

PROPOSAL

Presented To:

CVG / SIDOR

Pto Ordaz, Venezuela

**1 Frame 7FA – 1 Frame 7EA
Power Plant “B”**

By

DERWICK

DERWICK ASSOCIATES CORP.



Proposal No. T-1002

January 23, 2010

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Section 1.0 Introduction

This Technical Scope Document includes the details of a nominal 250 MW power plant to be constructed near the SIDOR R5 Substation. The plant will supply power to the SIDOR R5 Substation through a new 115KV overhead transmission line and to the SIDOR R6 Substation through an existing 115KV feeder from the R5 Substation. The plant will utilize (1) GE Frame 7FA and (1) GE Frame 7EA gas turbine generator. Generator Step-up Transformers will be utilized to step up the Frame 7FA output of 18KV to 115KV and the Frame 7EA output of 13.8KV to 115KV. Note: the new 115KV transmission line and GSU transformers are not included in the scope of this TSD.

The Frame 7EA machine is currently configured for natural gas fuel only. However during the construction of the plant, the gas turbine will be reconfigured for dual fuel operation. Note: the dual fuel conversion of the gas turbine is not included in this TSD scope. The Frame 7FA is already configured for dual fuel operation.

The plant will be configured for operation on both natural gas and #2 diesel fuel. The Owner will provide natural gas supply through a pipeline to the plant boundary at a pressure of 16 bar (235 psig). Contractor will provide compressors to raise the gas pressure to meet the requirements of the gas turbines.

The Owner will provide clean diesel fuel to the plant boundary which meets the GE liquid fuel specifications. The Contractor will provide storage tanks, filtration and handling equipment to meet the requirements of the gas turbines.

The Owner will provide a sufficient supply of industrial grade water to the plant boundary. Contractor will provide a water treatment facility in the plant to insure that the water injected into the gas turbines meets the GE water specifications.

The Owner will supply all concrete and re-bar for the construction of the plant. Contractor will provide all civil designs and labor required to construct the plant.

The Contractor will provide all plant design engineering required for the civil work, mechanical, electrical and plant control.

Contractor will provide technicians to provide startup and commissioning of the plant.

Section 2.0 Equipment List - Detailed Division of Responsibility between Owner and Contractor:

Note: The Owner has purchased one (1) gas fueled GE Frame 7EA GTG with associated facilities and one (1) dual fueled Frame 7FA GTG for this project. These units and associated equipment are identified in the Table Below:

Material/Responsibility	Qty	Description
OWNER Provide /CONTRACTOR Install	1	<u>GE Model 7121 Frame 7EA (60Hz) Gas Turbine Generator</u> with Associated Equipment as Coming From Southhaven Including:
		Electrical
	1	PEEC Building
	1	13.8 KV 5000 amp Gas Turbine Generator Breaker NEMA 3R
	1	4160V 800 HP Starting Motor
	1	480 V GTG MCC
		Mechanical
	1	L.O. Cooler w/cooling water fin-fans (3-50hp) & water pumps (2- 75Hp)
	1	Fuel Gas Check Meter
	1	Fuel Gas Module/Purge Air
	1	Fuel Gas Heaters
	1	Fuel Gas Filter/Coalescer
	1	Demin Water Inject Pump 100 hp
	1	Demin Water Filters
	1	Liquid Fuel Inject Skid
	1	Liquid Fuel Filters
	1	Fogging Pump Skid
	1	Inlet Air Fogging System
OWNER Provide /CONTRACTOR Install	1	<u>Dual Fueled GE Model Frame 7FA (60Hz) DLN Gas Turbine Generator</u> including Water Injection for NOX for liquid fuel with Associated Equipment – See Details in Appendix
	1	Inlet Air Filter Assembly with Evaporative Cooler
	1	Fuel Gas Conditioning scrubber, separator-filter
	1	Liquid Fuel System – Stainless Steel piping, duplex filters, fuel atomizing module w/air compressor, motor driven fuel pump
	1	Distillate fuel forwarding system
	1	Lubricating and Hydraulic System w/pumps, filters and coolers
	1	Exhaust System Diffuser, expansion joint – no stack
	1	Fire Protection System
	1	Water Wash Cleaning System
	1	GTG Cooling Water System excluding piping, pumps, motors, etc.
	1	Generator Start with load commutated inverter and isolation transformer
	1	Hydrogen Cooled Generator including Generator Gas Coolers, LO Systems
	1	Generator Excitation Systems, Static Components, Current & Voltage Transformers
	1	PEEC Modular Building with:
	1	-Turbine Control Panels
	1	- Local Operator Station
	1	-Generator Protection Panel
	1 set	- 24 VDC Batteries and Chargers
	1 set	-125 VDC Batteries and Chargers
	1	GTG Auxiliary Cooling System with fin-fans
	1 set	Cooling Water Circulation Pumps
	1 set	Fuel Gas Filters

Material/Responsibility	Qty	Description
OWNER Will Provide		
	1 Lot	Project Site free and clear of rock and ground water
	1 Lot	Natural Gas Fuel Tie in Point at Plant Boundary with measurement
	1 Lot	115 KV Utility connection immediately adjacent to Site Boundary
	1 Lot	#2 Diesel Fuel Supply Tie in Point at Plant Boundary with measurement
	1 Lot	Firewater supply (w/pumps) and feeder to site boundary
	1 Lot	Fuel Gas, DFO and Water for commissioning and start up
	1 Lot	Waste Water Disposal
	1 Lot	Eight (8) Telephone Circuits to Project Site
	1 Lot	Permits for Environmental, Transportation, Building, Construction, Operations, etc.
	1 Lot	Construction & Commissioning Water and 480V three phase power
	1 Lot	Concrete and Rebar for foundations
	1 Lot	Access Roads to site
	1 Lot	Import Duties and Taxes
	1 Lot	Construction lay down area (3 acres) within or adjacent to project site
	1 Lot	Transportation of Owner Equipment from the US to Site
	1 Lot	Removal of all unused building foundations, underground piping, etc. on the proposed project site
Contractor – ProEnergy EPC Responsibility		
Civil / Structural		
	1 Lot	Site Preparation, Rough Grading, Excavation, and final grading
	1 Lot	Plant Concrete Foundations (Owner to provide concrete and rebar)
	1 Lot	Plant Paving, Gravel and Pads for Turbine and Generator
	1 Lot	Basic Architectural Treatment and landscaping
Buildings		
	1	Climitized Control Room and Office Building with attached Maintenance / Warehouse Building
	1	Fuel Gas Compressor Shed
	1	Water Treatment – pumps Building
	1	Fuel Treatment, pumps Shed and MCC Room
	1	Guard House
Contractor (continued) Mechanical		
	1	Frame 7FA 55 Ft. tall Exhaust Stack with Silencing
	1	Lube Oil Cooling water System for GTG including piping, pumps, etc.
	2	Fuel Gas ESDV Valves
	2 ea.	100% Capacity Fuel Gas Compressors for 7FA
	2 ea.	100% Capacity Fuel Gas Compressors for 7EA
	1	Raw water Storage Tank 500,000 gallon
	1	100% Demin Water Forwarding Pumps
	1	Demineralized Water Storage Tank, 300,000 Gallons
	2	100% Demineralized Water Forwarding Pumps for Turbine Wash
	2	Duplex Demineralized Water Filters Fr. 7EA – 7FA
	2	Demineralized Water Injection Pumps NOx / Fogging
	1	DFO Injection Skid
	2	DFO Fuel Filters
	1	Oily Water Separator
	1	Waste Oil Tank, 10,000 Gallon.
	1	Waste Oil Delivery Pump
	1	Waste Water Tank, 10,000 Gallon
	1	Waste Water Delivery Pump
	1	Instrument Air Package with two compressors, receiver, filters and dryer
	1	Raw Liquid fuel storage tank, (500,000 gallons)
	2	Liquid Fuel Transfer Pumps Fr 7EA

Material/Responsibility	Qty	Description
Electrical	2	Liquid Fuel forwarding Pumps Fr. 7FA
	1	Treated Fuel Storage Tank (1,000,000 gallons)
	2	Treated Liquid Fuel Forwarding Pumps Fr. 7EA
	2	Treated Liquid Fuel Forwarding Pumps Fr. 7FA
	1 set	Liquid Fuel Filters Fr. 7EA
	1 set	Liquid Fuel Filters Fr. 7FA
	2	Natural Gas ESD Valves
	2	Natural Gas Scrubbers
	2	Fuel Gas Regulator Skids
I&C	1	18 KV 8000 amp GTG Generator Breaker NEMA 3R Frame 7FA
	1	18 KV Iso-Phase Buss – Fr 7FA
	1	4160V / 480 V 1500 KVA Station Service Transformer
	1	4160V / 480 V 1000 KVA Station Service Transformer
	1	18 KV / 4160 V 10,000 KVA Station Service Transformer
	1	4160 V Distribution Switchgear
	2	4.160 V MCC's Gas Compressors
	2	480 V BOP MCC
	2	480 V Distribution Board
	1 Lot	BOP 480 V / 120 V Transformers, Lights, Panels etc.
	1	UPS System for Control Room
	4	Welding Receptacles
	1	Plant Grounding Grid
	1 Lot	Lightning Protection
	1 Lot	Cathodic Protection for underground steel piping
	1 Lot	Area Lighting
Construction	1 Lot	Plant Instrumentation
	1	Plant DCS System
Engineering	1 Lot	Construction Tools, Rental Equipment & Rental Cranes
	1 Lot	Temporary Power Distribution
	1 Lot	Local Subcontractor(s) Electrical & Mechanical Craft Labor
	1 Lot	Transportation of all Contractor supplied BOP equipment
	1 Lot	Construction Offices, Storage, Temporary Facilities and Utilities
	1 Lot	Lubricants, Chemicals, Filters, etc. for Plant Commissioning
	1 Lot	Balance of Plant Start up and Commissioning Spare Parts
Project Management	1 Lot	Conceptual and Detail Design Engineering (Total Plant)
	1 Lot	Project Management with Scheduling, QA/QC, safety, and training
	1 Lot	Plant Start-up, Commissioning and Testing
	1 Lot	Overall Plant Training

Section 3.0 Design Basis and Interconnect Points

3.1 Design Basis

Design Conditions

Site Elevation	Simple Cycle 1 Fr 7FA and 1 Fr 7EA (fogged) 100 ft. (30.5 m)
Air Temperature, High	95°F (35°C)
Air Temperature, Low	60°F (15°C)
Design Temperature	85°F (29.4°C)
Design Relative Humidity	75%
Wind Speed	80 mph (53 km/hr)
Gas Turbine Power	250 MW (ISO)
GTG Fuel Consumption Rate	61.07 MCFD Natural Gas
GTG Liquid Fuel Consumption Rate	321 gpm
High Voltage Interconnect	115 KV
Demin Water Storage	500,000 Gallon SS Tank by Contractor
Instrument Air System	185 SCFM by Contractor
Waste Oil Storage	10,000 Gallons by Contractor
Waste Water Storage	10,000 Gallons by Contractor
Raw Water Storage	500,000 Gallon CS Tank by Contractor
Raw DFO Storage	500,000 Gallon CS Tank by Contractor
Treated Fuel Storage	1,000,000 Gallon CS Tank by Contractor

3.2 Interconnect Points

Natural Gas at min. 235 psig	Owner to provide interconnection point to the Plant Battery Limits.
Liquid Fuel	Owner to provide pipeline and measurement at Plant Battery limits
Plant Waste Water	Plant Battery Limits.
Plant Waste Oil	Plant Waste Oil Tank.
115 KV	Dead End Tower at site boundary
Telephone	Plant Battery Limits.
Raw Water Supply	Plant Battery Limits.
Sanitary Sewer	Plant Septic System
Raw/Firewater Supply	Plant Battery Limits by Owner

Section 4: Plant Performance

Puerto Ordaz

B

Simple Cycle

Site Elevation

100 Feet

Design Temperature

85 F

Relative Humidity

75%

ID GTPRO

201

253

Average

	(1) 7FA		(1) 7EA Fogging		Total	
	Gas Fuel	Liquid Fuel	Gas Fuel	Liquid Fuel	Gas Fuel	Liquid Fuel
Gross Power KW	161081	165707	78596	80465	239677	246172
Net Power KW	158521	163145	77423	79063	235944	242208
Aux & Losses KW	2559.9	2562	1173.5	1401.5	3733.4	3963.5
LHV Gross Heat Rate (BTU/kWh)	9516	9942	10612	11089	10064	10515.5
LHV Net Heat Rate (BTU/kWh)	9670	10098	10772	11286	10221	10692
LHV Gross Electric Eff %	35.86	34.32	32.16	30.77	34.01	32.55
LHV Net Electric Eff %	35.29	33.79	31.68	30.24	33.485	32.02
LHV Fuel (kBTU/h)	1532838	1647385	834030	892304	2366868	2539689
HHV Fuel (kBTU/h)	1697016	1754687	923361	950424	2620377	2705111
Fuel Gas (KPPH)	77.03	0	41.92	0	118.95	0
Fuel Gas (MMSCFD)	39.55	0.00	21.52	0.00	61.07	0.00
Liquid Fuel (KPPH)	0	90.04	0	48.77	0	138.81
Liquid Fuel (GPM)	0	208.17	0.00	112.76	0.00	320.93
Water for Nox (KPPH)	0	72.03	0	39.01	0	111.04
Water for Nox (GPM)	0.00	143.94	0.00	77.96	0.00	221.90
Evap Cooling / Fogging (KPPH)	5.25	5.25	3.47	3.47	8.71	8.71
Evap Cooling / Fogging (GPM)	10.5	10.5	6.9	6.9	17.4	17.4

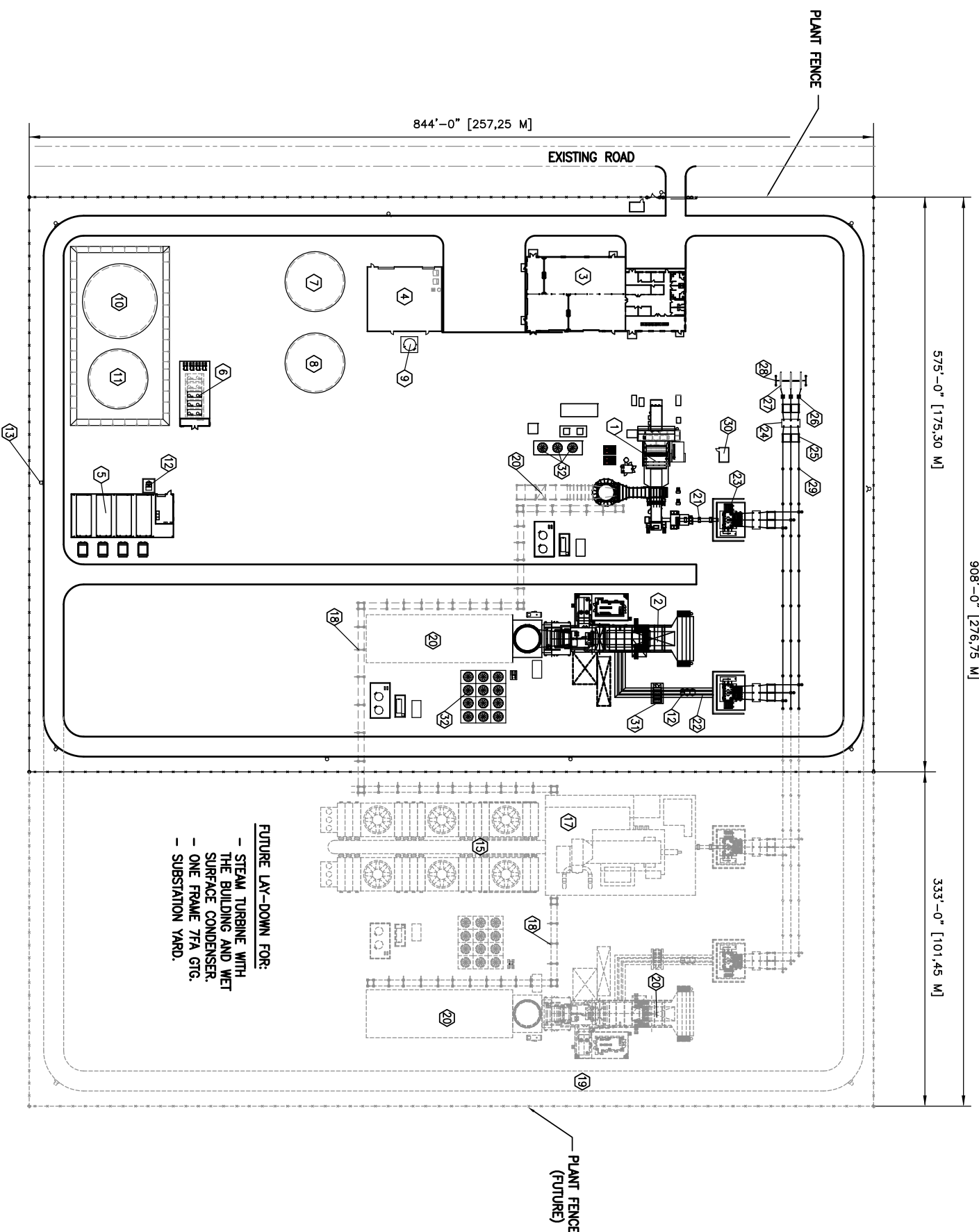
	GPM	GPD (24)	3 Day	5 Day
RAW Water Total	306	441134	1323402	2205670
Demin Water Total	239	344636	1033908	1723179
Liquid Fuel Total	321	462136	1386409	2310682

	7FA	7EA	Total
Fuel Gas Total (MMSCFD)	39.55	21.52	61.07

Section 5: Plant Drawings

Plot Plan	1002-10-001 Sh 1
Process Flow Diagram	1002-50-001 Sh 1
Process Flow Diagram	1002-50-001 Sh 2
Process Flow Diagram	1002-50-001 Sh 3
One Line Diagram	1002-60-001 Sh 1
One Line Diagram	1002-60-001 Sh 2





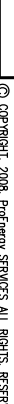
- ① G.E. FRAME 7EA GAS TURBINE GENERATOR.
- ② G.E. FRAME 7FA GAS TURBINE GENERATOR.
- ③ CONTROL/OFFICES/WAREHOUSE BUILDING.
- ④ WATER TREATMENT BUILDING.
- ⑤ GAS COMPRESSORS WITH SHED, FIN FANS, AND MCC ROOM.
- ⑥ CENTRIFUGE PACKAGE.
- ⑦ RAW WATER TANK.
- ⑧ DEMIN WATER TANK.
- ⑨ R.O. WATER TANK.
- ⑩ RAW DIESEL FUEL TANK.
- ⑪ TREATED FUEL TANK.
- ⑫ AUXILIARY TRANSFORMERS.
- ⑬ LIGHTING POLES.
- ⑭ ROAD.
- ⑮ WET SURFACE CONDENSER (FUTURE).
- ⑯ G.E. FRAME 7EA (FUTURE).
- ⑰ STEAM TURBINE GENERATOR WITH BUILDING (FUTURE)
- ⑱ PIPE RACKS (FUTURE).
- ⑲ ROAD (FUTURE).
- ⑳ HRSG. (FUTURE).
- ㉑ OVERHEAD CABLE TRAY.
- ㉒ ISO PHASE BUS.
- ㉓ STEP-UP TRANSFORMER.
- ㉔ SFB BREAKER.
- ㉕ DISCONNECT SWITCH.
- ㉖ CURRENT TRANSFORMER (TYPE CWT).
- ㉗ LIGHTNING ARRESTER.
- ㉘ DEAD END TOWER.
- ㉙ BUS SUPPORT.
- ㉚ SUBSTATION HOUSE.
- ㉛ GENERATOR BREAKER FOR 7FA.
- ㉜ L.O. FIN FAN COOLERS.

FUTURE LAY-DOWN FOR:

- STEAM TURBINE WITH THE BUILDING AND WET SURFACE CONDENSER.
- ONE FRAME 7FA GTG.
- SUBSTATION YARD.



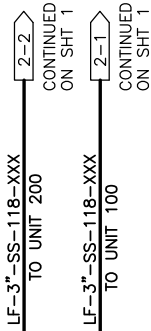
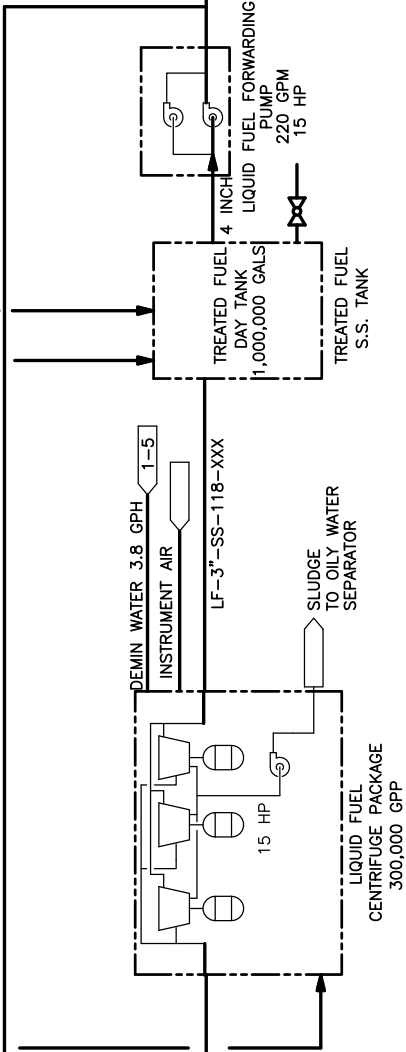
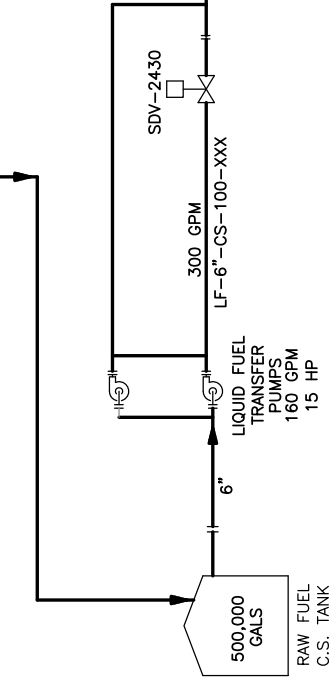
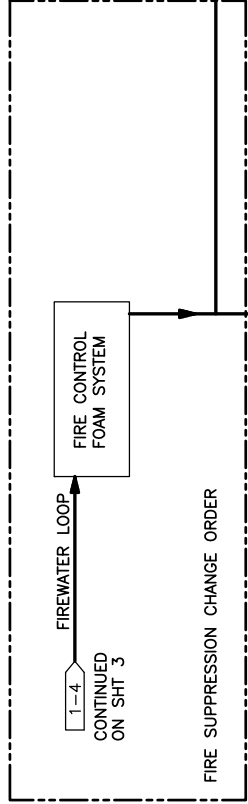
GRAPHIC SCALE

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<p>PROENERGY EPC SERVICES, LLC GENERAL ARRANGEMENT PLT PLAN (1) FRAME 7EA & (1) FRAME 7FA GTG UNITS, CVG POWER PLANT B</p>							
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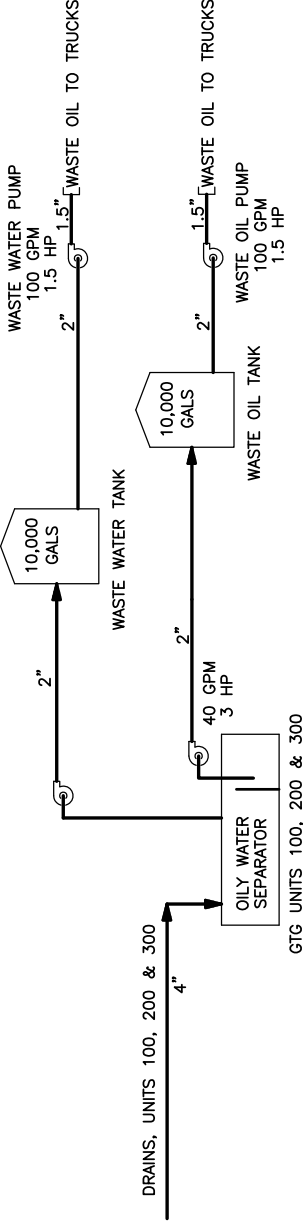
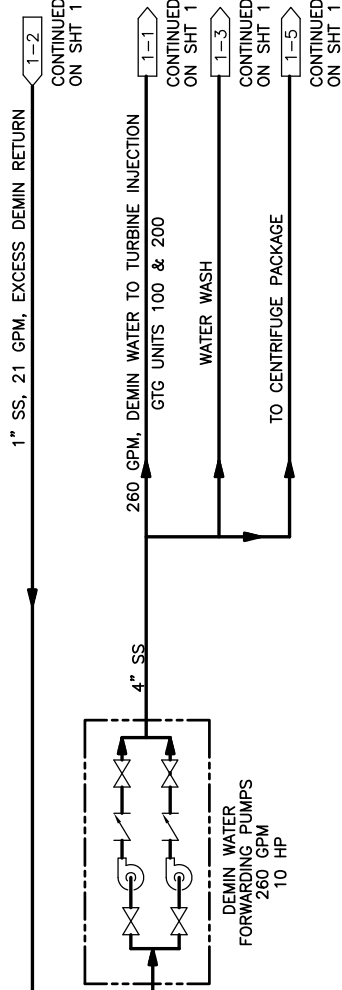
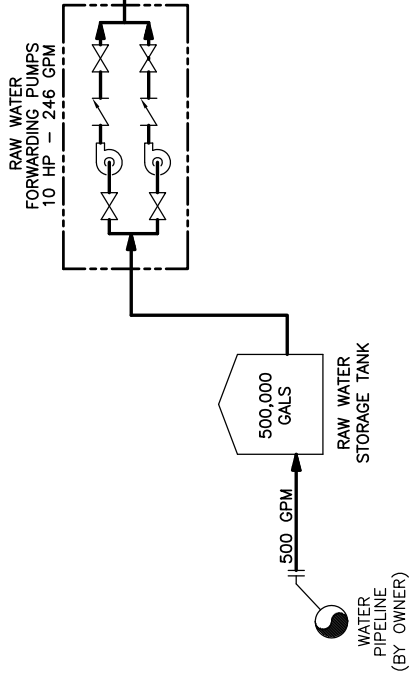
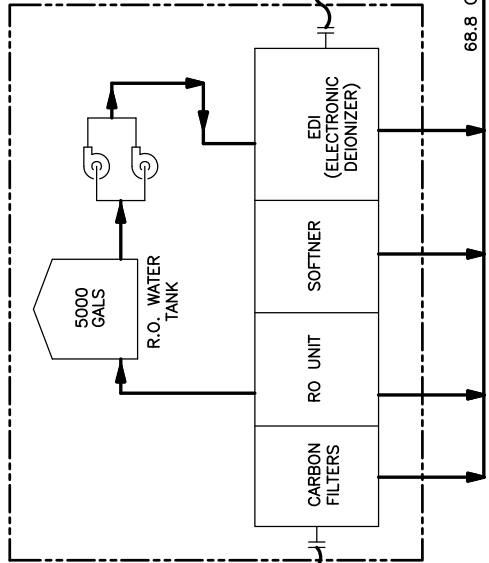
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DEMIN WATER
TREATING BUILDING & SKID



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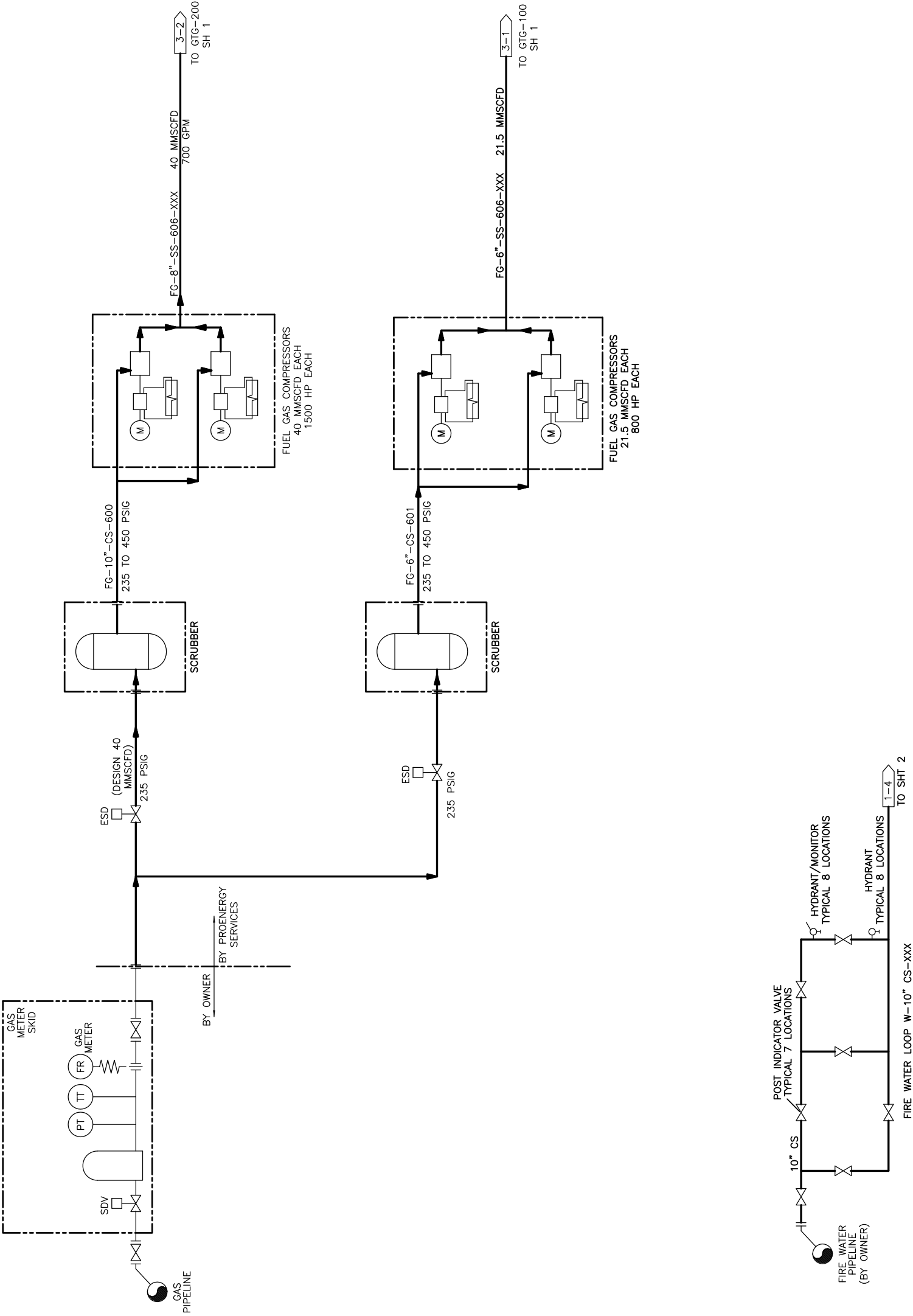
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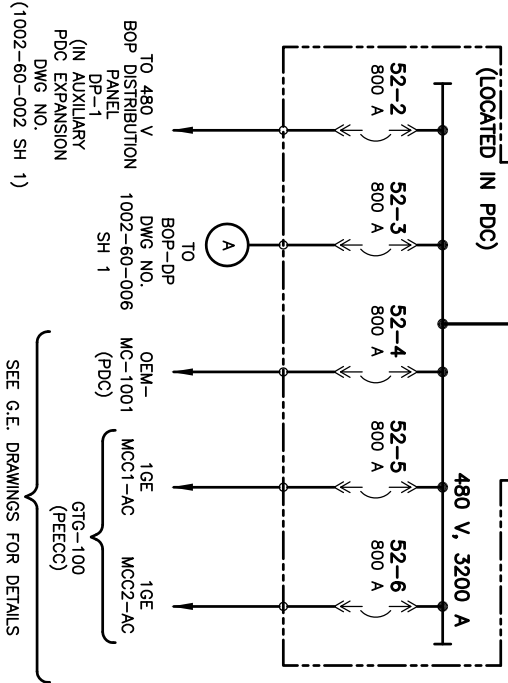
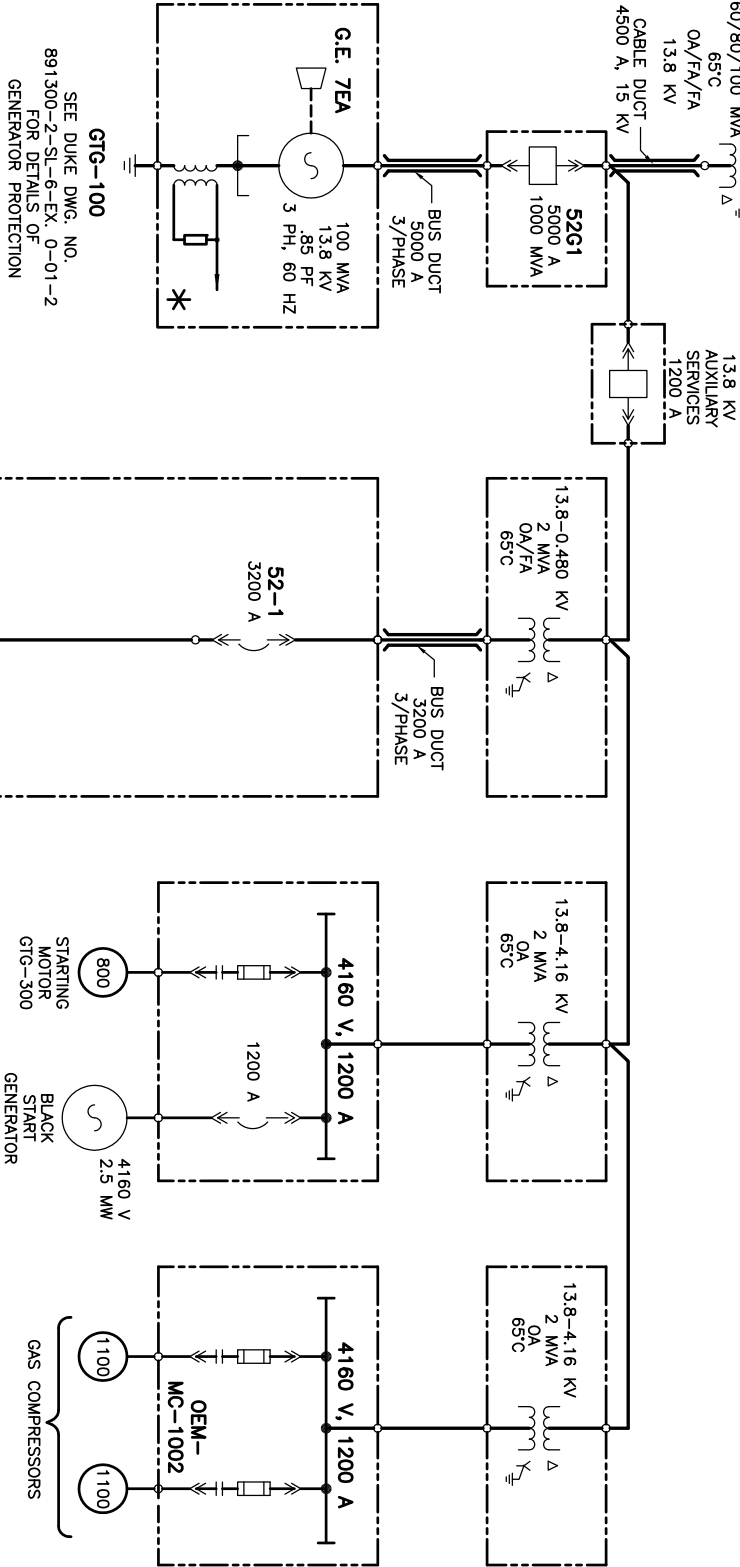
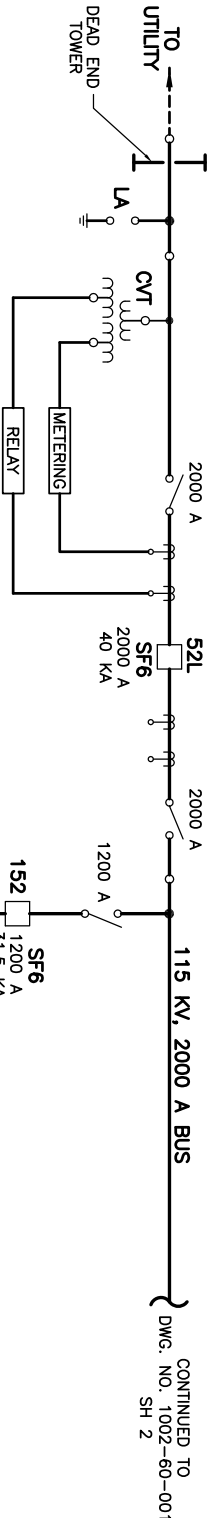


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ProEnergy EPC Services, LLC			
PROCESS FLOW DIAGRAM			
(1) FRAME 7EA & (1) FRAME 7FA GTG UNITS			
CVG POWER PLANT B			
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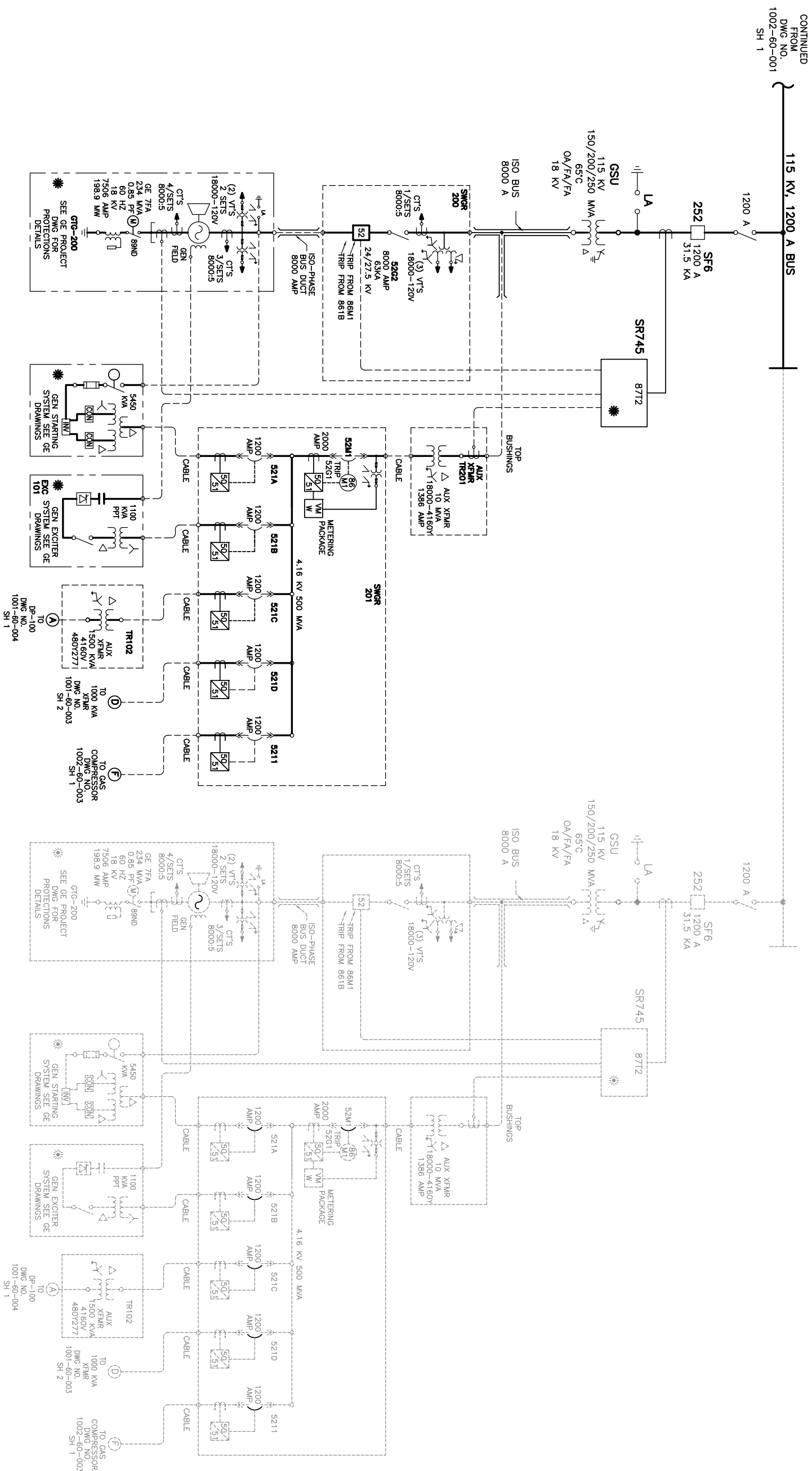


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*** INCLUDED IN GE PACKAGE**

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SIDOR	DWG NO.	SH NO.	REV
T1002	1002-60-001	2	A
VENUSULA			

Section 6.0 Schedule

CVG Steel mill
T1001 Timeline for Plant "B"
1-Frame 7FA and 1-Frame 7EA

