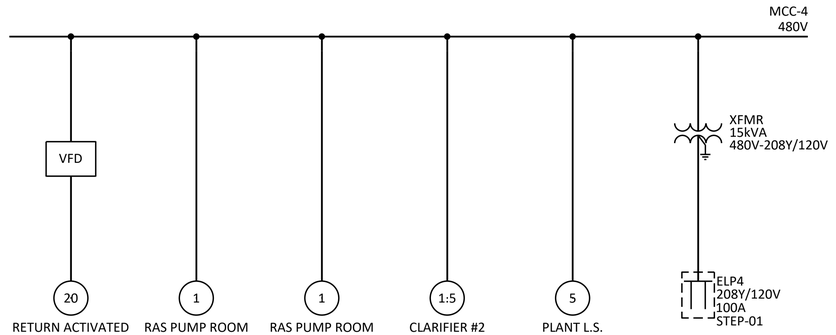
Plot Date: 6/2/2023 6:00 PM Plot By: 03616 Filename: N:\ELEC\EL-BP1-DG-ONEL02.dwg

GENERAL NOTES:

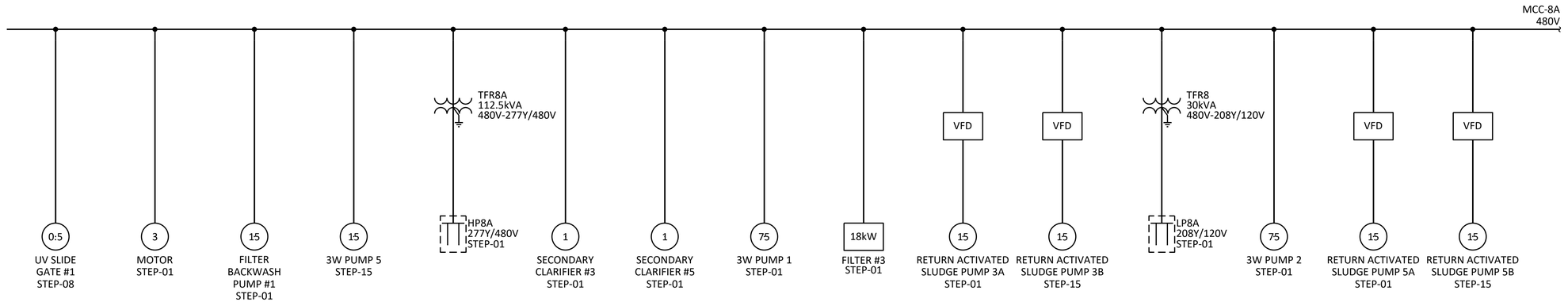
1. LOADS UNDER EMERGENCY SCENARIO START UP STEP SEQUENCE.
2. THIS ONE-LINE DIAGRAM IS PARTIAL AND RELATED TO THE INCLUDED PROJECT SCOPE, IT IS NOT INTENDED TO REPRESENT THE ENTIRETY OF EXISTING ELECTRICAL DISTRIBUTION SYSTEM.

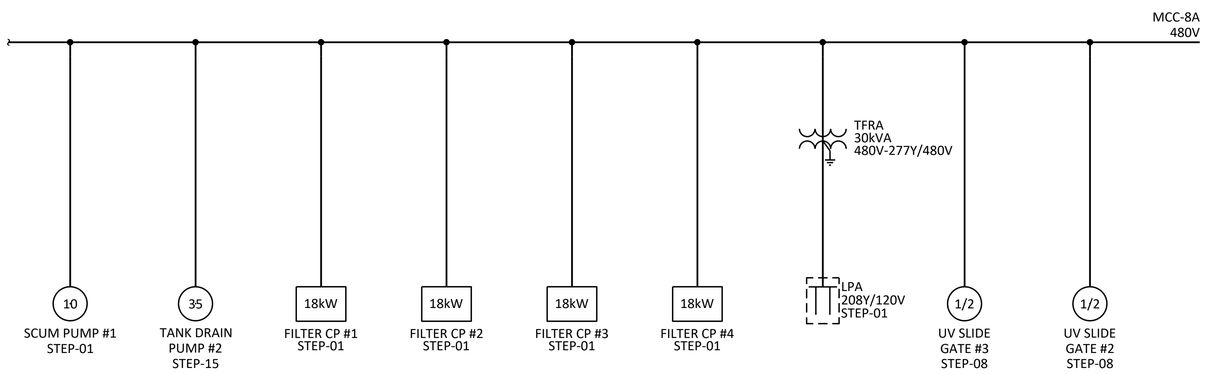


MCC-3 DIAGRAM (1 / -)
NOT TO SCALE

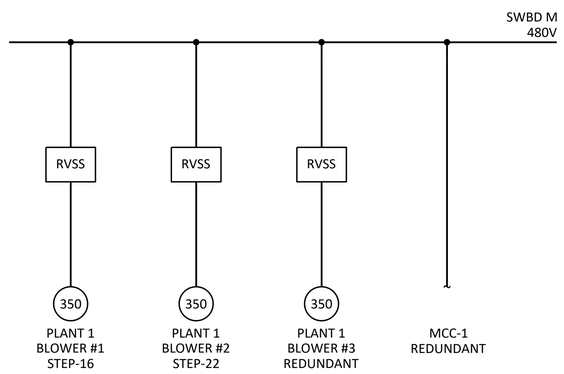


MCC-4 DIAGRAM (2 / -)
NOT TO SCALE





MCC-8A DIAGRAM (3 / -)
NOT TO SCALE



SWBD-M DIAGRAM (4 / -)
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EL PASO WATER

JOHN T. HICKERSON WRP

ELECTRICAL

LOAD STEPS I

F&N JOB NO. ELP21641
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FILE NAME EL-BP1-DG-ONEL03.dwg

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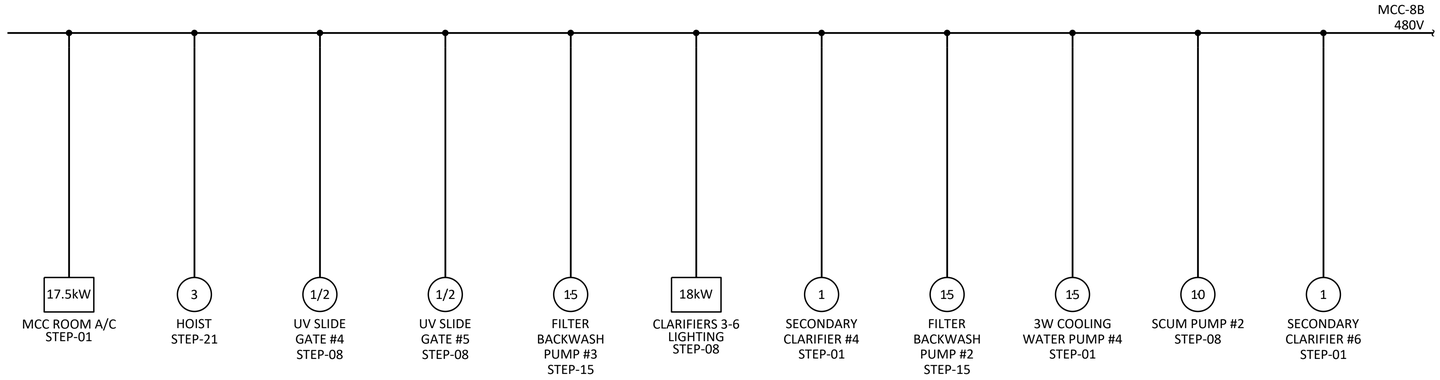
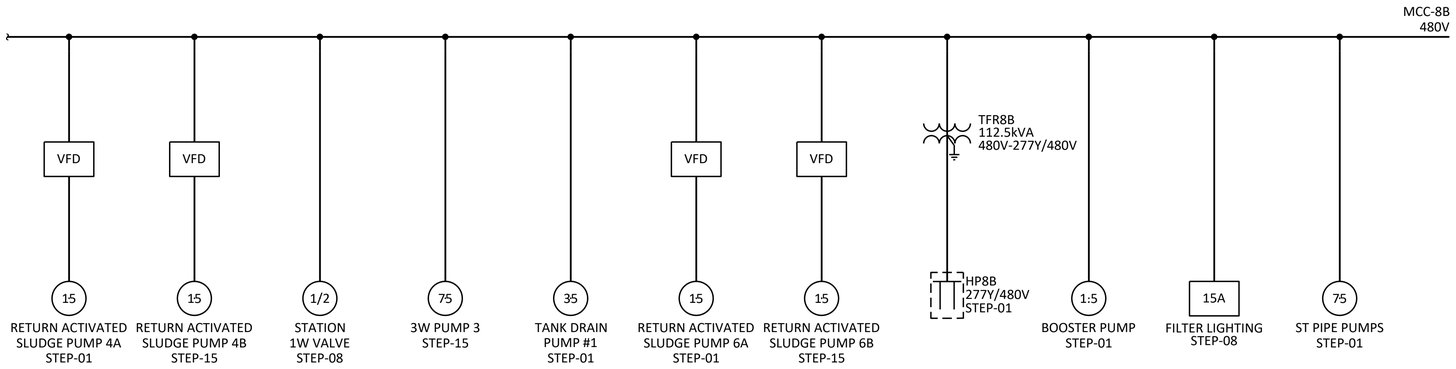
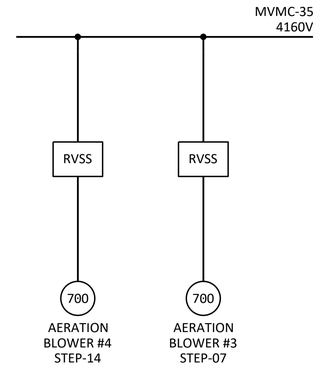




1 - MCC-8B DIAGRAM
NOT TO SCALE



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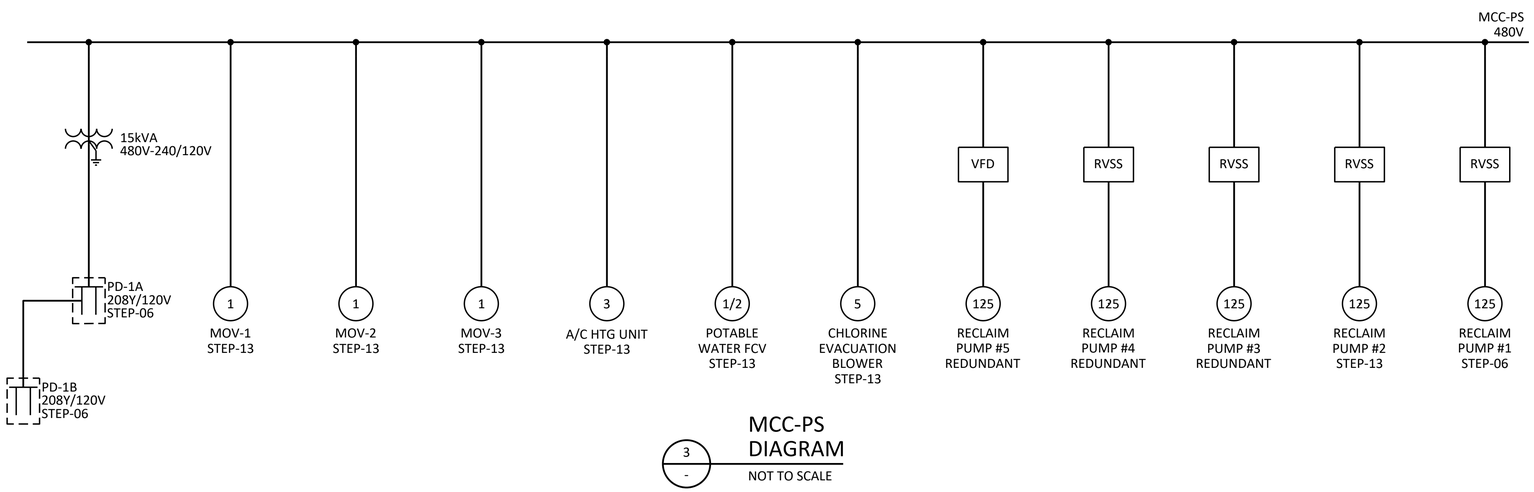
NOT TO SCALE



3 - MCC-PS DIAGRAM
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GMP 1 – EARLY EQUIPMENT PACKAGE

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EL PASO WATER

JOHN T. HICKERSON WRP

ELECTRICAL

LOAD STEPS II

F&N JOB NO.	ELP21641
DATE	JUN 2023
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BP1-E-7

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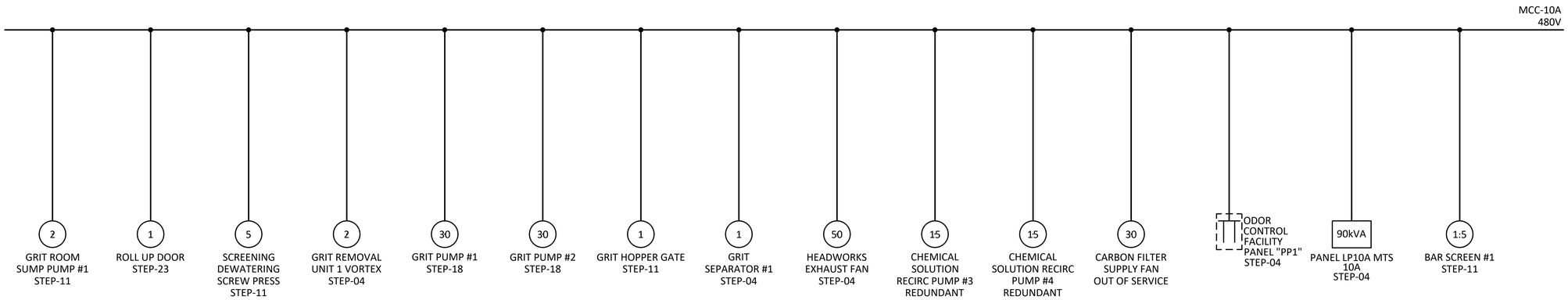
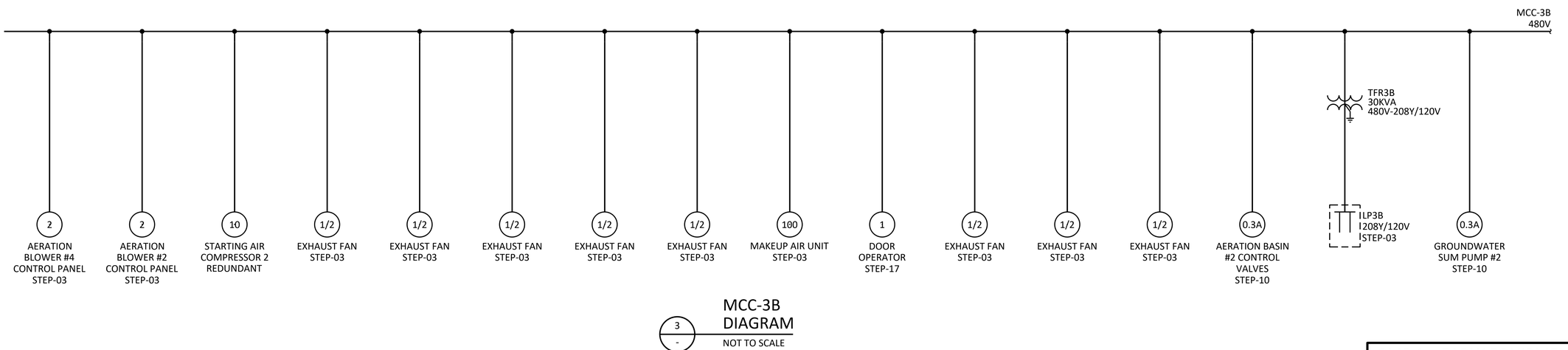


2 / - MCC-10A DIAGRAM
NOT TO SCALE



3 / - MCC-3B DIAGRAM
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EL PASO WATER

JOHN T. HICKERSON WRP

ELECTRICAL

LOAD STEPS III

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FILE NAME EL-BP1-DG-ONEL05.dwg

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SEQ. .

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Last Saved: 6/2/2023 5:57 PM Saved By: 03616

Plot Date: 6/2/2023 6:02 PM Plot By: 03616 Filename: N:\ELEC\EL-BP1-DG-ONEL05.dwg

GENERAL NOTES:

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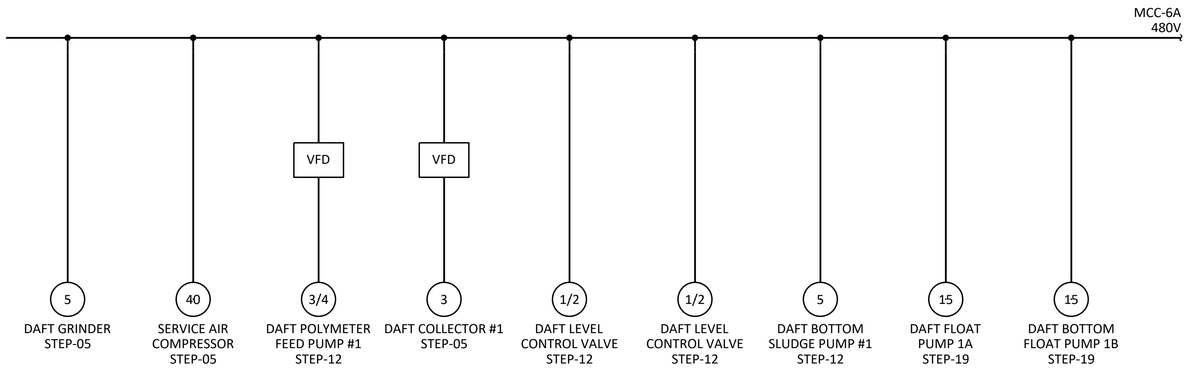
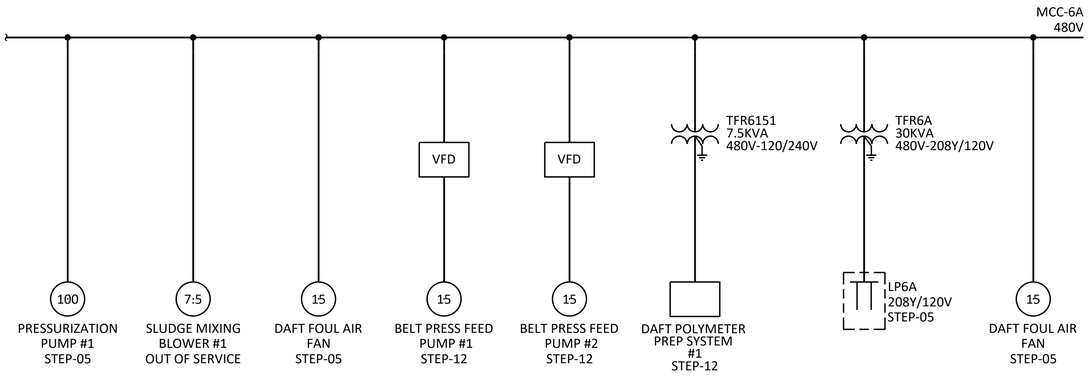
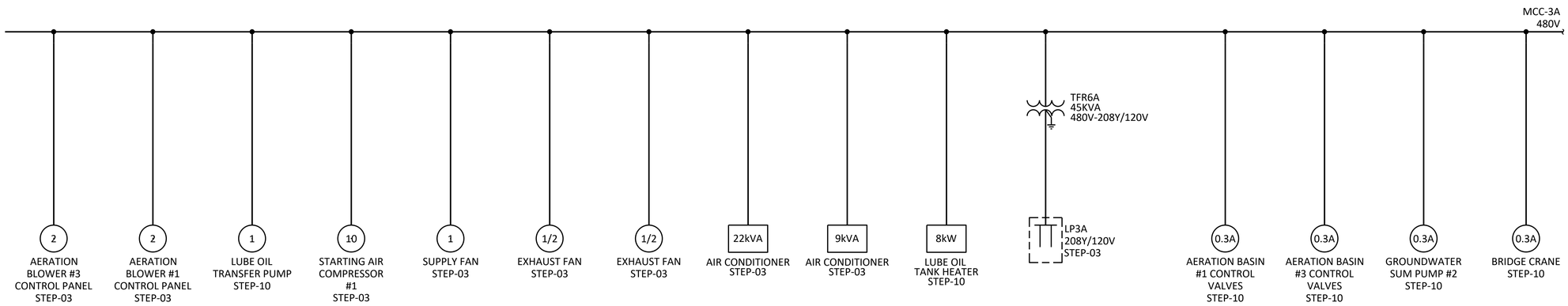




1 MCC-6A DIAGRAM
NOT TO SCALE



3 MCC-3A DIAGRAM
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EL PASO WATER

JOHN T. HICKERSON WRP

ELECTRICAL

LOAD STEPS IV

F&N JOB NO.	ELP21641
DATE	JUN 2023
DESIGNED	AM
DRAWN	JTR
REVISED	-
CHECKED	JNH
FILE NAME	EL-BP1-DG-ONEL06.dwg

NO.	ISSUE	BY	DATE

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VERIFY SCALE 0 1

SHEET
BP1-E-9

SEQ.
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GMP 1 – EARLY EQUIPMENT PACKAGE

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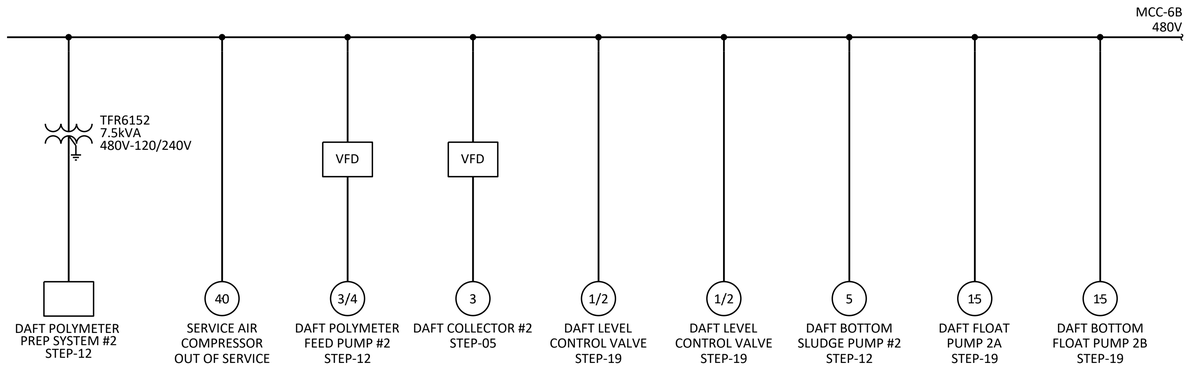
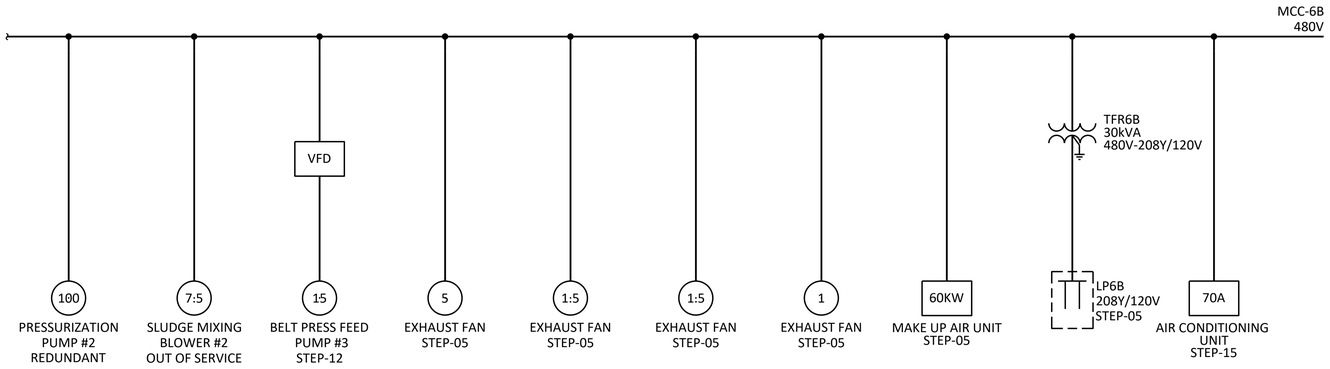
Filename: N:\ELEC\EL-BP1-DG-ONEL06.dwg
Last Saved: 6/2/2023 11:12 AM Saved By: 08380

Plot Date: 6/2/2023 6:02 PM Plot By: 03616 Filename: N:\ELEC\EL-BP1-DG-ONEL06.dwg





2 MCC-6B DIAGRAM
NOT TO SCALE

GENERAL NOTES:

1. LOADS UNDER EMERGENCY SCENARIO START UP STEP SEQUENCE.
2. THIS ONE-LINE DIAGRAM IS PARTIAL AND RELATED TO THE INCLUDED PROJECT SCOPE, IT IS NOT INTENDED TO REPRESENT THE ENTIRETY OF EXISTING ELECTRICAL DISTRIBUTION SYSTEM.

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Texas Registered Engineering Firm F-2144

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FREESE NICHOLS
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Fort Worth, Texas 76102
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EL PASO WATER
JOHN T. HICKERSON WRP
ELECTRICAL
LOAD STEPS V

F&N JOB NO. ELP21641
DATE JUN 2023
DESIGNED AM
DRAWN JTR
REVISED -
CHECKED JNH
FILE NAME EL-BP1-DG-ONEL07.dwg

NO.	ISSUE	BY	DATE

VERIFY SCALE 0 1
Bar is one inch on original drawing. If not one inch on this sheet, adjust scale.

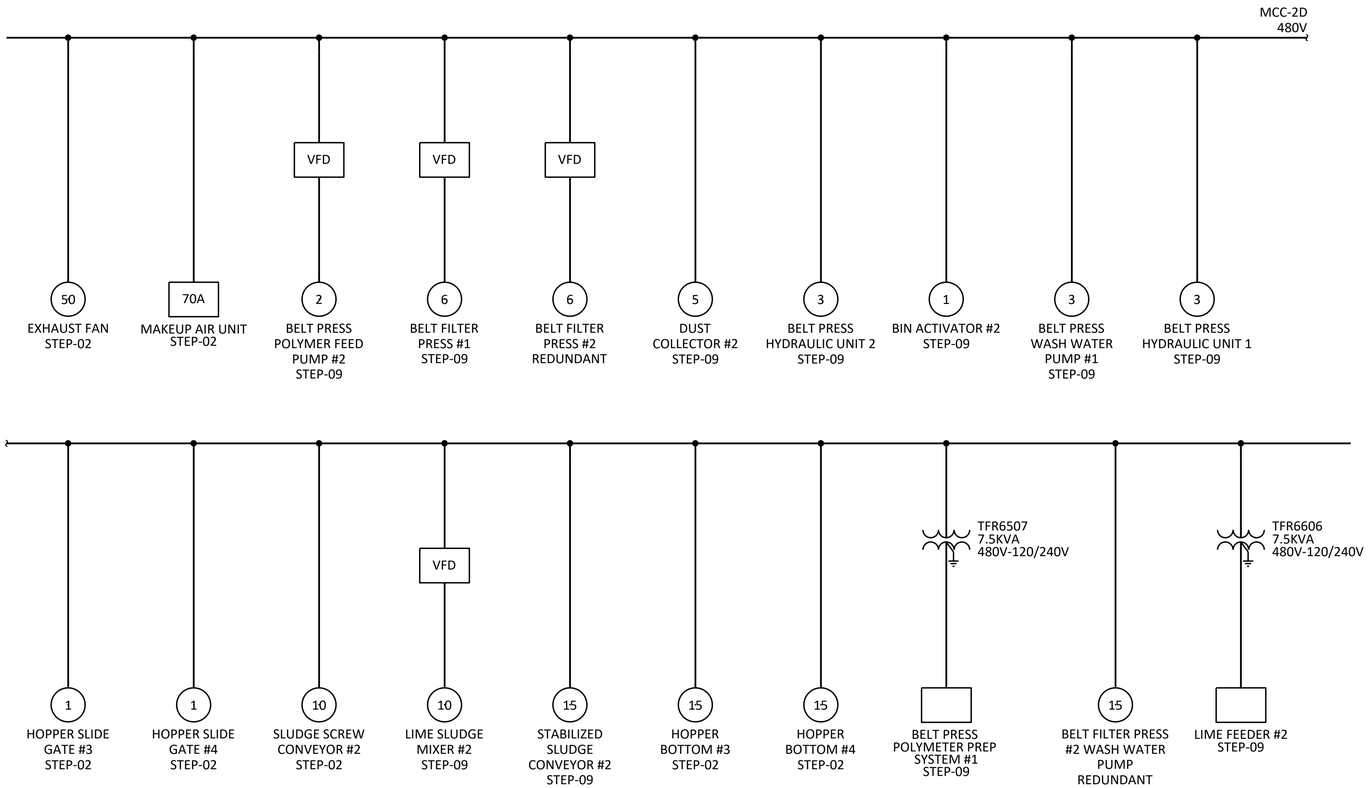
SHEET BP1-E-10
SEQ. .

GMP 1 – EARLY EQUIPMENT PACKAGE

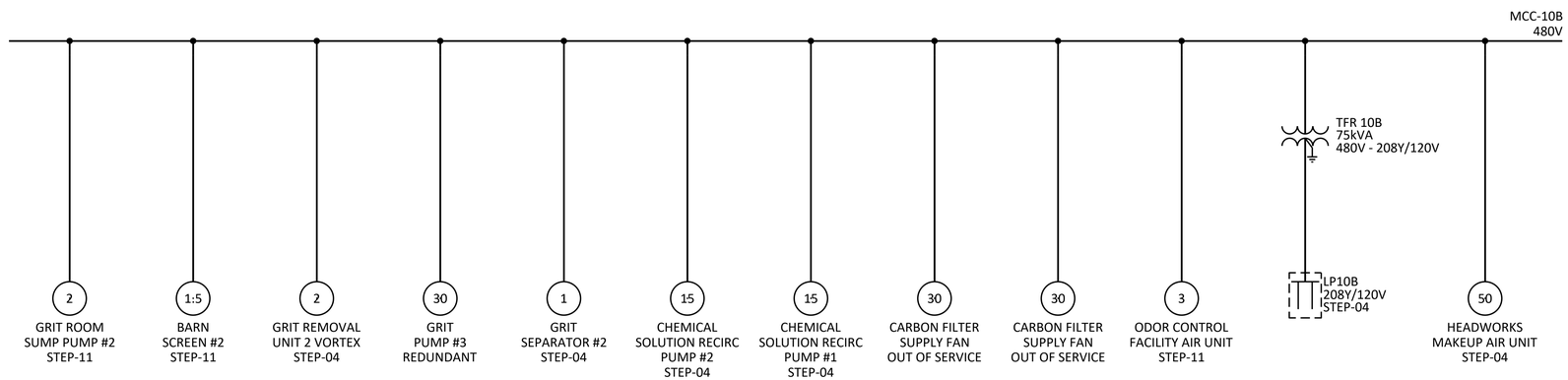
ACAD Rel: 24.2s (LMS Tech)
Filename: N:\ELEC\EL-BP1-DG-ONEL07.dwg
Last Saved: 6/2/2023 11:12 AM Saved By: 08380
Plot Date: 6/2/2023 6:03 PM Plot By: 03616 Filename: N:\ELEC\EL-BP1-DG-ONEL07.dwg

GENERAL NOTES:

1. LOADS UNDER EMERGENCY SCENARIO START UP STEP SEQUENCE.
2. THIS ONE-LINE DIAGRAM IS PARTIAL AND RELATED TO THE INCLUDED PROJECT SCOPE, IT IS NOT INTENDED TO REPRESENT THE ENTIRETY OF EXISTING ELECTRICAL DISTRIBUTION SYSTEM.



1 - MCC-2D DIAGRAM
NOT TO SCALE



1 - MCC-10B DIAGRAM
NOT TO SCALE

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EL PASO WATER

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LOAD STEPS VI

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SHEET BP1-E-11
SEQ. .

ACAD Rel: 24.2s (LMS Tech)
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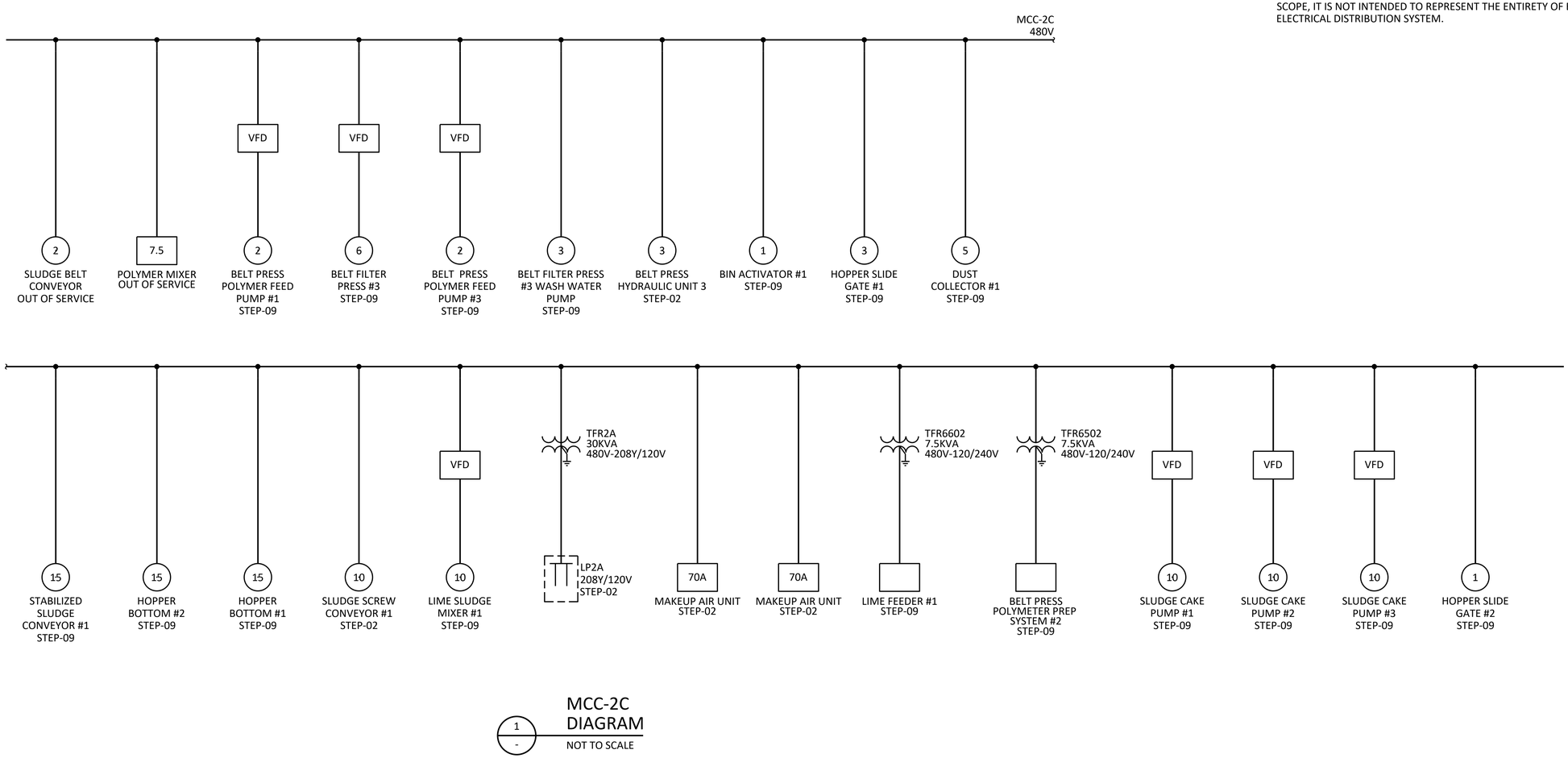
Last Saved: 6/2/2023 11:12 AM Saved By: 08380

Plot Date: 6/2/2023 6:03 PM Plot By: 03616 Filename: N:\ELEC\EL-BP1-DG-ONEL08.dwg

GENERAL NOTES:

1. LOADS UNDER EMERGENCY SCENARIO START UP STEP SEQUENCE.
2. THIS ONE-LINE DIAGRAM IS PARTIAL AND RELATED TO THE INCLUDED PROJECT SCOPE, IT IS NOT INTENDED TO REPRESENT THE ENTIRETY OF EXISTING ELECTRICAL DISTRIBUTION SYSTEM.



1 - MCC-2C DIAGRAM

NOT TO SCALE

GMP 1 – EARLY EQUIPMENT PACKAGE

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EL PASO WATER

JOHN T. HICKERSON WRP

ELECTRICAL

LOAD STEPS VII

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FILE NAME EL-BP1-DG-ONEL09.dwg

VERIFY SCALE 0 1

Bar is one inch on original drawing, if not one inch on this sheet, adjust scale.

SHEET BP1-E-12

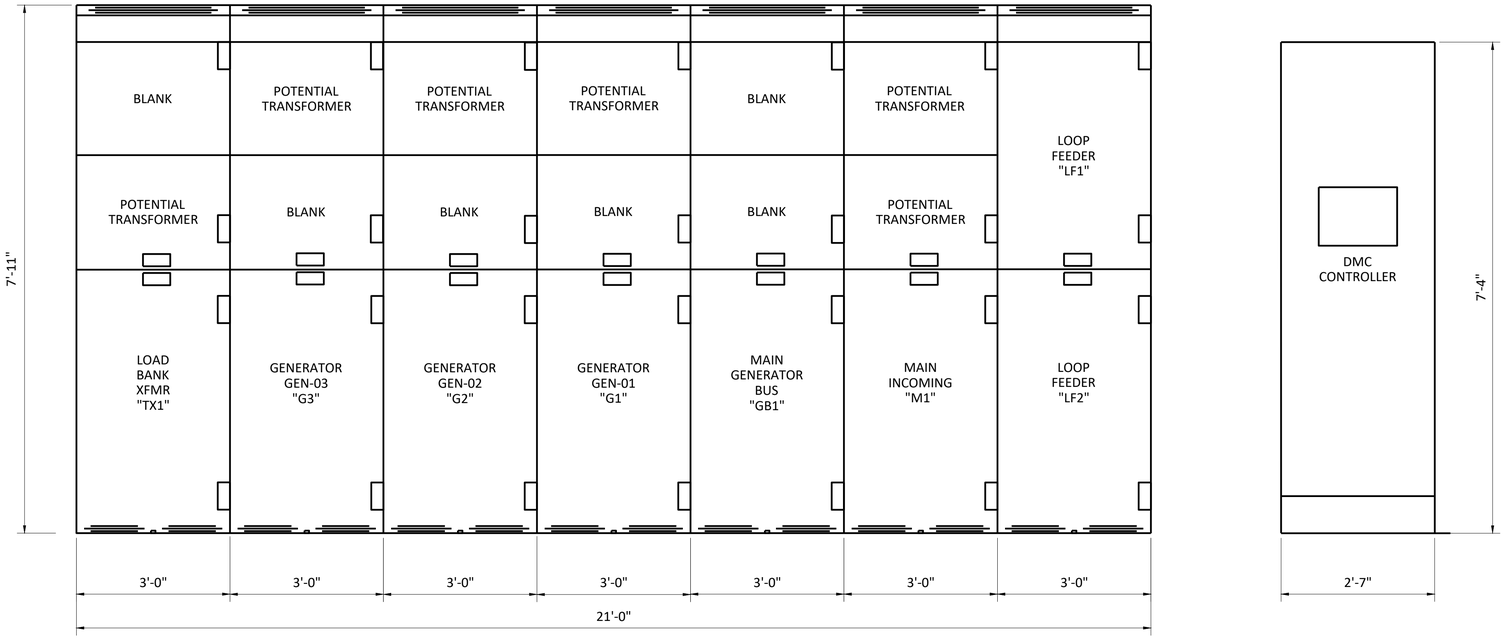
SEQ. .

ACAD Rel: 24.2s (LMS Tech)
Filename: N:\ELEC\EL-BP1-DG-ONEL09.dwg
Last Saved: 6/2/2023 11:12 AM Saved By: 08380

Plot Date: 6/2/2023 6:04 PM Plot By: 03616 Filename: N:\ELEC\EL-BP1-DG-ONEL09.dwg

GENERAL NOTES:

1. DIMENSIONS SHOWN INDICATE MAXIMUM DIMENSIONS.



1 / - MAIN SWITCHGEAR SWGR-MV-100 ELEVATION

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ELEVATIONS

F&N JOB NO. ELP21641
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FILE NAME EL-BP1-DG-ELEV01.dwg

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0 1

SHEET BP1-E-13

SEQ. .

ACAD Rel: 24.2s (LMS Tech)
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Plot Date: 6/2/2023 6:05 PM Plot By: 03616 Filename: N:\ELEC\EL-BP1-DG-ELEV01.dwg