

# TECHNICAL SCOPE DOCUMENT

Presented To:



For:

## 2 x GE Frame 7FA's 340 MW ANACO Power Plant

By



Proposal T-1025 Rev. 0

September 7, 2010

This document is privileged and contains confidential information intended for use only by  
efacec

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## **Section 1.0 Introduction**

ProEnergy EPC Services (Contractor) is pleased to provide this Technical Proposal to install a nominal 340 MW Gas Turbine Simple Cycle Power Plant at the ANACO Plant Site. This turnkey proposal includes installing the following Owner supplied equipment:

- Two (2) gas fueled GE Frame 7FA gas turbine generator packages w/114.8 ft. exhaust stacks
- Two (2) 100% Capacity Fuel Gas Compressors manufactured by GEA

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

Contractor will furnish commissioning, start-up, and performance testing services for the Frame 7FA GTG's and associated Balance of Plant Equipment.

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

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## **Section 2.0 Scope of Work**

**The Scope of Work for this proposed project is outlined as follows:**

**2.1 Major Equipment** – The Owner will supply two (2) GE Frame VII FA Gas fueled Gas Turbine Generators with associated equipment. The power will supply the adjacent substation at 230KV.

The Frame VII FA is configured to operate on natural gas only which will be supplied to the plant at 250 PSIG. The Owner will furnish the following outlined associated equipment:

- .. Two PEEC Electrical Buildings
- .. Two Starting Transformers 18KV Primary
- .. Two Exhaust Stacks
- .. Two 100% Capacity Fuel Gas Compressors 250 psig to 500 psig

**2.2 The Contractor will provide the Balance of Plant which includes the following outlined list of major equipment:**

- .. Redundant Fuel Gas Filters
- .. Fuel Gas Compressor L.O. and Gas Discharge - Cooling Tower w/3 ea. 50% capacity circulation pumps
- .. Cleaning Owner provided 264,000 gallon Diesel Storage for use as Raw water/Firewater Storage Tank
- .. Water Treatment Systems (RO & EDI)
- .. Oily Water Drain System with Oily Water Separator
- .. One (1) diesel fueled 500KW Emergency Generator
- .. Control/Office Building
- .. Electric Utility Building
- .. Water Treatment/Firewater Pump/Warehouse Building
- .. Guard House
- .. Two 18KV Generator Breaker
- .. Two Sets of 18KV ISO Phase Bus Ducts
- .. Two Aux Transformer 18KV / 4.16KV 15 MVA

**2.3 The Contractor will furnish the Engineering and Detailed Design of the facility including Civil, Foundations, Structural, Mechanical, Electrical, Instrumentation, and Control System.**

**2.4 The Contractor will furnish the equipment and materials including installation of same as follows:**

- .. Site Preparation, Foundations, Gravel, Roads, Parking, and Fencing
- .. Mechanical installation of the various items of equipment with pipe, valves, fittings, supports, etc
- .. Electrical Installation of the various items of equipment with cabling, conduit, duct banks, etc.
- .. Contractor will install Owner supplied buildings including the PEEC Buildings
- .. Contractor will furnish and install Control/Office Building
- .. Contractor will furnish and install Water Treatment/Firewater Pump/Warehouse Building
- .. Contractor will furnish and install an Electric Utility Building

2.5 In addition to the above the Contractor will supply:



- .. Project Management, QA/QC, Safety, and Training
- .. Plant Commissioning and Start Up
- .. Plant Performance and Reliability Testing
- .. Furnish Plant Documentation including Vendor Information, Warranty, Engineering
- .. Calculations, O&M Manuals, and As Built Drawings.



Contractor will furnish commissioning, start-up, and performance testing services for the Frame 7FA GTG's.

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### Section 3.0 Division of Responsibility and Equipment Supply Matrix



Material/Responsibility	Qty	Description
Owner	2	GE Frame VII FA Gas Turbine Generators with associated equipment as outlined by GE Scope of Supply
	2	GE Frame VII FA Exhaust Stacks
	2	100% Capacity Fuel Gas Compressors
	1	Raw Water Storage & supply to Plant Boundary Limits
	1	Lot Water for construction, commissioning, and start up
	1	Lot Permits for Environmental, Building, Construction, etc.
	1	Lot access roads to site
	1	Lot of Fuel Gas for commissioning and start up
	1 Lot	230 KV Substation including 18 KV/230KV GSU's, etc.
	1	Lot of Electrical Power for construction, commissioning and start-up
	1	Construction Lay Down Area
	1	Lot Import Duties and Taxes
Contractor		<u>Civil / Structural</u>
	1	Lot Site Preparation, Rough Grading, and final grading
	1	Lot Concrete Foundations
	1	Lot Structural Steel Pipe Racks, Stairs, Walkways, and Bus Supports
		<u>Buildings</u>
	1	Control / Office Building
	1	Water Treatment / Firewater Pump/Warehouse Building
	1	Electric Utility Building
	1	Guard House
		<u>Mechanical Equipment and Materials</u>
	2	Fuel Gas Filter Regulator Skids
	2	Duplex Filter Coalescer Skids
	1	Fuel Gas ESD Valve
	2	Fuel Gas metering flow transmitter
	1	Fuel Gas Scrubber
	1	Fuel Gas Electronic Check Meter
	1	Fuel Gas Compressor Cooling Tower (LO & Fuel Cooling)
	3	50% capacity Cooling Water circulation pumps
	1	Water Treatment System w/ RO and EDI
	1	Duplex Raw Water Forwarding Pump Skid
	1	Duplex Demin Water Forwarding Pump Skid
	2	Duplex Demin Filter Skids

- 1 RO Water Tank
- 1 Demin Water Tank
- 1 Fire Water Skid w/ three pumps
- 1 Lot underground Fire Water Piping, Monitors, Hydrants, etc.
- 1 Duplex Instrument / Service Air Compressor with Dryers, Tanks etc.
- 1 Oily Water Drain System 
- 1 Oily Water Separator 
- 1 Waste Oil Tank
- 1 Waste Oily Water Tank
- 1 Waste Oil Pump
- 1 Waste Oily Water Pump
- 1 Diesel Fuel Tank
- 1 Emergency Diesel Generator 500 KW


#### Electrical Equipment and Materials

- 2ea 18KV Generator Circuit Breakers 
- 2ea Sets 18KV ISO Phase Bus
- 2ea Aux Transformers 18KV/4.16KV 15 MVA
- 2ea 4.16 KV Switchgear
- 1ea 4.16 KV MCC Gas Compressors
- 4ea Aux Transformer 4.16 KV/480 volt
- 3ea DP Panels 480 volt
- 2ea BOP MCCs 480 volt
- 1 Lot Area Lighting
- 1 Lot Plant Grounding
- 1 Lot Cathodic Protection
- 1 Lot Lightning Protection
- 1 Set BOP 125 VDC Batteries and Charger
- 1 125 VDC DP Panel
- 1 Lot 15KV, 4.16KV, 480V Cabling, Conduit, Tray and Duct Banks

#### Instrumentation and Controls

- 1 Lot Plant Instrumentation
- 1 Lot Fiber Optic Communication Cabling System to interconnect Telephones and DCS Systems 
- 1 Plant DCS System 

#### Construction

- 1 Lot Construction Tools, Rental Equipment, and Cranes 
- 1 Lot Local Subcontractors Civil, Mechanical, Electrical
- 1 Lot Temporary Electrical Power Distribution
- 1 Lot Transportation of Contractor Supply Equipment and Materials
- 1 Lot Lubricants, Chemicals, and Filters plant commissioning

1 Lot BOP Start Up Spares



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## SECTION 4     DESIGN CONDITIONS

### 4.1     Design Basis

<b>Design Conditions</b>	<b>2 x Fr 7FA</b>
Site Elevation	732 ft.
Average Temperature	80°F
Relative Humidity	77 %
Average annual precipitation	50.3 in.
Seismic Zone	4
Wind Speed	75 mph
Minimum Gas Pressure	247 psig
Plant Fuel Consumption Rate (2) Frame 7FA	84 MCFD Natural Gas*
High Voltage Interconnect	18KV Terminals of 18KV/230 KV GSU's
Demin Water Storage	5,000 Gallon SS Tank by Contractor
Demin Water Required	15 gpm per GTG water wash only
Instrument Air System	185 SCFM by Contractor
Waste Oil Storage	10,000 Gallons by Contractor
Waste Water	Pump to Owner for disposal
Raw/Firewater Water Storage	264,000 Gallon CS Tank Existing
Diesel Tank	5,000 Gallon
Diesel Fueled Emergency Generator	500 KW
R.O. Water Storage Tank	3,000 Gallon

\*assumes 900 – 1050 Btu/Scf natural gas quality

### 3.2 Interconnect Points

Natural Gas at min. 247 psig	Owner to provide interconnection point to the Plant Battery Limits.
Plant Waste Water	Owners water disposal.
Plant Waste Oil	Owners Truck disposal
18 KV	Frame 7FA GSU terminals adjacent to plant
Telephone	Plant Battery Limits by Owner
Raw Water Supply	Plant Battery Limits by Owner.

## SECTION 5 EXPECTED PERFORMANCE

### ANACO

#### Power Plant

Site Elevation

**(2) GE Frame FA**

Design Temperature

732 Feet

Relative Humidity

80 F

#### Simple Cycle

79%

ID GTPRO

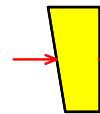
172

	<b>(2) Frame FA</b>
	<b>Fuel Gas</b>
Gross Power KW	344231
Net Power KW	339033
Aux & Losses KW	5196
LHV Gross Heat Rate (BTU/kWh)	9265
LHV Net Heat Rate (BTU/kWh)	9407
LHV Gross Electric Eff %	36.83
LHV Net Electric Eff %	36.27
LHV Fuel (kBTU/h)	3189288
HHV Fuel (kBTU/h)	3530884
Fuel Gas (KPPH)	160.3
Fuel Gas (MMSCFD)	82.30

#### NOTE:

ProEnergy does not guarantee the results showing in this table,  
This is typical for a Frame 7FA. If the Owner wants more precise results,  
GE should be contacted for this information

14.7 p  
59 T  
60 %RH  
3461 m  
0 ft elev.



14.55 p  
59 T  
3461 m

Natural gas 80.14 m  
LHV 1594644 kBTU/h  
77 T

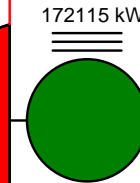


121 T

1X GE 7241FA

226 p  
723 T

214.7 p  
2423 T



172115 kW

3541 m

2 X GT  
14.88 p  
1120 T  
7081 M

Net Power 339033 kW  
LHV Heat Rate 9407 BTU/kWh

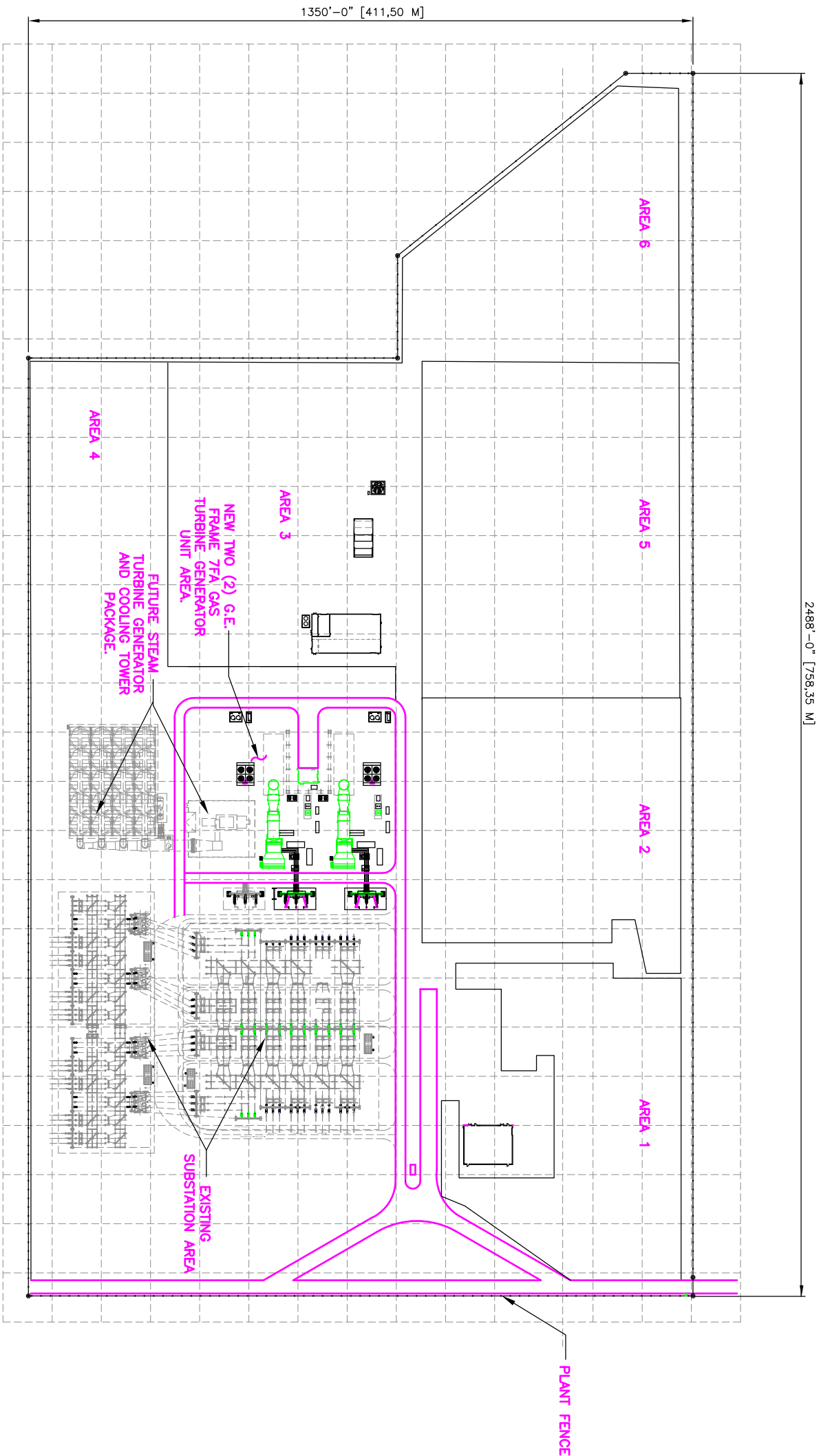
74.51 %N2  
12.56 %O2  
3.815 %CO2  
8.217 %H2O  
0.8957 %Ar

## **SECTION 6     PLANT DRAWINGS**

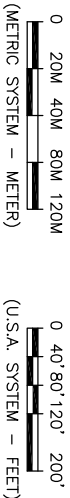
<b>Plot Plan:</b>	<b>Overview</b>	<b>1025 – 10001 Sh 1</b>
	<b>Plot Plan</b>	<b>1025 - 10002 Sh 1</b>

<b>Process Flow Diagrams:</b>	<b>1025 – 50001 Sh 1</b>
	<b>1025 – 50001 Sh 2</b>

<b>Electric One Line Diagrams:</b>	<b>1025 – 60000 Sh 1</b>
	<b>1025 - 60001 Sh 1</b>
	<b>1025 - 60002 Sh 1</b>
	<b>1025 - 60002 Sh 2</b>
	<b>1025 - 60004 Sh 1</b>
	<b>1025 - 60004 Sh 2</b>
	<b>1025 - 60005 Sh 1</b>
	<b>1025 - 60005 Sh 2</b>
	<b>1025 - 60006 Sh 1</b>
	<b>1025 - 60007 Sh 1</b>
	<b>1025 - 60008 Sh 1</b>
	<b>1025 - 60009 Sh 1</b>
	<b>1025 – 60010 Sh 1</b>
	<b>1025 - 60011 Sh 1</b>



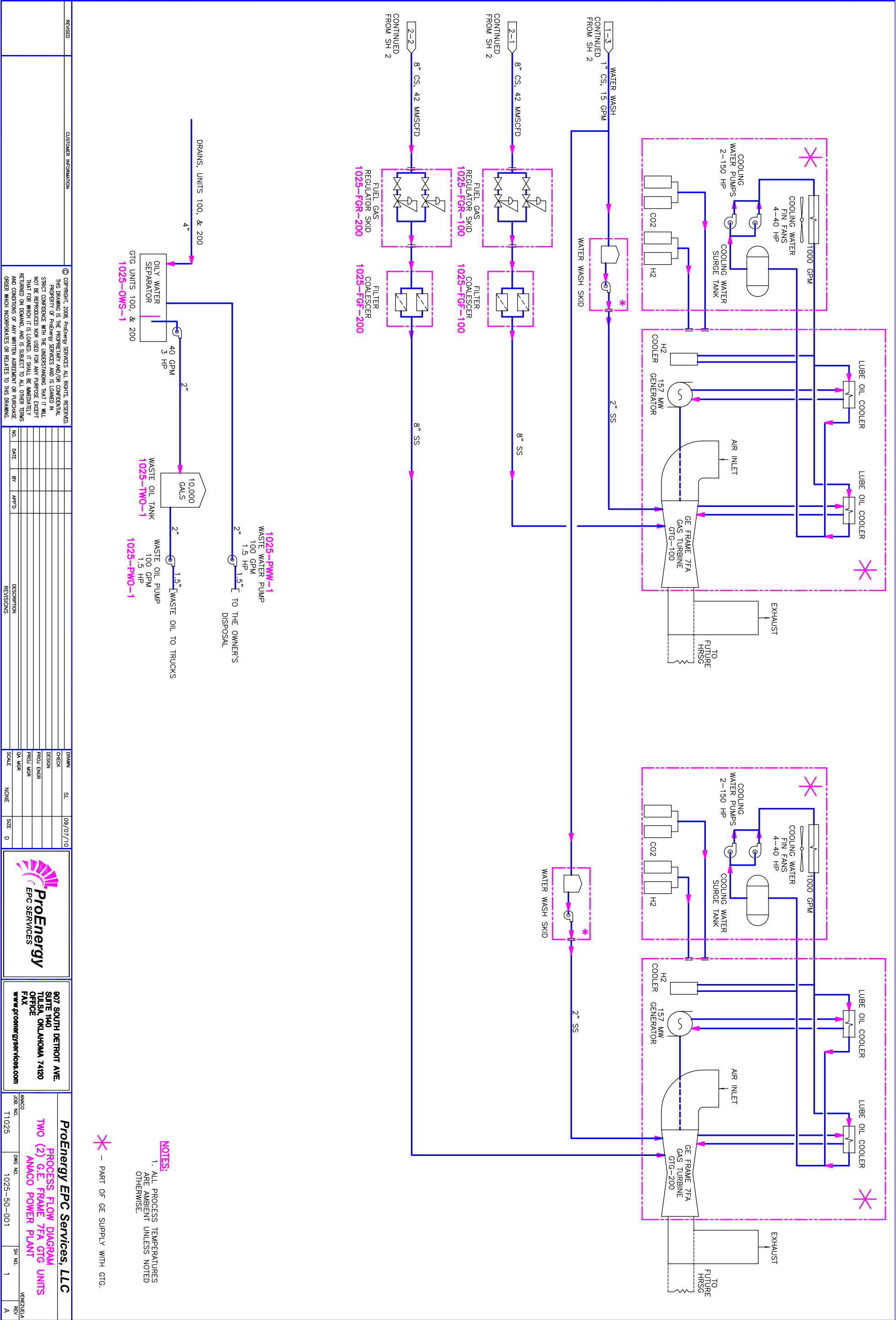
- THE GRID IS A 100 FEET [30.48 M] SQUARE.  
- REFER TO DWG. NO. 1025-10-002 SH 1 FOR  
GENERAL ARRANGEMENT PLOT PLAN DETAILS.



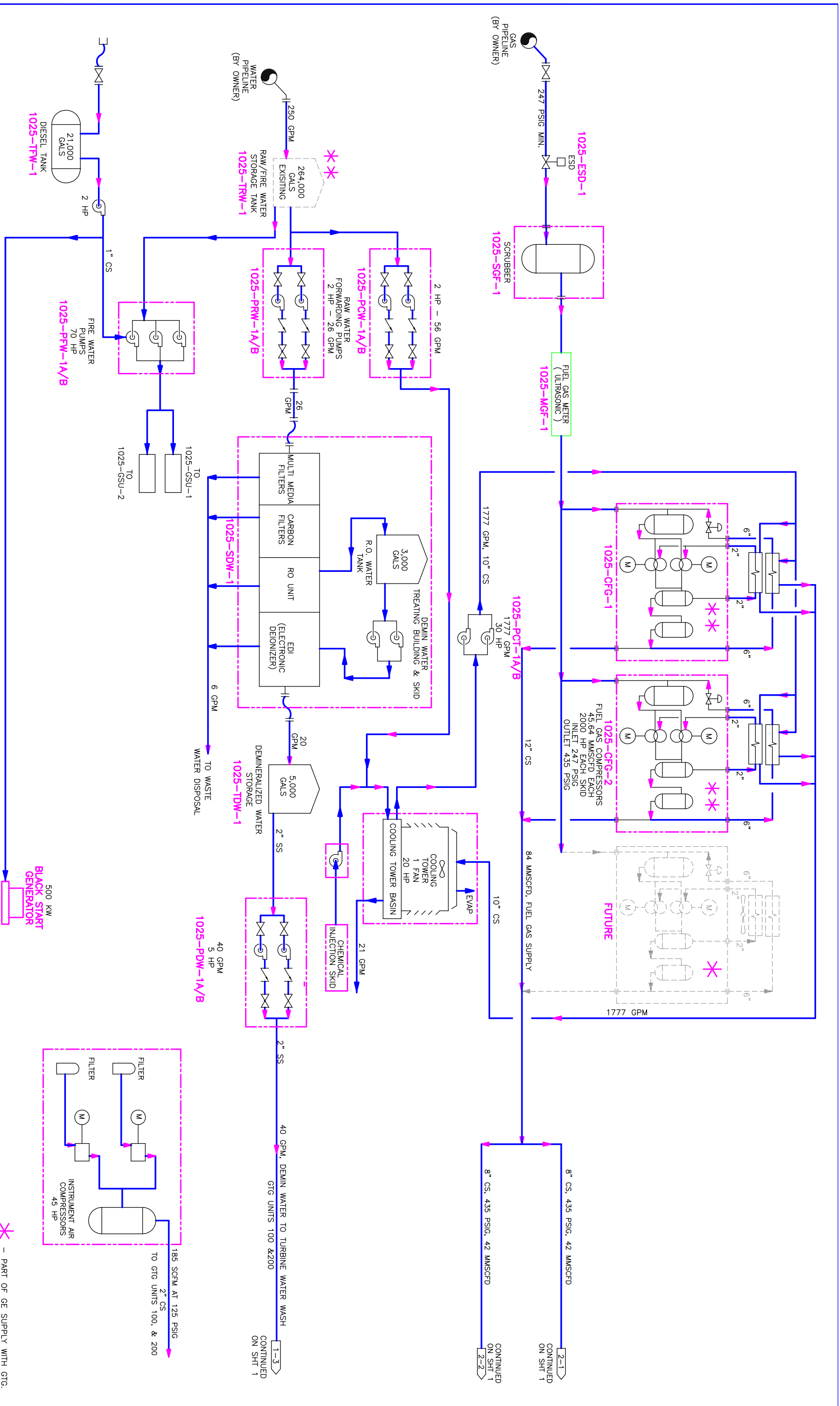
GRAPHIC SCALE

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ProEnergy EPC Services, LLC										SITE OVERVIEW PLOT PLAN									
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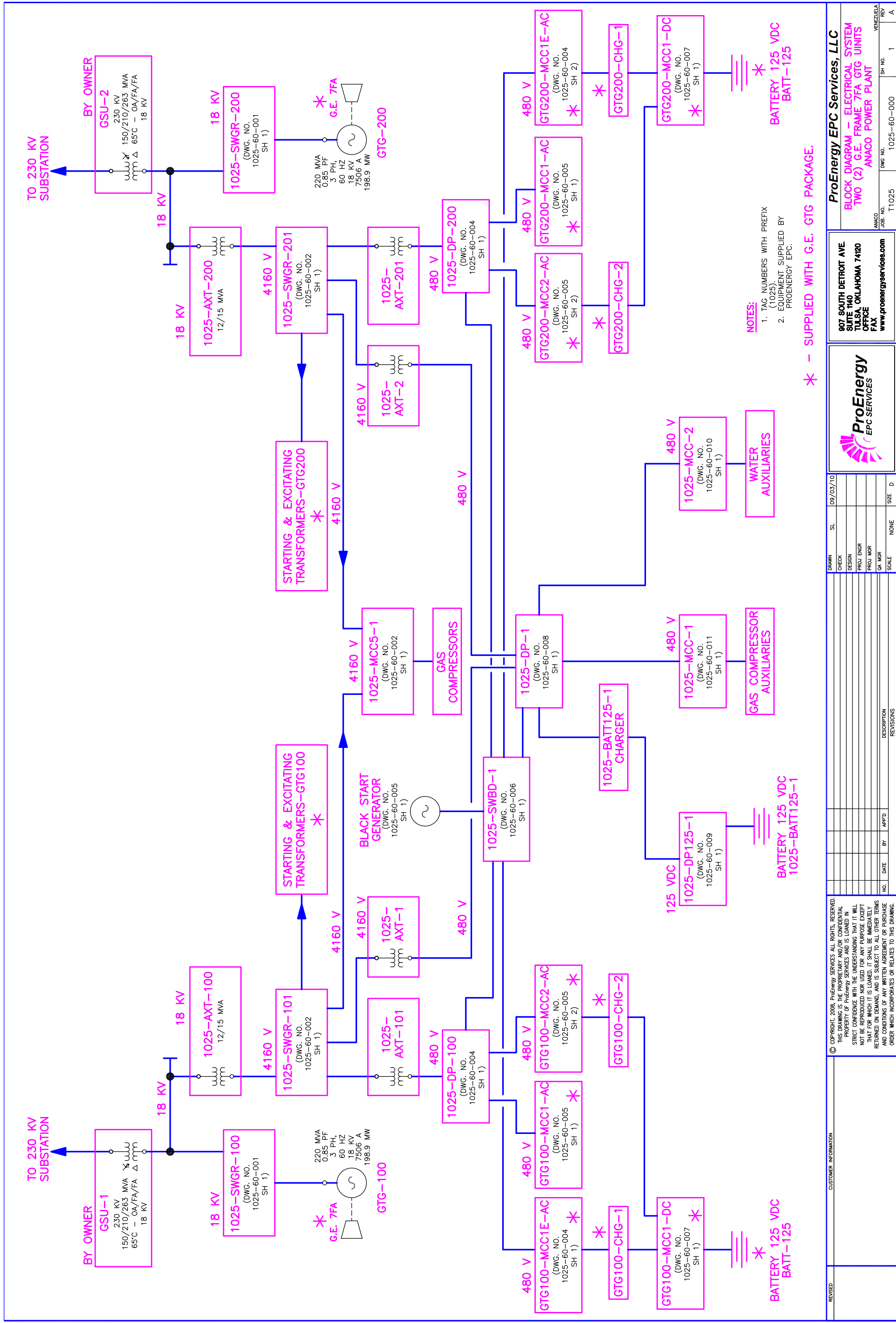




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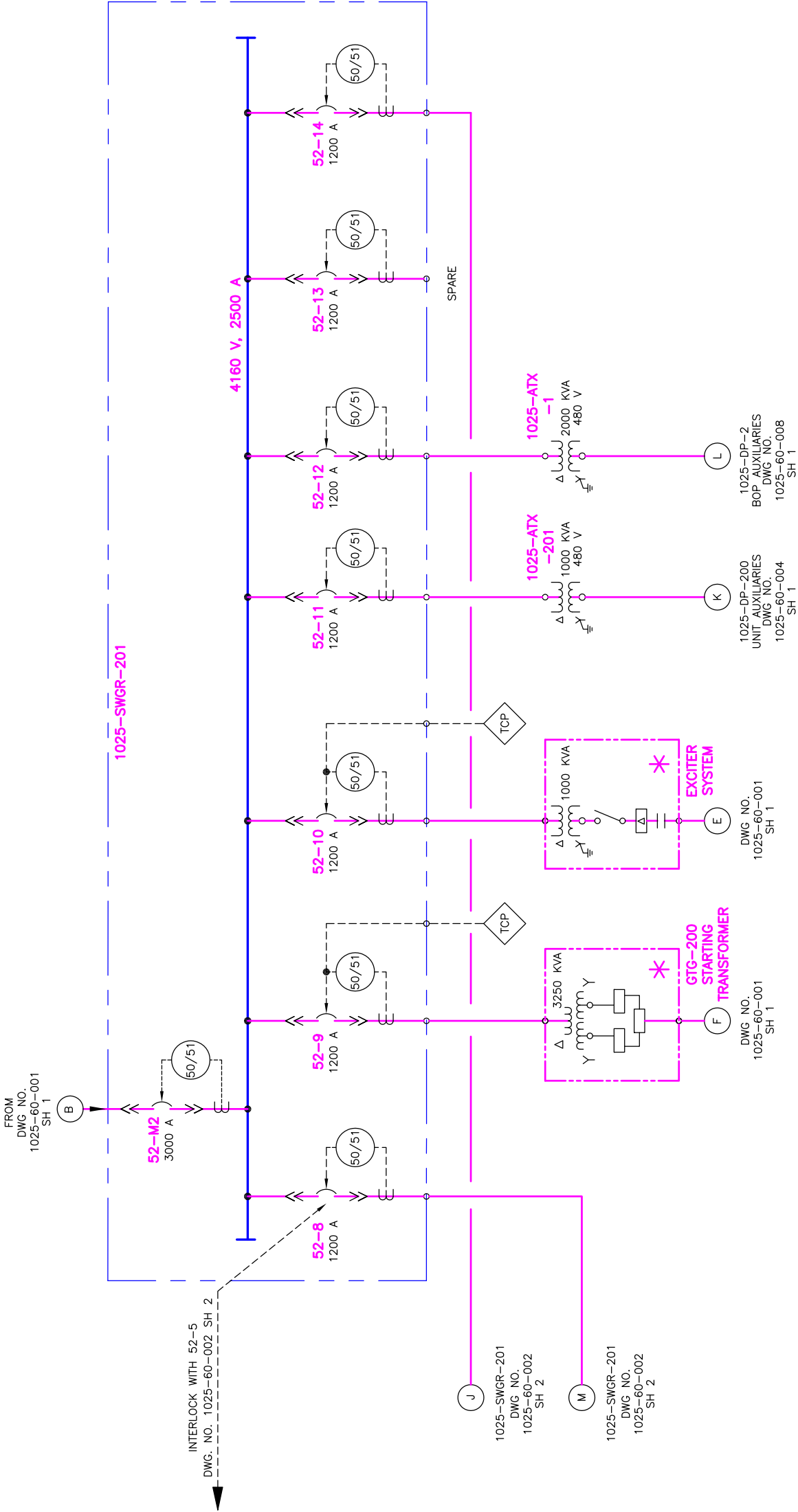
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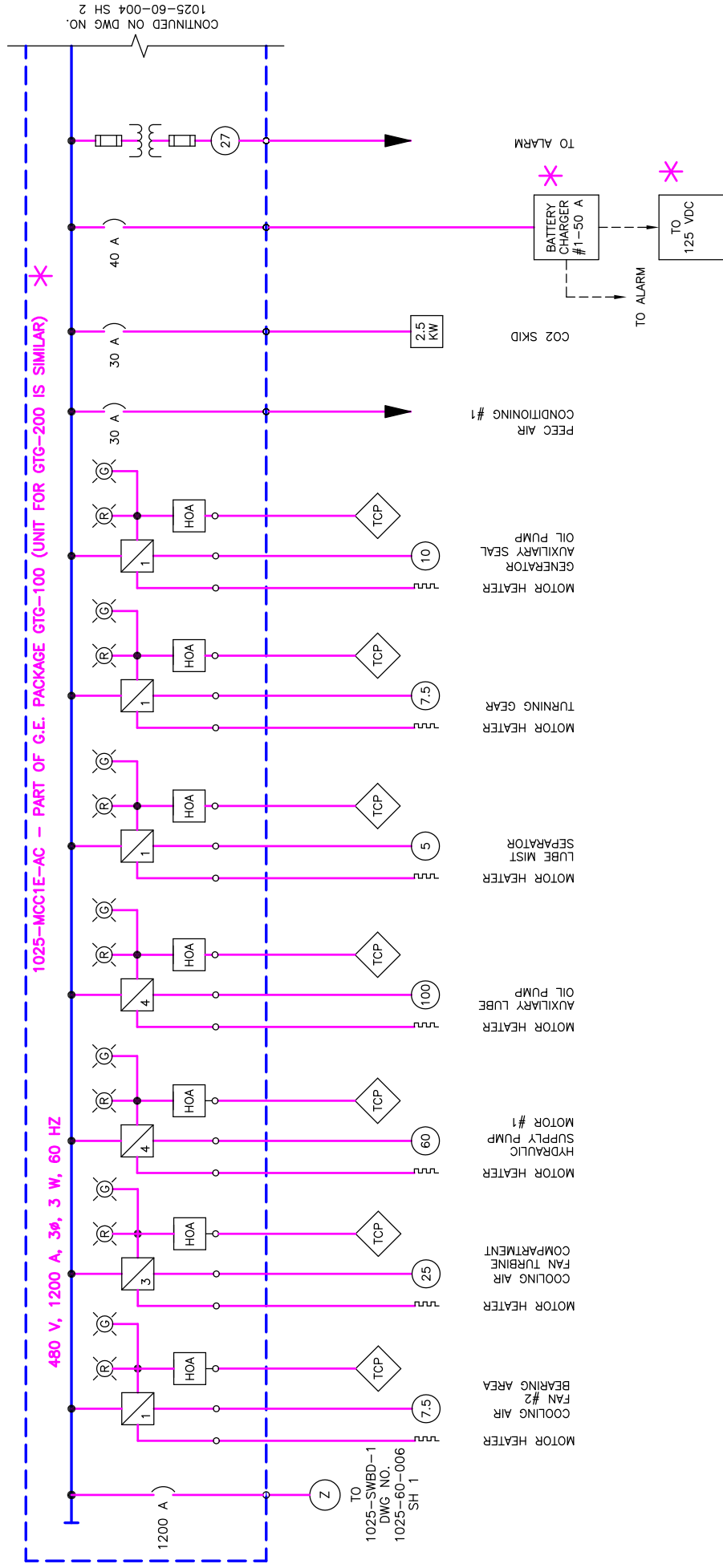
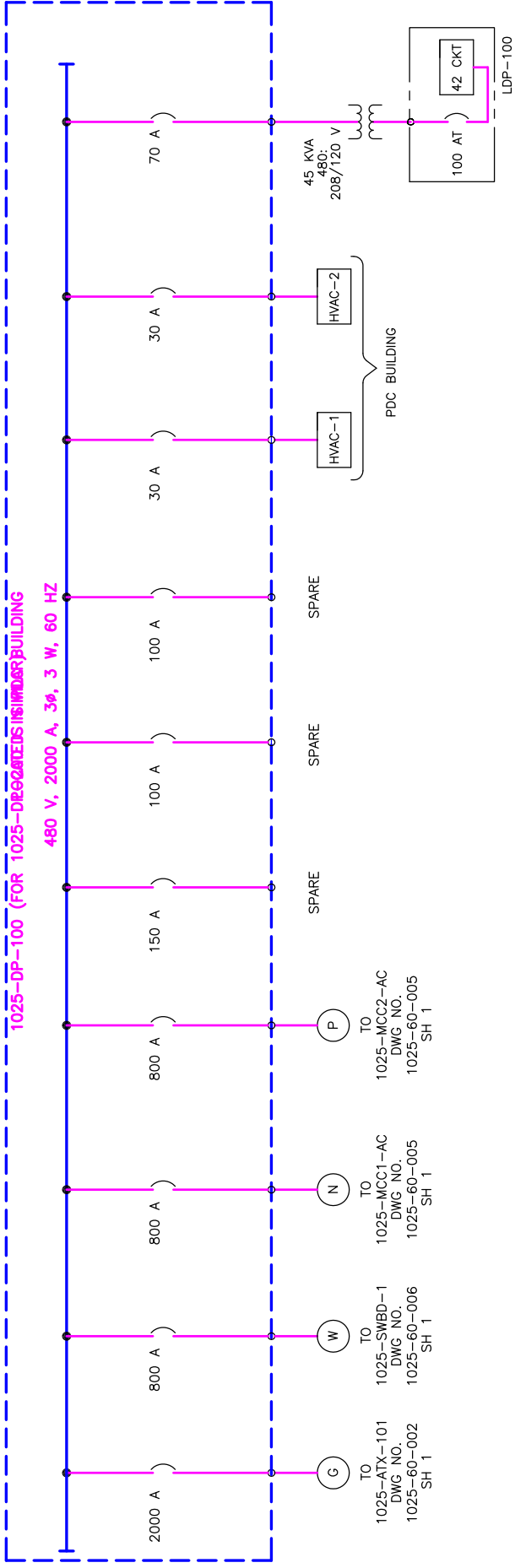




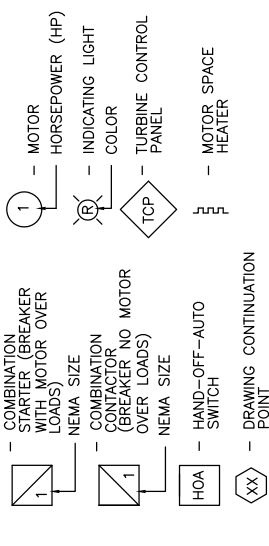


\* - SUPPLIED WITH G.E. GTG PACKAGE.

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**LEGEND:**



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TWO IDENTICAL UNITS REQUIRED



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TULSA, OKLAHOMA 74120  
OFFICE  
FAX  
[www.proenergyservices.com](http://www.proenergyservices.com)**

***ProEnergy EPC Services, LLC***

ONE LINE DIAGRAM-PDC-L.V. DISTRIBUTION  
TWO (2) G.E. FRAME 7FA GTG UINITS  
ANACO POWER PLANT

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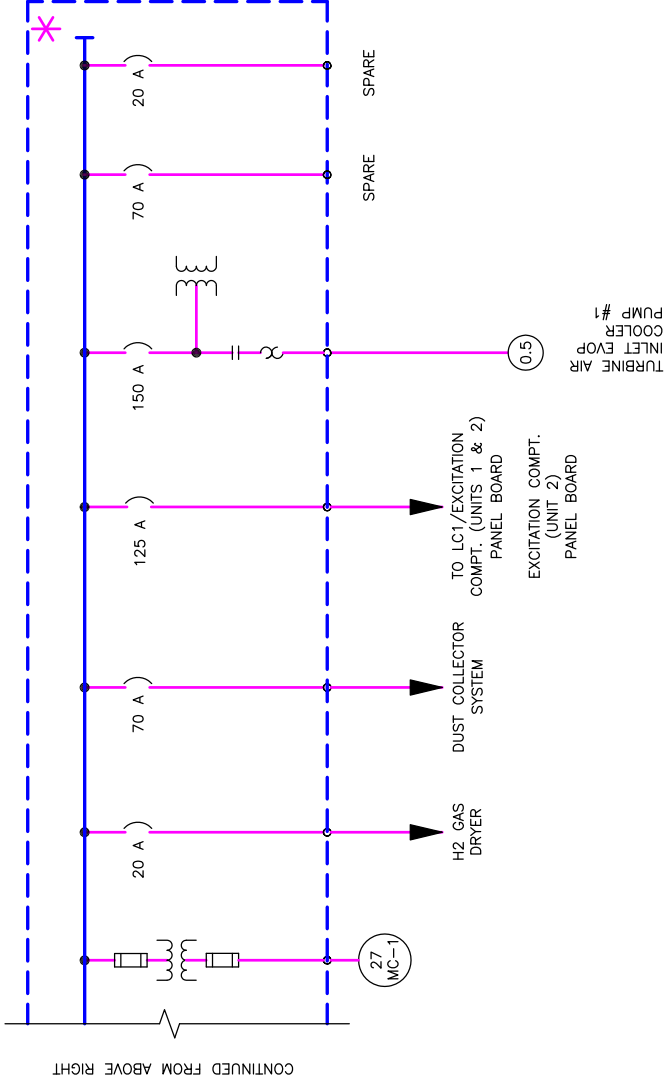
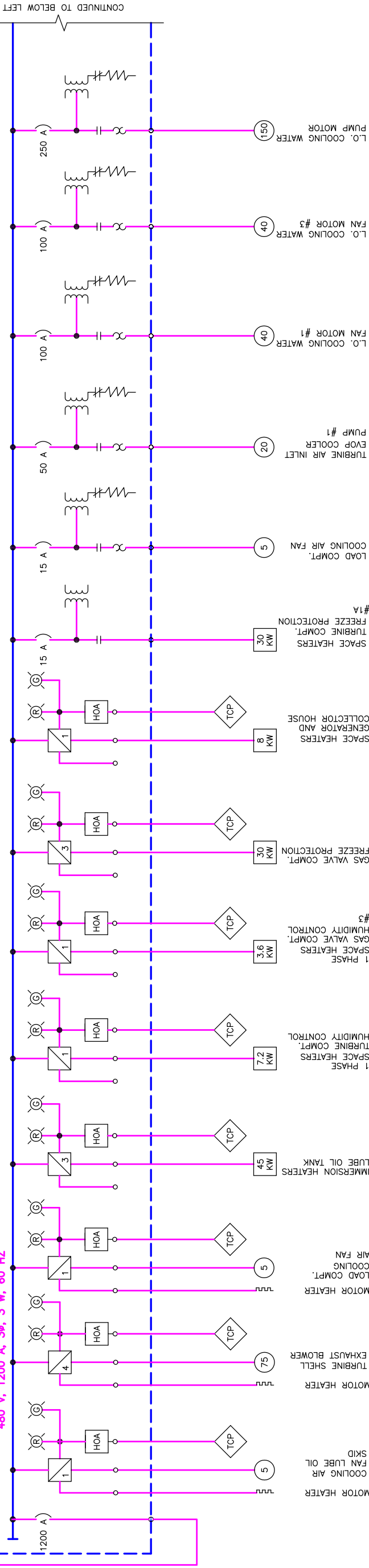


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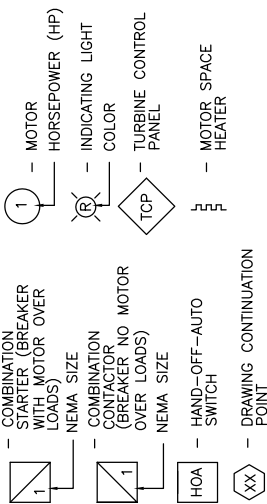
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480 V, 1200 A, 3ø, 3 W, 60 HZ

1025-MCC1-AC - PART OF G.E. PACKAGE GTG-100 (UNIT FOR GTG-200 IS SIMILAR) - LOCATED IN PECC BUILDING




LEGEND:



TWO INDENTICAL UNITS REQUIRED

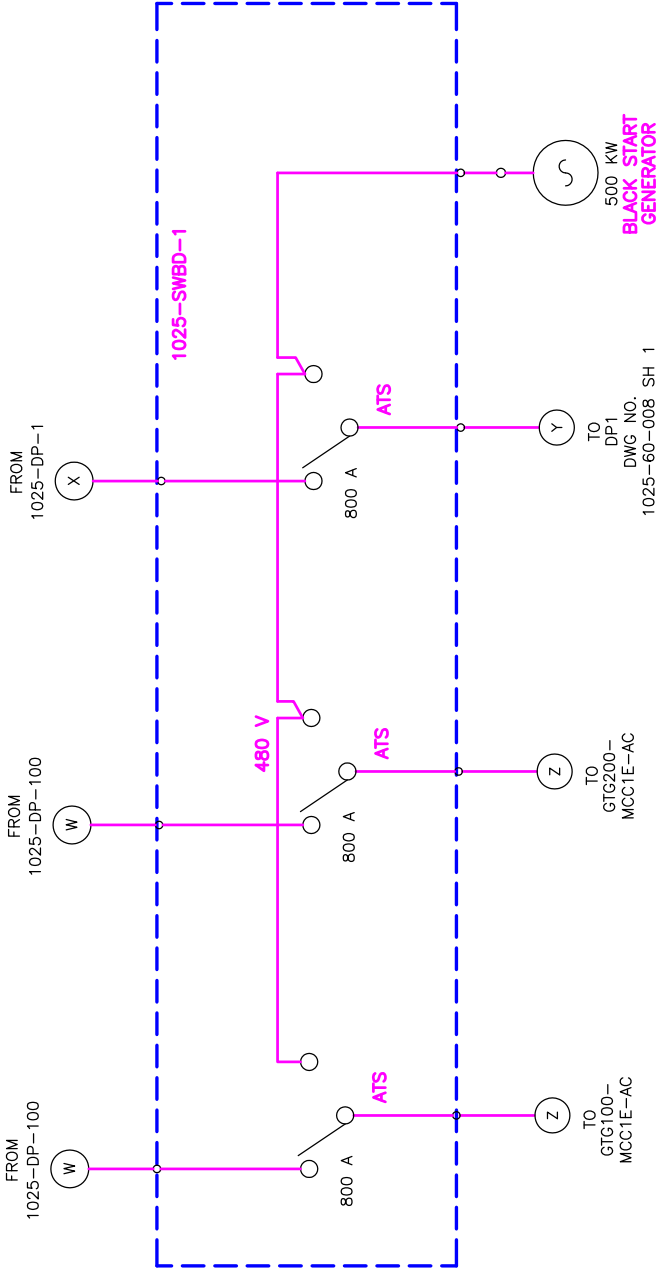
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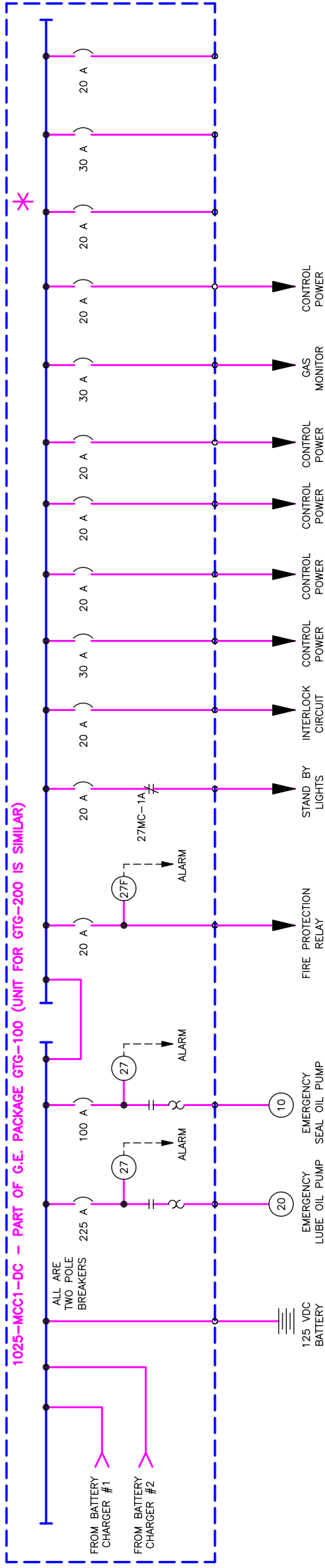




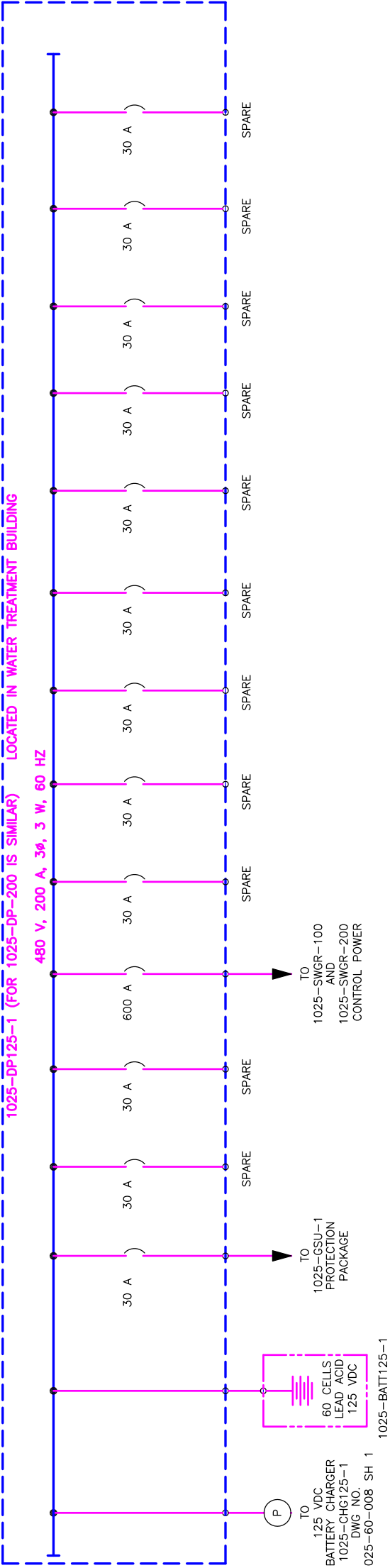
NOTES:

ATS – AUTOMATIC TRANSFER SWITCH.

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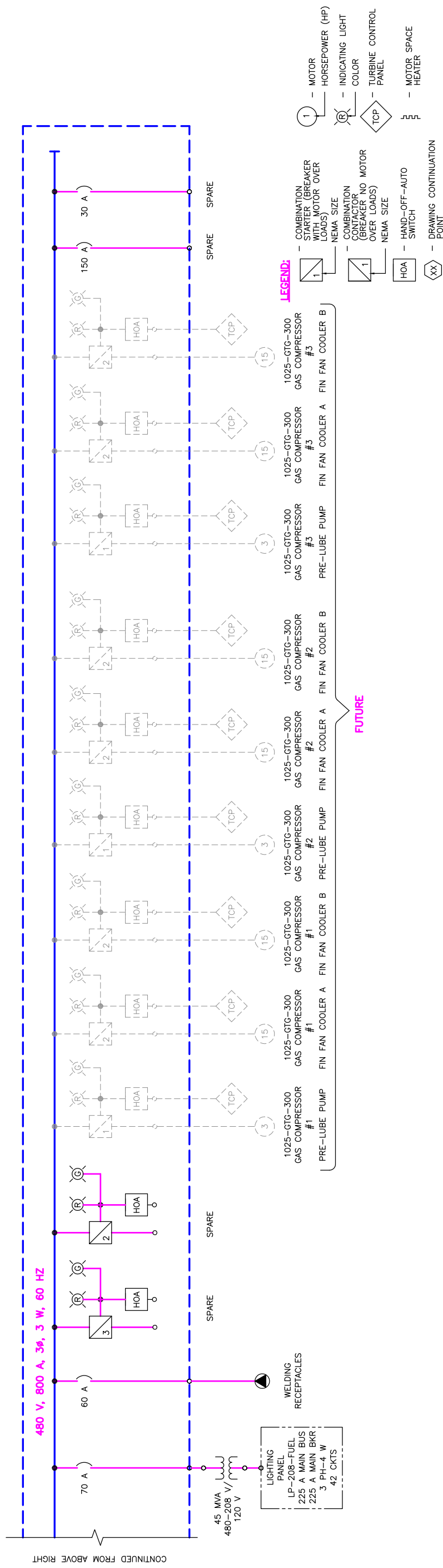
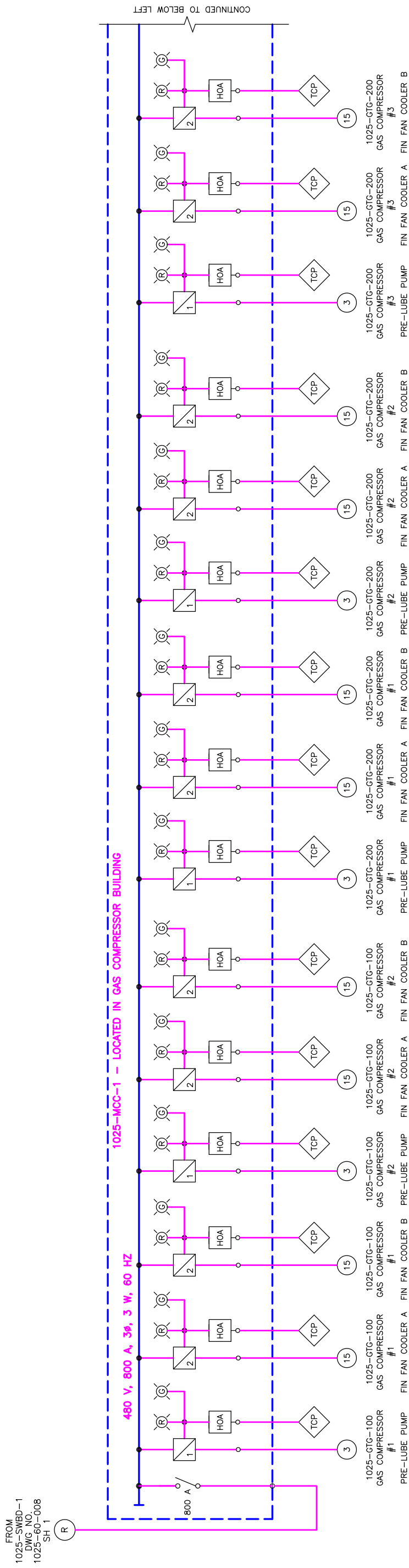






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