

TECHNICAL SCOPE DOCUMENT

Presented To:

C.A. La Electricidad de Caracas

For:

LM6000 PC & PD Plant

La Raisia Power Plant Phase 2

By



Proposal T-9036
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EDC

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Section 1 Introduction

Derwick Associates Corp. (Contractor) is pleased to provide this Technical Proposal to install a nominal 98 MW Gas Turbine Simple Cycle Power Plant addition to the LaRaisa Power Plant.

This turnkey proposal includes installing the following Owner supplied equipment:

- One (1) gas fueled GE LM 6000PC gas turbine generator package
- One (1) gas fueled GE LM 6000PD gas turbine generator package

Contractor will furnish all engineering, required balance of plant equipment, contract locally for the required subcontractors to accomplish the site construction, construction tools, equipment rental and project management.

Contractor will furnish commissioning, start-up, and performance testing services for the LM6000PC unit. The Contractor will also bring in GE or a qualified service provider to commission the LM6000PD. However, commissioning of the PD is much more complicated than the PC machine and will require much more time to complete.

This Technical Scope Document will become an exhibit to the EPC Contract.

Water Pipeline

Contractor through the use of a qualified local subcontractor will also construct a water supply pipeline to the site based on the specifications provided by EDC and Asincro. Unlike the balance of the project, the construction of the pipeline will be furnished on a Cost Plus Basis based on the labor and materials used to construct the pipeline. The definition of the pipeline scope of supply is not included in the various sections of this TSD document. The final scope will be provided following the selection of the pipeline contractor.

This Technical Scope Document will become an exhibit to the EPC Contract.

THIS DOCUMENT IS CONFIDENTIAL. IT IS DESIGNED AND INTENDED FOR EDC'S USE. THIS DOCUMENT IS FOR THE SOLE PURPOSE OF EVALUATING CONTRACTOR'S PROPOSAL FOR THE (2) GE LM 6000 PC POWER PROJECT ADDITION.

Section 2.0 Scope of Work and Equipment

The Scope of Work and Supply is comprised of the following outlined items:

Major Generation Equipment

The installation of (1) each Owner Supplied GE LM 6000 PC gas turbine generator package and (1) Owner Supplied GE LM6000 PD gas turbine generator package. The units are complete with turbine control panels, auxiliary skids and inlet filters. Note: These units do not include motor control centers, modular control rooms or exhaust stacks. These will be included in the balance of plant supplied by the Contractor.

GE LM 6000 interface points are as follows:

| Equipment System | General Electric |
|--|--|
| <ul style="list-style-type: none"> All supply piping, including Fuel Gas, Demineralized Water, Lube Oil, Compressed Air, Instrument Air | <ul style="list-style-type: none"> Flanged or threaded connection on GE LM 6000 GTG base plates. |
| <ul style="list-style-type: none"> Inlet Air-to-Filter | <ul style="list-style-type: none"> Atmosphere |
| <ul style="list-style-type: none"> Turbine/Generator Ventilation Air | <ul style="list-style-type: none"> Atmosphere |
| <ul style="list-style-type: none"> Turbine Exhaust | <ul style="list-style-type: none"> Flange & Expansion Joint for connection to Exhaust Stack. For both, PC and PD. |
| <ul style="list-style-type: none"> Instruments on the LM 6000 Base plate | <ul style="list-style-type: none"> Terminal box on base plate |
| <ul style="list-style-type: none"> Instrument wiring in Turbine Control Panel | <ul style="list-style-type: none"> Terminal in Turbine Control Panel |
| <ul style="list-style-type: none"> High Voltage Connections | <ul style="list-style-type: none"> Bus bar in LM 6000 generator line side cubicle |
| <ul style="list-style-type: none"> Generator Ground Connections | <ul style="list-style-type: none"> LM 6000 Neutral cubicle |
| <ul style="list-style-type: none"> Electric Motors | <ul style="list-style-type: none"> With cables & conduits from Control Module |
| <ul style="list-style-type: none"> Ladders and Platforms for Air Filter | <ul style="list-style-type: none"> Ladders and Platforms for Inlet Air Filter and Vent Fans |

2.0 Balance of Plant

The contractor will design and install the facility as described in the following sections of this document and as clarified in the associated Clarification Document included in Section 12. The design will include the necessary Structural, Mechanical, Electrical, Instrumentation, and Control System to install the above Major Equipment.

The Balance of Plant scope of supply will be comprised of the following:

- Contractor will provide complete design of the facility including civil, structural, buildings, mechanical, electrical, instrumentation and control
- Contractor will provide concrete foundations, plant gravel, and access roads
- Owner is providing a reasonably level site which Contractor has visited and based its plant layout on
- Owner is providing an entrance road to the site which Contractor has visited.
- Owner will provide (2) 13.8 KV to 230 KV, 60 to 75 MVA GSU Transformers
- Contractor will provide Installation of the complete Power Plant with the inter-ties as described later in this document and including:
 - Mechanical installation of the various items of equipment with the associated inter-ties of, gas fuel, sanitary sewer, waste water, demin water, waste oil, drainage.
 - Electrical installation of the plant including the 13.8Kv interconnect cable, plant electrical for BOP equipment, area lighting, grounding, lightning protection, and cathodic protection
 - Installation of Instrumentation, Control and Protection System including plant instrumentation, metering, and Plant remote DCS PLC

2.1 BOP Major Mechanical Systems

2.1.1 Simple Cycle Exhaust Stack

The Contractor will supply and install 45 ft. exhaust stacks in accordance with the standards set out by GE for each LM 6000 machine.

2.1.2 Plant Fuel Gas System

The Contractor will install the plant fuel gas system outlined as follows:

- Interconnect to header near PDVSA gas metering station above ground at the Plant boundary as described on the Plot Plan
- Install two (2) redundant coalescing filter separators on a common skid including redundant pressure regulators

- Furnish and Install the fuel gas compression plant with two (2) ea. 100% Gas Compressors to raise the available supply pressure to the required 675 - 681 psig for the PC and PD respectively. supply pressure to the gas turbines
- Install all plant fuel gas carbon steel piping, valves and fittings from plant inlet fuel gas interconnect to the fuel gas regulator filter
- Install stainless steel piping from the fuel gas filter to the gas turbine generator

2.1.3 Water and Demineralized Water System

Contractor will Supply and install the plant Water Treatment System expansion outlined as follows:

Contractor Supplied Equipment

- Supply and Install an expansion (demin water modules shall be similar to existng demin modules of P&W FT8) to the Multi- Media filter and R.O. systems
- Supply and install GE EDI Demineralized system addition as required to meet the GE engine specification
- Provide and Install two (2) 50% capacity Demin water forwarding pumps and one (1) spare pump of 50% capacity for 3x50%
- Provide and Install two (2) 100% capacity Demin Water filter/regulator duplex type skids
- Provide and install all plant Demin water Stainless steel piping, valves and fittings from the plant Demin Water storage tanks, to the Demin injection pumps and to the (2) Demin water injection connections at each of the GE LM 6000 GTGs
- Provide and install 3x50% raw water pumps.
- Provide and install 275.000 demin tank.

2.1.4 Oily Water Drain System – as provided with FT8 Plant

The Contractor will furnish and install the oily water drain system as follows:

- Furnish and install PVC or HDPE below ground piping and fittings from concrete oil containment units located at:
 - 1) All Transformers
 - 2) Gas Turbine Generator Auxiliary Skids and Gas Turbine Generator Drains.

Piping is to be routed to the oily water separator and then to the waste oil storage tank. Provisions are to be made to pump out the waste oil to a truck for disposal, which will be provided by the Owner.

2.1.5 Plant Fire Water System

The Contractor will furnish and install a header expansion to the Firewater System that includes:

- Furnish and Install headers in accordance with NFPA Codes and PDVSA standards. All piping to be carbon steel.
- Monitors and Hydrants installed in accordance with NFPA Codes and PDVSA standards
- Portable fire extinguishers as required according to PDVSA standards
- Water spray systems for transformers

2.1.6 Instrument and Service Air Systems

The instrument and service air systems will be as follows:

- Furnish and install one (1) set of two (2) instrument and service air screw compressors with associated filters, dryer and air storage tanks. Piping can be routed from existing service compressors to LM 6000 area and save compressors installation
- Furnish and install Stainless Steel tubing, valves, fittings and instruments for instrument and service air systems from the air compressors to various required areas throughout plant for instrument air and service air. Furnish the appropriate quick connect connectors

2.2 BOP Electrical Systems

2.2.1 13.8 KV System

The Contractor will perform the following work on the 13.8 KV system:

- Install two (2) Contractor furnished 13.8 KV 3,000 amp generator circuit breakers with PTs and CTs
- Furnish and install all 13.8 KV cabling, bus work, cable tray etc. from the generators to the generator circuit breakers.
- Furnish and install two (2) 13.8 KV 1200 A Feeder Breakers
- Furnish and install all five (5) circuit breakers for auxiliary transformer
- Furnish and install four (3) 13.8KV / 480 volt auxiliary power transformer

2.2.2 13.8/4.16 KV System

The contractor to provide the following:

- Furnish and install one (1) 13.8KV / 4160V auxiliary power transformer for the gas compressors.
- Supply one (1) spare 13.8KV / 4160V auxiliary power transformer for the gas compressors.
- Furnish and install four (4) 13.8KV / 480 volt auxiliary power transformer.
- Furnish and install one (1) 4160 V MCCs for Ariel Gas Compressors

2.2.3 480V System

The Contractor will provide the 480V system as follows:

- Furnish and install one (1) 480 V water MCC
- Furnish and install two (2) 480 V GTG MCC
- Furnish and install one (1) 480V Gas Compressor MCC with two (2) starters
- Furnish and install cable tray / conduit with cabling from transformers to MCCs and from MCCs to plant 480V equipment and motors
- Furnish and install underground conduit, duct banks, or overhead cable tray mounted on the pipe racks

2.2.4 120/208 System

The Contractor will provide the 120/208 system as follows:

- Furnish and install 480V/120/208V transformers, distribution panels and lighting panels as required with associated conduits, fittings and wire.

2.2.5 Plant Area Lighting

The Contractor will provide the plant area lighting as follows:

- Furnish and install area lighting consisting of two (2) 25 ft galvanized metal poles with two (2) 400 watt high pressure sodium floodlights on each pole sufficient to illuminate both GTG's and common areas to 50 lux

2.2.6 Ground Grid

The Contractor will provide the ground grid for the plant as follows:

- Furnish and install plant ground grid expansion with associated ground rods and connections to plant equipment, buildings and fence in accordance with Paragraph 12.2.21 of the EDC specification according to IEEE 665

2.2.7 Plant Electrical Cable Tray

The Contractor will provide the plant electrical cable tray work as follows:

- Furnish and install galvanized steel cable trays throughout plant. Cable trays to be mounted on cable trenches for routing plant cabling. A separate cable tray will be installed for each of the 15/5KV systems, 480V system, and instrumentation system cables

2.2.8 Underground Conduit and Cable Systems

The Contractor will provide the plant underground conduit and cable system as follows:

- Furnish and install rigid galvanized conduit or PVC encased in concrete for all underground power, control and instrumentation systems

2.2.9 Lightning Protection

The Contractor will provide lightning protection as follows:

- Furnish and install lightning protection on each gas turbine exhaust stack. Also install protection on all the buildings, structures, etc within the project area that need to be protected against the lightning discharge

2.2.10 Batteries / Chargers / UPS Systems

The Contractor will perform the following work on the batteries / chargers / UPS systems:

- Furnish and install BOP UPS system for remote Distributed Control System (DCS) PLC and associated equipment
- Furnish and install one (1) 125V DC battery and charger for 13.8KV plant switchgear

Note: 24 VDC batteries and chargers are to be supplied as part of the GE LM 6000 package

2.3 Plant Instrument and Distributed Control Systems (DCS)

2.3.1 BOP Control System

The Contractor will furnish and install a BOP control system consisting of:

- One (1) new Distributed Control System (DCS) PLC system expansion and HMI's to be located in the main control room
- Provide and install remote PLC panels as required in certain areas of the site and interfaced back to the main control room DCS
- Two (2) GE package supplied HMI's to interface with DCS System. There will be a remote panel to control the two (2)
- Contractor will transfer software licenses to the Owner at the completion of the project. This will include the license documentation passwords and keys. It will be the responsibility of the owner to maintain these licensing articles for the time when the software needs to be reinstalled
- The new DCS shall include all the new configuration for the existing three (3) P&W turbines and the two (2) GE 7EA turbines in La Raisa Plant
- Operator stations in the control room can be expanded while in remote mode and the Power Plant is operational.
- Various vendor supplied PLCs for the major equipment will use either function block or ladder logic programming. The Balance of Plant PLC will use ladder logic programming.



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- Gas detectors to be located in plant area per applicable codes and standards. (Natural Gas supply is not odorized).

2.3.2 Plant Instrumentation Devices

- Gas Turbine Control Panel is supplied with each LM6000 gas turbine mounted in Control Module supplied by GE
- Contractor to furnish and install instrument devices, both pneumatic and electric, consisting of meters, pressure, flow, temperature and level where required

2.3.3 Electronic Wiring and Pneumatic Piping

- Contractor to furnish and install necessary instrument wiring and pneumatic piping with associated Swagelok fittings, etc.

2.4 230 KV Substation – Not Included: Contractors Scope stops at high voltage side of the transformer (high voltage 230 kV bushing). Contrator shall install the transformers and accessories.

2.4.1 Generator Step-up Transformers (GSUs)

- Contractor to install two (2) each Owner Supplied 60 to 75 MVA generator step-up transformers with 13.8KV delta to 230 KV wye windings

2.4.2 Protective Relaying

- Contractor to supply and install protective relay panel for the GSU transformers and provide interface points for other substation protective relay equipment provided by Owner

2.4.3 Site Work

- Contractor to prepare the site and provide the following:
 - Foundations for the GTGs, fuel and water tank area, GSU transformers, buildings, truck off-load and three (3) gas compressors.
 - Driveways and roads
 - Gravel

2.5 Plant Communication System

- Contractor to provide communication and public address system for the new plant in accordance with 16.10 & 17 of the terminos de referencia.
- Contractor to furnish temporary telephones and email capability for construction communication purposes.
- Permanent telephone lines for operation of the plant will be provided by Owner.

2.6 Plant Civil and Structural

- Site preparation, rough grading, and finished grading to be furnished by Contractor based on an existing site requiring minimal cut and fill.
- Contractor to furnish and install all plant reinforced concrete foundations designed to IBC 2003 as per COVENIN Standards for Industrial Buildings and Seismic Foundations. GSU foundation shall have 9" freeboard.
- Contractor to furnish and install concrete containment curbs and equipment foundations, including liquid fuel offloading area.
- Contractor to furnish and install plant gravel and asphalt paving as shown on the Plot Plans.
- Contractor to provide structural steel pipe racks to support overhead piping and cable trays. Pipe racks to be located as shown on Plot Plan drawings.

2.7 Plant Buildings

Contractor to furnish and install:

- Demin Water Treatment Building expansion
- Gas Compressor Shed expansion
- Electrical / Control Building with pump shed

2.8 Plant Equipment Erection

- Contractor to unload all Plant equipment delivered to site.
- Contractor will provide all cranes and support equipment and manpower as required to erect the gas turbine generators.
- Contractor to provide for erection of all BOP equipment.

2.9 Cranes, Equipment and Tools

Contractor to furnish or provide for all plant construction required cranes, fork lifts, back hoes, hydraulic lifts, welding machines, air compressors, generators, temporary lights, trucks, pick-ups, etc.

2.10 Transportation

Contractor will provide the transportation of the BOP equipment to site.

2.11 Lubricants and Chemicals

- Contractor will supply and install all lubricants, lube oils and chemicals for furnished equipment.
- Contractor to supply and install non-PCB oil for GSU transformers.

2.12 Spares

- Contractor will make provision to supply, receive and store all spare parts furnished for equipment during start-up and commissioning, and a list of spare parts for two years operation for turbines and BOP equipment.
- Contractor to provide Owner with recommended list of spare parts for the BOP equipment supplied by Contractor.

2.13 Spares List

See appendix 12.8.

2.14 Construction Offices and Storage Facilities

- Contractor to provide construction offices for Contractor, Technical Representatives (3), and Owner.
- Owner is providing the site which has sufficient lay down area and site for construction offices and construction utilities (electrical and potable water)
- Contractor to provide fenced storage and a lay down area and around the construction site during construction.
- Contractor to provide sanitation facilities for Contractor, & Owner personnel during construction.
- Contractor to provide communication facilities for construction.

2.15 Engineering and Project Management

- Contractor to provide detailed engineering (drawings and documents) and specifications for all disciplines involved for the power plant including civil and concrete foundations.
- Contractor to provide project management complete with construction management, safety and health supervisors as required by local ordinances, quality control / quality assurance, scheduling, administration, warehousing, and expediting including regular monthly reporting of all disciplines.

- Contractor to arrange for and provide fully qualified technical representatives during erection, testing, start-up, commissioning for the LM6000PC gas turbine generator unit. Owner to contract with GE directly for the commissioning, start-up and testing of the LM6000PD package.
- Contractor to provide startup, commissioning and testing of BOP associated systems.
- Contractor to provide O&M service for at least 6 months after C/O.
- Contractor to provide operator and maintenance training for Power Plant on the Gas Turbine Generator Packages and Balance of Plant.
- Contractor to provide one (1) electronic and two (2) hard copies in English and Spanish of the O&M manuals, training manuals, engineering calculations, commissioning and start-up manuals, test manuals, as-built drawings, design specifications and warranty manuals for plant equipment.

2.16 Cathodic Protection

Cathodic Protection will be provided for all steel underground piping and tanks.

Section 3.0 Balance of Plant Equipment Supply Matrix

| Material/Responsibility | Qty | Description |
|---|-------|---|
| Owner | 1 Lot | Removal of all unused building foundations, underground piping, etc. on the proposed project site |
| | 1 Lot | Natural Gas Pipeline and supply metered at inter-tie point within 50' of Plant Boundary. Connection will be in a header tie in. |
| | 1 Lot | Fuel Gas for Commissioning / Start-up that meets GE Fuel Specifications |
| | 1 Lot | Raw Water Supply to site boundary |
| | 1 Lot | Raw Water for Commissioning and Startup |
| | 1 Lot | Waste Water and Waste Oil Truck Removal |
| | 1 Lot | Permits for Environmental, Importation, Transportation, Building, Operations, etc. to allow plant construction and commercial operations |
| | 1 Lot | Construction Commissioning 480V three phase power |
| | 1 Lot | Access Roads to site |
| | 1 Lot | Any required Electric Utility 13,8KV to 230 KV Tie-In interconnect to the Utility |
| | 1 Lot | Import Duties and Taxes |
| | 1 Lot | Construction lay down area as available on the existing site |
| | 1 Lot | Right of Way, easements, etc. to allow proposed interconnects as required |
| | | Gas Turbine Generator |
| | 2 | GE Frame LM6000 PC (60Hz) Gas Turbine Generator packages |
| | 2 | Turbine Control Panels |
| | 2 | Generator Control Panels and Protection Panels - 24 VDC Batteries and Chargers |
| | 2 | 13.8 KV to 230 KV GSU Transformers , 60 – 75 MVA |
| Contractor – Responsibility Civil / Structural | 1 Lot | Site Soil Borings & Studies to design Foundations |
| | 1 Lot | Site Preparation, Rough Grading, Excavation, final grading and fencing |
| | 1 Lot | Temporary Power Distribution |
| | 1 Lot | Plant Concrete Foundations |
| | 1 Lot | Plant Paving, Gravel and Pads for the GTG Turbines and Generators |
| | 1 Lot | Structural piping supports, platforms, ladders, and Misc structural steel supports. (Note: Platforms and ladders for the exhaust stacks to be furnished by Owner) |
| | 1 Lot | Erection of the (2) Owner Furnished GE LM 6000 PC Gas Turbine Generators, Exhaust Stacks, Control Modules and associated accessories. |
| | | |
| | | |
| | | |

Buildings

| | | |
|--------------------------------------|---|--|
| Mechanical | 1 | Demin Water Treatment System expansion & Forwarding Pump Building expansion |
| | 1 | Gas Compressor shed expansion |
| | 1 | Control Room, Electrical building and pump shed |
| | 1 | Water Treatment Building expansion (Fire Water Pumping Station Shed Expansion) |
| | 2 | Exhaust 45' Stacks with Silencers |
| Mechanical | 2 | 100 % Fuel Gas Compressors, one for each turbine |
| | 1 | Fire Water System expansion including, Loop, Monitors and Hydrants |
| | 1 | Duplex Instrument Air Compressor |
| | Qty | Description |
| | Material/Responsibility Contractor (continued) | |
| Mechanical | 2 | GTG Duplex Demin Water Filter Skids |
| | 1 | Water Treatment System expansion consisting of Multi-Media filters and R.O. System |
| | 1 | Demineralized Water Treatment system (EDI) expansion |
| | 2 | Demin Water forwarding Pumps |
| | 1 Lot | Pipe, Valves and Fittings with Insulation as required |
| Electrical | 1 Lot | Mechanical Labor |
| | 2 | 13.8KV 3000 Amp, NEMA 3R Generator Breakers |
| | 5 | 13.8 KV Fused Disconnects (Station Service) NEMA 3R |
| | 2 | 13.8 KV/4160 V 1500 KVA Fuel Gas Compressor |
| | 4 | 13.8 KV/480 V 500 KVA Transformers |
| Electrical | 1 | 4160 V MCC for Fuel Gas Compressor |
| | 2 | 480 V GTG MCC's |
| | 1 | 480 V Water MCC |
| | 1 | 480 V Gas Compressor MCC |
| | 1 Lot | BOP 480/220 V Transformers, Lights, Panels etc |
| Electrical | 1 | 120 V UPS System for Control Room |
| | 1 | Plant Grounding Grid |
| | 1 Lot | 125 VDC Battery & Charger |
| | 1 Lot | Lightning Protection 50 lux |
| | 1 Lot | Cathodic Protection for underground steel piping |
| Electrical | 1 Lot | Area Lighting (50 lux) |
| | 1 Lot | 480 V Welding Receptacles |
| | 1 Lot | Electrical Labor |
| | 1 Lot | Local Subcontractor(s) Civil, Electrical & Mechanical Craft Labor |
| Instrumentation & Control | 1 Lot | Plant Instrumentation |
| | 1 | Remote DCS |

| | | |
|---|------------|--|
| | 1 Lot | I&C Installation and Construction |
| Construction | 1 Lot | Major Equipment Erection |
| | 1 Lot | Mechanical Installation and Construction |
| | 1 Lot | Construction Tools, Rental Equipment & Rental Cranes |
| | 1 Lot | Lubricants, Chemicals, Filters, etc. for Plant Commissioning and Start up |
| | 1 Lot | Balance of Plant Start up and Commissioning Spare Parts |
| | 1 Lot | Transportation of all BOP Equipment to site |
| | 1 Lot | Plant Commissioning and Performance Testing |
| | 1 Lot | Overall Plant Training |
| Engineering | 1 Lot | Conceptual and Detail Design engineering (Total Plant) |
| | 1 Lot | Project Manuals including O&M, Warranty, and Engineering Calculations |
| | 1 Lot | As Built Drawings |
| | 1 Lot | Recommended Vendor Spare Parts List |
| | Qty | Description |
| Material/Responsibility Contractor (continued) | | |
| Project Management | 1 Lot | Project Management with QA/QC, Safety, and Training |
| | 1 Lot | Construction Permits |
| | 1 Lot | Local Business Taxes |
| | 1 Lot | Project manuals including project procedures, Systems Turnover Manuals, project implementation, QA/QC, safety and training |
| | 1 Lot | Training of Operators for the LM 6000 GTGs and BOP |



Section 4.0 Design Basis and Interconnect Points

4.1 Design Conditions

Design Conditions

| | |
|---|---|
| Site Elevation (Meters above Mean Sea Level) | 283.6 |
| Multi-year median temperature: | 27.5°C |
| Maximum dry bulb temperature: | 33°C (95°F) |
| Maximum wet bulb temperature: | 28.3°C (82.94°F) |
| Multi-year median relative humidity: | 69% |
| Median annual precipitation: | 813mm (32 in) |
| (Majority during the months of October and November) | |
| Predominant wind direction: | Northeast |
| Maximum average multiannual wind velocity: | 78km/h |
| Seismic Zone | 4 |
| Fuel Gas Supply Pressure | 250 psig minimum |
| Plant Gas Fuel Consumption Rate (2) LM6000 | 20.8 mmscfd * |
| High Voltage Interconnect @ GSU Bushings | 230KV Substation (By Owner) |
| Instrument Air System add | 185 scfm by Contractor |
| Demin Water required add | 65 gpm |
| Demin Water Storage - existing | 1,000 m ³ (275,000 gal) |
| Demin Water Storage – add | 1,000 m ³ (275,000 gal) |
| Raw Water Storage (Includes Fire water) existing | 2,400 m ³ (675,000 gal) |
| Raw Diesel Fuel Storage existing | 5,000 m ³ (2 x 675,000 gal) existing |
| Clean Diesel Fuel Storage (2) existing | 3,000 m ³ (2 x 275,000 gal) existing |

* assumes 900 - 1050 BTU/SCF natural gas quality

4.2 Interconnect Points

Interconnect Points

| | |
|-------------------|---|
| Fuel Gas | 250 psig at PDVSA Metering & Regulating Station within Site |
| Plant Waste Water | At existing waste water tank discharge pump |
| Plant Waste Oil | At existing waste oil tank discharge pump |
| 230 KV | At GSU High Side Bushings |
| Raw Water Supply | At existing Raw Water Tank |

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Section 5.0 Expected Performance – Using Natural Gas or Diesel Fuel

La Raisa II

Simple Cycle

Site Elevation 930.4 Feet

Design Temperature 81.5 F

Relative Humidity 69%

ID GTPRO 331

Without Chiller

| | LM6000 PC SPT | LM6000 PD SPT | |
|----------------------------------|------------------|------------------|-----------|
| Gross Power KW | 43516 | 40811 | 84327 |
| Net Power KW | 42387 | 39776 | 82163 |
| Aux & Losses KW | 1128.9 | 1035.2 | 2164.1 |
| LHV Gross Heat Rate (BTU/kWh) | 8690 | 8414 | 4771.45 |
| LHV Net Heat Rate (BTU/kWh) | 8921 | 8633 | 8661.5 |
| LHV Gross Electric Eff % | 39.27 | 40.56 | 4480.78 |
| LHV Net Electric Eff % | 38.25 | 39.53 | 39.4 |
| LHV Fuel (kBTU/h) | 378151 | 343370 | 343408.25 |
| HHV Fuel (kBTU/h) | 418653 | 380147 | 798800 |
| Fuel Gas (KPPH) | 19 | 17.26 | 36.26 |
| Fuel Gas (MMSCFD) | 9.75 | 8.86 | 18.62 |
| Liquid Fuel (KPPH) | 0 | 0 | 0 |
| Liquid Fuel (GPM) | 0 | 0.00 | 0.00 |
| Water for Nox (KPPH) | 17.23 | 0 | 17.23 |
| Water for Nox (GPM) | 34.47 | 0.00 | 34.43 |
| SPT Water (KPPH) | 8.756 | 8.68 | 17.438 |
| SPT Water (GPM) | 17.50 | 17.4 | 34.85 |

| | GPM | GPD (24) | 3 D | 5D |
|-----------------|-----|----------|--------|--------|
| RAW Water Total | 89 | 127800 | 383399 | 638999 |
| Water Total | 69 | 99844 | 299531 | 499218 |

| | LM6000 PC SPT | LM6000 PD SPT | Total |
|--------------------|------------------|------------------|----------------|
| Gas Fuel | 9.75 | 8.86 | 18.62 (MMSCFD) |
| Demin Water for GF | 52 | 17 | 69 GPM |
| RAW Water for GF | 67 | 22 | 89 GPM |

14.21 p
82 T
69 %RH
920.4 m
930.4 ft elev.



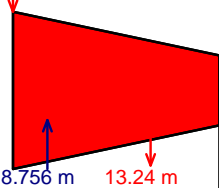
14.07 p
82 T
920.4 m

8.756 m
Natural gas 19 m
LHV 378151 kBTU/h
77 T



Water 17.23 m

1X GE LM6000SPT

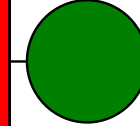


13.24 m

180 T



43516 kW



952.1 m

14.39 p
862 T
952.1 M
25 ppm NOx

Net Power 42387 kW
LHV Heat Rate 8921 BTU/kWh

70.49 %N2
12.49 %O2
3.3 %CO2
12.87 %H2O
0.8475 %Ar

14.21 p
82 T
69 %RH
918.1 m
930.4 ft elev.



14.07 p
82 T
918.1 m

8.682 m 13 m
Natural gas 17.26 m
LHV 343370 kBTU/h
77 T

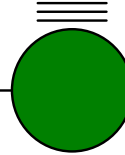


196 T

1X GE LM6000SPT

931 m

40811 kW



14.39 p
866 T
931 M

Net Power 39776 kW
LHV Heat Rate 8633 BTU/kWh

72.73 %N2
13.48 %O2
3.102 %CO2
9.809 %H2O
0.8746 %Ar

6.0 Plant and Equipment Warranties

Balance of Plant Warranties – Contractor will obtain from all equipment vendors their warranty on the material and equipment provided. These warranties will be for a term of 12 months from commercial operation (full power) date and if a replacement is required, for a term of 12 months following such replacement. The warranty for each component will include replacement of the item as well as the Contract labor cost to replace and install.

This vendor warranty information will be assembled and packaged into a Warranty Manual. The Warranty Manual will provide vendor name and contact information, component description, and model number. The warranty Manual will be provided to the Owner.

Section 7.0 Project Management and Organization (TYPICAL & NOT PROJECT SPECIFIC)

A project specific plan will be submitted following the project kick-off.

7.1 Project Management Execution

7.1.1 Project Management Team (Typical)

The Contractor will assemble a well qualified and experienced team of individuals who have worked together on many previous projects.

The team will be comprised of:

- Project Manager
- Administration Manager
- Project Technical Consultants
- Construction Manager
- Purchasing / Expediter
- Scheduling
- QA/QC
- Project Engineering Manager
- Site Erection
- Commissioning / Start up Managers
 - Mechanical
 - Electrical
- Mechanical Construction Superintendent
- Electrical Construction Superintendent
- Training

The team as outlined above has worked together on many gas turbine generator power plants within the US as well as internationally. They have successfully completed a number of “Fast Track” projects internationally.

7.1.2 Project Manuals

One of the first tasks to be initiated is the preparation of the project specific project manuals. These manuals are listed:

- Project Procedures
- Project Implementation
- Project Engineering Calculations
- Project Warranties
- QA/QC
- Safety

- Training
- Operation and Maintenance
- Commissioning, Start Up, and Turnover
- Project Performance Test

Project Schedule

Along with the commencement of preparation of the project manuals, the detailed project schedule will be started. This detailed schedule will be developed utilizing Microsoft Project. The project schedule will be a living document which will be continually updated by a full time assigned scheduler for the life of the project. The proposed project schedule is included in Section 8.0.

7.1.3 Project Engineering

Preliminary conceptual engineering has been developed during the proposal phase which consists of:

- General Arrangement Plot Plan
- Process Flow Diagram
- One Line Diagrams

The conceptual drawings listed above are immediately completed after project Notice to Proceed. This entails updating the various drawings based on final agreed upon items with the Owner and/or Owner's Engineer. The Process Flow Diagram is completed with the latest heat and material balance. The One Line Diagrams are further developed to reflect loads, breaker / fuse sizing, DL power, etc. The Control System Drawing is likewise further completed reflecting agreed upon HMI's, printers, Balance of Plant Equipment PLC's, etc.

The conceptual engineering is completed utilizing the project technical consultants (responsible for proposal preparation) and the detailed engineering team to guarantee a smooth hand over to the detailed engineering phase.

During the conceptual engineering phase, specifications are finalized for all engineered equipment to be purchased. On a "Fast Track" project most of the engineered equipment has been preliminarily specified with only final checks and agreed upon modifications made.

Detailed engineering will be completed utilizing the conceptual drawings previously described and with Owner approval. This detailed engineering will include: engineering protocol for drawings and specification.

As-built drawings will be completed upon completion of the installation phase of the project.

7.1.4 Owner Approval

It is proposed that three approval steps be in place for the engineering phase of the project. These steps would be 30%, 60%, and 90%. The Owner or Owner's Representative could travel to the Contractor or vice versa at the Owner's request.

7.1.5 Project Procurement

Major engineered equipment which has been specified during the proposal and configuration phases of the project are submitted on the agreed upon approval process and when approved will be purchased.

The Balance of Plant Equipment and materials (normally short delivery) will be itemized and listed during detailed engineering. A decision will be made as to who will furnish (Contractor or Subcontractor) based on job conditions, locations, etc.

7.1.6 Construction Phase On Site

The project management team will move to the site for the construction phase of the project. This phase is further described as follows:

1. Mobilization
A mobilization and construction lay down plan will have been prepared as part of the Project Implementation Manual. This would include setting up the normal required items.
 - Construction offices
 - Site utilities
 - Secure and non-secure lay down areas
 - Communications
 - Project management housing, transportation, food, etc.
 - Arrangements for major equipment rental
 - Surveys, soil tests, etc.
2. Project Construction
Project construction will be carried out utilizing local subcontractors and materials where feasible. Contractor will furnish construction management and detailed supervision of all disciplines.
3. Commissioning and Turnover
Commissioning and Turnover Manuals will be prepared for each discrete system making up the power plant. An experienced and knowledgeable commissioning and turnover team will be assigned under the supervision of a well qualified start-up manager. This team will commission on a "priority system" basis the various systems to provide for plant start up. It is desired that plant operation and maintenance personnel be involved to provide valuable hands on experience.

4. Training

An extended O&M support after start up and during the period of 6 months of initial commercial operation will be included.

Training includes two TA's in operation and maintenance during a 12 hour period and they will be available on call for the other 12 hour period.

Operation and maintenance training will be conducted in two phases:

- General Electric LM 6000 GTG equipment classroom at the site subject to plant operator preference.
- On site balance of plant operation and maintenance.

Formal training manuals will be prepared with formal on site training to be conducted.

5. Plant and Performance Testing

Plant and performance test documents will be prepared and submitted for approval. The formal tests will be conducted on an agreed time with the necessary Owner's Representatives attending.

8.0 PROJECT SCHEDULE

A schedule and list of products will be supplied for each phase.

A Project Schedule for the installation of (1) LM6000 PC and (1) LM6000 PD Gas Turbine Generator will be provided following the project kickoff meeting.



Section 9.0 PROJECT QA/QC PLAN

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PART 1 PROJECT QA/QC PLAN

I. INTRODUCTION

Our employees have over 40 years of history with EPC projects for the Power Generation industry. As a fast-track with three steps of approval made by the owner or the owner's representative engineering and construction contractor, we have followed stringent quality guidelines throughout its history. The QA/QC Controls in place have been developed and fine tuned over these multiple and varied project experiences. The QA/QC plan that exists today is based upon experience in interpretation and application of codes and standards as well as practical knowledge learned in expeditiously bringing a project to successful completion.

The following sections will provide a detailed description of the Corporate Policy regarding Quality Assurance/Quality Control and a Project Specific Plan for the Quality Assurance/Quality Control management of the Power Project.

II. ORGANIZATION

The Quality Assurance Manager acts as the point-of-contact for any non-conformance reports and initiates corrective action as required. He/she ensures that required inspections, tests, evaluations, reviews, audits and all other quality control measures are performed as necessary to strictly adhere to the corporate-approved Quality Control and Assurance program plan. The Quality Assurance Manager is assisted by a team of inspectors who conduct all manners of inspections and tests required, ensuring that the installed system conforms to the approved drawings and specifications.

An organization chart is furnished which shows the organization of the Quality Control and Assurance Team by position, title and name. All quality control team personnel will be assigned based upon individual and collective expertise as related to the specific areas of quality control necessary to support the contract work effort.

III. PLAN TASKS AND PROCEDURES

A. Construction Design

1. Design Documentation Review - Drawings

Project Engineers are responsible for conceptualizing and engineering the project. To ensure that the design meets all requirements, inspections will be conducted throughout the design process. Prior to issuance of "Issue For Construction" package, all drawings will have the following signatures and dates.



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| | |
|------------------|---|
| Draftsman | Signature and Date in Drawn By Block |
| Checker | Signature and Date in Check Block |
| Project Engineer | Signature and Date in Design Block |
| Project Manager | Signature and Date in Project Manager Block |
| QA Manager | Signature and Date in QA Block |

The Project Engineer responsible for the drawing design will initial his approval on all completed drawings. Fundamental configuration drawings (i.e., PFD, P&ID, Electrical One-lines, and Control Configuration drawings) will undergo peer review. Selection of the peer reviewer will be made jointly by the Senior Engineering Manager and the QA/QC Manager. The Quality Assurance Manager will check the drawing for all necessary signatures and initials and will then sign his name and date. The Drawing Review Sheet will be filed by the Quality Assurance Manager as a permanent project record.

Changes to approved drawings require the same review process. Changed drawings will be issued as revisions and will be labeled as such.

2. Design Documentation Review - Specifications

A specification will be generated for each major piece of equipment to be purchased for this project. The Project Engineer responsible for the generation of each specification will initial the completed specification. Prior to each specification's attachment to a Request for Bid or a Purchase Requisition, this specification will undergo peer review by the Project Manager and the Engineering Manager. The Specification will then be passed to the QA/QC Manager for his review and will become a permanent part of the project record.

3. Drawing Control

A Master Drawing Index of all drawings will be maintained. The index will be updated as drawing changes occur and will reflect the current status of each drawing. Only the latest applicable drawings, specifications, instructions and authorized changes thereto, will be issued for manufacturing, construction, inspection and testing. Reproducible copies or computer disk files of final revision levels of a drawing will be maintained for record.

B. Subcontracted Design

The same approval and quality assurance procedures to which own design work is subjected will also be applied to all design work subcontracted to an outside source. Drawings and other design documents will be reviewed and examined for compliance with both the technical and format requirements of the contract specifications.

C. Material Procurement

Responsibility for procurement of various equipment and supplies will be clearly defined prior to the initiation of any procurement. Purchasing Manager and staff will directly monitor all procurement efforts of major equipment under their immediate control.

Balance of Plant purchasing, i.e., Buildings, Mechanical, Electrical (conduit, fittings and wire), and Area Lighting will be the primary responsibility of the various subcontractors. Some of the project tasks will be purchased as a sub-system or system from different vendors or subcontractors. In order to ensure adherence to the project schedule, will direct scheduling and expediting of materials and equipment purchased by subcontractors.

1. Procurement Procedures

Procurement Procedures are published in the Corporate Project Procedures Manual. The following sections detail Procurement Procedures for this project. We implements these controls for every large project to ensure that the client receives the best value in materials and equipment as well as a quality installation effort.

1.1 Prequalification of Manufacturers / Vendors / Construction Contractors

Select Manufacturers / Vendors / Construction Contractors based on our own Qualified Vendors List (QVL). The stated purpose of the QVL is to ensure the best value and the highest quality in workmanship, materials and equipment for and our clients. Each manufacturer / vendor / contractor listed on the QVL has been evaluated based on past performance using the following criteria:

- Proper documentation of and compliance with inspection/test requirements
- Quality of workmanship
- Efficient handling of Purchase Orders
- Adherence to shipping schedules
- Prompt resolution of non-conforming material problems
- Compliance in manufacture and supply with specifications
- Warranty Work
- Product or Product Lines
- QA/QC audit (if necessary)
- Price

New vendors / contractors with no previous history are evaluated based upon the following:

- Product Lines

- Project Histories for similar projects
- Discussion with former Client Contacts
- Financial Stability
- Staff Qualifications
- Capability to complete the project
- Financial Stability
- QA/QC Audit (Manufacturers / fabricators if necessary)
- Client List

1.2 Material / Equipment / Parts / Services Selection

This section provides an overview of methodology in selecting materials, equipment, parts and services. Expediting procedures are included to ensure that the project schedule is not impacted by shipping delays.

The established twelve main stages in the procurement of materials, equipment, parts and services:

- Preparation of the Specifications for equipment and materials
- Identification of each item and preparation of purchase requisitions
- Issuing the Request for Quotation
- Quotation Review, Negotiations and selection of vendor or contractor
- Preparation and Placement of the Purchase Order
- Scheduling delivery of the Purchase Order
- Expediting the Purchase Order
- Receipt of Materials/Equipment/Parts and Inspection of same
- Inspection of Contracted Services and Approval of Same
- Resolution of any Non Conforming Material problems as well as any Corrective Action Items
- Field Purchase Orders

2. Equipment / Material Specification Preparation

Procurement specifications originate in the Engineering Department. The Engineering Manager will task staff engineers with the generation of specifications. The Engineering Manager and the Project Manager will review the equipment specification for compliance with applicable codes/standards and contract specifications. If Client approval is required, the Project Manager will forward specification to Client, obtain approval signatures, and then return the approved specifications to the Engineering Manager. Equipment and material specification shall be provided to the client or client's representative for revision.

Standard Specifications are divided into two (2) classes, "short form" and "book type." Short form specifications are used whenever good engineering practice and contractual arrangements permit. They are simple and flexible. "Book type" specifications are more formal, more expensive, and may be used on major engineered items of equipment, usually at the request of the Client.

2.1 Purchase Requisitions

Purchase Requisitions will originate with engineering. The Purchase Requisition will be approved by the Project Manager or Engineering Manager prior to submittal to the Purchasing Department. The Requisition will be checked by either the Engineering Manager or the QA/QC Manager for compliance to specifications. The Purchase Requisition will then be forwarded to the Purchasing Manager. The Purchasing Manager will direct that the Request for Quotation (RFQ) be developed and sent to approved suppliers on QVL. The specifications developed by Engineering will be attached to the RFQ.

The vendor or subcontractor shall be given sufficient time to prepare their bid for equipment or services. The time frame for bidder response shall be so stated on the RFQ.

2.2 Quotation Reviews

Each quotation will be reviewed prior to the issue of a Purchase Order. Major Equipment, Material, and Contracted Services purchases will be reviewed by a representative from the applicable engineering discipline and project management.

2.3 Purchase Order

Following evaluation of quotations and completion of negotiations, an award will be made. The Purchasing Manager will generate the Purchase Order. Vendor's bids shall be revised by the owner or owner's representative before purchase.

Purchase Orders include the following:

- Detailed description of products and services
- Required delivery date
- Test and Inspection requirements, if applicable
- Terms of payment
- Shipping information and point of contact
- Required documentation

A Purchase Order Log will be maintained at all times. Purchase Progress Reports will be updated weekly.

2.3.1 Expediting the Purchase Order

Purchasing Manager will delegate an expeditor to track delivery of major equipment and materials for the project. The expeditor will closely monitor the progress in fabricating or gathering of materials from each vendor of equipment and materials which could impact the project schedule.

2.3.2 Closing out of Purchase Orders

Documented receipt of equipment / materials in good order will be forwarded to the Administrative Manager and the Purchasing Manager. Contracted services will be inspected and signed off upon satisfactory completion. At this time, the Administrative Manager will sign these documents and direct the Purchasing Manager to forward same to Accounting for payment. Payment will be by terms agreed to on Purchase Order.

2.3.3 Field Purchase Orders

Field Purchase Orders will require approval from Purchasing Manager. Field Purchase Orders will be documented, and a written Field Purchase Order Log will be maintained. Vendor's bids shall be revised by the owner or owner's representative before purchase.

2.4 Material / Equipment Receiving Inspection

Receiving Inspections will be performed on all major equipment / material for the project. QA/QC project staff will perform the inspection. Methodology is discussed in detail in the project QA/QC Section of this document.

All materials requiring Material Certifications and/or Material Test Reports (MTRs) will be checked for compliance to project specifications. Materials received without the proper certifications will be tagged and segregated until such required documentation is received.

2.4.1 Hazardous Materials Storage

All coating materials, lubricants, flammable solvents, and other items identified by the Project Manager or the Owner as falling under Hazardous Material designation will be segregated from other project materials and equipment. These items will be stored in a secure location. All MSDS sheets will be posted in this area concerning each type Hazardous Material. An inventory will be maintained detailing receipt and issuance of any said material to installation staff and/or subcontractor.

If a subcontractor will directly receive or bring upon jobsite any materials in this category, they will be directed to comply with the established HAZMAT storage materials plan. This plan will be issued as a separate document and will be available at site for all personnel to review.

2.5 Corrective Action / Non-Conforming Equipment / Materials

All equipment / materials which do not reflect compliance to project specifications, shipped without MTRs, damaged in shipment, etc. will be tagged and segregated until such time as vendors resolve the problem. Methodology for these processes is discussed in detail in the QA/QC section of this document.

D. Test Plans

Test plans will be developed for testing each segment of the project both independently and collectively. Test plans will explain the purpose of the tests, define inputs, specify procedures, and acceptance criteria.

1. Measurement and Test Equipment

Measurement and test equipment used for inspection and acceptance testing shall be calibrated at established intervals against certified standards. All subcontractor and vendor test equipment used for vendor acceptance testing in connection with this contract shall meet the same calibration requirements.

2. Documentation

Inspection and testing documentation will be prepared in clear language. Test procedures will define all conditions and materials required for the test, specify test equipment and provide pass/fail criteria.

Reports will be prepared to document the results of each inspection and test performed. The records will identify the test equipment used, the observations made, the deficiencies found and the corrective actions taken.

3. Definition of Test Types

- a. Factory Tests are defined as tests performed at the location where the item is produced, fabricated, manufactured or assembled prior to shipment to the site.
- b. Field Verification Tests or Pre-Operational Tests are tests performed after installation. These tests verify that components and subsystems are installed and perform correctly.
- c. The Operational Systems Test is a comprehensive test of the installed system. The results of this test determine acceptance or rejection of the system.
- d. Performance tests are a series of tests to verify project-mandated performance guarantees.

E. Corrective Action

When problems or deficiencies are discovered in workmanship and/or materials during the inspection process, they will be documented. The inspector will prepare a Corrective Action Request (CAR) detailing the problem and submit it for resolution. The QA Inspector will forward the CAR to the QA Manager and the Project Manager. Corporate



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Project Management will investigate the problem and direct the proper course of action. All Corrective Action Requests shall be maintained for future reference or analysis as may be required.

IV. INSPECTION REQUIREMENTS

A. Responsibilities

Perform the inspections and/or tests required to substantiate that the materials and services conform to requirements. The Client may witness any of the inspections or tests. All errors and/or defects discovered during inspections and/or tests shall be documented.

B. Classification of Test

Test Classifications include factory testing of components and major subsystems, field testing, and on-site final acceptance testing of the complete system. Some of the individual component and subsystem testing may be performed concurrently with the Operational Test. Construction Inspections will be performed during the installation work.

1. Factory Testing

Factory testing will be accomplished as required to ensure compliance with the contract specifications. Prior to shipment from the factory, some components and/or subsystems may be tested to demonstrate their compliance with the specifications. These items shall be identified and noted on the purchase order.

2. Operational System Test (OST)

A test of the entire System in full operational mode will be conducted to verify correct operation of all subsystems and system components. All functional capabilities of the system will be demonstrated. Following completion of the test, we will prepare and submit a test report.

These test procedures will be developed during the project construction phase and will be delivered to the client for approval prior to Operational Testing efforts being undertaken.

C. Test Documentation

The Quality Assurance Manager will ensure that test procedures and test reports are prepared as outlined herein. Test documentation will be issued to the client. Test procedures will be developed for testing components, subsystems and the overall system. Testing shall demonstrate that the system design meets the requirements and that materials and workmanship are as specified. Test results shall be recorded and bound with the test procedures to form a permanent record.

V. PROJECT SPECIFIC INSPECTIONS AND TESTS

The project warrants a wide variety of inspections and tests. The following sections briefly describe the project inspection and test requirements by function and/or discipline.

A. Site Preparation

- Confirmation of site dimensions.
- Confirmation of topographical elevations on completion of final grading. Assumes existing elevation is within two (2) feet of final grading level.
- Confirmation of Water Run Off Control after Final Grading is achieved
- Review of complete soil compaction and associated tests.
- Grain, density, humidity analysis of soil material shall be done before earth moving. Compaction analysis during the backfill shall be done for each compacted layer of 25 to 30 cms thickness.

B. Ground Grid

- Confirm grid installed at correct depth and dimension with correct materials.
- Observe and confirm that junctions, splices, and taps are made with the correct Thermic weld type molds or pressure connectors and tools.
- Observe and confirm that correct wire and size are used with regard to ground rods.
- Perform ground grid resistance test.

C. Concrete Foundations, Walls and Slabs

- Soil study, including at least 3 borings in the centerline of major equipment foundation like the turbine generator shall be done in order the structural engineer may recommend the subsoil improvement of preparation.
- Confirmation of correct locations and dimensions of concrete foundation and wall forms.
- Confirmation of correct size and spacing of rebar in concrete foundations.
- Confirmation of proper anchor bolt sizes and location.
- Verify procurement of correct concrete strength and the selection of appropriate cement for concrete.
- Determine the level of acceptance of allowed slump and temperature for each concrete mixing truck. •
Carry on the required concrete strength test at 7, 14 and 28 days of poured. •
Carry out a conservative procedure of curing the concrete after poured, by adding appropriate additives to avoid concrete superficial cracks, and maintain a permanent wetting of concrete surface.
- Witness the taking of necessary concrete samples for "slump" and "strength tests."

- Obtain qualified testing lab for concrete strength tests.
- Confirm proper correct elevations and slope of all slabs, walls, etc.
- Document above items on concrete pour card.

D. Electrical

- Confirm the receipt of each major item of electrical equipment. Verify specification compliance and inspect for transit damage.
- Confirm that receipt of all equipment and miscellaneous materials - conduits, cabling, etc., adhere to procurement requirements.
- After wiring is pulled and prior to connection, the wire will be Megger tested and all test results will be recorded on a Megger / Hi-Pot Test Record Form. Confirm adequate insulation of cable terminals, to use thermo contractile sleeves for the cable terminations.
- Observe all conduits routing to ensure adequate turning radius for cable pulling.

- Perform detailed point-to-point wiring checks to verify power, control, and instrument wiring.
- Perform pre-operational tests on all electrical equipment and systems.
- Confirm tagging and labeling, verify and document as-built drawings.

E. Structural Steel

- Certificates of origin and of mill batch will be given for all structural steel.
- Confirm correct size and type of structural steel.
- Confirm proper installation of anchor bolts, washers, and nuts installed, as required.
- Verify that qualified welders perform welding in accordance with applicable codes.
- Visually inspect all field welds to confirm they are complete and adequate.
- Verify paint and corrosion protection.

F. Piping and Welding

- Confirm correct size, rating, etc., of each piping system as applicable.
- Verify that qualified welders are utilized. Inspect piping fit up to ensure proper workmanship is utilized.
- Obtain qualified testing lab for welding radiography.
- Set up welding inspection and test procedures in accordance with applicable codes and standards.
- Set up a detailed welding documentation system to address individual pipe code, each weld, x-ray, welder, welding map, date, and inspector review.
- Establish a pipe cleaning procedure.
- Witness hydrostatic testing and test procedures, as required by various codes for each piping system.

G. Instrumentation

- Confirm all instrumentation and control equipment adheres to procurement requirements.
- Confirm instrumentation specification compliance, and inspect for transit damage.
- Observe individual calibration of each instrument, confirming range, accuracy, etc. in accordance with specifications and applicable codes.
- Perform functional loop checks and document same.

H. Documentation

Test and Inspection Documentation will be maintained on site throughout the project construction, commissioning and startup phase. The client will be allowed access to this data at any time.



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Following Completion of Startup and Commissioning, the full battery of project Testing and Inspection Documentation will be delivered to the Client.

VI. SHIPPING AND HANDLING

Procedures for shipping and handling of materials will ensure that all shipments meet the requirements for identification, packing, packaging and data submittal. Contractor will be responsible for packing, shipping, receiving and installing the component parts and subsystems that comprise the complete system. The degree of protection and method of handling will be consistent with the anticipated hazards.

Contractor will ensure that the appropriate shipping and handling procedures will be followed. Should damage occur in transit, it will be repaired or replaced as appropriate.

PART 2 PROJECT SPECIFIC TEST AND INSPECTION PROCEDURES

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PART 2 PROJECT SPECIFIC TEST AND INSPECTION PROCEDURES

I. SCOPE

The following civil, mechanical and electrical test and inspection requirements have been developed for the project.

The civil, mechanical and electrical tasks on this project shall comply with the standards set forth in this document to ensure both the safety and quality of the installation. This document stipulates the inspections and tests that will be performed on the project.

II. STANDARDS AND CODES

The following organization's standards and codes are applicable to design and construction practices for the project.

| | |
|-------------------|---|
| ANSI B31.3 | Plant Piping |
| ASME IX | Welder Qualifications |
| AWS A3/0 | Definitions of Welding Terminology |
| AWS B2.1-84 | Standard for Welding Procedure and Performance Qualification |
| AWS D1.1 | AWS Code for Structural Welding |
| AISC | American Institute of Steel Construction – Various sections |
| ASTM | American Society for Testing Materials – Various Sections |
| ASME | American Society for Mechanical Engineers – Various Sections |
| ISA S5.1 | Instrumentation Symbols and Identification |
| NACE RP018890 | Standard Recommended Practice: Discontinuity (Holiday) Testing of Protective Coatings |
| NEMA AB1 | Molded Case Circuit Breakers |
| NEMA ICS1 | General Standards for Industrial Control and Systems |
| NEMA ICS2 | Industrial Control Devices, Control and Systems |
| NEMA ICS4 | Terminal Blocks for Industrial Use |
| NEMA ICS6 | Enclosures for Industrial Controls and Systems |
| MG1 | Motors and Generators |
| PE5 | Constant-Potential-Type Electric Utility (Semi-Conductor Static Converter) Battery Chargers |
| SG2 | High Voltage Fuses |
| WC2 | Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy |
| NFPA70 | National Electric Code |
| NFPA No. 1 | Carbon Dioxide Extinguishing Systems |
| NFPA No. 37 | Stationary Combustion Engines and Gas Turbines |
| OSHA CFR Title 29 | Occupational Safety and Health Administration |
| API 650 | Tanks |
| IEEE Std. 665 | Station Grounding |

(Note: Codes and Standards may also include Codes and Standards issued by other organizations as directed by Owner.)



Electricidad de Caracas LaRaisa Power Plant Phase II Technical Scope Document

III. TESTS / INSPECTIONS - CIVIL

Inspections will be undertaken throughout the civil portion of the project. The site dimensions will be confirmed. Topographical elevations will be confirmed following grading. All concrete slab and wall dimensions will be confirmed prior to concrete pouring. All concrete will be confirmed to be compliant with design specifications. A qualified third party inspection agency will be retained to conduct slump tests prior to and during concrete pours. All concrete will be strength-tested intervals per ASTM standards. Grouting of mechanical equipment skids will be performed per the developed specifications.

IV. TESTS / INSPECTIONS - GROUND GRID

The ground grid will be inspected throughout installation to ensure that materials used are per design specifications and that installation splices, junctions, and taps are made properly. Depth and dimensional boundaries will be measured and recorded. At the conclusion of installation, the grounding grid will be tested using a test instrument specifically for the task to confirm acceptable impedance levels.

V. TESTS / INSPECTIONS - MECHANICAL

Several elements of the project will require welding during fabrication and installation. These elements include:

- Structural Steel
- Fuel System - Natural Gas Fuel System Piping
- Process Water Systems
 - Demin tank
 - Raw Water System Storage Tank and Piping
 - Waste Water System Piping
 - Firewater System Piping (HDPE piping Thermal Welding Inspections)
- Oily Waste System
- Lube Oil System

The welding inspection criteria for each of these tasks will be based upon the applicable codes and standards. The following paragraphs briefly describe each task and stipulate the specific code and/or standard(s) that apply.

A. Structural Steel

The structural steel aspects of the project will consist of the building related structural steel and various supports of racks. Design and erection of these assemblies shall be in accordance with the latest edition of the AISC. All welding will be visually inspected per AWS applicable codes and standards.

B. Welding Inspections/Tests

All welders are required to have current certification of their qualifications. Current certifications should indicate the welder has been tested to the project welding procedures within one year prior to welding on project piping.

All visual-welding inspections will be performed by persons who have current certification from AWS or ASNT-TC-1A. All NDE will be performed and approved by persons holding current ASNT-TC-1A Level II certification for the specific test processes implemented. All visual welding inspections will be performed based on the criteria established in ANSI B31.1 and AWS D1.1.

Radiographic Testing (RT) where necessary will be performed in accordance with standards established by ASME Boiler and Pressure Vessel Code, Article 2, Section V, except as stipulated in the applicable code, ANSI B31.3 (Pipe welding inside Plant Battery Limits).

All radiographs of full penetration welds must be accepted by a certified Level II inspector with current certification under ASNT-TC-1A. Accept/Reject criteria for all welds shall be in accordance with criteria established as well as applicable codes. Any rejections will require two (2) weld penalty shots on that welder. If in the judgment of the Site QA/QC Manager that a welder or welders have excessive rejections; may demand the welder be removed from the project or certified to weld on only non critical piping.

C. Natural Gas Piping

Piping from the supply source to the Fuel Filter/Separators will be Carbon Steel. The piping on the downstream side of the filter/separators to the will change to Stainless Steel piping. All Natural Gas piping will be designed and constructed to ANSI B31.3.

A total of 100% of the pipeline welds (100% of each weld) will be subjected to Radiographic Testing (RT).

All radiographs of full penetration welds must be approved and accepted per criteria established in Section B above.

D. Lube Oil System

The Lube Oil system consists of a skid and interconnecting stainless steel piping to the Gas Turbine Package. All interconnecting pipe welds shall be in accordance with ANSI B31.3. All Lube Oil system welds will undergo visual inspection or testing in accordance with ANSI B31.3. Ten percent (10%) of these welds will undergo RT testing (100% of the weld)

E. Hydraulic System

The Hydraulic System consists of a skid and interconnecting stainless steel piping to the Gas Turbine Package. All interconnecting pipe welds shall be in accordance with ANSI B31.3. All Hydraulic system welds will undergo visual inspection or testing in accordance with ANSI B31.3. Ten percent (10%) of these welds will undergo RT testing (100% of the weld)

All radiographs of full penetration welds must be approved and accepted per criteria established in Section B above.

F. Raw Water System

The Raw Water System consists of Carbon Steel Piping.

Raw Water System piping welds will be visually inspected.

G. Process Water Systems

All welded steel piping will be visually inspected as welds are completed. All PVC piping joints will be inspected as they are made up. The Process water systems will be inspected prior to startup. All pumps will be balanced. Remaining components will be inspected and confirmed that they are supplied and installed per specifications.

H. Pump Testing

All pumps supplied will be balanced and confirmed as fully operational prior to startup.

VI. WELDER QUALIFICATIONS

Welders qualified according to the appropriate codes shall make all welds on the project:

- Structural Steel

- | | |
|-----------------------------------|---------------|
| • Fuel System Piping | AWS CODE D1.1 |
| • Lube Oil System Piping | ANSI B31.3 |
| • Hydraulic Startup System Piping | ANSI B31.3 |
| • Tanks | API 650 |

All welders will be required to provide certification of their qualification to the appropriate standard. Each welder's certified qualifications will be reviewed and approved by the welding

inspector prior to the welder's beginning work on the project. Applicable welding procedure specifications (WPS) and Procedure Qualification Reports (PQRs) will be required. All reports and certifications will be in accordance with ASME Section IX Article II.

VII. AREA DESIGNATION

Areas where combustible fluids, gases or vapors might be present shall be classified as hazardous areas or hot areas. Guidelines for welding in these areas will be drawn from ANSI Z49.1. Areas designated as safe areas will be those areas on site remote from hazardous areas and where no contact with combustible fluids, gases and vapors are present. Welding in these safe areas, as well as on-site welding fabrication, will be subject to the same standards and codes listed in the previous paragraphs. The welding inspector shall designate an area classification for the project.

IX. SUB-SYSTEMS MECHANICAL TESTS

The test requirements for the various tasks on the project are defined in the following paragraphs. Tests are defined in this case to be "system" centered, i.e., hydrostatic tests, vacuum tests, etc., versus inspections which are "component" centered. All tests shall be performed in the presence of a QA/QC inspector or his designate. All tests shall be documented with a written test report. The test report shall include a description of the test, the item or items tested, the procedure used, the date and time of the test and the test results. All test documentation shall be signed by the inspector.

A. Fuel System Tests

All fuel system piping shall be subjected to hydrostatic leak testing to 1.5 times the design pressure. Non-pipe components of the system shall be isolated from the test. The hydrostatic leak test pressure shall be held for a minimum of 1 Hour and then reduced in accordance with ANSI B31.3 to conduct examination for leakage. Pneumatic tests on the PE or RTR may be substituted at 1.2 times design pressure.

B. Lube Oil System Tests

All Lube Oil System piping shall be subjected to hydrostatic leak testing to 1.5 times the design pressure. Non-pipe components of the system shall be isolated from the test. The hydrostatic leak test pressure shall be held for a minimum of 1 Hour and then reduced in accordance with ANSI B31.3.

C. Hydraulic Starter System Tests

All Hydraulic Starter System piping will be subjected to hydrostatic leak testing to 1.5 times the design pressure. Non-Pipe components of the system shall be isolated from the test. The hydrostatic leak test pressure shall be held for a minimum of 1 Hour and then reduced in accordance with ANSI B31.3.

D. Process Water System Tests

All metallic process water system piping will be leak service tested prior to commissioning. The piping systems under test will be brought up to Normal Operating Pressure and this pressure will be held for 10 minutes or as long as it takes to check each joint or fitting on the line under test. Test shall be conducted in accordance with ANSI B31.3 to conduct examination for leakage. Piping Systems which will be tested in this manner are the following:

- Cooling Water Systems (New Piping)
- Oily Water Piping

E. Instrument Air System Leak Tests

Instrument air piping systems will be subjected to a Pneumatic leak test following installation. Pressures will be raised to Normal Operating Pressures levels for each system and held for a minimum of 10 minutes.

X. SPECIFIC TESTS – ELECTRICAL

A. Ground Grid Integrity Test

The new installed grounding cables/rods will be attached to the existing system. Installed Ground Grid will be tested using a suitable multimeter to measure integrity prior to startup. Continuity and resistance will be confirmed for the new installed cables/rods. The readings will be recorded for record.

B. Cable Insulation Testing - Megger

All 600 Volt and above wire and cable to be used on this project will undergo an insulation test or tests to ensure cable is suitable for intended usage and has structural integrity for installation. All low voltage cables, below 600 volts, will be tested for continuity prior to being energized.

All medium and high voltage cable and wire will undergo Megger testing. Cables will be tested to levels established not to exceed the rated voltage of the cables. Megger testing will be performed with a calibrated test instrument certified to national standards.

The results will be recorded and maintained for record. A cable failing a Megger test will be tagged, segregated and removed from the job site.

C. Cable Insulation Testing - Hi Potential Test

Medium and high voltage cables will undergo Hi-Potential testing to detect any insulation breakdown in these cables.

Testing will be accomplished with a calibrated instrument certified to national standards. Results will be recorded and maintained for record. A cable failing a Hi-Pot test will be tagged, segregated and removed from the job site.

D. Cable and Conduit Installation - Inspections

All cable, conduit and associated fittings will be checked to ensure compliance to specifications developed for this project. Conduit, fittings and cable installation will be monitored during construction to ensure compliance to NEC codes.

E. Point to Point Testing

All installed cables shall be point-to-point tested prior to being energized. The point-to-point test shall confirm cables are installed as designed and phased properly.

F. Switchgear, Motor Control Centers, Breakers, and other Electrical Components, Instrumentation

All switchgear, motor control centers, breakers and other electrical components, will be inspected and tested prior to and following installation. Specific test procedures will be developed for each major piece of equipment to be installed. Electrical components will be inspected prior to installation and, in most cases, will be tested as part of a larger sub-system. Instrumentation will be inspected prior to installation and calibrated following installation. Instrumentation will be tested as part of a larger sub-system.

XI. FACTORY ACCEPTANCE TESTS / INSPECTIONS

The Client has the right to request the contractor an inspection of the equipment and witness all factory tests prior to shipment to the Project site if schedule allows. Tests will be undertaken at the manufacturer or fabricator's facility prior to being shipped to site.

XII. STARTUP TESTING AND COMMISSIONING

Startup testing and commissioning will involve integration of all sub-systems into a complete system-wide test of operation. Testing will involve operation of all sub-systems listed below:

- Process Water Systems – Raw Water Supply System and Firewater System
- Fuel Gas Delivery System
- Gas Turbine Startup
- Gas Turbine Electrical Transmission
- Breaker Operation
- Protective Relays, Breaker Testing

XIII. REPORTS

A copy of all inspection and test reports shall be maintained in a file at the project site. These reports shall be made available for review and reference as may be required throughout the project. The original copies of all inspection and test reports shall be forwarded periodically to the Quality Assurance Manager for review and safekeeping. Quality related problems that cannot be readily corrected at the project site will be immediately referred to the Quality Assurance Manager for resolution.

Section 10.0 Exceptions and Clarifications

For clarification of the project the following exceptions and assumptions are stated:

10.1 The Scope of Supply of this document does not include the following outlined items:

- Real estate property on which the Power Project is to be sited.
- Local, state, and/or government taxes associated with the Owner's corporations.
- Local, state, and/or government taxes associated with the Contractor furnished equipment.
- Any site environmental cleanup or modifications to site. Contractor shall clean the area after construction.
- Environmental permits. (Note: Contractor will assist in obtaining all permits where applicable.)
- Local county or state construction permit. (Contractor will assist in obtaining.)
- Fuel gas for blow down, flushing, commissioning, start-up, and operation.
- Supply of Owner furnished items as outlined in Section 2.0 of this Proposal.
- Operating spares. (Contractor will submit a list of recommended spare parts for two years of operation)
- Engineering, Design or Construction per specifications and requirements different than those submitted and verbally agreed to for the 2 x LM6000 GTG's on this same site.
- Scope of Work including the GSU 230KV connection to Owner's 230KV substation.

10.2 This proposal is also based on the following assumptions:

- Owner to supply to Contractor or receive the items outlined in Section 3.0
- Owner will provide all authority required to make the proposed utility interconnects.
- Owner will provide complete site for use as described in the TSD and associated drawings.
- Contractor to furnish and install "first fill" lubricants and chemicals for the plant.

- Contractor will provide soil borings to be utilized for site design.
- Owner to provide site survey as necessary
- Owner to provide custody transfer fuel metering and interconnect point at sit boundary as shown on drawings.
- Owner to provide fuel for plant commissioning and start-up.
- Owner to provide rights-of-way for roadways, entrances, pipeline, and transmission line to the Power Project.
- Performance guarantees, administration of warranty conditions will be discussed and agreed upon and inserted into the appropriate sections of this document at contract signing.
- Contractor will transfer software licenses to the Owner at the completion of the project. This will include the license documentation passwords and keys. It will be the responsibility of the owner to maintain these licensing articles for the time when the software needs to be reinstalled.
- The Contractor supplied DCS shall allow for system expansion through the addition of controllers, operator stations in the control panels, process I/O systems and / or process controllers while the equipment associated with the controller/computer are in manual mode. Modifications can be preformed while the Power Plant is operational and the equipment in question is in manual mode. Proper safety precautions must be adhered to. "Tag out" procedures may be required.
- Operator stations in the control room can be expanded while in remote mode and the Power Plant is operational.
- Various vendor supplied PLCs for the major equipment will use either function block or ladder logic programming. The Balance of Plant PLC will use ladder logic programming. The Gas Turbines will utilize a GE designed control system.
- Owner accepts the use of Contractors proposed Codes, Standards and Specifications for this project.

10.3 Contractor's Key Issues in Owner's Specifications Referenced include:

- **Natural gas tightly limited relief to atmosphere (Because of No odorizing) – *joint discussions are required to resolve.***

- COVENIN Specifications and it applies in any other nation, based upon the most demanding. – *This is a fast track project and it is not realistic to expect non-standard specifications.* Specific cases will be studied by the owner or owner's representative, and any deviation from this standards will be made after EDC's approval.
 - COVENIN 1294 Hydrants
 - COVENIN 200 "National Electric Code"
 - COVENIN 758 "Manual Alarm Stations"
 - COVENIN 823 "instructive guide on detection systems, alarm and fire fighting"
 - COVENIN 1041 Central Board of detection and fire alarm"
 - COVENIN 1176 "detectors. General"
 - COVENIN 1329 fire protection systems. Symbols"
 - COVENIN 1377 "automatic fire detection. Components"
 - COVENIN 1382 "hot spot detector"
 - COVENIN 1420 "optical smoke detector (photoelectric)"
 - COVENIN 1443 "ionization smoke detectors"
 - Codes, Standards, and publications
 - Venezuela Commission for Industrial Standards (COVENIN)
- Basic Engineering
 - Logic and functional diagrams
 - Drawings of architectural details – *Not included in our standard "fast track" project.*
 - Plans for details of security systems, fire detection
 - Currently operating philosophy of the plant is simple cycle
 - Plan workshop
 - EDC reserves right to approve development of all basic and detailed engineering, and acquisition of all the teams that make up this range, including any other equipment that may compromise the efficiency and reliability of the plant. - *Design uses available "off the shelf" equipment to meet schedule*
- Design shall be made according to EDC's internal standards, including those of design and operation
- Operations rules – *We do not know what this means*
- Standards of Materials – *Design basis is USA and World Standards*
- Other Rules – *Needs defined*

10.4 Additional Scope

The following Spreadsheet defines the Additional Scope which has been requested by Owner and agreed to by Contractor.

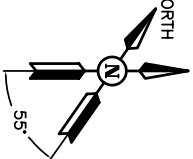
Section 11.0 Drawings

Please find on the following pages the following preliminary project drawings.

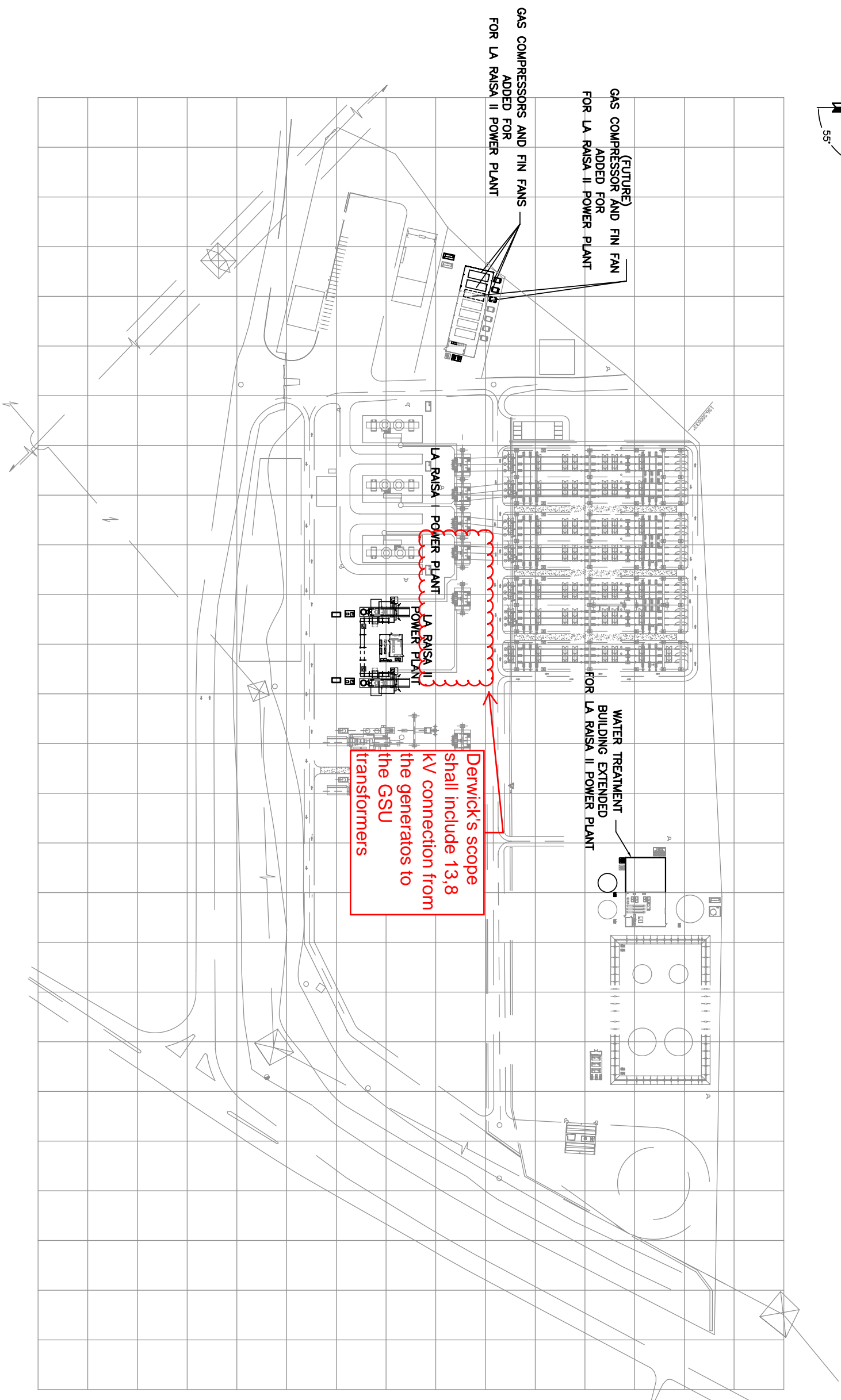
| | |
|--|-------------|
| Overview General Arrangement Plot Plan | 10-001 Sh 1 |
| General Arrangement Plot Plan | 10-002 Sh 1 |
| General Arrangement Plot Plan | 10-002 Sh 2 |
| General Arrangement Plot Plan | 10-002 Sh 3 |
| Process Flow Diagram | 50-001 Sh 1 |
| Process Flow Diagram | 50-001 Sh 2 |
| One Line Diagram | 60-001 Sh 1 |
| One Line Diagram | 60-001 Sh 3 |
| One Line Diagram | 60-002 Sh 1 |
| One Line Diagram | 60-003 Sh 1 |
| One Line Diagram | 60-004 Sh 1 |
| One Line Diagram | 60-005 Sh 1 |

PLANT NORTH

EARTH NORTH

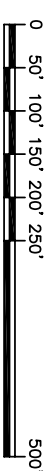


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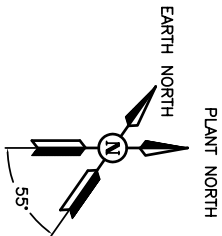
Derwick's scope shall include 13,8 kV connection from the generators to the GSU transformers

- THE GRID IS A 100' SQUARE.
- SEE LA RAISA I POWER PLANT DWG. NO. T9018-10-001 SH 1 FOR DETAILS.



GRAPHIC SCALE

| CUSTOMER INFORMATION | | REVISED | |
|---|--|--|--|
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| DESCRIPTION REVISIONS | | CHECKED DESIGN PROJ ENGR PROJ MGR QA MGR | |
| SCALE 1"=100' | | SIZE D | |
| www.proenergyservices.com | | LA RAISA | |
| 907 SOUTH DETROIT AVE SUITE TWO TULSA, OKLAHOMA 74120 FAX www.proenergyservices.com | | OVERVIEW GENERAL ARRANGEMENT PLOT PLAN TWO (2) LM-6000 GAS TURBINE UNITS LA RAISA II POWER PLANT | |
| JOB NO. 190356 | | DWG NO. 9036-10-001 | |
| REV A | | SH NO. 1 | |
| VENEZUELA | | R | |



It is not accordance
to Derwick drawing
0923-10-001 hoja
1 Rev 0

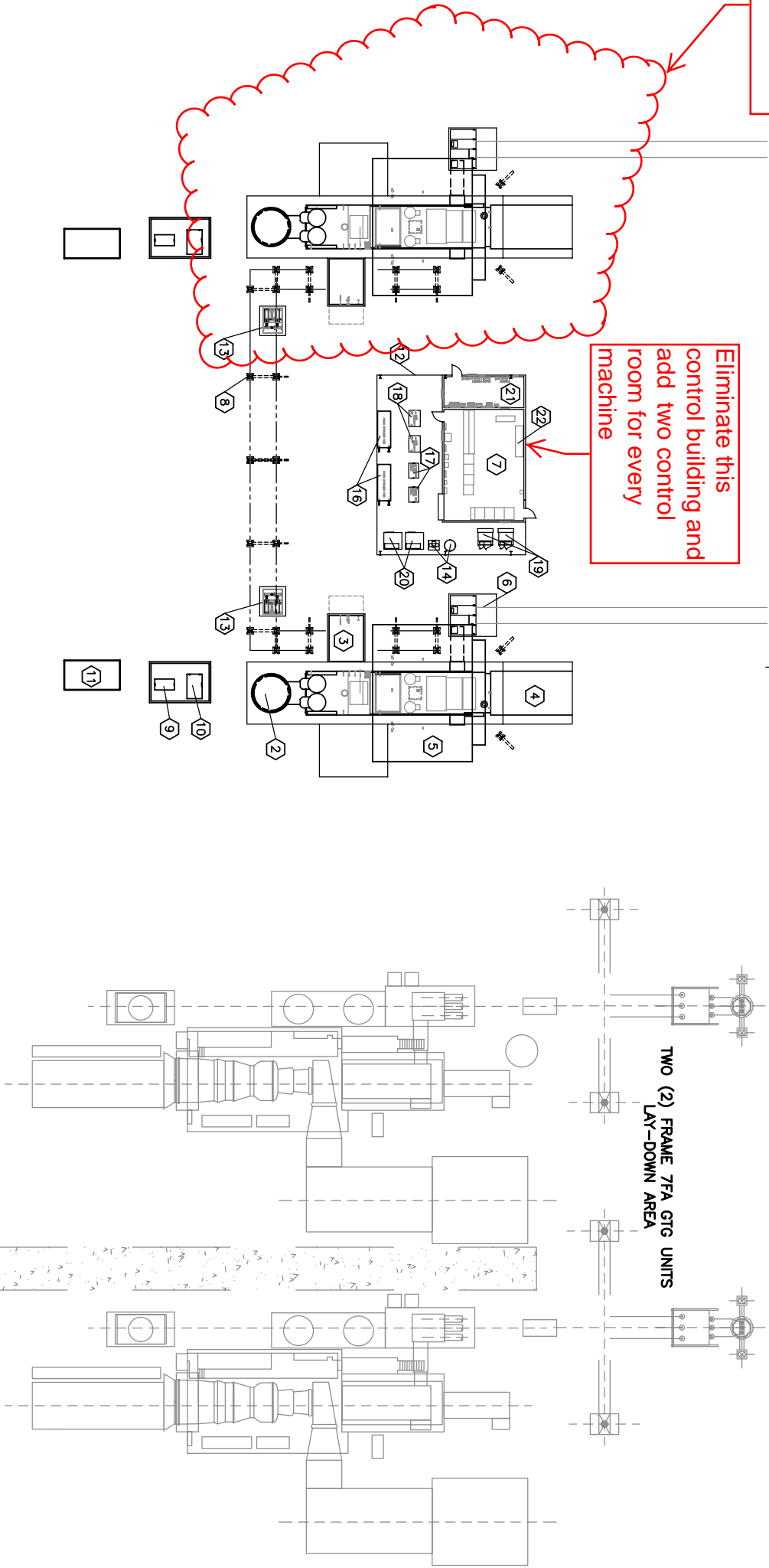
Eliminate this
control building and
add two control
room for every
machine

TO OWNER'S SUBSTATION

Please update according to plot plan
TER-01-0102-PLA-C-0072 REV 1

It does not apply

- LEGEND:**
- 1 LM-6000 GAS TURBINE.
 - 2 EXHAUST STACK.
 - 3 AUXILIARY SKID.
 - 4 GENERATOR REMOVAL AREA.
 - 5 TURBINE REMOVAL AREA.
 - 6 15 KV SWITCHGEAR.
 - 7 MCC AREA (TURBINE).
 - 8 PIPE RACK.
 - 9 ~~LIQUID FUEL FILTER~~
 - 10 ~~LIQUID FUEL BOOSTER SKID~~
 - 11 FUEL GAS FILTER SKID.
 - 12 PUMP SHED.
 - 13 LUBE OIL FIN FAN COOLER.
 - 14 AIR DRYER AND RECEIVER TANK.
 - 15 CONTROL AND AUXILIARY BUILDING.
 - 16 WATER INJECTION SKID (2 REQUIRED).
 - 17 SPRINT SKID (2 REQUIRED).
 - 18 DEMIN FILTER SKID (2 REQUIRED).
 - 19 AUXILIARY TRANSFORMER (480 V).
 - 20 AIR COMPRESSOR.
 - 21 BATTERY ROOM.
 - 22 TOP AREA (TURBINE).



- SEE DRAWING NUMBERS 10-002 SH 2
FOR GAS COMPRESSORS ADDED, AND
10-002 SH 3 FOR WATER TREATMENT
BUILDING EXTENDED.



GRAPHIC SCALE

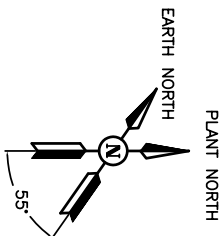
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| | | | | | | | | | | GENERAL ARRANGEMENT PLOT PLAN | | | |
| | | | | | | | | | | TWO (2) LM-6000 GAS TURBINE UNITS | | | |
| | | | | | | | | | | LA RAISA II POWER PLANT | | | |
| | | | | | | | | | | LA RAISA II | | | |
| | | | | | | | | | | VENUEZA | | | |
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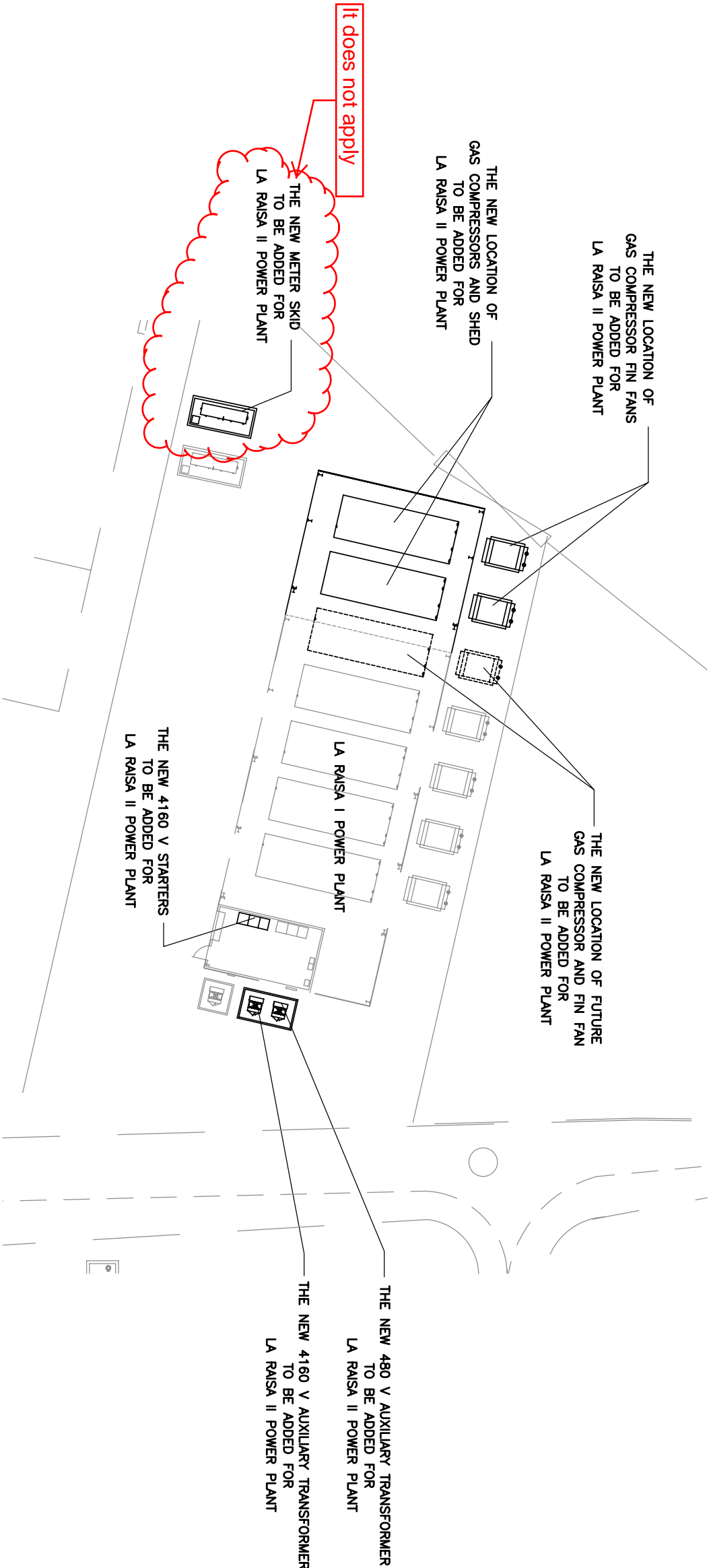
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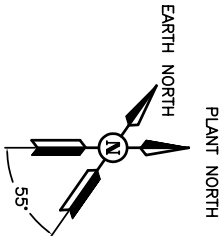


- SEE DRAWING NUMBER 10-001 SH 1
FOR OVERVIEW GENERAL ARRANGEMENT
PLOT PLAN.

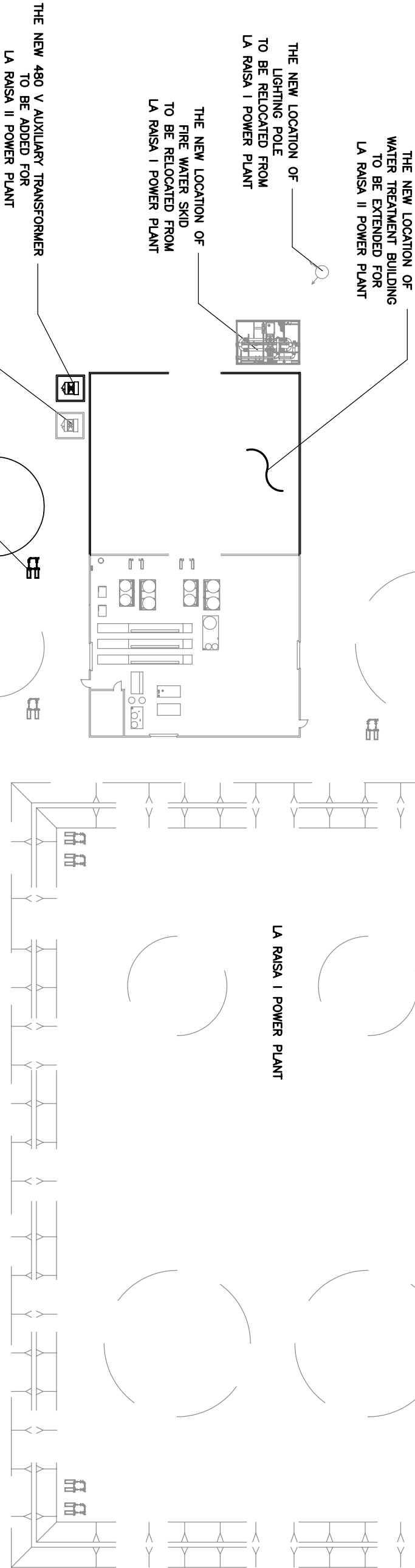


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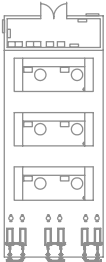
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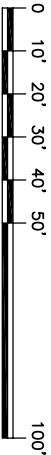
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Add equipment
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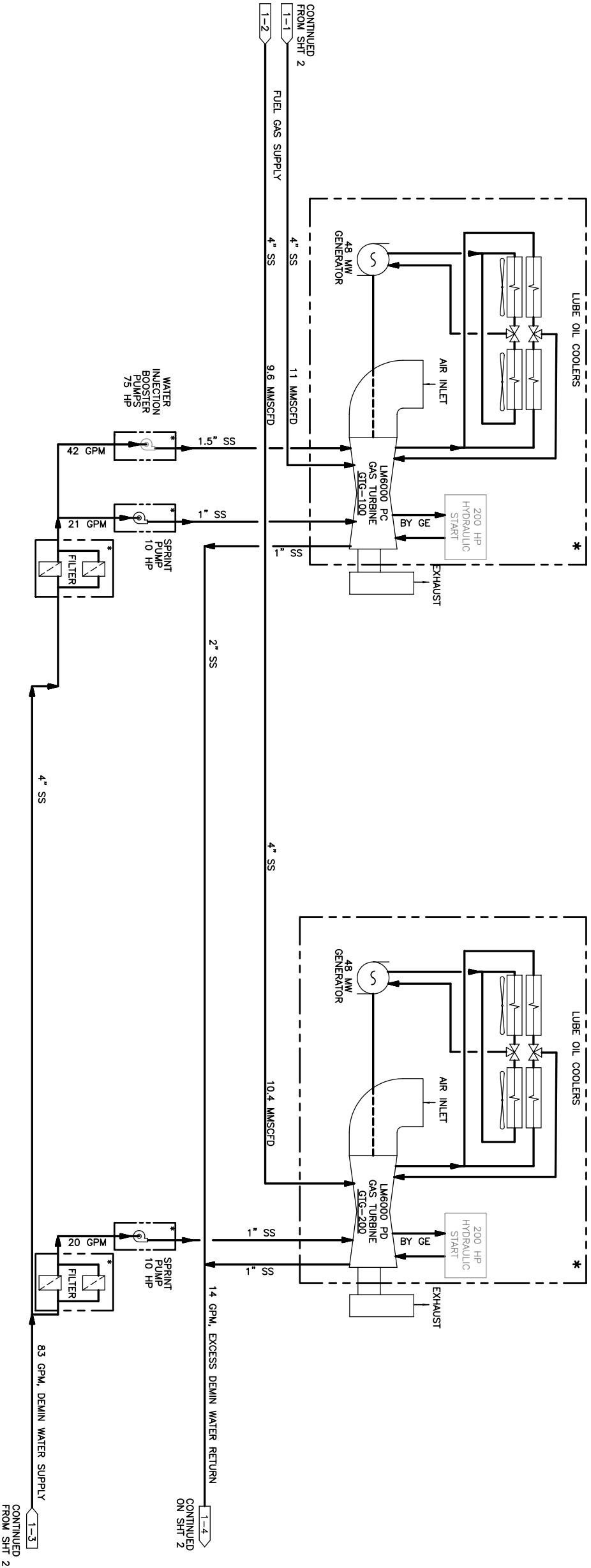


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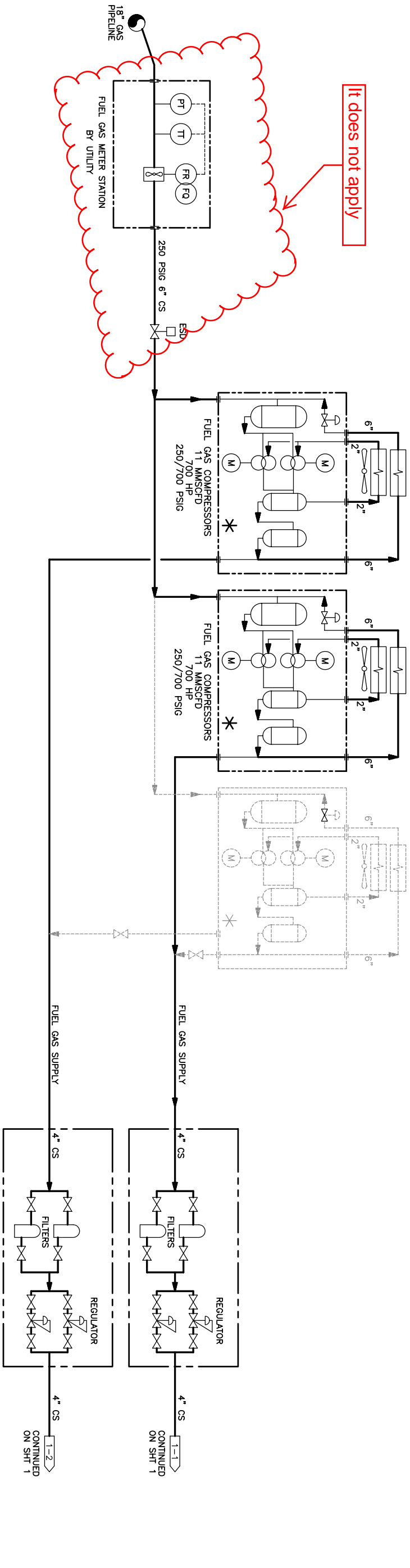


GRAPHIC SCALE

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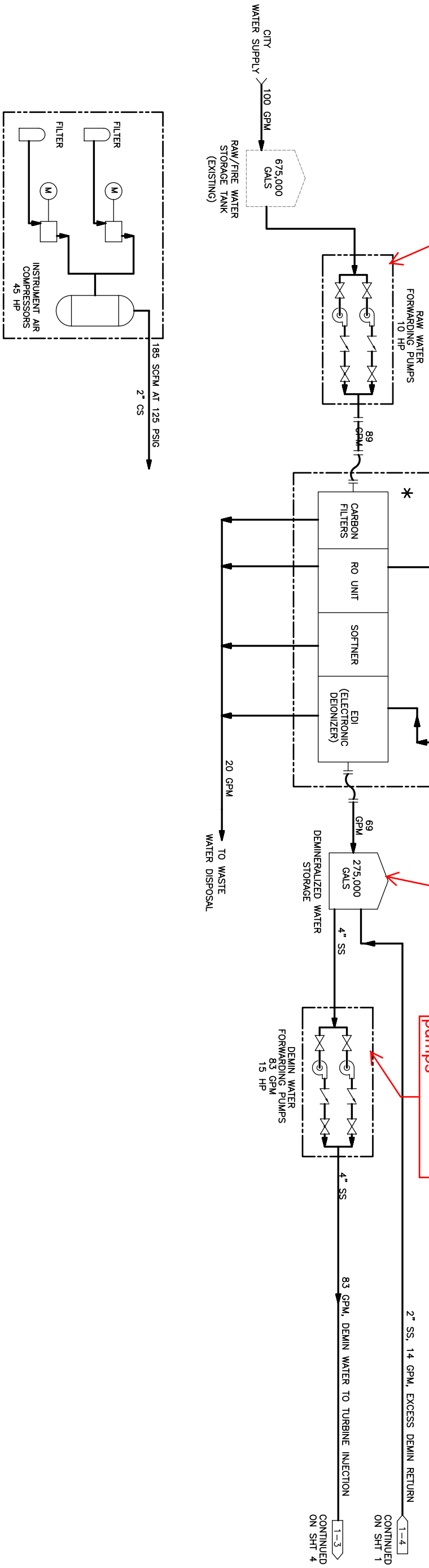


It does not apply

Add 3x500% raw water pumps

Add new tank

Change to 3x500% pumps



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LA RAISA II POWER PLANT

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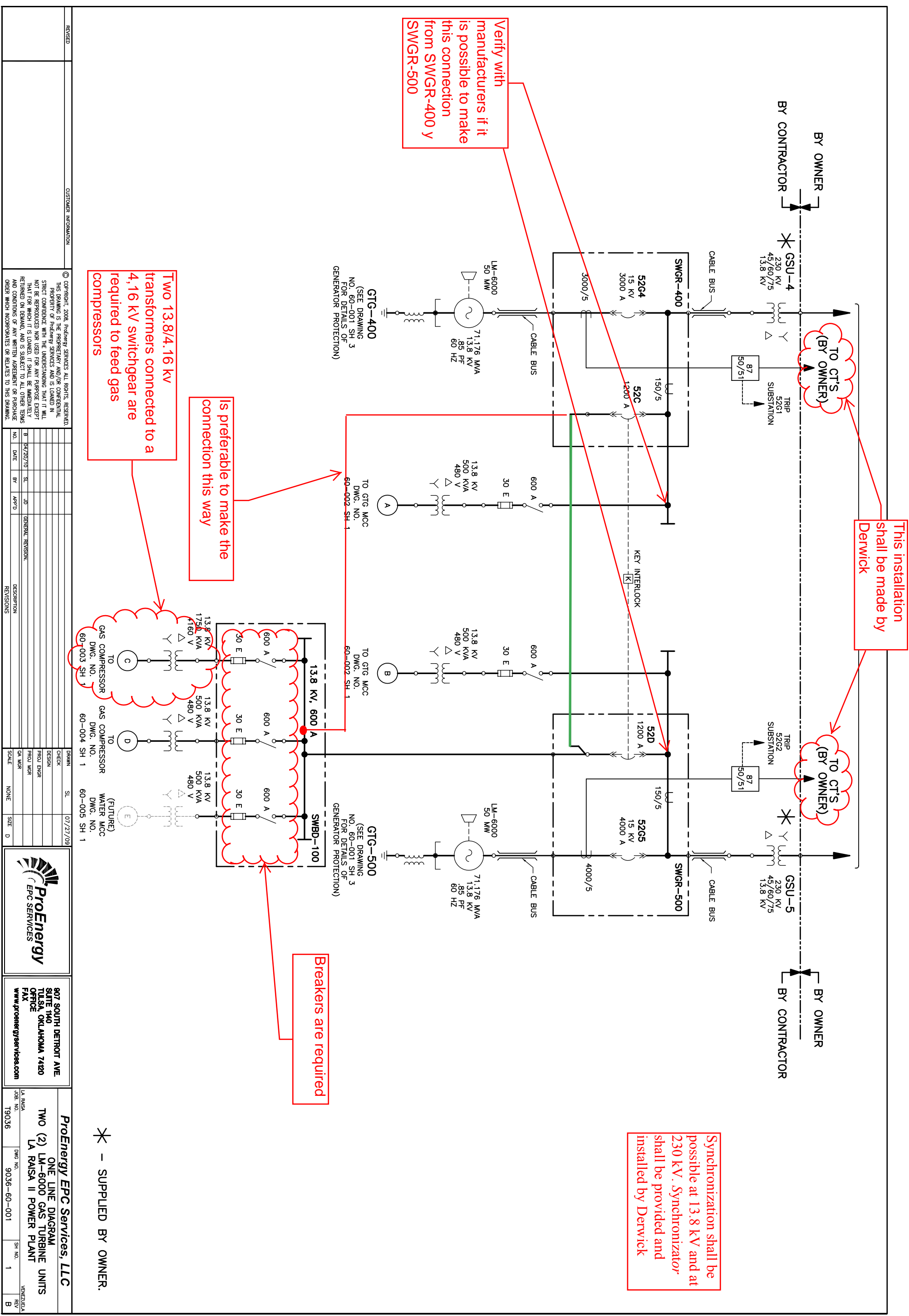
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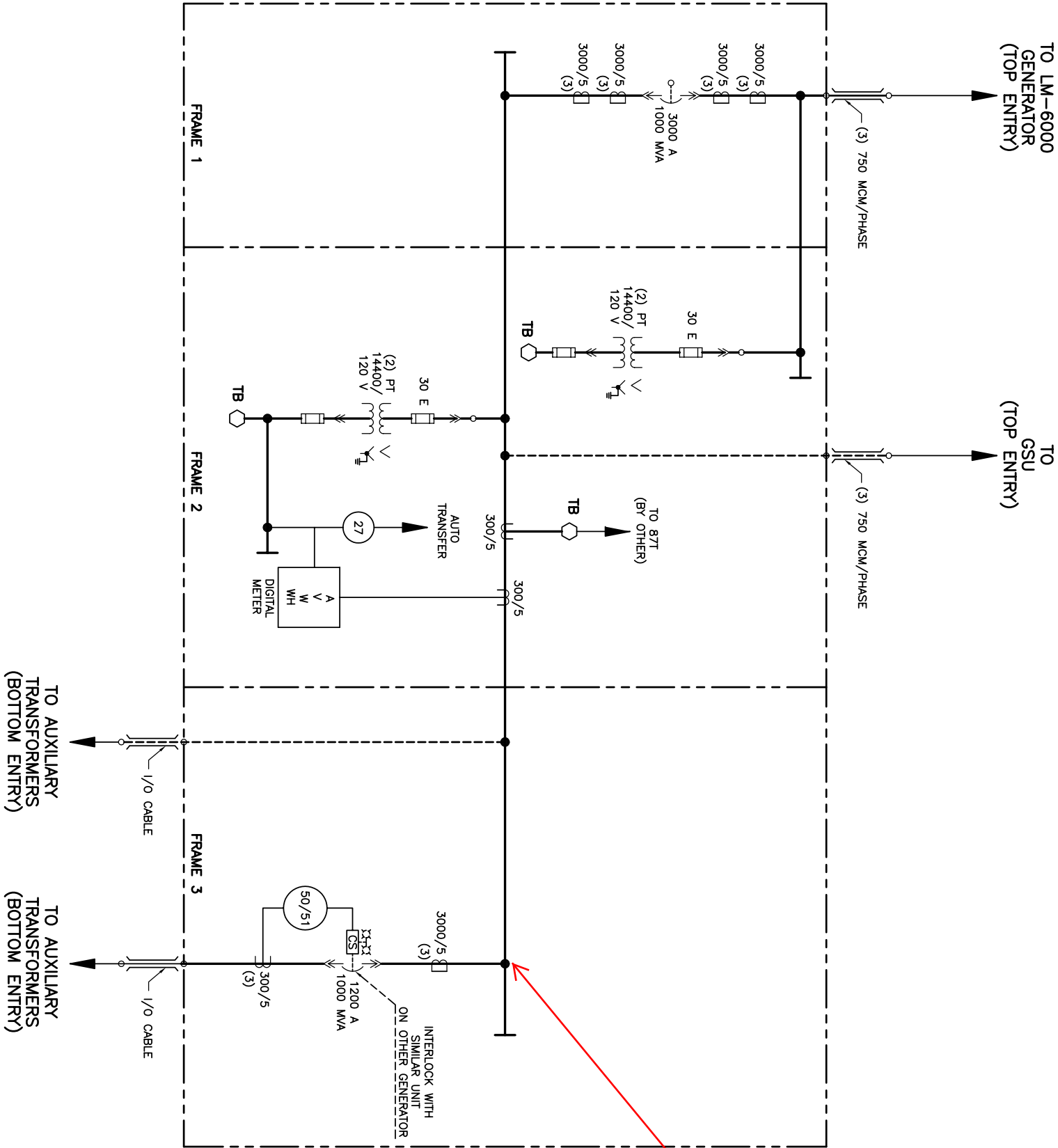
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Verify with manufacturers if it is possible to make this connection from SWGR-400 y SWGR-500

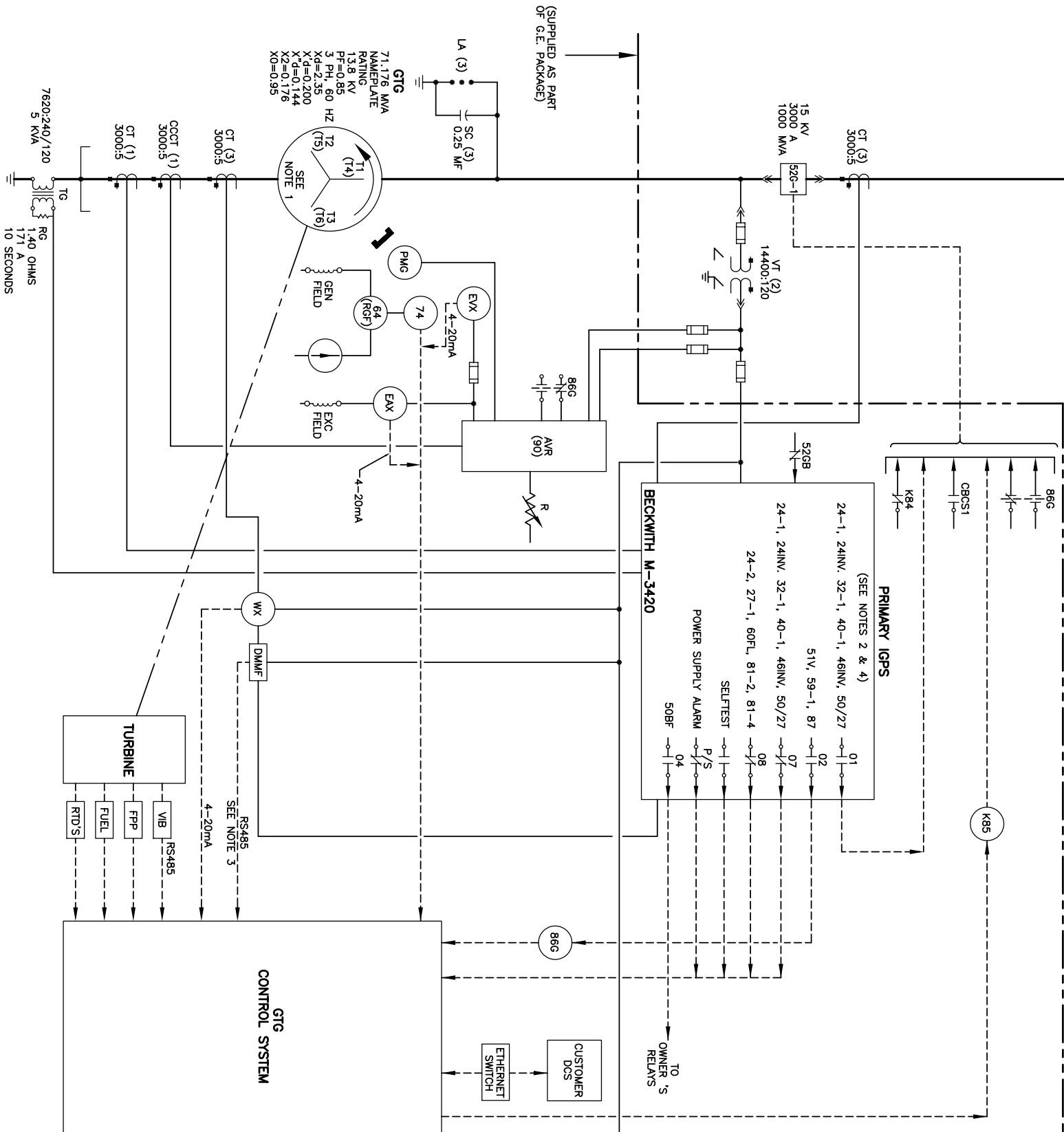


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TO GSU VIA SW1
(SEE DWG NO. 60-001 SH 1)

15 KV, 3000 A, SWITCHGEAR BUS



TYPICAL

Synchronization shall be possible at 13.8 kV and at 230 kV. Synchronizator shall be provided and installed by Derwick

LEGEND:

- AIR-AUTO VOLTAGE REGULATOR
- BFX-TRANSUDUCER, BUS FREQUENCY (RUNNING)
- BYX-TRANSUDUCER, BUS VOLTAGE (1=INCOMING, 2=RUNNING)
- CBOS1-SWITCH, CIRCUIT BREAKER CONTROL "52G"
- CCCT-TRANSFORMER, CROSS CURRENT COMPENSATION
- CT-TRANSFORMER, CURRENT
- DCS-DISTRIBUTED CONTROL SYSTEM
- DGP-DIGITAL GENERATOR PROTECTION SYSTEM
- DSM(15/25)-SYNCHRONIZER, AUTO SPEED-VOLTAGE WATCHING
- EAX-TRANSUDUCER, EXCITER FIELD CURRENT
- EXC-EXCITER
- FPP-PANEL, FIRE PROTECTION
- FUEL-CONTROL, FUEL
- GTX-GAS TURBINE GENERATOR
- GUX-TRANSUDUCER GEN VOLTAGE
- K75-RELAY, GTG BUS SYNCHRONIZER ENABLE (52-1)
- K84-RELAY, CIRCUIT BREAKER CLOSE (52G)
- K85-RELAY, CIRCUIT BREAKER TRIP (52G)
- K95/96-RELAY, DEAD BUS A (SWITCHGEAR BUS A)
- K114-RELAY, DSM GEN SENSE ENABLE
- LA-ARRESTOR, LIGHTNING
- PMG-GENERATOR PERMANENT MAGNET
- R-RESISTOR
- RELAY 1-OWNERS LINE RELAY CABINET
- RG-RESISTOR, GROUNDING
- RID-DETECTOR, RESISTANCE TEMPERATURE
- SC-CAPACITOR, SURGE
- SL#-LAMPS, SYNCHRONIZING
- SRP-SENSOR, REAL POWER
- SY-METER, SYNCHROSCOPE
- TG-TRANSFORMER, GROUNDING
- VIB-MONITOR, VIBRATION
- V1-TRANSFORMER, VOLTAGE
- WX-TRANSUDUCER, WATT
- 24-RELAY, OVER EXCITATION, GENERATOR VOLTS/HERTZ
- 24INV-VOLTS/HZ INVERSE TIME RELAY
- 25A-B-RELAY, SYNC-CHECK
- 27-RELAY, UNDERVOLTAGE
- 32-RELAY, DIRECTIONAL POWER (ANTI-MOTORING)
- 40-RELAY, FIELD (EXCITATION LOSS)
- 46-RELAY, CURRENT UNBALANCE
- 50/27-OVER CURRENT UNDER VOLTAGE
- 51V-RELAY, TIME OVERCURRENT, VOLTAGE RESTRAINED
- 52G-AC CIRCUIT BREAKER, GENERATOR
- 58F-BREAKER FAIL RELAY
- 59-RELAY, OVERVOLTAGE
- 59N-NEUTRAL OVER VOLTAGE RELAY
- 60FL-VT FUSE LOSS DETECTION
- 64(RG)-RELAY, GROUND FAULT
- 64G-RELAY STATOR GROUNDING
- 74-RELAY ALARM
- 78-OUT OF STEP RELAY
- 810/U-RELAY, OVER/UNDER FREQUENCY
- 86G-RELAY, LOOKOUT (SHOWN RESET), GENERATOR
- 87-DIFFERENTIAL RELAY

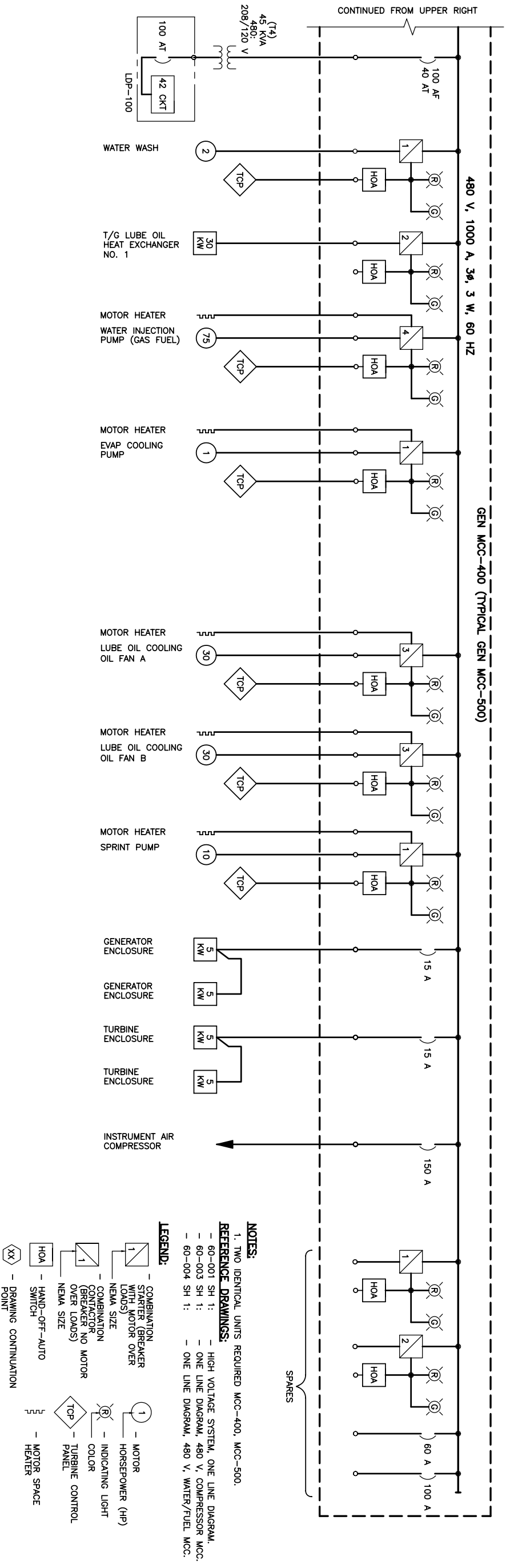
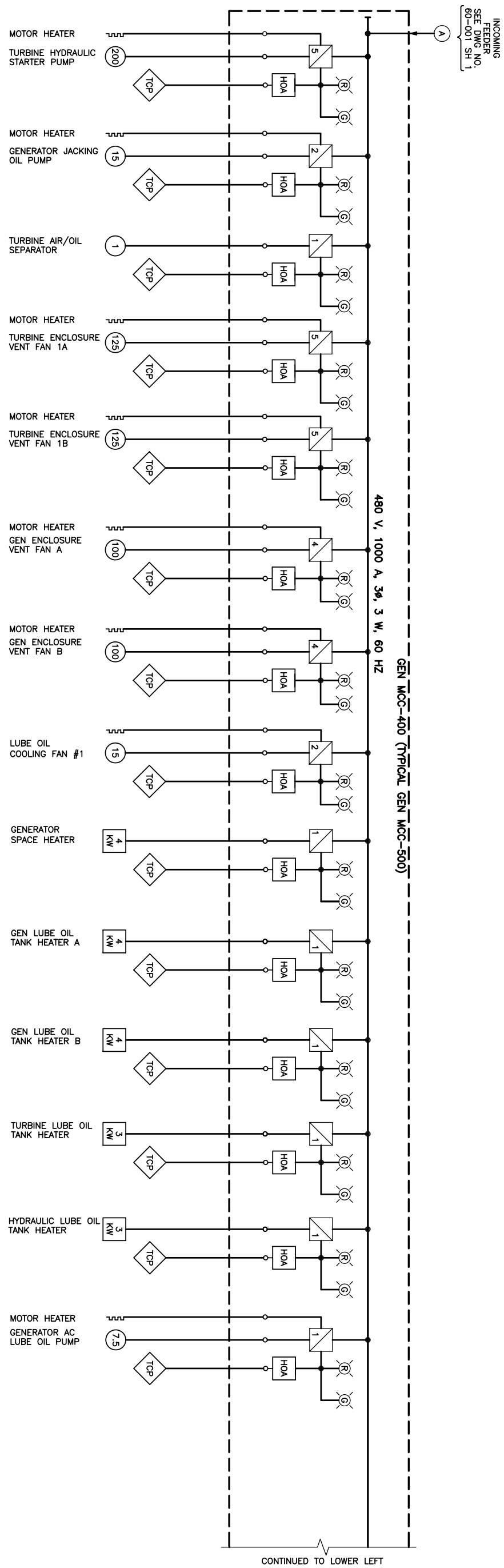
REFERENCE DRAWINGS:

60-001 SH 1: - HIGH VOLTAGE SYSTEM, ONE LINE DIAGRAM.

NOTES:

- GENERATOR PHASE SEQUENCE IS T1-T3-T2 FOR LEFT HAND LINESIDE CUBICLE, OR T4-T6-T5 FOR RIGHT HAND LINESIDE CUBICLE. SEE MAIN UNIT GENERAL ARRANGEMENT FOR LINESIDE PLACEMENT.
- VOLTAGE TRANSFORMER FUSE LOSS DETECTION HAS BEEN PROGRAMMED IN THE IGPS.
- DMWF INCLUDES THE FOLLOWING: VOLTS, AMPS, POWER FACTOR, KW, KVA, KVAR, FREQUENCY, KW/H, AND KWH.
- REFERENCE XXX960 FOR RELAY SETTINGS.
- OUT 101 = 24C2T+32PT+40ZT+40ZT+11NACT+00ST.
- OUT 102 = 51VT+50V+59+PP1+59PP2+87R+87U+64GIT.
- OUT 104 = i(OUT101).
- OUT 101 = i(24C2T+27PP1+81D1T+81D3T).
- G.E. DWG. 689031 SH 1 & 2 ARE MODIFIED TO ADD PSS AND SE-3000.
- TYPICAL FOR TWO UNITS.

| REVISED | | CUSTOMER INFORMATION | | | | DRAWN | | | | ProEnergy EPC Services, LLC | | | |
|---------|--|---|--|--|--|-----------|--|--|--|--|--|--|--|
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| | | NO. | | | | DESIGN | | | | 13.8 KV - ONE LINE DIAGRAM TYPICAL LM-6000 PROTECTION LA RAISA II POWER PLANT | | | |
| | | DATE | | | | PROJ ENGR | | | | LA RAISA | | | |
| | | BY | | | | QA MGR | | | | DWG NO. | | | |
| | | APPRO | | | | SCALE | | | | 9036-60-001 | | | |
| | | REVISIONS | | | | SIZE | | | | SH NO. | | | |
| | | | | | | NONE | | | | 3 | | | |
| | | | | | | D | | | | REV | | | |
| | | | | | | | | | | A | | | |



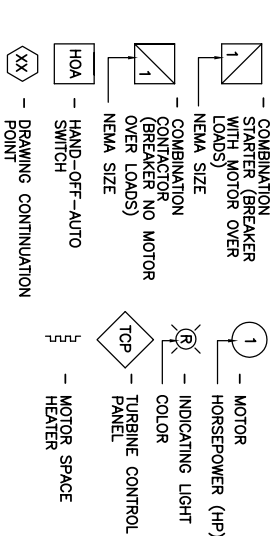
NOTES:

1. TWO IDENTICAL UNITS REQUIRED MCC-400, MCC-500.

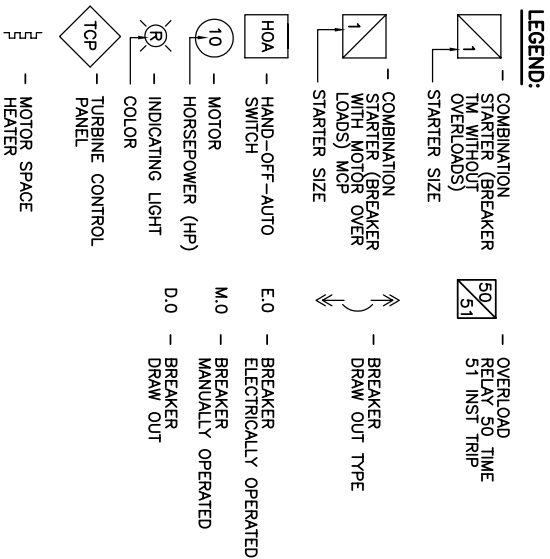
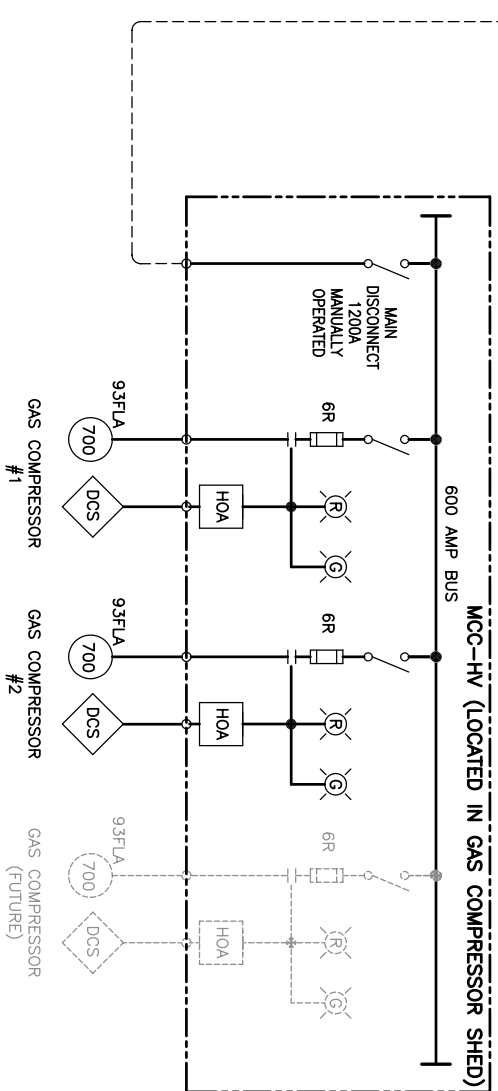
REFERENCE DRAWINGS:

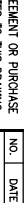
- 60-001 SH 1: - HIGH VOLTAGE SYSTEM, ONE LINE DIAGRAM.
- 60-003 SH 1: - ONE LINE DIAGRAM, 480 V, COMPRESSOR MCC
- 60-004 SH 1: - ONE LINE DIAGRAM, 480 V, WATER/FUEL MCC.

LEGEND:

[illegible]

TO SWBD-100
DWG. NO.
60-001 SH 1



| | | | |
|---|-------------|----------|-------|
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| REVISIONS | | | |
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| NO. | DATE | BY | APP'D |
| DESCRIPTION | | REVISONS | |
| CHECK | SL | 07/27/09 | |
| DESIGN | | | |
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| PROJ MGR | | | |
| QA MGR | | | |
| SCALE | SIZE | D | |
| NONE | | | |
|  | | | |
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| ProEnergy EPC Services, LLC | | | |
| ONE LINE DIAGRAM – 4160 V MCC TWO (2) LM-6000 GAS TURBINE UNITS LA RAISA II POWER PLANT | | | |
| LA RAISA | DWG NO. | SH NO. | REV |
| 79036 | 9036-60-003 | 1 | A |
| VENZUELA | | | |

12.8 Spares List

VENTILATION & COMBUSTION SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|--------------------|-----------------------------|---|
| 1 | 1950-00 | | Switch,Differential Pressure |
| 1 | 1950-10 | | Switch,Differential Pressure-Filter System |
| 1 | 1950-5 | | Switch,Differential Pressure-Inlet Screen |
| 1 | 2010 | | Gauge,Differential Pressure |
| 5 | 5VX1060 | | Belt,Generator Supply Fan - FAN PART # C-31109 (60HZ) |
| 6 | 5VX1500 | | Belt,Turbine Exhaust Fan - FAN PART # C-29592 (60HZ) |
| 1 | 78R25N00N120E 6 | | Sensor,Temperature |
| 1 | XREF28 | FLT93-F-1B1A203C1A03000-CSA | Flow Switch,Fan |

TURBINE LUBE OIL SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|-------------|-------------------|-----------------------------------|
| 1 | J04467 | 3051TG3A2A21AB4C6 | Transmitter,Pressure |
| 1 | 132P41C6B | | Switch,Pressure-Lube Oil Scavange |
| 1 | 132P4S129 | | Switch,Pressure-Lube Oil Supply |
| 1 | 152P82C6413 | | Switch,Differential Pressure |

| | | | |
|---|-----------------|---------------|---|
| 1 | 160P4S36 | | Switch,Differential Pressure-Lube Oil |
| 1 | 160P4S43 | | Switch,Differential Pressure |
| 1 | 162P42C6BH | | Switch,Differential Pressure |
| 1 | 95-117 | | Element,Filter-Lube Oil Tank Demister |
| 2 | AC-B244F-2440Y1 | | Element,Filter-VGV Pump |
| 4 | HC9600FKN13Z | | Element,Filter-Lube Oil |
| 1 | J04920 | XT20-1H3A-BKP | Switch,Level-Lube Oil Tank |
| 1 | 155-500710-606 | | Heater/Thermostat-Lube Oil |
| 1 | J00464 | CFSJ12002F | Valve,Thermostatic Control |
| 1 | J00092 | 15830-1061A | Valve,Solenoid Air Purge(H2o,Air,24VDC) |

FUEL SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|-------------|---------------------------|----------------------------------|
| 1 | 132P44C6B | | Switch,Pressure-Fuel Gas |
| 1 | 132P46C6B | | Switch,Pressure-Fuel Gas |
| 1 | 310-SP-1 | | Valve,Gas Shut Off |
| 1 | 31840-1417 | | Valve,Solenoid-Fuel - (24VDC) |
| 1 | 32861-626 | | Valve,Solenoid-Gas Vent |
| 1 | J01068 | 78R25N00A025T34E6 | Sensor,Temperature-Fuel Gas |
| 1 | 8915-955 | | Valve,Gas |
| 1 | XREF0158 | PG3000-O1M-48-13-21-01-93 | Transmitter,Pressure,Fuel Supply |
| 1 | J00094 | DY050-NBMBA4-2N/FF1/SCT | Transmitter,Gas Fuel Flow |
| 1 | J01007 | DYA-D2D-FF1/SCT | FLOW CONVERTER |



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| | | | |
|---|--------------|-------------|--------------------------|
| 1 | 9907-994 | | VALVE, LIQU FUEL |
| 1 | J00097 | 31830-1063E | SOV, Fuel Manifold Drain |
| 1 | L21674P13 | | Valve, Check |
| 1 | L21674P14 | | Valve, Check |
| 1 | 7017M64G03 | | Valve, Check |
| 1 | HC8904FKS13Z | | Filter, LF |

WATER INJECTION SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|-----------------|-------------------|---|
| 1 | J04460 | 3051TG4A2A21AB4C6 | Transmitter,Flow-Water Injection |
| 1 | J00147 | 31861-1140A | Valve,Solenoid-Demineralized Water (DF2,H2O,120VAC) |
| 1 | 8915-948 | | Valve,Control-Exhaust Injector |
| 1 | FT-24C3XWRLEG-5 | | Transmitter,Flow-Water Injection |
| 1 | J01008 | LN-5-C-MA-9 | FLOW CONVERTER |

AUXILIARY SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|-------------|-----------------------------|--|
| 1 | J04461 | 3051TA2A2A2A21AC6 | Transmitter,Pressure-HP Compressor Inlet & Inlet Air |
| 1 | J03490 | EJA310A-DAS-92NC/FF1/HAC/D1 | Transmitter,Pressure-Inlet Static |

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| | | | |
|---|----------|---------------------------|--|
| 1 | XREF0212 | PA3000-01M-48-13-21-01-93 | Transmitter,Pressure-Turbine HP Compressor Discharge |
| 1 | XREF0160 | PA3000-200-48-13-21-01-93 | Transmitter,Pressure-LP Turbine Inlet |
| 1 | XREF0159 | PA3000-500-48-13-21-01-93 | Transmitter,Pressure-Thrust Balance |

3500 SERIES VIBRATION SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|-----------------------|-------------------|-----------------------------------|
| 1 | 3500/15-04-01 | | DC Power Supply |
| 1 | 3500/92-04-01-01 | | System Monitor |
| 1 | 3500/44-02-01 | | Aeroderivative Monitor |
| 1 | 3500/40-02-01 | | Proximitior Monitor |
| 1 | 3500/42-02-01 | | Proximiter/Seismic Monitor |
| 1 | 33018/50-05 | | Proximitior |
| 1 | 33018/90-05 | | Proximitior |
| 1 | XREF0103 | 86517-01-01-01-01 | Accelerometer Interface Module |
| | 607208-00 | | Cable |
| 1 | 3500/22-01-01-01 | | Transient Data Interface |
| 1 | 3500/25-01-05-01 | | Module, Keyphasor 3500 |
| 1 | 3500/32-01-01 | | Module Relay 4 Channel |
| 1 | 3500/92-04-01-01 | | Module, Communication Gateway |
| 1 | 350500-00-00-00-01-01 | | Dynamic Pressure Charge Amplifier |
| 1 | 145536-01 | | Cable, Inter. Dynamic Pressure |



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HYDRAULIC START SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|---------------|-----------------------------------|--|
| 1 | 100P44C6R | | Switch,Pressure-Hydraulic Pump Control |
| 1 | 100TC5DC6R | | Switch,Temperature-Reservoir |
| 1 | 132T4FC6 | | Switch,Temperature |
| 1 | 180P44C6R | | Switch,Vacuum-Charge Pump |
| 1 | 5115005 | | Starter Motor |
| 1 | 6601-01-019-C | | Overrunning Clutch |
| 1 | J04919 | XT31-002B-B0A | Switch,Level-Reservoir |
| 2 | P16-5332 | | Element-Charge Pump |
| 4 | P16-5659 | | Element,Filter-Charge Pump |
| 1 | J04683 | 90R130KX1AB80L4F1F03GBA3610 24 | Pump,Hydraulic/SOV Activated |

GENERATOR LUBE OIL SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|---------------|-------------|---|
| 1 | 100TC5DCC6R15 | | Switch,Temperature-Generator/Gearbox Tank |



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| | | | |
|---|-----------------|-------------------|---|
| 1 | J04467 | 3051TG3A2A21AB4C6 | Transmitter,Pressure-Lube Oil Inlet |
| 1 | 132P4S129 | | Switch,Pressure-Lube Oil |
| 1 | 132P4S185 | | Switch,Pressure Switch-Lube Oil |
| 1 | 160P4S36 | | Switch,Differential Pressure |
| 1 | J01068 | 78R25N00A025T34E6 | Sensor,Temperature-Lube Oil Supply |
| 4 | HC9600FKN13Z | | Element,Filter-Lube Oil |
| 1 | J04920 | | Switch,Level-Lube Oil Tank |
| 1 | LV471-03-05-SG1 | | Switch,Level-Rundown Tank |
| 4 | P16-7185 | | Element,Filter-Jacking Oil Pump Discharge |
| 1 | J00176 | 2BCSJ14002D | Valve,Control-Generator/Thermostatic |

FIRE PROTECTION SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|------------|--------------------|--------------------|----------------------------------|
| 1 | 240833EXPB | | Detector,Thermal Spot, 225 Deg F |
| 1 | 240835EXPB | | Detector,Thermal Spot, 450 Deg F |
| 1 | U7698 | 006962-001 | Detector,Optical Flame |
| 2 | WFGASDE505 | | Detector,Combustible Gas |

SPRINT SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|-------------|-------------------------|------------------------|
| 1 | 132P49C6B | | Switch,Pressure |
| 1 | 160P4S36 | | Switch,Pressure |
| 1 | J04467 | 3051TG3A2A21AB4C6 | Transmitter,Pressure |
| 1 | J03744 | DY025-DBMBA1-2D/FF1/SCT | FLOW METER |
| 1 | J00092 | 15830-1061A | Valve,Solenoid (24VDC) |
| 1 | J00095 | 31840-1058A | Valve,Solenoid (24VDC) |

GE MARK VI CONTROL SYSTEM

| QTY | PART NUMBER | COND. | DESCRIPTION |
|-----|----------------|-------|----------------------------|
| | FUEL CONTROL | | |
| 1 | IS215UCVDH2AA | NEW | CPU,MARK VI,W/GEIUS |
| 1 | IS2020DRLYH1A | R/M | TERMINATION BD. RELAY |
| 1 | IS200VAICH1C | R/M | VME ANALOG I/O |
| 1 | IS200VCRCH1B | R/M | CONTACTS IN, RELAYS OUT |
| 1 | IS200VRTDH1D | R/M | MARK VI, VME RTD CARD |
| 1 | IS200VSVOH1B | R/M | VME SERVO CARD, DRIVER |
| 1 | IS200VTCCH1C | R/M | MARK VI THERMOCOUPLE CARD |
| 1 | IS200VTURH1B | R/M | VME TURBINE CARD, SPEED |
| 1 | IS2020LVPSG1AE | NEW | POWER SUPPLY, MARK VI, 24V |
| 1 | IS210DRTDH1AA | R/M | CARD ASSEM. DRTD RAIL MTG. |
| 1 | IS210DSVOH1AA | R/M | CARD ASSEM. DSVO RAIL MTG. |
| 1 | IS210DTAIH1AA | R/M | CARD ASSEM. DTAI RAIL MTG. |

| | | | |
|---|---------------|-----|--------------------------------|
| 1 | IS210DTCIH1AA | R/M | CARD ASSEM. DTCI RAIL MTG. |
| 1 | IS210DTRTH1AA | R/M | CARD ASSEM. DTRT RAIL MTG. |
| 1 | IS210DTTCH1AA | R/M | CARD ASSEM. DTTT RAIL MTG. |
| 1 | IS210DTURH1AA | R/M | CARD ASSEM. DTUR RAIL MTG. |
| 1 | IS215VCMIH1B | R/M | VME COMMUNICATIONS ASSM. |
| | SEQUENCER | | |
| 1 | IC697CGR935 | NEW | HOT STANDBY - CPU MODULE |
| 1 | | | POWER SUPPLY, 24VDC INPUT 160 |
| | IC697PWR724 | NEW | W |
| 1 | IC670ALG621 | NEW | MODULE, RTD INPUT, 4 CHANNEL |
| 1 | | | MODULE, ANALOG INPUT, 16CH, 4- |
| | IC670ALG240 | NEW | 20MA |
| 1 | | | MODULE, ANALOG OUTPUT, 8CH |
| | IC670ALG330 | NEW | 4-20MA |
| 1 | IC670MDL644 | NEW | MODULE, DISCRETE INPUT, 16 CH. |
| 1 | HE670RLY168 | NEW | MODULE, RELAY OUTPUT, 16 CH |
| 1 | | | MODULE, DISCRETE OUTPUT, 16 |
| | IC670MDL740 | NEW | CH |

HOSES

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|-------------|-------------|-------------------|
| 2 | 398003 | 900003 | Interconnect |
| 2 | 398004 | 900004 | Interconnect |
| 2 | 398006 | 900006 | Interconnect |
| 1 | 398011 | 900011 | GLO Hose Assembly |

| | | | |
|---|--------|--------|----------------------------------|
| 1 | 398013 | 900013 | Instrument Line |
| 1 | 398017 | 900017 | ABC Sump Vent |
| 1 | 398018 | 900018 | DE Sump Vent |
| 1 | 398019 | 900019 | TLO Supply To Filter |
| 1 | 398020 | 900020 | TLO Supply (L1) |
| 1 | 398021 | 900021 | TLO Supply (L2R) |
| 1 | 398022 | 900022 | Header Supply (L3) |
| 1 | 398024 | 900024 | Exhaust Drain |
| 1 | 398025 | 900025 | Power Turbine Air Supply |
| 1 | 398029 | 900029 | Hydraulic Start Seal Drain |
| 1 | 398037 | 900037 | Generator Run Down Tank |
| 1 | 398038 | 900038 | Jacking Pump Supply |
| 1 | 398039 | 900039 | Jacking Pump Discharge |
| 1 | 398041 | 900041 | Jacking Oil Pump Relief |
| 1 | 398084 | 900084 | Water Injection Pump Discharge |
| 1 | 398134 | 900134 | Manifold Block To Pump Discharge |
| 1 | 398045 | 900045 | Manifold Case Drain To Filter |
| 1 | 398046 | 900046 | Pump Case Relief To Tank |
| 1 | 398113 | 900113 | Auxiliary Fan Pump To Fan Motor |
| 1 | 398114 | 900114 | Cooler To Tank |
| 1 | 398049 | 900049 | Fan Motor Discharge |
| 1 | 398050 | 900050 | Return Filter Outlet |
| 1 | 398095 | 900095 | Pump Section |
| 1 | 398131 | 900131 | Fan Motor Suction |
| 1 | 398071 | 900071 | Pump Case Drain To Filter |
| 1 | 398057 | 900057 | Filter Return To Cooler |
| 1 | 398058 | 900058 | Fan Pump Relief To Tank |
| 1 | 398070 | 900070 | Cooler By-Pass To Tank |
| 1 | 398086 | 900086 | Manifold Block To Return Filter |

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| | | | |
|---|--------|--------|--|
| 1 | 398209 | 900209 | HOSE,3"-150# AIR/OIL SEP,ROOF |
| 1 | 398210 | 900210 | HOSE,2"-150# AIR/OIL SEP,ROOF |
| 1 | 398116 | 900116 | GLO Pump Discharge |
| 1 | 398115 | 900115 | GLO Hose Assembly |
| 1 | 289195 | 900195 | HOSE ASSY,ENH SPRT WATER CONN |
| 1 | 289196 | 900196 | HOSE ASSY,ENH SPRT NOZ AIR CON |
| 1 | 288056 | 900056 | Sprint System, Inlet Air Manifold |
| 1 | 288057 | 900057 | SPRINT SYSTEM, INTERSTAGE AND INLET WATER MANIFOLDS |
| 1 | 466624 | 355624 | Hose Assembly, Water Injection Pump |

BRUSH GENERATOR SPARES

(O&M Manual - Gen Type
BDAX7.290ERJT - Manual No: 521,
Rev: B)

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|-----|---------------|-------------|--------------------------|
| 1 | S317741201 | | RECTIFIER SPARES KIT |
| 5 | S314428801 | | FUSE ATM20 |
| | MAINT. SPARES | | |
| 1 | S840012101 | | BRUSH HOLDER |
| | OPER.SPARES | | |
| 1 | S317436007 | | GASKET (STATOR) SET OF 4 |
| 1 | S317436002 | | GASKET (STATOR) SET OF 6 |
| 1 | S025281528 | | HEATER(STATOR) |
| 1 | S314828501 | | TERMINAL BUSHING ASSY. |

| | | |
|---|------------|--------------------------------|
| 1 | S314909801 | GASKET(EXCITER) SET OF 4 |
| 1 | S311745677 | WASHER (JOINT) |
| 1 | S024116168 | SEAL WASHER SET OF 4 |
| 1 | S018713133 | SEALING COMPOUND SET OF 3 |
| 1 | S018713194 | LOCKING COMPOUND |
| 1 | S314089901 | PUMP OIL |
| 1 | S314263801 | PUMP COUPLING |
| 1 | S313223721 | HOSE |
| 1 | S314149411 | SHAFT SEAL |
| 1 | S314149412 | SHAFT SEAL |
| 1 | S961529800 | UTILITIES CARD |
| 1 | S962243100 | MICROAVR CONTROL CARD |
| 1 | S962243700 | MICROAVR MONITOR CARD |
| 1 | S962615908 | FUSE SEMI-COND 20A SET OF 5 |
| 1 | S962615909 | FUSE QUICKBLOW 5A SET OF 5 |
| 1 | S962615936 | FUSE QUICK BLOW 2A SET OF 5 |
| 1 | S961503700 | ROTOR EARTH FAULT AERIAL |
| 1 | S961502100 | ROTOR EARTH FAULT XMITTER. |
| 1 | S317684302 | BEARING BUSH (NON EXCITER END) |
| 1 | S317684402 | BEARING BUSH (EXCITER END) |

| QTY | PART NUMBER | ALT. NUMBER | CABLES DESCRIPTION |
|------------|--------------------|--------------------|-------------------------------|
| 1 | 608214-4036 | 25600-001-040-T36 | E1 & E9 40' CABLE |
| 1 | 608919-4036 | 25600-021-040-T36 | E21 40' CABLE |
| 1 | 608920-4036 | 25600-0016-040-T36 | E16 40' CABLE |
| 1 | 608926-4036 | 25600-008-040-T36 | E8 40' CABLE |
| 1 | 608928-4036 | 25600-005-040-T36 | E5 & E6 40' CABLE |
| 1 | 608930-4036 | 25600-012-040-T36 | E12 40' CABLE |

| | | | |
|---|-------------|--------------------|----------------------|
| 1 | 608932-4036 | 25600-019-040-T36 | E19 40' CABLE |
| 1 | 608933-4036 | 25600-020-040-T36 | E20 40' CABLE |
| 1 | 608934-4036 | 25600-010-040-T36 | E10 & E11 30' CABLE |
| 1 | 608935-3036 | 25600-030-030-T36 | E30 & E 31 30' CABLE |
| 1 | 608937-3036 | 25600-034-030-T36 | E34 30' CABLE |
| 1 | 608938-3036 | 25600-036-030-T36 | E36 30' CABLE |
| 1 | 609975-40 | 25600-022-040-T00 | E22 40' CABLE |
| 1 | 609976-40 | 25600-032-040-T00 | E32 40' CABLE |
| 1 | 8EH2ABW1 | 25600-0056-040-T36 | E56 40' CABLE |
| 1 | 8EH2DHF1 | 25600-043-040-T36 | E54 & E55 40' CABLE |

| QTY | PART NUMBER | ALT. NUMBER | CABLE ADDITIONAL (PD UNIT) |
|-----|-------------|-------------|----------------------------|
| . | | | |
| 1 | 8EH15AAA1 | | CABLE,PATCH |
| 1 | 8EH2ABW1 | | CABLE,BAL VALVE |
| 1 | 8EH2DHA1 | | CABLE, ENGINE |
| 1 | 8EH2DHB1 | | CABLE, ENGINE |
| 1 | 8EH2DHC1 | | CABLE,ENGINE |
| 1 | 8EH2DHD1 | | CABLE, ENGINE |
| 1 | 8EH2DHF1 | | CABLE, ENGINE |
| 1 | 8EH2DHR1 | | CABLE, ENGINE |



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WATER WASH SYSTEM

| QTY | PART NUMBER | ALT. NUMBER | DESCRIPTION |
|------------|--------------------|--------------------|---|
| 1 | J-4413 | | CONNTECT 6000, 55 GALLON DRUM TURBINE WASH |

| QTY | PART NUMBER | ALT.NUMBER | TURBINE INSURANCE SPARES DESCRIPTION |
|------------|---------------------|-------------------|---|
| 1 | 1304M52G03 | | HPT STAGE 2 BOREScope |
| 1 | 1322M32G10 | | LPT STAGE 2/4 BOREScope |
| 1 | 1642M98G01 | | CHECK VALVE |
| 4 | 1962M86P02 | | T48 THERMOCOUPLE |
| 1 | 1826M46G01 | | CHECK VALVE & TUBE |
| 1 | 38-18604-2025- 3 | | SCREEN |
| 1 | 38-18604-2024- 3 | | SCREEN |
| 1 | 9299M96G07 | | HPT STAGE 1 BOREScope |
| 2 | 9392M95P04 | | PLUG, IGNITER |
| 1 | 9600M37P13 | | LEAD, IGNITER |
| 2 | L21131P02 | | XN25 SENSOR, SPEED |
| 1 | L24922P03 | | PUMP, VG HYDRAULIC |
| 1 | L31967P27 | | ACCELEROMETER, CRF |

| | | | |
|----|------------|-----------|--------------------------|
| 1 | L31967P29 | | ACCELEROMETER, TRF |
| 3 | L35166P01 | | DETECTOR, RES |
| 1 | L43342P03 | P04 | CABLE, TEMP LIQ MANIFOLD |
| 1 | L43416P02 | | T3 SENSOR |
| 1 | L43418P03 | | VSV/ VIGV ACTUATOR |
| 1 | L43419P04 | | VBV ACTUATOR |
| 1 | L43420P04 | | VBV ACTUATOR |
| 2 | 4J7316 | | CHIP DETECTOR |
| 1 | L44500P09 | | PUMP, L&S |
| 1 | L44571P01 | | HYDRAULIC CONTROL |
| 1 | L44684P01 | | LPT SPEED SENSOR |
| 1 | L44736P05 | | UPPER T48 HARNESS |
| 1 | L44737P04 | | LOWER T48 HARNESS |
| 1 | L44745P01 | | T2/P2 SENSOR (CIT) |
| 1 | L44745P02 | | T25/P25 SENSOR |
| 1 | 9504M33P01 | | SENSOR, TEMP |
| 6 | L31476P57 | | FUEL NOZZLE |
| 30 | 9559M20G01 | | GASKET,NOZZLE |
| 2 | L45970G01 | | TUBE, FUEL |
| 2 | L45972G01 | | TUBE, FUEL |
| 2 | L49274P01 | L45882P04 | HOSE, FUEL |
| 2 | L45881P04 | | HOSE, FUEL |
| 3 | L45921P01 | | GASKET |
| 6 | L49273P03 | | FUEL HOSE |
| 1 | L49274P01 | | SEC-FUEL HOSE |
| 1 | L47328P02 | | VALVE, THRUST BALANCE |
| 1 | L47330P04 | | VALVE, STG 8 BLEED |

TURBINE EXPENDABLE SPARES

| QTY | PART NUMBER | ALT.NUMBER | DESCRIPTION |
|-----|-------------|------------|-------------|
| 2 | 1337M46P03 | | GASKET |
| 2 | 1538M42P01 | | GASKET |
| 4 | 1540M69P207 | | CLAMP |
| 10 | 1704M61P03 | | SLEEVE |

| | | | |
|----|-------------|------|-----------------|
| 5 | 1704M62P04 | | SPACER |
| 5 | 1704M62P05 | | SPACER |
| 2 | 1704M63G07 | | ARM |
| 1 | 1704M63G08 | | ARM |
| 3 | 1704M63G09 | | ARM |
| 1 | 1704M63G10 | | ARM |
| 3 | 1704M63G11 | | ARM |
| 1 | 1704M63G12 | | ARM |
| 5 | 1774M59P01 | | SEAL |
| 10 | 1855M35P08 | | BOLT |
| 1 | 619E223P52 | | FITTING REDUCER |
| 10 | 635E901P03 | | NUT SLF LKG |
| 4 | 705B276P5 | | RING |
| 10 | 9009M32P01 | | WASHER |
| 4 | 9009M74P03 | | GASKET, ROUND |
| 3 | 9011M60P01 | | GASKET |
| 2 | 9013M28P01 | | GASKET |
| 3 | 9013M29P02 | | GASKET |
| 3 | 9013M30P02 | | GASKET |
| 1 | 9014M45P65 | | CLAMP |
| 30 | 9559M20G01 | | SEAL, RING |
| 2 | 9048M33P06 | | BEARING |
| 1 | 9057M50P01 | | SEAL |
| 1 | 9057M92P11 | | GASKET, SQUARE |
| 5 | 9107M23P02 | | GASKET |
| 1 | 9107M55P01 | | SHIM |
| 5 | 9108M27P03 | | BOLT |
| 5 | 9109M91P01 | | BOLT |
| 5 | 9131M44P02 | | BUSHING |
| 5 | 9365M41P117 | | PACKING |
| 5 | 9365M41P122 | | PACKING |
| 3 | 9365M41P229 | | SEAL |
| 3 | 9371M19P04 | P104 | SEAL |
| 2 | 9371M19P06 | P106 | SEAL |
| 2 | 9371M19P08 | | SEAL |
| 2 | 9371M19P10 | | SEAL |
| 3 | 9371M19P12 | P112 | SEAL |
| 3 | 9378M31P01 | | FITTING |

| | | |
|----|------------|----------------|
| 5 | 9379M93P01 | GASKET |
| 1 | 9397M20P02 | BUSHING |
| 1 | 9397M22P02 | LOCK WASHER |
| 10 | 9608M12P04 | GASKET |
| 5 | 9609M13P02 | GUIDE |
| 10 | 9609M43P02 | WASHER |
| 10 | 9610M50P02 | NUT |
| 3 | 9628M16P02 | BOLT |
| 10 | 9629M48P02 | NUT |
| 10 | 9629M48P04 | NUT |
| 10 | 9629M48P06 | NUT |
| 10 | 9629M48P10 | NUT |
| 1 | 9649M39P05 | CLAMP |
| 10 | 9699M66P01 | BOLT |
| | AC-B244F- | |
| 2 | 2440Y1 | FILTER ELEMENT |
| 10 | AN316C4R | NUT |
| 10 | AN960C10 | FLAT WASHER |
| 10 | AN960C10L | FLAT WASHER |
| 10 | AN960C416L | FLAT WASHER |
| 10 | AN960C516 | WASHER |
| 10 | AN960C516L | WASHER |
| 10 | AN960C616L | FLAT WASHER |
| 10 | J1092P04 | NUT |
| 10 | J1092P05 | NUT |
| 5 | J1220G05 | CLAMP |
| 4 | J1221G03 | CLAMP |
| 4 | J1221G04 | CLAMP |
| 3 | J1221G07 | CLAMP |
| 10 | J1221G08 | CLAMP |
| 5 | J1221G10 | CLAMP |
| 5 | J201P04 | NUT |
| 3 | J219P02 | GASKET |
| 2 | J219P03 | SEAL GASKET |
| 5 | J219P04 | SEAL GASKET |
| 5 | J219P05 | GASKET |
| 4 | J219P06 | GASKET |
| 4 | J219P07 | GASKET SEAL |

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| 5 | J221P028 | PACKING |
| 5 | J221P138 | PACKING |
| 2 | J221P163 | PACKING |
| 5 | J221P216 | PACKING, PREFORMED |
| 3 | J221P219 | PACKING |
| 5 | J221P222 | PACKING, PREFORMED |
| 2 | J221P224 | PACKING, PREFORMED |
| 2 | J221P240 | PACKING |
| 2 | J221P260 | PACKING, PREFORMED |
| 3 | J221P903 | PACKING |
| 10 | J221P904 | PACKING, PREFORMED |
| 10 | J221P905 | PACKING |
| 10 | J221P906 | PACKING |
| 10 | J221P908 | PACKING |
| 10 | J221P910 | PACKING |
| 10 | J221P912 | PACKING |
| 5 | J221P916 | PACKING, PREFORMED |
| 10 | J414P034A | BOLT |
| 3 | J415P123A | BOLT |
| 1 | L45921P01 | GASKET, SEAL |
| 2 | J511P106 | NIPPLE |
| 1 | J511P108 | NIPPLE |
| 1 | J511P110 | NIPPLE |
| 1 | J515P04 | ELBOW |
| 1 | J522P57 | NIPPLE |
| 1 | J534P06 | TUBE NIPPLE |
| 1 | J534P08 | NIPPLE |
| 1 | J534P10 | TUBE NIPPLE |
| 1 | J534P12 | TUBE NIPPLE |
| 10 | J574P02 | NUT |
| 2 | J628P06 | NUT |
| 4 | J643P04B | MACHINE BOLT |
| 10 | J643P12A | MACHINE BOLT |
| 10 | J644P06D | MACHINE BOLT |
| 10 | J644P07D | BOLT |
| 10 | J644P08D | MACHINE BOLT |
| 5 | J644P09D | BOLT |
| 10 | J644P11A | BOLT |

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| 10 | J644P12A | BOLT |
| 5 | J645P30A | BOLT |
| 1 | J816P072C | BOLT |
| 2 | L28004P01 | Gasket |
| 5 | L42821P01 | GASKET |
| 2 | L43073P01 | GASKET |
| 1 | L43616P01 | BOLT |
| 1 | L44539P01 | PLUG |
| 1 | L52148P01 | NIPPLE |
| 3 | M83248/1-121 | PACKING |
| 3 | M83248/1-243 | PACKING |
| 1 | M83248/1-904 | PACKING |
| 5 | M83248/1-905 | PACKING |
| 4 | M83248/1-910 | PACKING |
| 5 | M83248/1-912 | PACKING |
| 1 | MS21083C4 | NUT SLF LKG |
| 5 | MS21083C5 | NUT |
| 1 | MS24693-C342 | SCREW |
| 2 | MS35842-15 | CLAMP |
| 1 | MS9193-04 | CONNECTOR |
| 1 | MS9193-12 | CONNECTOR |
| 10 | MS9201-04 | NUT |
| 3 | MS9202-042 | GASKET |
| 5 | MS9315-04 | TUBE CAP |
| 10 | MS9321-10 | WASHER FLAT |
| 3 | MS9371-15 | GASKET |
| 1 | MS9404-04 | PLUG |
| 10 | MS9489-07 | BOLT |
| 3 | MS9556-07 | BOLT |
| 5 | MS9556-10 | BOLT |
| 2 | MS9557-06 | BOLT |
| 3 | MS9557-07 | MACHINE BOLT |
| 5 | MS9557-09 | BOLT |
| 10 | MS9557-10 | MACHINE BOLT |
| 10 | MS9557-14 | BOLT |
| 3 | MS9557-22 | MACHINE BOLT |

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| 4 | MS9557-38 | BOLT |
| 3 | MS9565-05 | BOLT |
| 5 | MS9566-12 | BOLT |
| 3 | MS9567-14 | BOLT |
| 1 | MS9902-03 | PLUG |
| 2 | MS9902-04 | PLUG |
| 2 | MS9902-06 | PLUG |
| 1 | MS9902-08 | PLUG |
| 1 | MS9902-10 | PLUG |
| 1 | NAS1291C8M | NUT |
| 2 | R1316P007 | PACKING |
| 2 | R287P04 | NIPPLE |
| 1 | R287P06 | NIPPLE, TUBE |
| 1 | R287P08 | NIPPLE |
| 1 | R287P10 | NIPPLE |
| 2 | J644P13F | BOLT |
| 2 | J1128P12 | SEAL RING, METAL |
| 2 | MS9558-24 | BOLT |
| 4 | J1092P06 | NUT |
| 3 | 9608M08G48 | GASKET |
| 1 | J1314G104 | CAP ASSY |
| 4 | NAS3106C16-14 | U-BOLT |
| 4 | 9134M25P117 | STRAP, RETAINING |
| 38 | 133A1624P6 | WASHER FLAT |
| 14 | MS9557-08 | BOLT |