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Glenarm Repowering Project
OTSG Erection

James Tong
January 8, 2014

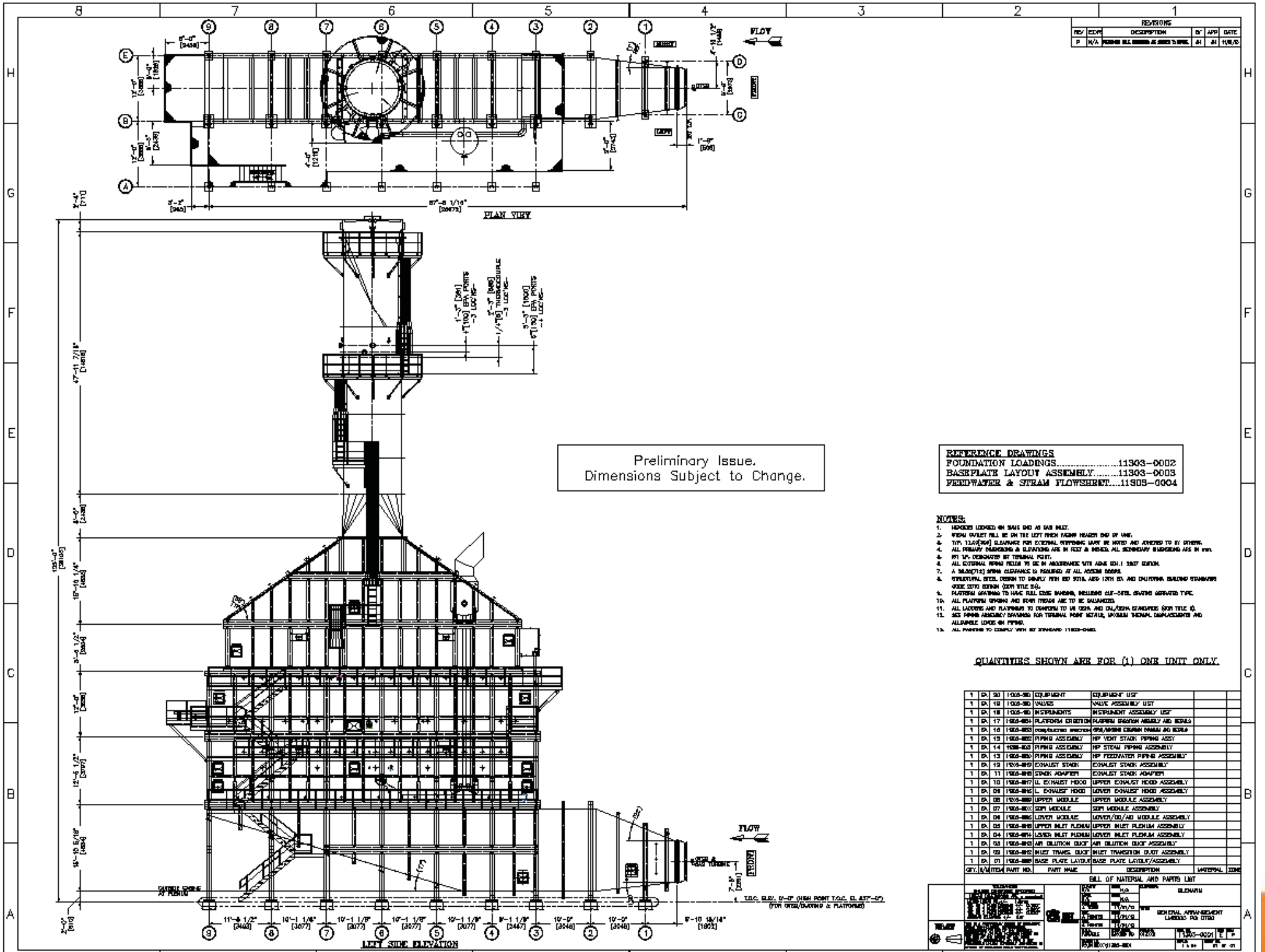
Agenda

- General Arrangement Overview
- OTSG Module Details
- 3D View of OTSG
- Flowsheet Overview
- Erection Sequence
  - Baseplate Assemblies
  - Inlet Plenum
  - Erection Plate Installation
  - OTSG Modules
  - Exhaust Hood
  - Exhaust Stack
  - Inlet Transition Duct
  - Expansion Joint

Agenda

- Erection Sequence (Continued)
  - Pressure Part Support (Top Support Beams)
  - Internal Joint Welding and JAK Installation
  - Internal Restraint Adjustment
  - Platform Steel and SRV Silencer Installation
  - Boiler External Piping Installation
  - “Jumper” Tube Installation
  - Instrumentation and Thermocouple Installations
- Questions / Discussions

Preliminary General Arrangement / Shipping Pieces



OTSG Details

OTSG Mechanical Data: LM6000 PG

For Information Only. May be changed during contract stage

Overall Length, ft	88.60	
Overall Width, ft	12.95	
Overall Height, ft	125.00	
Overall Weight, lbs	884,149	
Number of pressure part modules per OTSG	2	
	Upper Module	Lower Module
OTSG Module Length, ft	54.74	61.47
OTSG Module Width, ft	12.95	12.95
OTSG Module Height, ft	8.53	9.56
OTSG Module Weight, lbs	301,291	194,422
Effective Net Surface Area, ft^2	231,436	
Number of Circuits per Module	41	
Tubes per Circuit	38	
Total Number of Tubes	1,558	
Transverse Pitch, inches	2.75	
Longitudinal Pitch, inches	2.38	
Effective Finned Tube Length, ft	42.73	
Tube Diameter, inches	0.75 / 1.0 / 1.25	
Tube Wall Thickness, inches	As req'd	
Fin Material	As req'd	
Fin Pitch, fins per inch	As req'd	
Fin Height, inches	As req'd	
Fin Thickness, inches	As req'd	

Approximate Exterior Dimensions & Weights (Please refer to attached drawing for referenced dimensions)

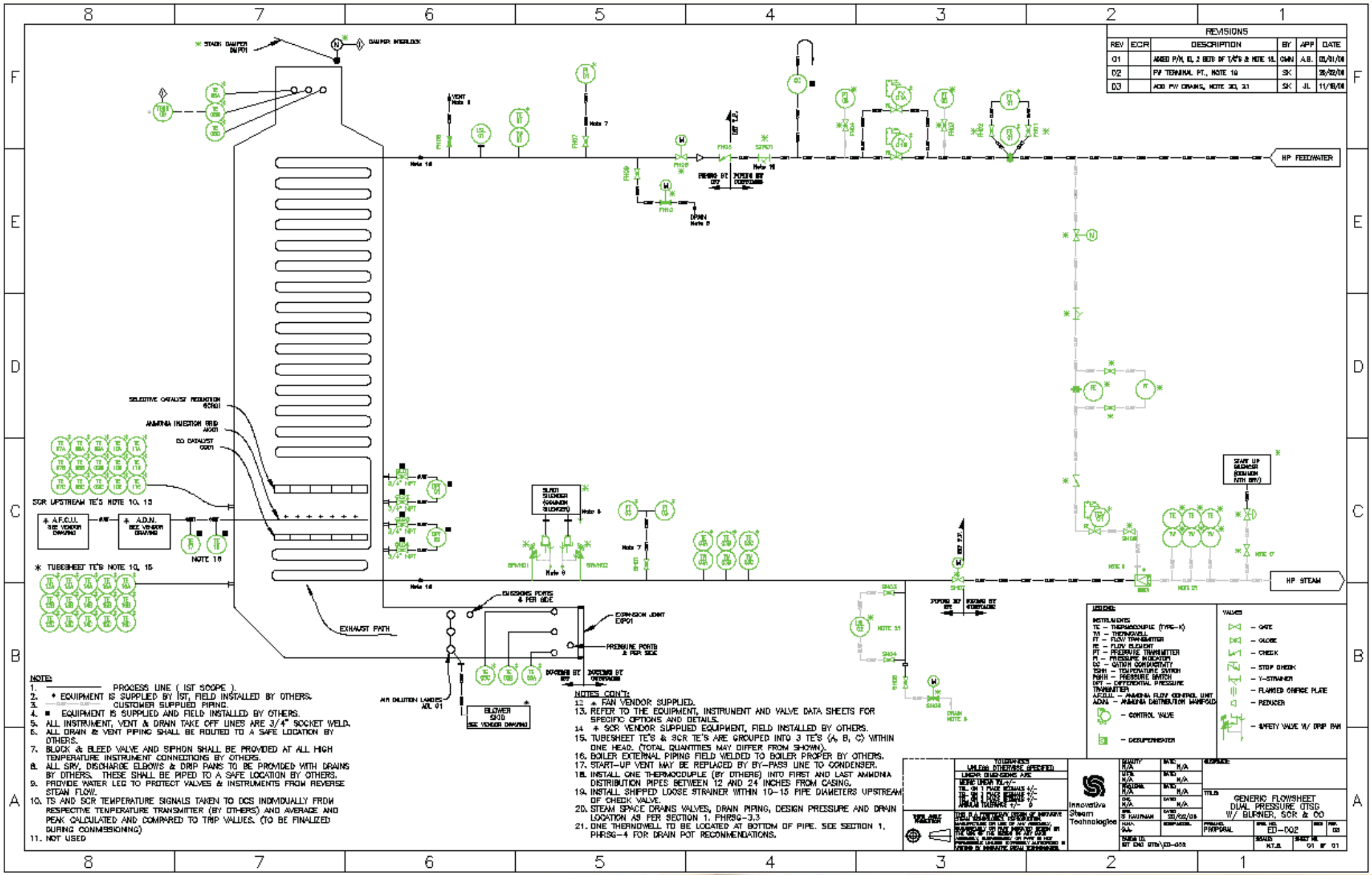
	Length		Width	Height		Weight
Inlet Duct Inlet, ft .			7.98	7.98	' A '	
Inlet Duct, ft & lbs	15.14	' B '				17,755
Inlet Duct Outlet, ft			12.86	15.49		
Air Dilution Duct, ft & lbs	10.00	' D '	12.86	15.49		15,494
Burner Duct Outlet, ft			12.86	15.49		
Inlet Plenum, ft & lbs	61.47	' E '	12.95	15.86	' F '	95,229
OTSG Lower Module, ft & lbs	61.47		12.95	9.56		194,422
SCR Module, ft & lbs	61.47		12.95	16.50	' G '	77,617
OTSG Upper Modules, ft & lbs	54.74		12.95	8.53		301,291
Exhaust Hood, ft & lbs	54.74		12.95	15.95	' H '	52,090
Exhaust Stack, ft & lbs	12.85	' K '	12.85	56.82	' J '	65,250
Ladders & Platforms. lot, lbs						65,000
				Total		**884,149**

3D View of a Similar OTSG

This generic flow sheet incorrectly state the IST OTSG is dual pressure with a duct burner.

This is a single pressure OTSG without a duct burner.

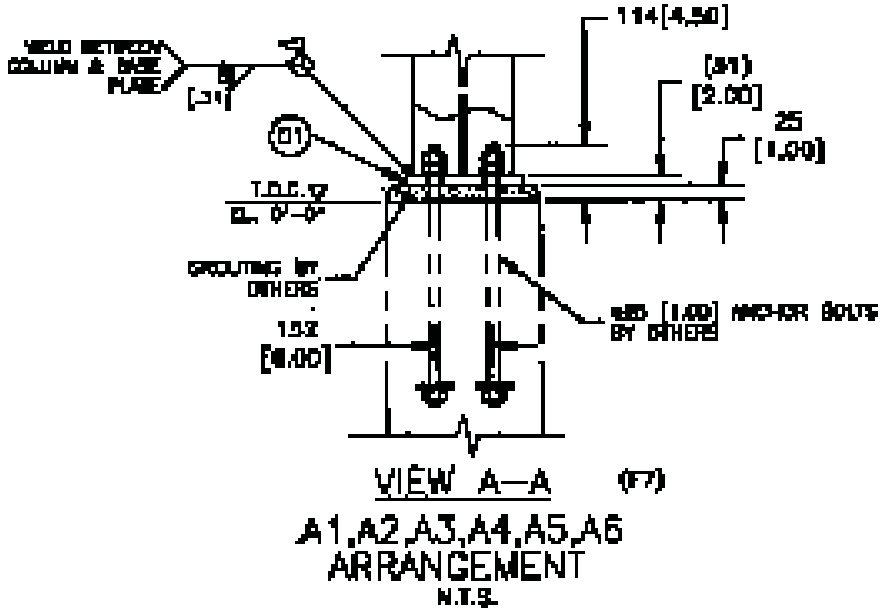
Glenarm GE OTSG Flowsheet

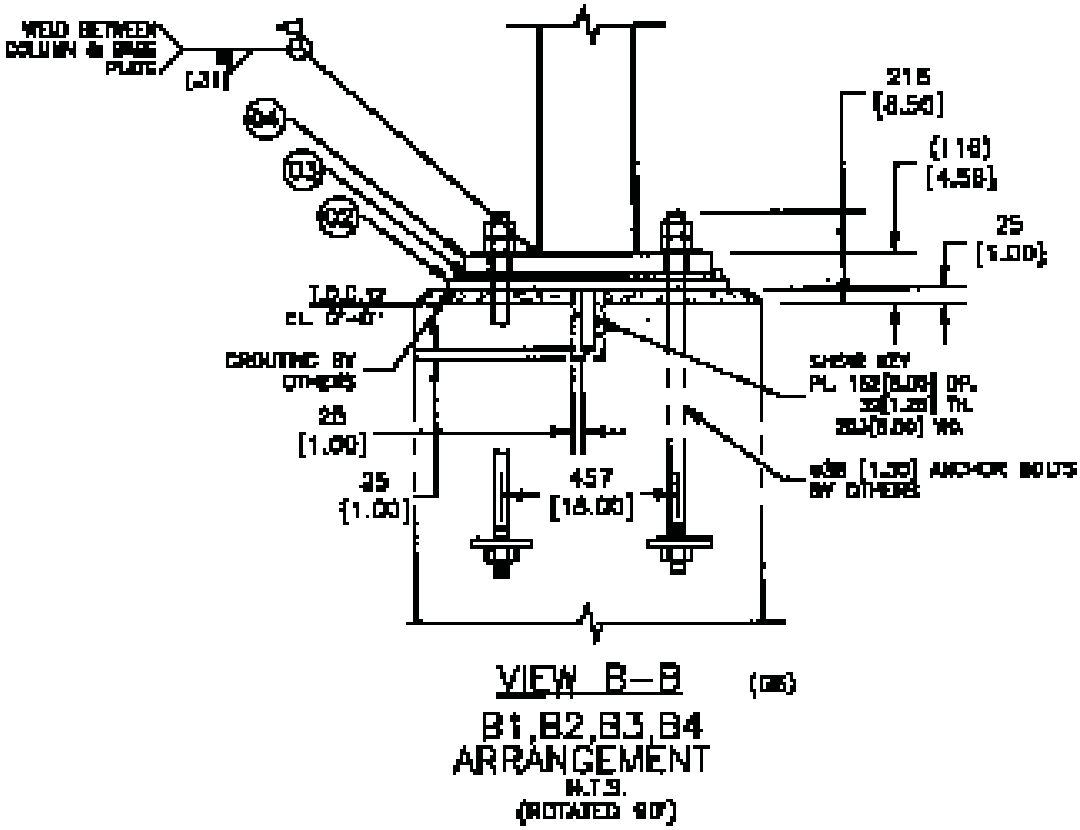


Baseplate Assemblies

- OTSG baseplates are designed to allow thermal expansion. One baseplate location is fixed.
- Platform column baseplate assemblies are fixed and do not include soleplates nor fabreeka pads.
- Check elevations at top of concrete and check for level at each footing using a transit before installing soleplates. Avoid installing shims below soleplates.
- Verify elevations of baseplates and for level with a transit after installation.
- All OTSG anchor bolt nuts are installed snug tight.
- At fixed column locations, anchor bolt nuts are installed snug tight and tightened an additional ¼ turn and baseplate is welded to soleplate.
- Lock all anchor bolt nuts with a tack weld or jam nut.
- Grouting of sole plates must be completed prior to installation of inlet plenum.

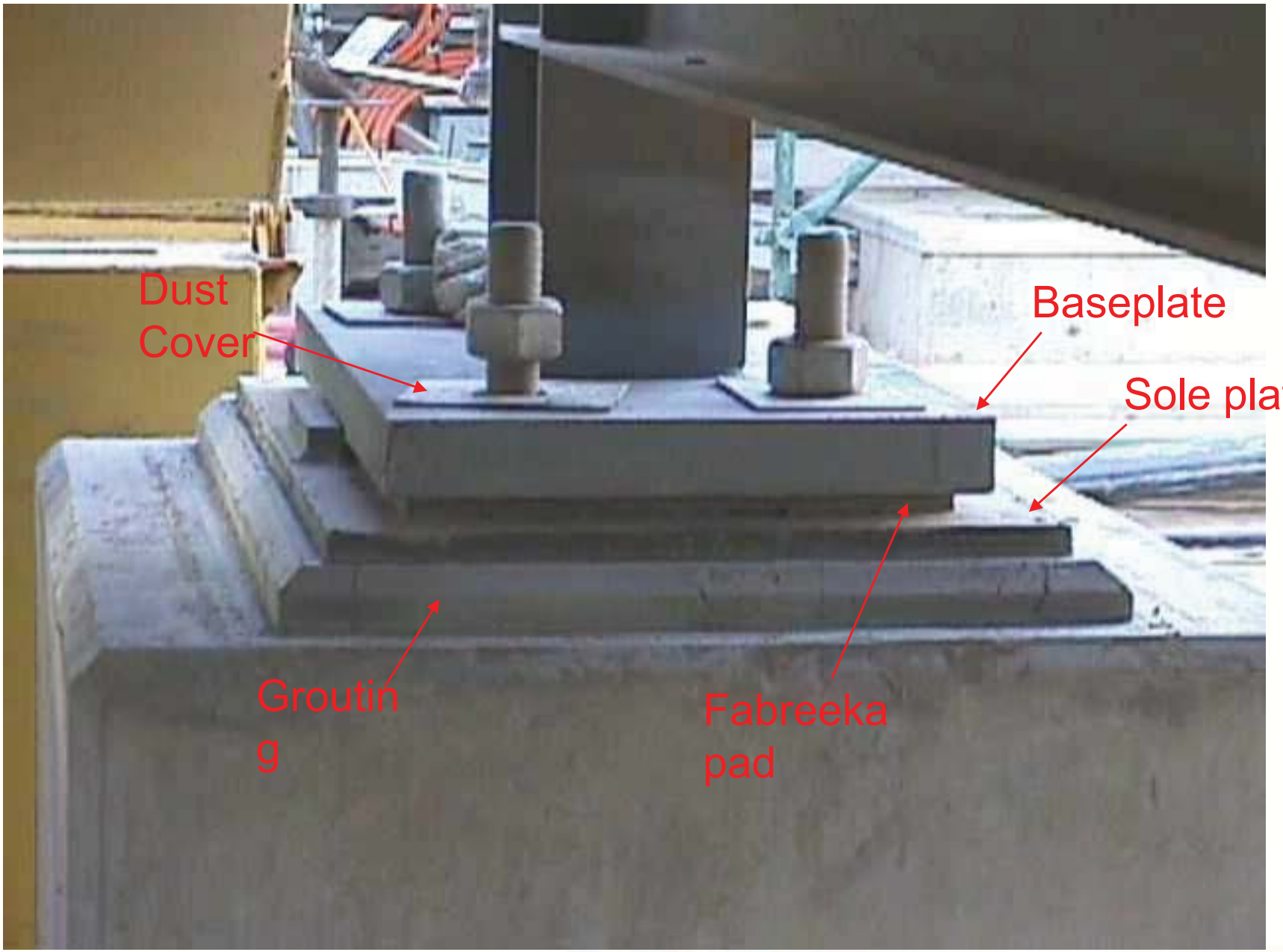
Typical Baseplate Arrangements



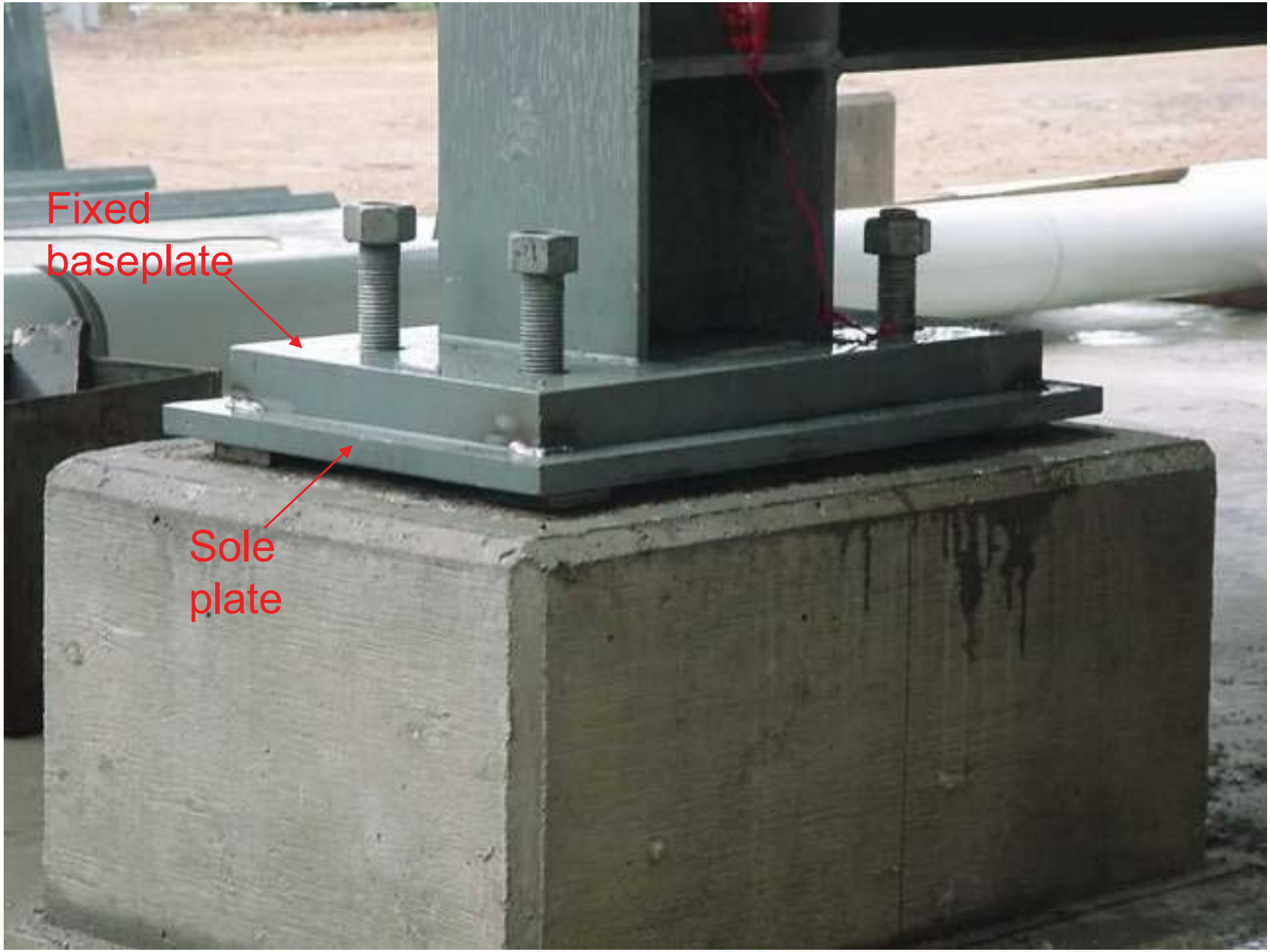


Baseplate/Soleplate Shipments

Sliding Baseplate Assemblies



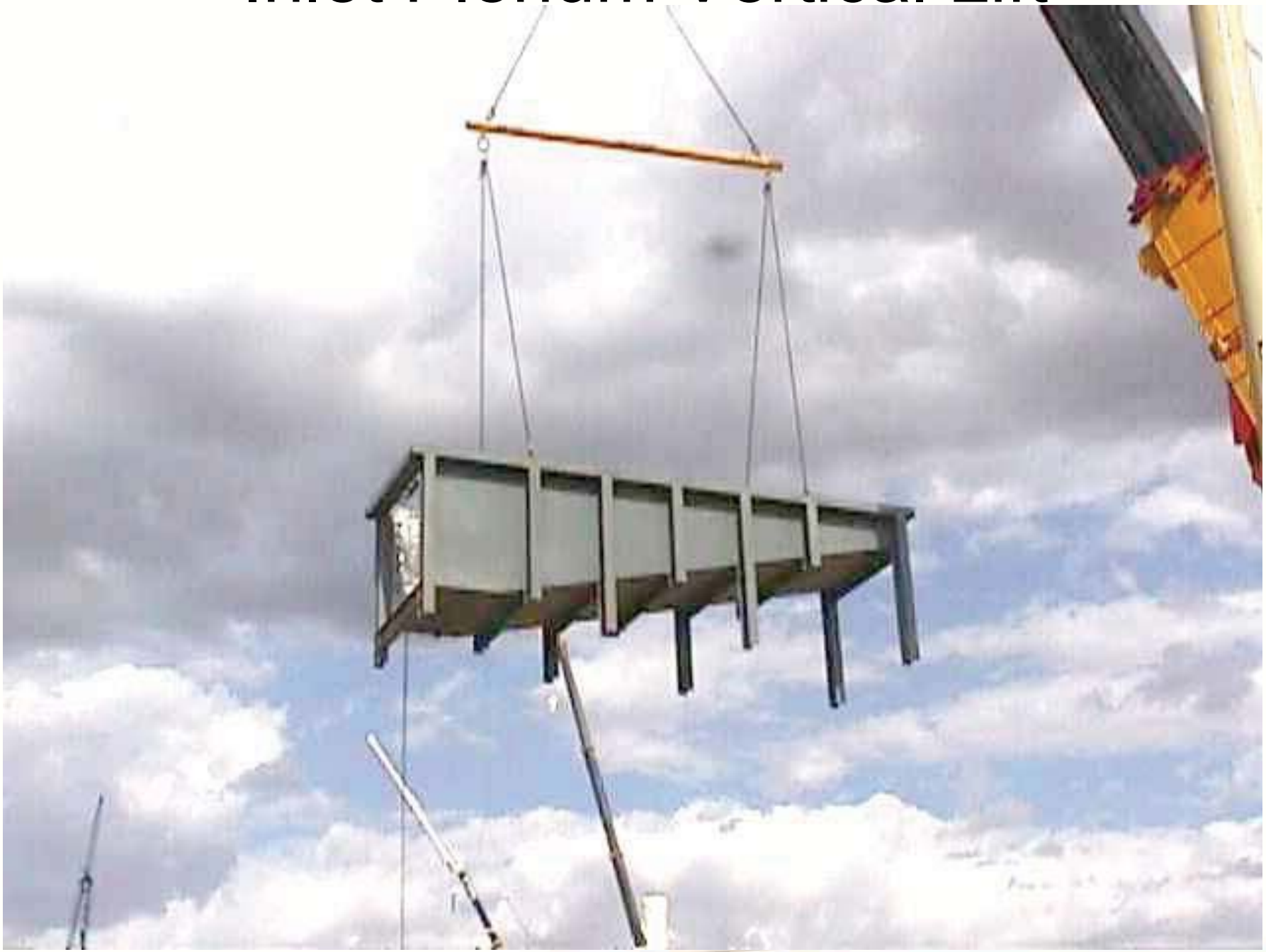
Fixed Baseplate Assemblies



Inlet Plenum Installation

- Two inlet plenum assemblies.
- Lift the inlet plenum into position so that each column rests centrally on its respective baseplate.
- Check the centreline distances to the gas turbine discharge to ensure fit-up dimensions are aligned and correct.
- Check the elevation dimensions at the four top corners of the inlet plenum to ensure that the plenum is level and matches the specified elevation on the drawings.
- Weld inlet plenum column to baseplates.
- Upper inlet plenums will have split rear columns that need to be bolted to the duct before being welded to their respective baseplate.

Inlet Plenum Vertical Lift



Inlet Plenum with External Scaffolding

Inlet Plenum with Internal Scaffolding

Erection Plate Installation

- Erection plates are installed at all columns and vertical stiffener locations around the perimeter.
- Bolts are installed “snug” tight to the exterior of the erection plate and tightened by an additional ¼ turn.
- Tightening shall progress systematically, from the most rigid part of the joint to its free edges.
- After erection plates are installed, weld the plate to the beam on 3 sides (top and sides).

Erection Plate Troubleshooting

- If erection plate holes are misaligned…
  - ❖ Install all erection plates that can be installed.
  - ❖ Open up misaligned holes with a carbide burr bit.

- If side or end beams do not align…
  - ❖ Install shims or spacers to make plate flush, or
  - ❖ For minor discrepancies, just install the plate tightly by slightly bending the plate.

- If the end perimeter joint has gaps at either end…
  - ❖ Leave the erection plates unbolted until internal seal welding is complete. Follow Erection instructions on welding sequence.

Erection Plates – Inlet Plenum to Module

OTSG Module Installation

- The OTSG consists of three (3) primary modules
  - OTSG Lower Module
    - Pressure parts including balance headers and steam outlet header
    - CO catalyst support structure
    - AIG lances
  - SCR Module
    - SCR catalyst support structure
  - OTSG Upper Module
    - Pressure parts including feedwater inlet header

Note:

1. Removeable panel doors are located at the rear of the module for catalyst installation. It is recommended that the panel doors be kept in place during the SCR module lift.
2. CO catalyst and SCR catalyst not be installed until after OTSG burn-out procedure is completed.

OTSG Module Installation

- Position crane (or cranes) as required in preparation for lift.
- Transfer OTSG module to the lifting location and securely place OTSG module on concrete/steel stools or dunnage in prescribed locations marked on the module.
- “Prepare” the module by removing protective tarp, placing plywood strips between top support beams to protect fin tubes, remove designated shipping beams, place JAK on plywood strips.
- Loosely install erection plates around the top of the upper inlet plenum beam and locate erection plate hardware in web of lower module bottom beam so they are readily available for installation.
- Lifting plates must be installed to hoist the module into place. Install all lower erection plates before releasing the crane.
- Remove the lifting plates, reinstall and secure the lifting pins.

Lower Module Transferred At Site

Dunnage Detail

Plywood Strips for Finned Tube Protection

Lower Module Lift – Single Crane Lift

Lower Module Lift – Two Crane Lift

Lower Module Lift – Two Crane Lift

Lower Module Lift – Two Crane Lift

Lower Module Lift – Two Crane Lift

SCR Module Internal View

Exhaust Hood Installation

- Exhaust Hood will be shipped in two modules. Lower Exhaust Hood contains silencer baffles.
- Prepare the exhaust hood by installing plywood over the silencer baffles for protection, placing JAKs on plywood for future installation.
- Lower Exhaust Hood and Upper Exhaust Hood will be installed using two separate lifts.

Exhaust Hood – Single Crane Lift

Exhaust Stack Installation

- Properly supporting the Exhaust Stack assembly in the horizontal position, install platforms, handrails, and ladders at grade.

- Place the Stack Adaptor assembly in a vertical position on dunnage and install the Exhaust Stack Assembly at grade. Complete assembly of erection plates and all joint welds at grade. The combined assembly can be installed in a single lift.

- Once the assembly is placed on the Upper Exhaust Hood assembly, all erection plates and full penetration welds at the base of the Stack Adaptor shall be completed prior to releasing the crane.

- Stack damper can be installed immediately after the Exhaust Stack is secured in place.

- Stack damper actuator should be installed prior to the assembly being lifted to the top of stack. Rain skirt liner panels will be bolted into position after damper is secured.

Stack Platform Installation

Stack in Vertical Position with Platforms

Stack Damper Placement

Inlet Transition Duct Installation

- Install the inlet plenum flow screen prior to installing the Inlet Transition Duct.
- Place insulation and JAKS inside the Inlet Transition Duct prior to installation.
- Inlet ducting installations are slip fit connections. With the duct still on the hook of the crane, pull the inlet duct into the inlet plenum opening with come-a-longs.
- Check to ensure all ducts are centered over the baseplates in both directions. At the inlet plenum to duct interface, the edge of the duct casing should line up with the plenum column centerline.
- Check the inlet duct center alignment with the combustion turbine centerline and compare distance between the inlet duct and combustion turbine flanges at four points – top, bottom, left, and right

Inlet Transition Duct Installation

Inlet Transition Duct Installation

Expansion Joint Installation

- Expansion joint is supplied in a compressed state to permit installation between combustion turbine and inlet duct flanges.

- All hardware, gasket tape, insulation, and liner plates required for joint installation are provided.

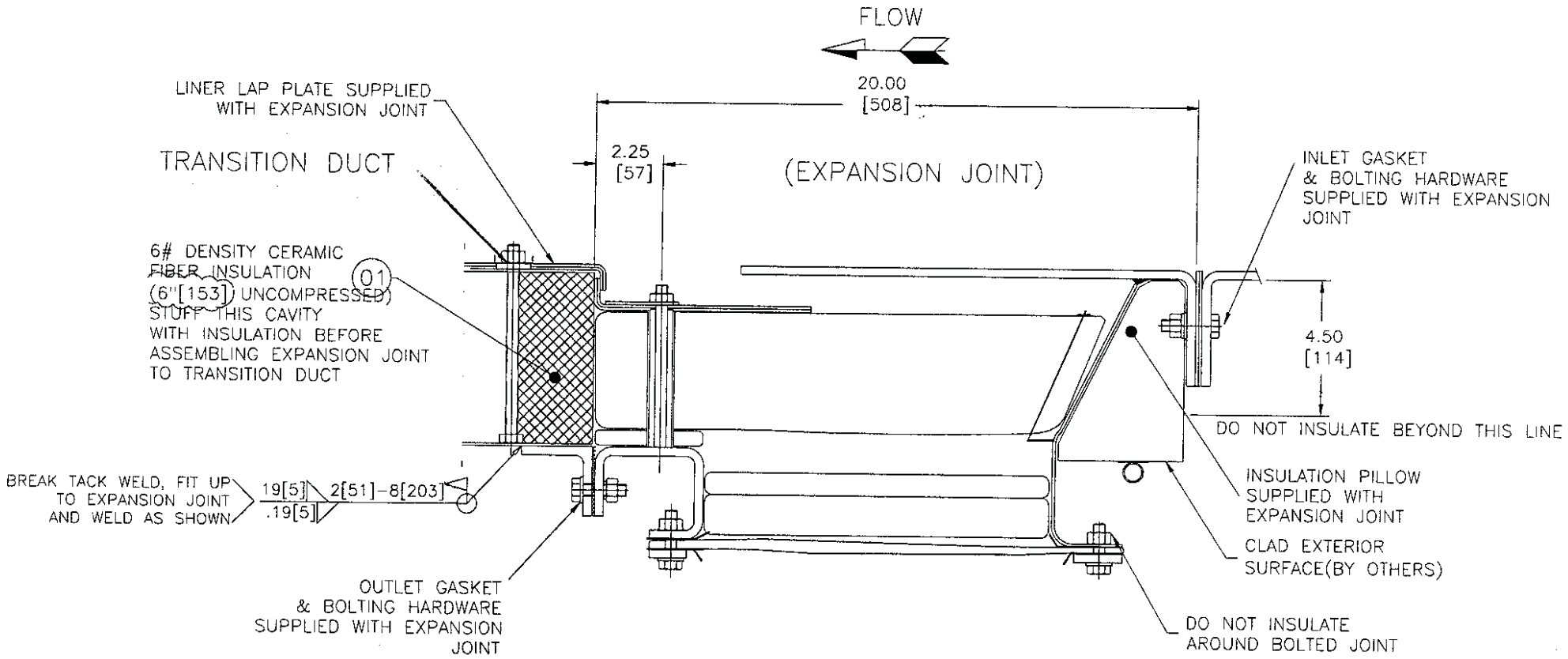
- Lift expansion joint to the combustion turbine exhaust flange and secure in place. Next, loosen the preset bars on the expansion joint and allow the joint to expand to the inlet duct flange. Securely bolt the joint to the inlet duct and then remove the preset bars.

- Fill internal void of expansion joint and transition duct with insulation and liners provided. Place these items into ducting prior to lifting the expansion joint for installation.

- An external insulation pillow for the expansion joint may be supplied for site installation. Cladding should be installed (by others) over the pillow.

Inlet Transition Duct Installation

Inlet Transition Duct Installation



SECTION A–A

SCALE: NTS

REFER TO SUDBURY EXPANSION JOINT DRAWING No. B24154 FOR INSTALLATION INSTRUCTIONS.

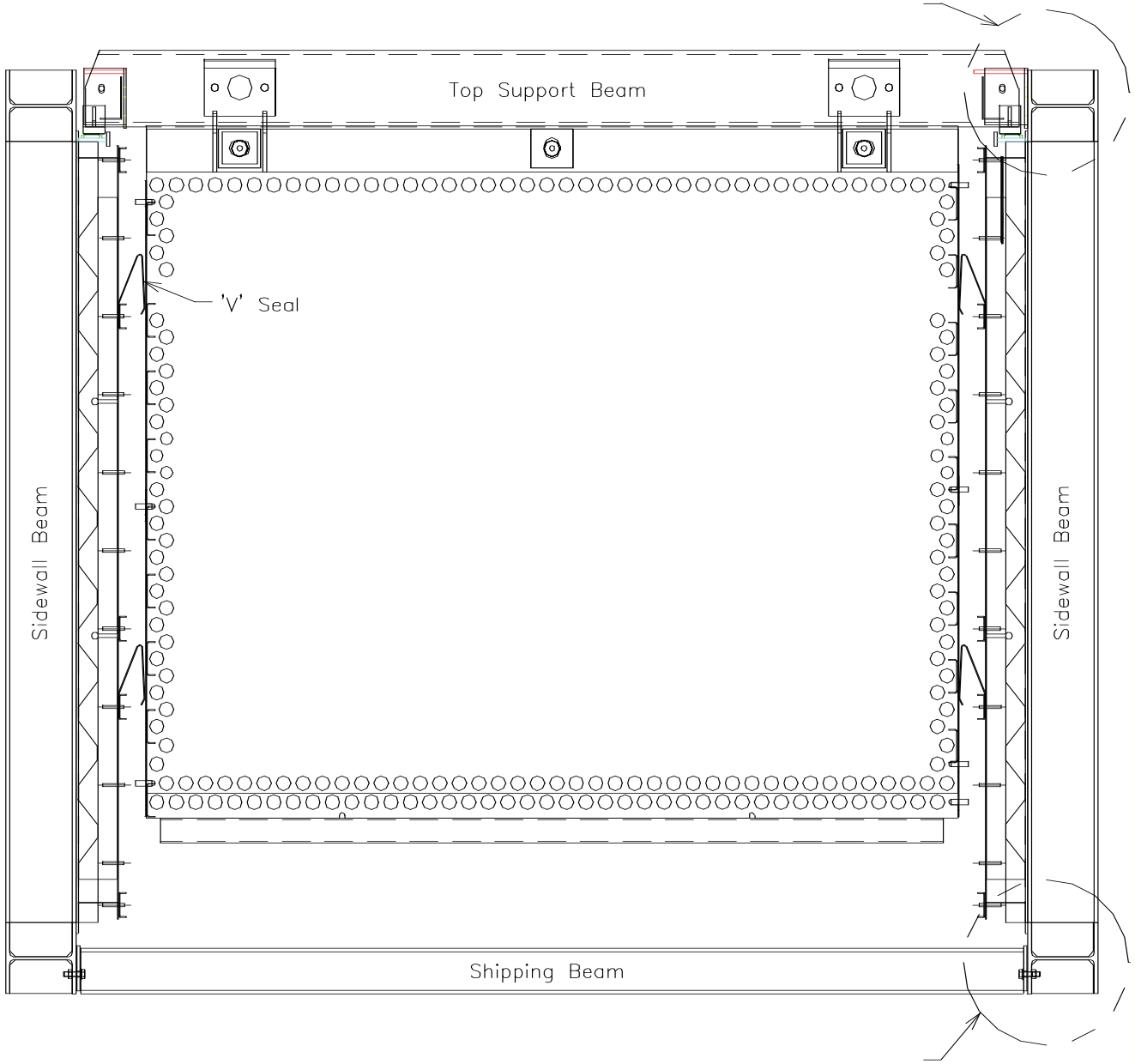
Top Support Beams

- Remove yellow painted shipping angles from the tubesheet support beams. This will involve removing two bolts that tie into the casing and one stud that attaches into the support beam.

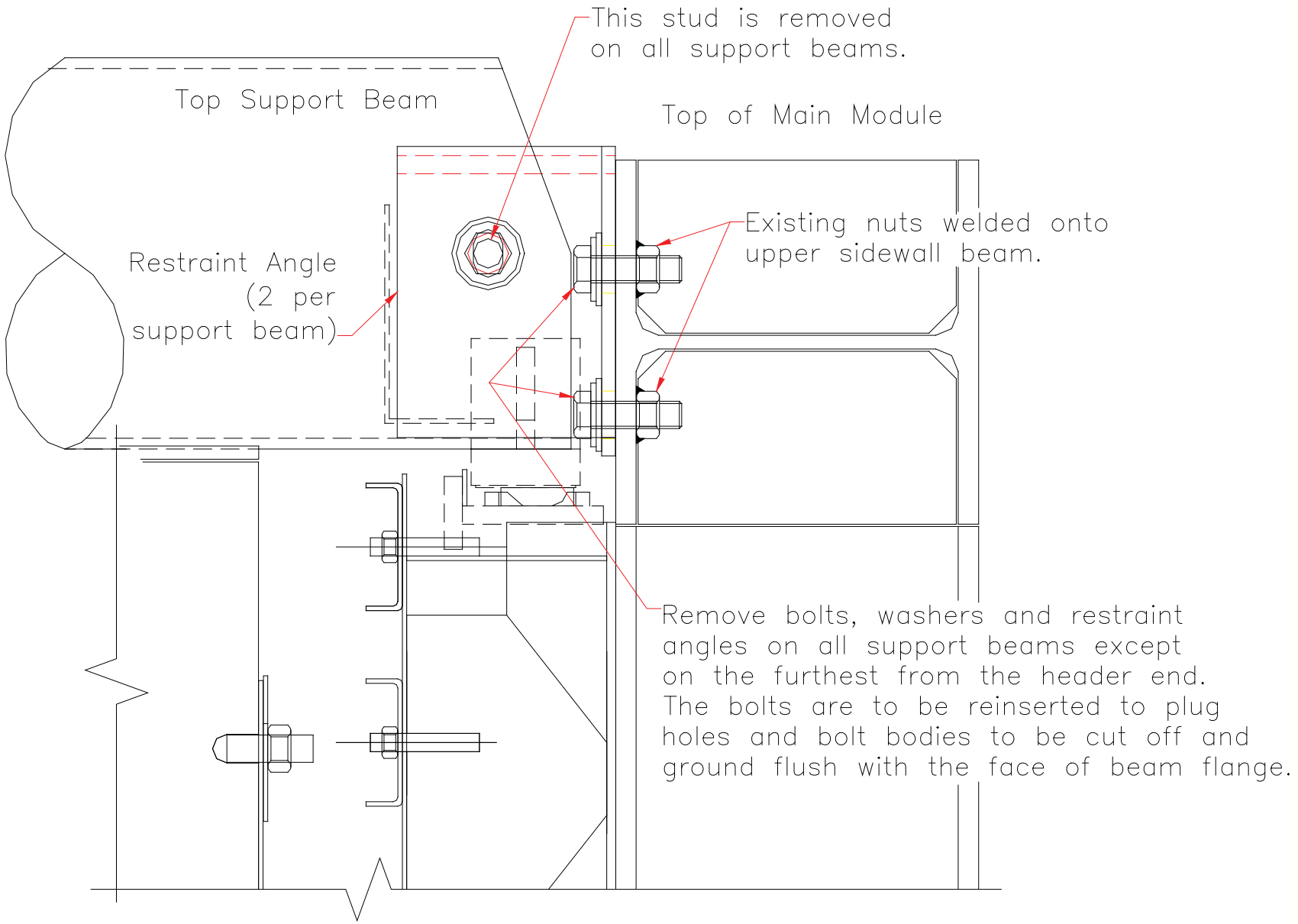
- On rear-most support beam, the angles restraining longitudinal movement are fixed and are not to be removed. The bolts tying the angle to the casing are to remain. The stud tying the angle to the support beam will be removed.

- At all locations where shipping angles have been removed, reinsert the bolts into their respective holes, cut heads off with a grinder and seal weld.

Module Cross Section



Top Support Beam Hardware Removal



Top Support Beam Shipping Angles

Internal Perimeter Joint Welding and Joint Assembly Kits

Note: These instructions are typical for all duct-to-duct joints.

Joint Assembly Kits = JAKs

- Remove all remaining shipping beams and seal weld casing bolt holes by reinstalling removed bolts and seal welding them into place.
- Seal weld internal perimeter joint between two components.
- Remove existing internal liner hardware (channel, nuts, and washers) adjacent to the joint for JAK installations.
- Install 3 layers of ceramic fiber insulation into the joint. Ensure insulation ends are tight against one another and that seams are overlapping.
- JAK liner panels must be installed in the same overlap sequence shown on the drawings to allow for unimpeded thermal expansion.
- All removed internal liner hardware are to be reinstalled. Nuts are to be installed “snug” tight and backed off ¼ turn of the wrench, then tack welded.

Module Joint Prior to JAK Installation

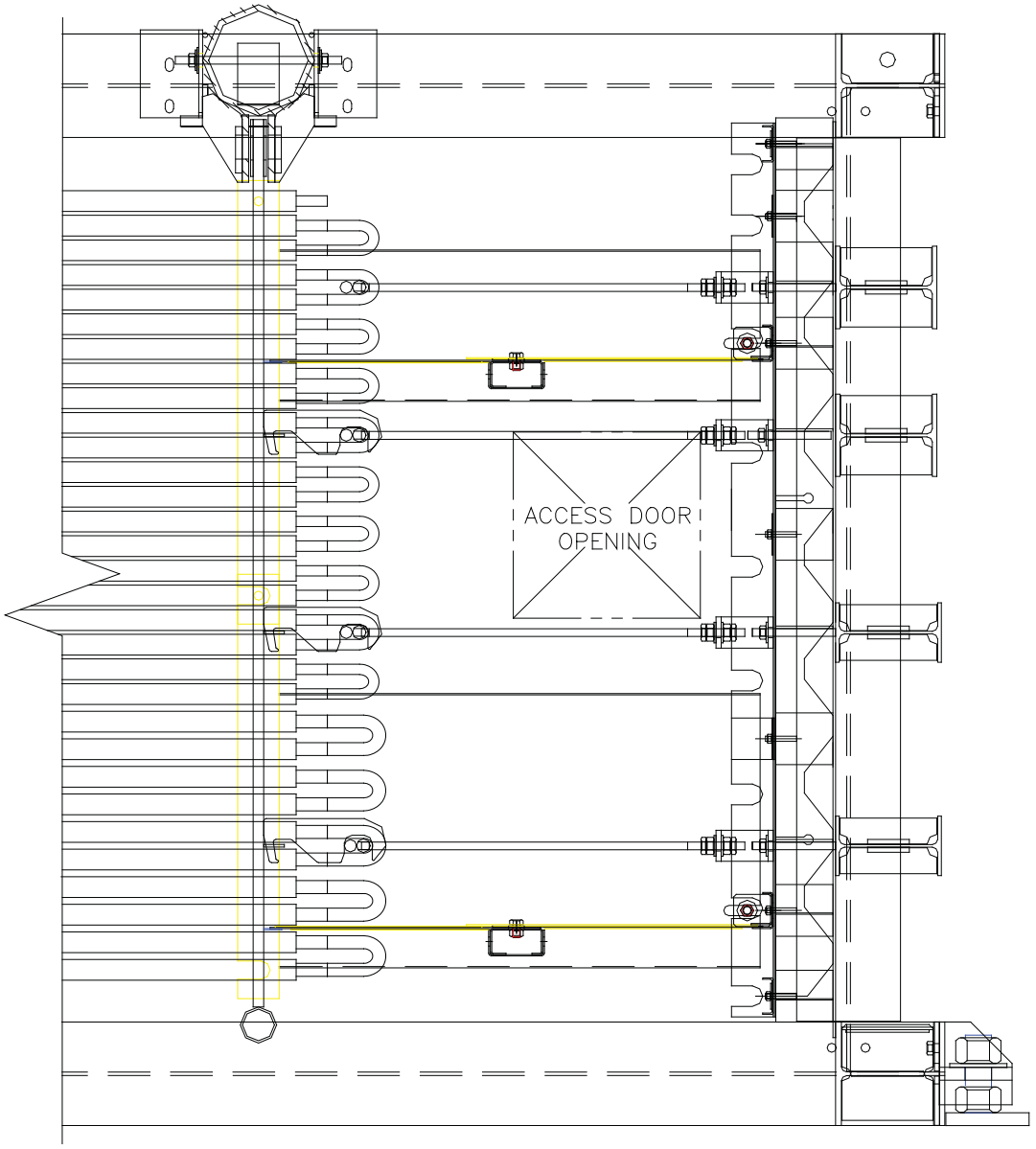
Module Joint Insulation

Completed Module JAK Installation

Pressure Part Restraint Adjustment

- After internal seal welding is complete and JAKs installed, the OTSG module tube bundles have restraint hardware that require adjustment.
- Rubber pads have been installed on the inside radius of radius bends at all restraint levels for shipping protection. These rubber pads have to be removed.
- All restraint rods require adjustments after the shipping protective rubber is removed.
- It is critical not to over tighten and to maintain the required gaps between restraint rods and return bends. Refer to erection drawing for instructions.
- In order to access all levels of restraints, some endseal panels will need to be removed. Ensure all panels are reinstalled immediately after the restraint is adjusted.

Sample Restraint Rods and End Seals



Platform Steel and SRV Silencer Installation

- Platform steel is typically installed after major components are in place.
  - Occasionally it is installed prior to the exhaust hood and stack installation in areas with high seismic zones or high wind loads.

- Brackets are welded to the OTSG vertical beams and columns from which platform beams are bolted.

- Pre-assembly of structural steel columns and beams should commence on the ground.

- In the event that piping or conduit penetrations are required through the grating, the contractor is responsible for cutting the grating and installing additional kick plate required for protection.

- Prior to installing the SRV Silencer, confirm the distance between bolt holes on the silencer support base plate versus the platform steel. Ensure platform steel support for the silencer is completely installed and secure before placing the SRV Silencer.

- Check orientation of the SRV Silencer outlet against the erection diagram.

Platform Steel Installation

SRV Silencer Lift

SRV Silencer Installation

Boiler External Piping Installation

- OTSG Boiler External Piping is supplied in two feedwater assemblies and one steam assembly.
  - Motorized valves are shipped loose for protection and will be welded at site.
  - Drain piping off the main run will terminate at the motorized block valve (second valve), balance of piping to be designed and supplied by others.
  - SRV and SRV Silencer drain and vent piping to be supplied by others.
  - Vent and instrument lines will terminate at the first block valve. Balance of tubing to instrumentation will be designed and supplied by others.
  - Piping stress analysis will be performed by others.
  - Pipe supports will be designed and supplied by others.

- Additional valves and instruments will be shipped loose to site for installation into piping beyond the IST terminal points.

Boiler External Piping Installation

- Check to ensure all piping assemblies, valves, and hardware are available and inspect all equipment for damage prior to installation.
- Boiler External Piping should not proceed until platform steel is in place.
- Do not remove protective end caps from piping until it is necessary.
- Ensure the safety relief valve hydrostatic test plugs have been installed prior to the hydrostatic testing.
- Check that the SRV vent pipes are secure and that sufficient clearance exists between the safety valve discharge elbow and the inside of the vent pipe to allow for thermal expansion.
- Ensure valves are installed in the correct flow direction. Motorized and pneumatic valves should be checked for proper operation. Operate the valve actuators to ensure the linkages do not bind.

Boiler External Piping Installation

- Check that pipe orifices and/or flow devices are properly installed.
- Ensure all flange bolts are tight and proper gaskets have been installed.
- Check that all drains and vents are free of obstructions and that the lines have been properly supported. Ensure all vent pipnig has been properly routed and is pointing safely away from access platforms.
- Ensure strainers are installed in the feedwater piping. Strainers will prevent plugging of OTSG flow orifices and damage to control valves by foreign matter.
- Ensure all necessary post weld treatment and non-destructive examination has been completed as necessary.
- Conduct a successful hydrostatic test as requried.

Steam Outlet Piping Installation

“Jumper” Tube Installation

Where the complete OTSG pressure tubing is contained in two or more modules, a connection must be made between these modules to complete the tubing circuitry from the inlet header to the outlet header. This activity is to be completed by IST orbital welding technicians using a specialized TIG welding process.

Orbital welding process…

- Prepare ends, on both “jumper” tubes and OTSG module tubes for welding.
- Fill the inside of the tubing circuit/bundle with argon.
- Fit-up and weld “jumper” tubes to OTSG module tubes.

“Jumper” Tube Installation

During this process, the construction contractor will be responsible for providing the following…

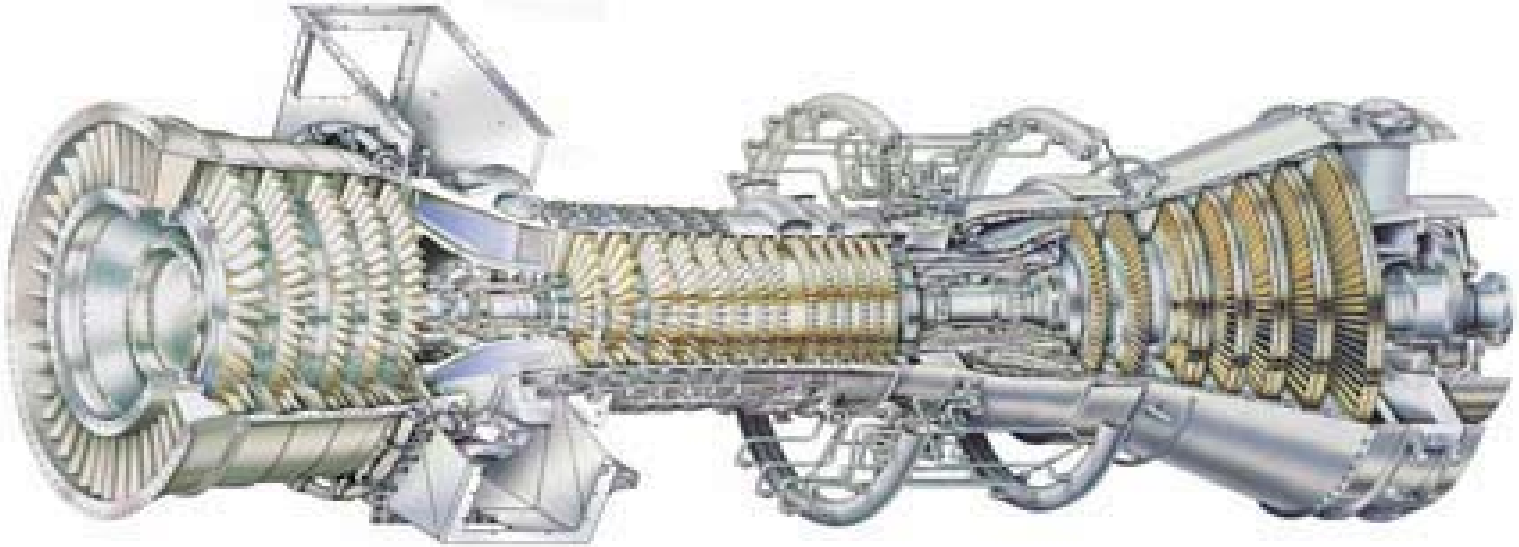
- Electrical junction and uninterrupted power source and hook-up service for IST tool crib container and transformer for orbital welding and 110V power tools.
- Designated lay-down area local to OTSG for IST tool crib container.
- Compressed air.
- Scaffolding, if platform steel and grating is not completed.
- Tarps for scaffold areas at feedwater inlet box, in case of inclement weather.
- Site safety induction of IST personnel prior to commencement of site activities.
- Provision of two personnel for assistance with general support labour duties and requirements of IST welding technicians / supervisors.
- Designated lunch, smoking area, and washroom facilities.
- Arrangement of any on site permit requirements.
- Supply of ample demineralized water and pressurizing equipment to perform a hydrostatic test of each OTSG circuit once “jumper” tube welding is complete and piping tie-ins are made.

Instrumentation and Thermocouple Installation

- Check that all instrumentation, thermocouples, and associated components are available. Inspect for damage prior to installation.
- During installation ensure that the correct fittings are utilized for the application.
- Check the inside of all thermowells to ensure they are void of any obstructions or deformities.
- Ensure that all gas side temperature probes install easily into the connection pipes.
- Ensure that any installed instrumentation does not interfere with platform access or walkways.
- Ensure that tubesheet thermocouples are installed per IST drawings.
- The supply of all wiring and junction boxes required for instrumentation installation will be by others.

Questions/Discussion

Glenarm Repowering Project
City of Pasadena Dept. of Water & Power



Power Island Equipment Review
BOP Contractor Pre-Bid Meeting
January 8, 2014

imagination at work

GE Power Island Equipment Scope

- LM6000 Packaged GTG
- Once Through Steam Generator
- Steam Turbine Generator
- Surface Condenser
- Cooling Tower
- STG Enclosure
- Generator Step-up Transformer
- Condensate, Boiler Feed water, Circulating Water and Auxiliary Cooling Water Pumps
- Chiller/Inlet Heating Module
- Condensate Polisher
- ST Bypass Valve
- Fuel Gas Compressors
- Gas Fuel Filter Skid
- Air Compressor
- Aux Boiler and Pump
- Aux Steam Seal Super heater
- Continuous Emissions Monitoring System

Steam Turbine Generator

Supplier: Shin Nippon Machinery Company/Hyundai Ideal

Steam Turbine Design: Horizontal axial flow, multistage condensing, non-extraction with gear reduction

- Rated output – 15.26MW
- Operating conditions – 6200/1800rpm, inlet press – 373psia, inlet temp – 849F, exhaust press – 1psia, max flow – 128,040 lbm/hr @ 1psia

Generator Design: TEWAC, horizontal brushless, synchronous generator

- Rated output – 15.26MW
- Operating conditions – 1800rpm, 17,952KVA, 0.85PF, 3Ph-60Hz, 13,800V, WYE conn, continuous duty

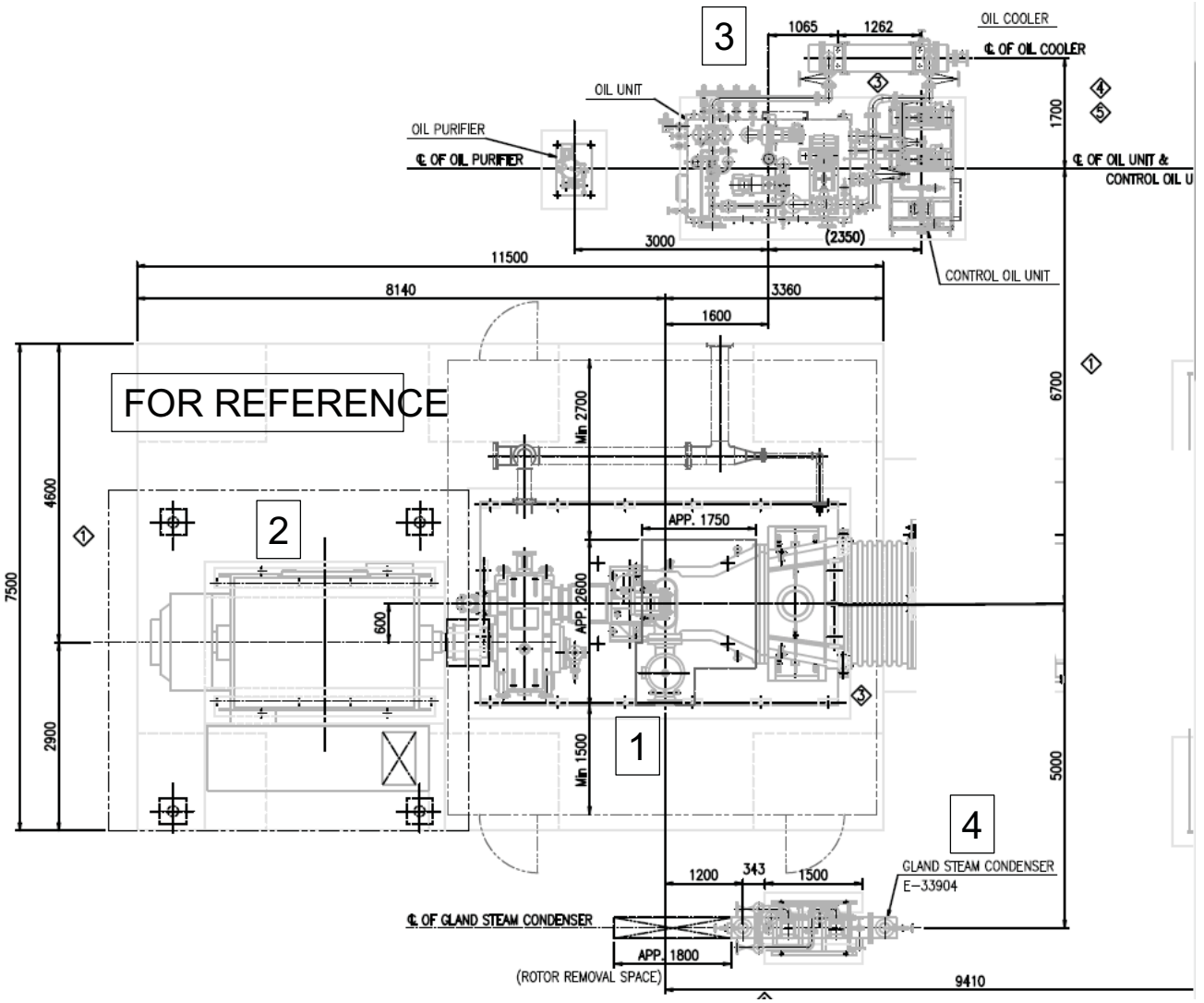
GE Scope Also Includes: Shims, keys, gearbox soleplate, access platform & stairs, lube oil & EHC interconnecting piping.

Comments: Foundation design, fire protection, drain & interconnecting piping (except lube oil & EHC), pipe supports, MCC's, motor starters, interconnecting wiring and battery system by BOP Contractor.

Steam Turbine Generator

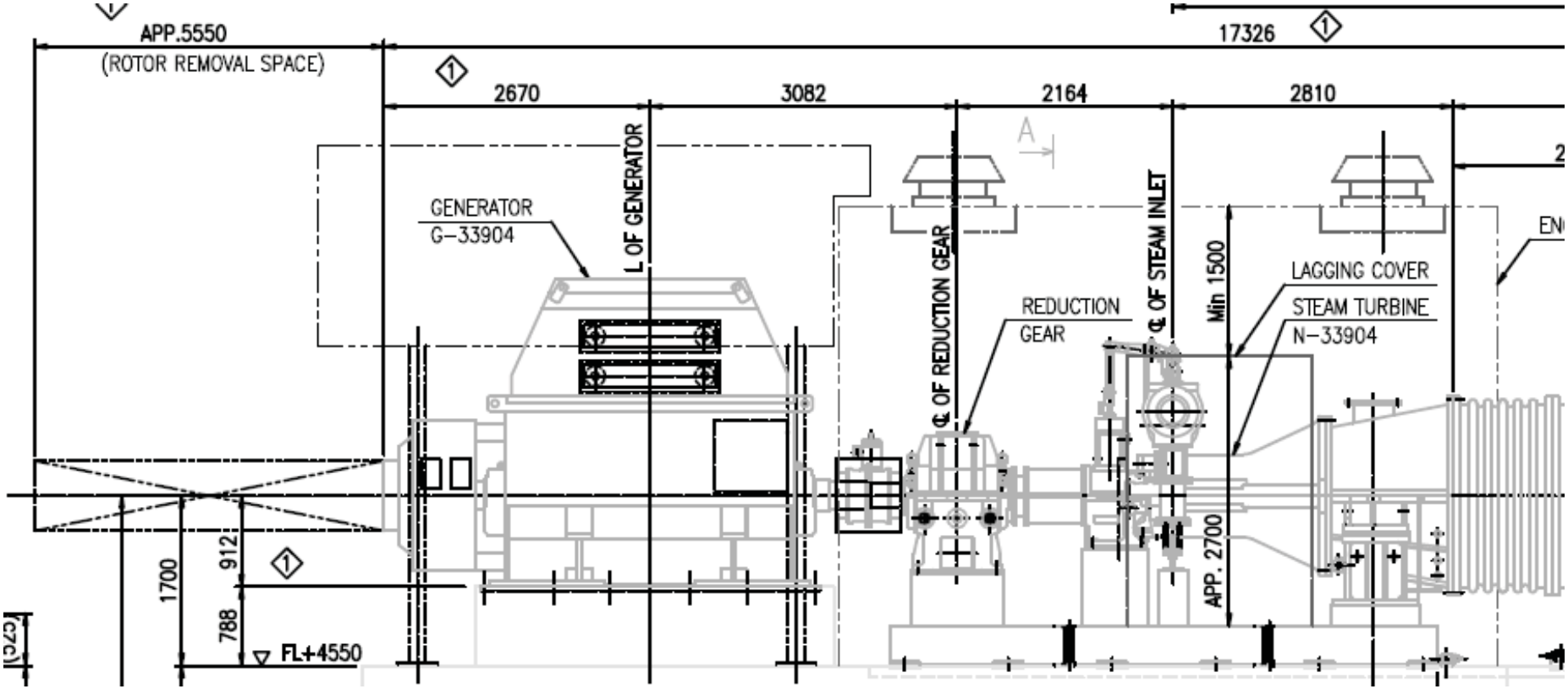
Equipment/Skids:

1) Steam turbine & gear reducer
2) Generator
3) Lube oil skid
4) Gland steam condenser
5) Turbine control panel (not shown)
6) Generator protection panel (not shown)
7) Exciter/AVR (not shown)
8) Neutral grounding equipment (not shown)



imagination at work

Steam Turbine Generator



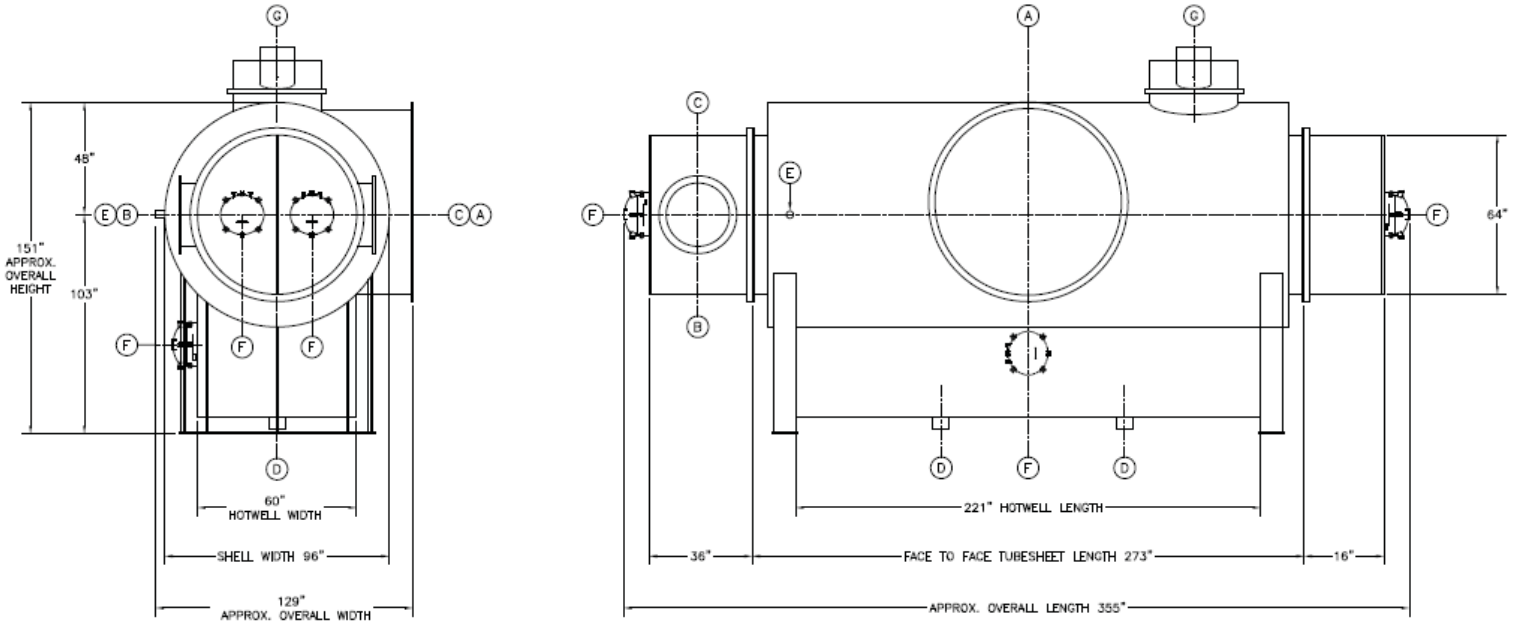
FOR REFERENCE

Surface Condenser Overview

Preferred Supplier: Holtec

Design: 2-pass, de-aerating, water cooled, 2 x 100% liquid ring vacuum pumps with silencers, 100% bypass operation

Comments: Drains piping, level & pressure transmitters & level switches by BOP Contractor.



FOR REFERENCE

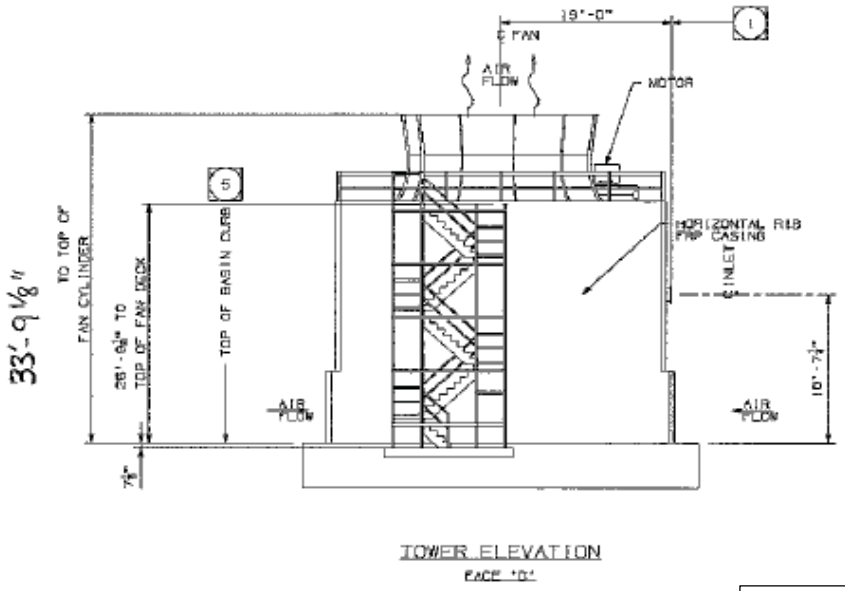
Cooling Tower

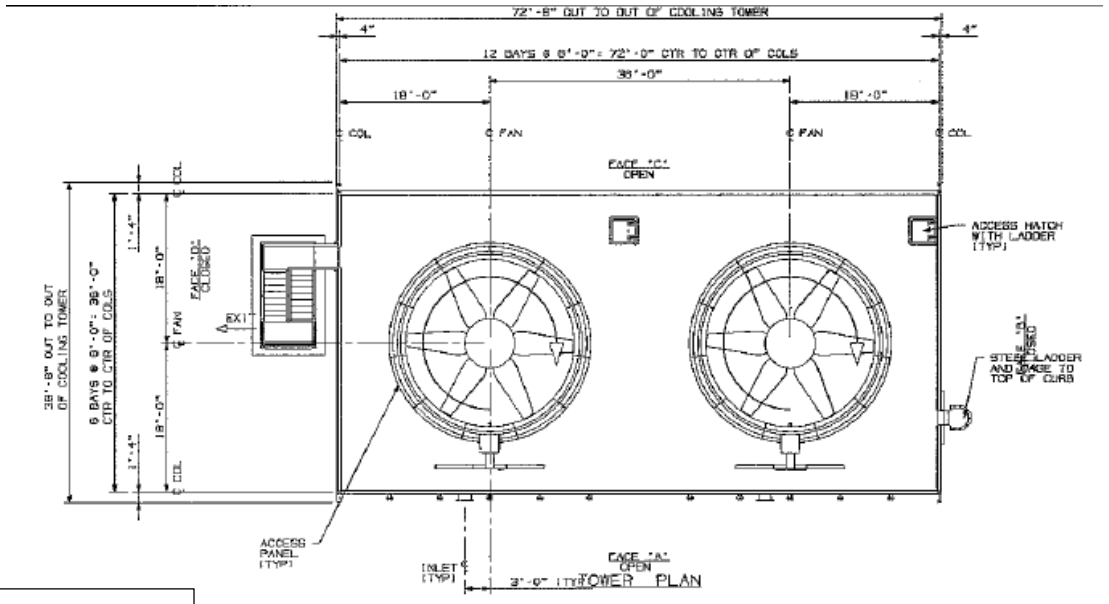
Preferred Supplier: SPX

Design: Mechanical induced draft, multi-cell counter flow design, 2 speed fans, reinforced composite construction, drift eliminators

Access: Fan deck accessible by stair tower and caged ladder

Comments: Sump basin design, fire protection, piping, lighting, lightning protection by BOP Contractor.





FOR REFERENCE

Steam Turbine Enclosure

Preferred Supplier: ATCO

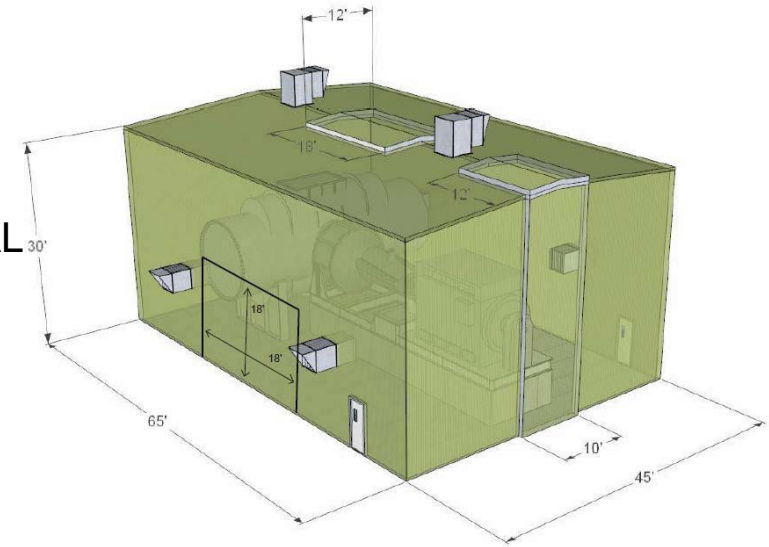
Design: Pre-engineered steel frame construction, roof & walls acoustic panels, ventilation included.

GE equipment housed: STG, lube oil skid, water cooled condenser, gland steam condenser, vacuum pumps, condensate pumps, electric aux boiler & pump, electric steam seal super-heater

Access: Personnel doors and removable wall and roof panels

Comments: Fire protection & lighting by BOP Contractor. No overhead crane or hoist to be included. Enclosure will not be designed to support BOP piping, cable tray, etc.

CONCEPTUAL



imagination at work

Generator Step-up Transformer

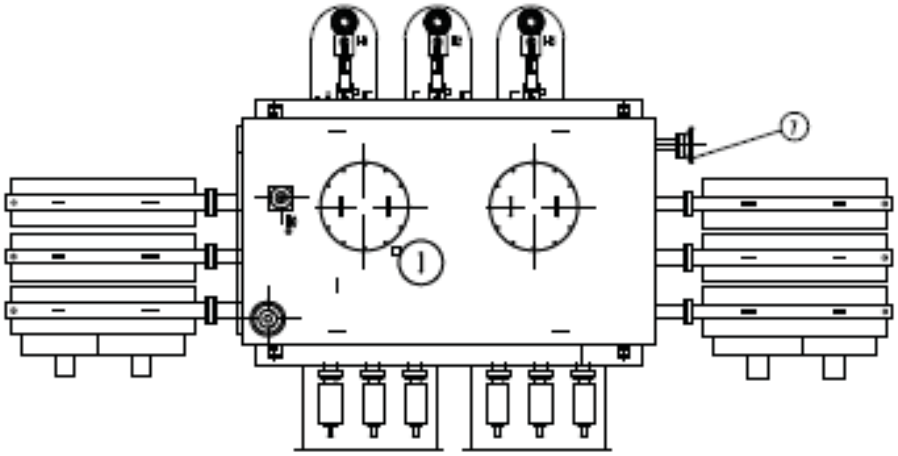
Preferred Supplier: Prolec

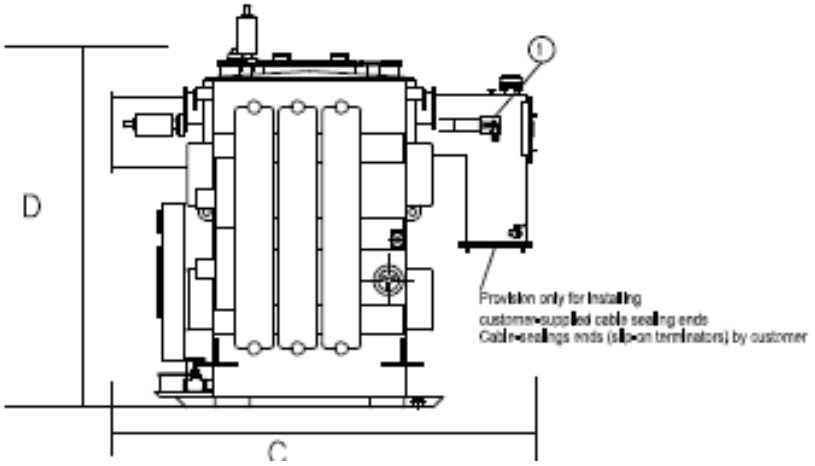
Design: 3 Winding, 3 phase, 60 Hz, 34.5kV(H)-13.8kV (X)- 13.8kV (Y), 95/75/20 MVA

Estimated Shipping Dimensions: 21.6 x 12.0 x 14.1 feet

Estimated Shipping Weight: 189,840 Lbs.

Comments: First fill of FR-3 insulating liquid included (field dress, oil fill and test by BOP Contractor).





FOR REFERENCE

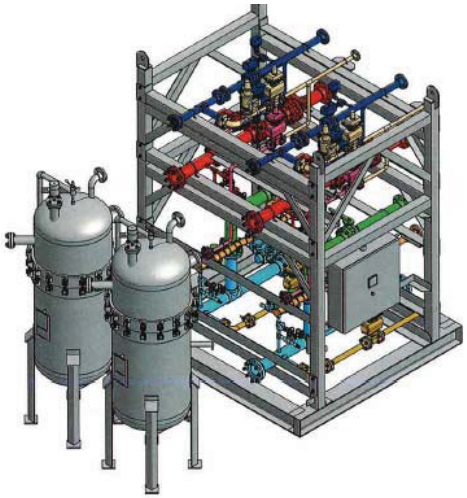
imagination at work

Condensate Polisher

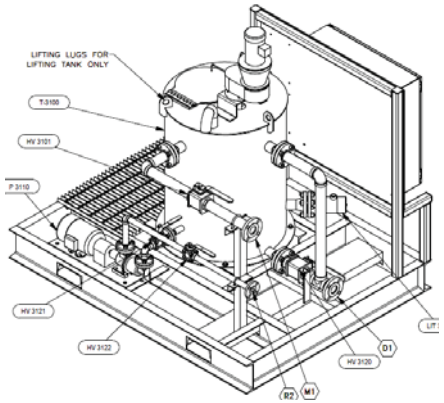
Preferred Supplier: Pall

Description: 2 x 100%, pre-coat resin, back flushable with recirculation & resin injection

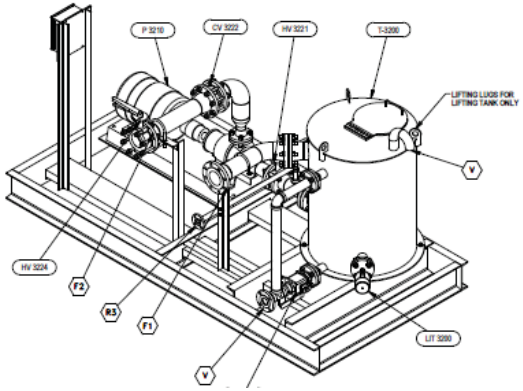
Equipment Skids:



(1) Valve Assembly Skid and
(2) Filter Vessels



(1) Injection Skid



(1) Recirculation Pump Skid

(1) Backwash Air Receiver

FOR REFERENCE

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Pumps

Boiler Feed Pumps: 2 x 100%, horizontal, multi-stage, ring pump, variable speed

Condensate Pumps: 2 x 100%, vertical can multi-stage, centrifugal pumps, constant speed

Circulating Water Pumps: 2 x 100%, vertical wet pit pump, fixed speed

Auxiliary Circulating Water Pumps: 3 x 50%, vertical wet pit pump, fixed speed

Other Equipment

Steam Bypass: 1 x 100%, full flow, HP bypass

Air Compressor: 2 x 100% capacity air compressors with dryers & receivers, skid mounted

Fuel Gas Compressors: 2 x 100%, rotary screw compressors, skid mounted

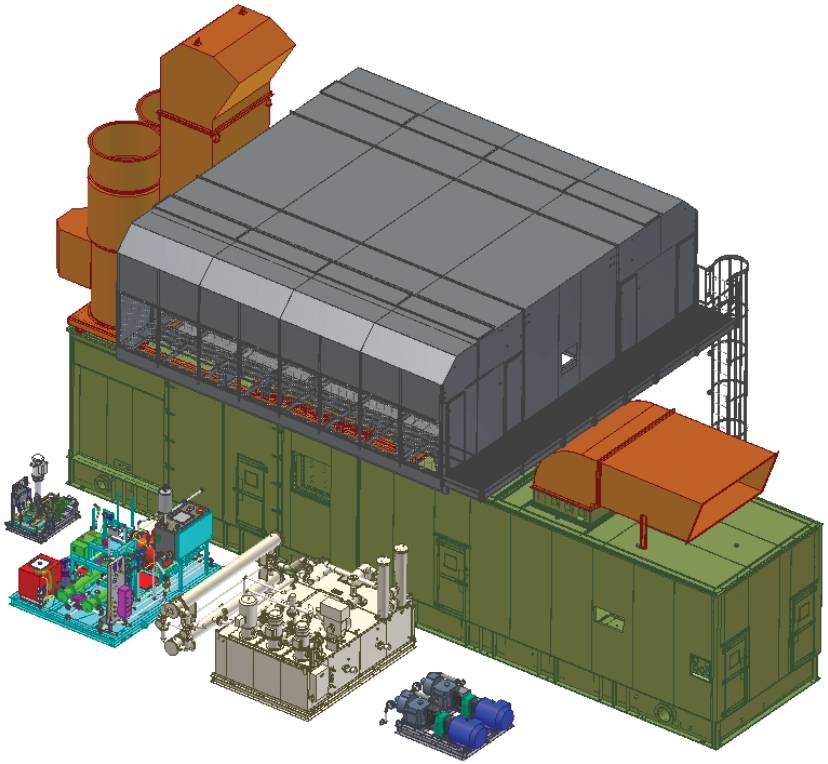
Inlet Air Chiller: Two (2) water cooled, centrifugal chillers, 2 x 50%

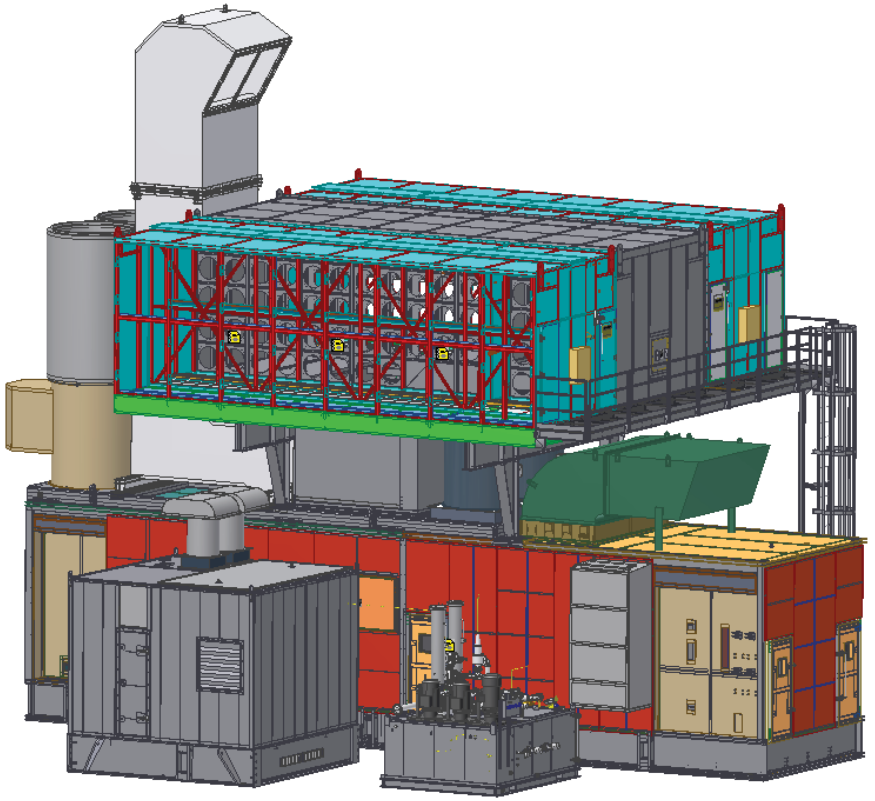
Electric Auxiliary Boiler: 1 x 100% steam generator for steam seals and condenser sparging

Electric Steam Seal Super-heater: 1 x 100%

Continuous Emissions Monitoring System (CEMS): Fully extractive, measuring SCR inlet NOx & stack outlet Nox, CO, Ammonia slip and O_2.

LM6000 Package Evolution

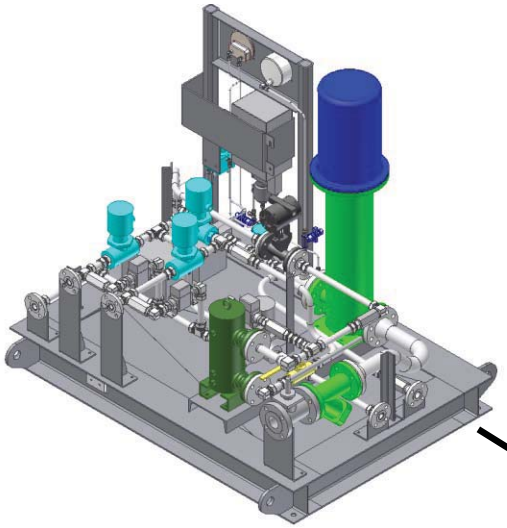




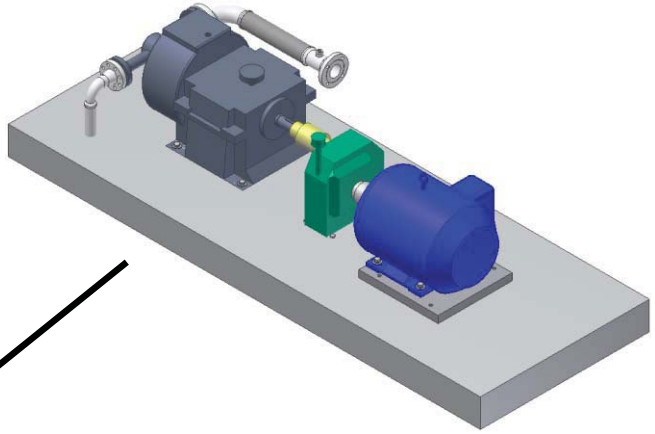
LM6000-PC/PD/PF
Separate Auxiliary Skids
Requires on-site interconnections of each skid
Mark6-90/70 & Woodward Controls

LM6000-PG/PH
Main base has Same Footprint
Universal Aux Skid reduces footprint
Minimizes field connections
Mark6e & Woodward Controls
Same inlet air filter house
Same chiller coils

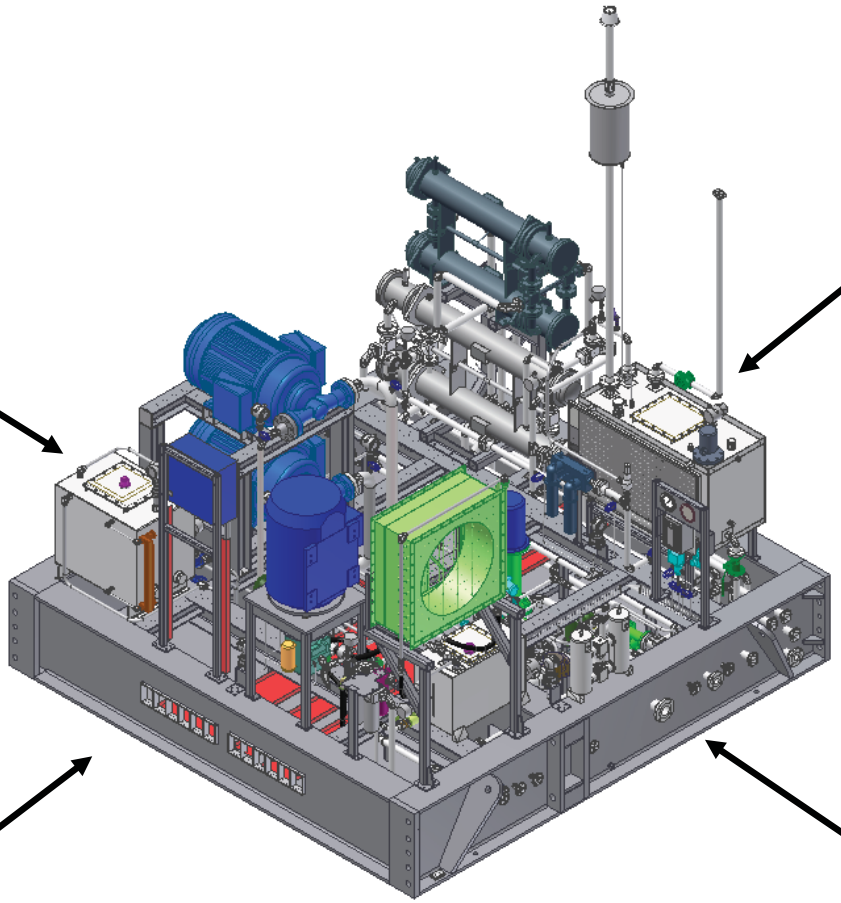
imagination at work



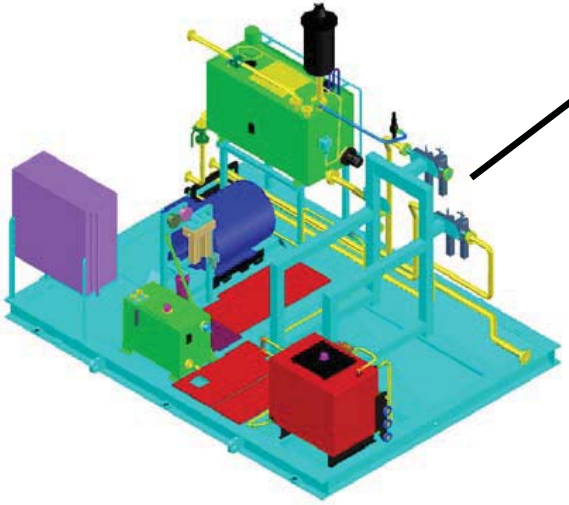
SPRINT SKID



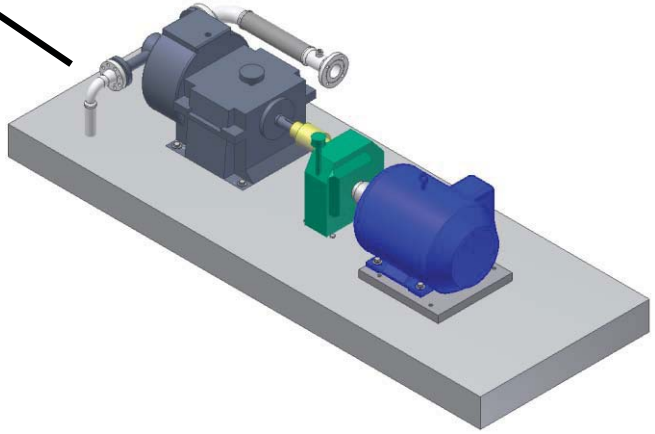
WATER INJECTION (HP)



UNIVERSAL AUX MODULE



AUX SKID



WATER INJECTION (LP)

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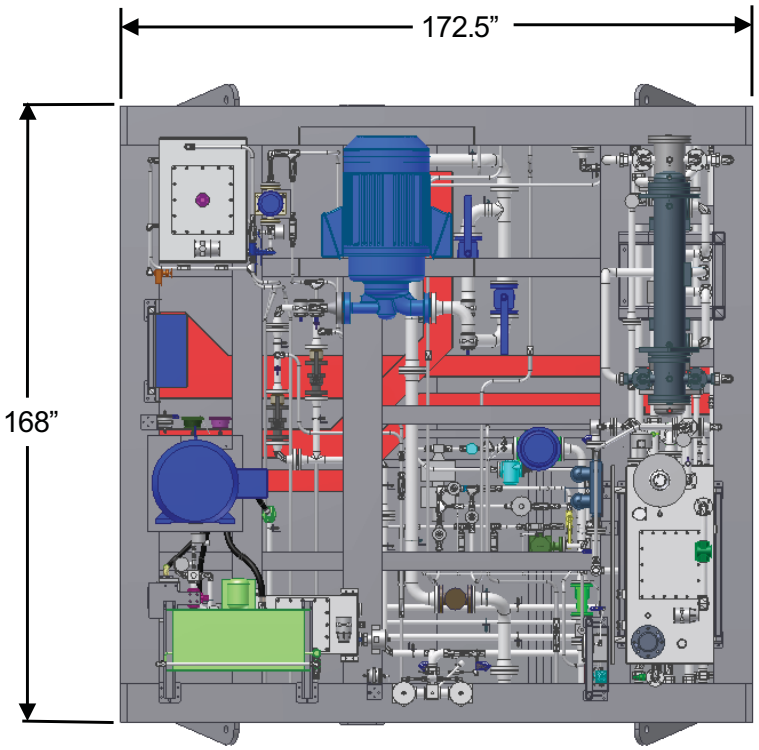
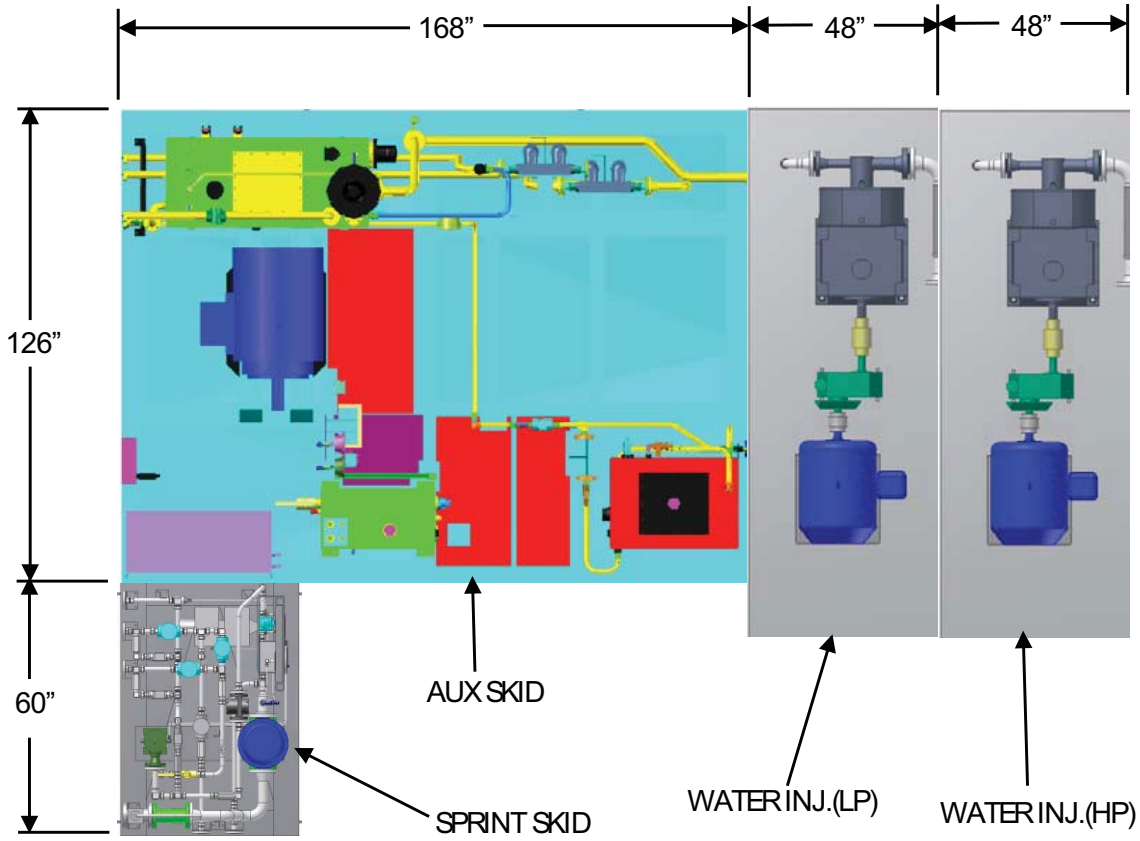


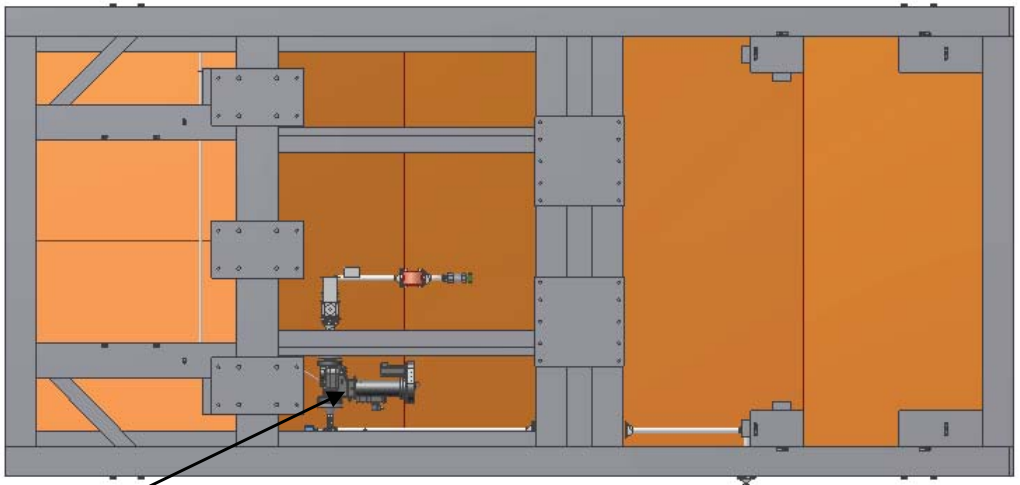
UNIVERSAL AUX MODULE
LM6000PG/PH



COMBINED SKIDS
LM6000 PC/PD/PF

WATER INJECTION

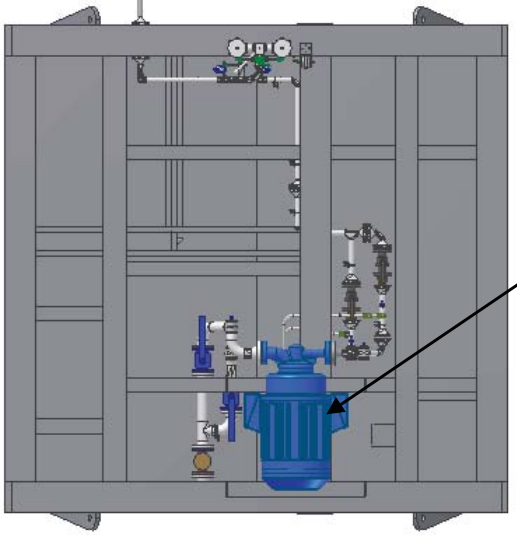
MAIN UNIT



New LMS100 type water metering valve

INTERCONNECT HOSE

AUX MODULE



New VSR175 pump

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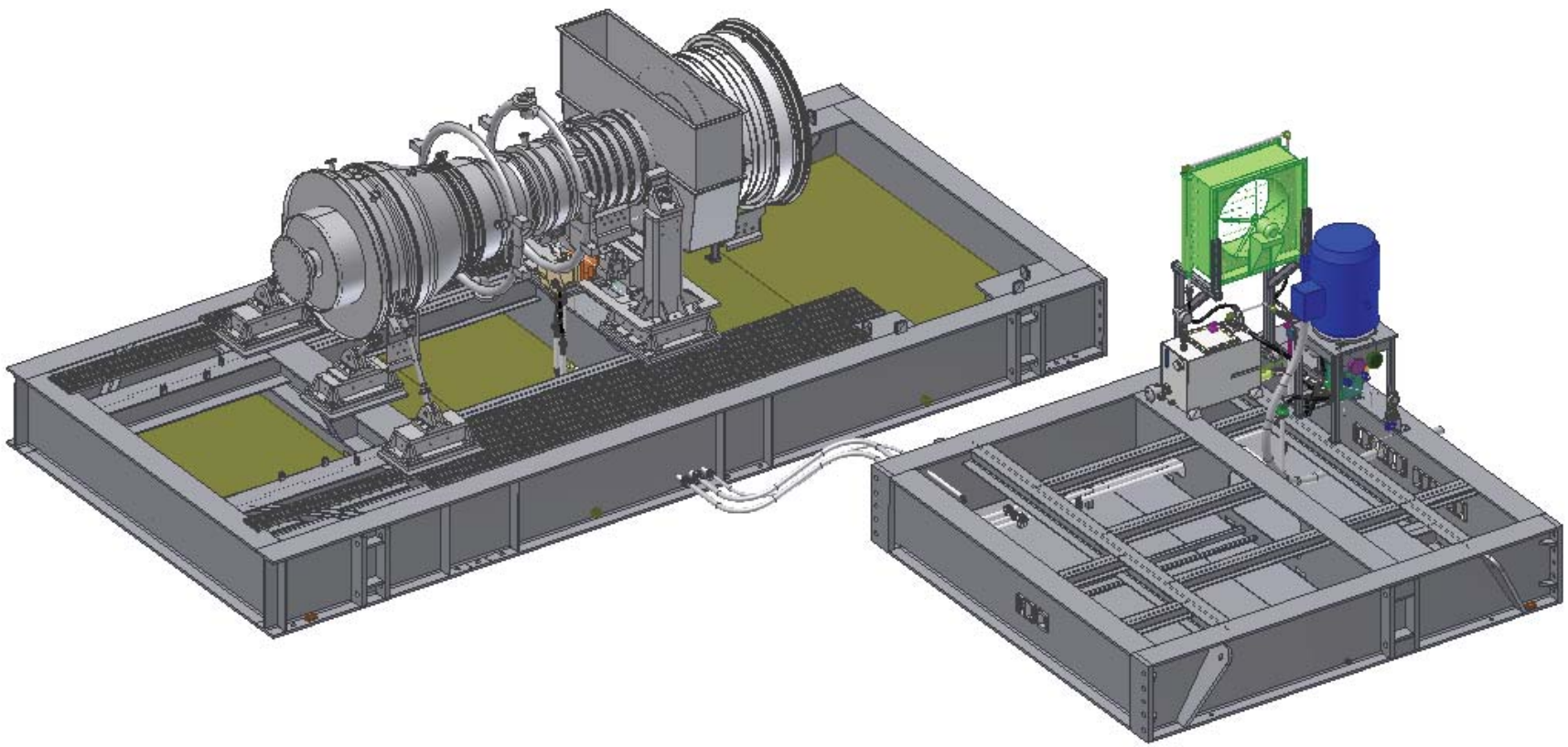
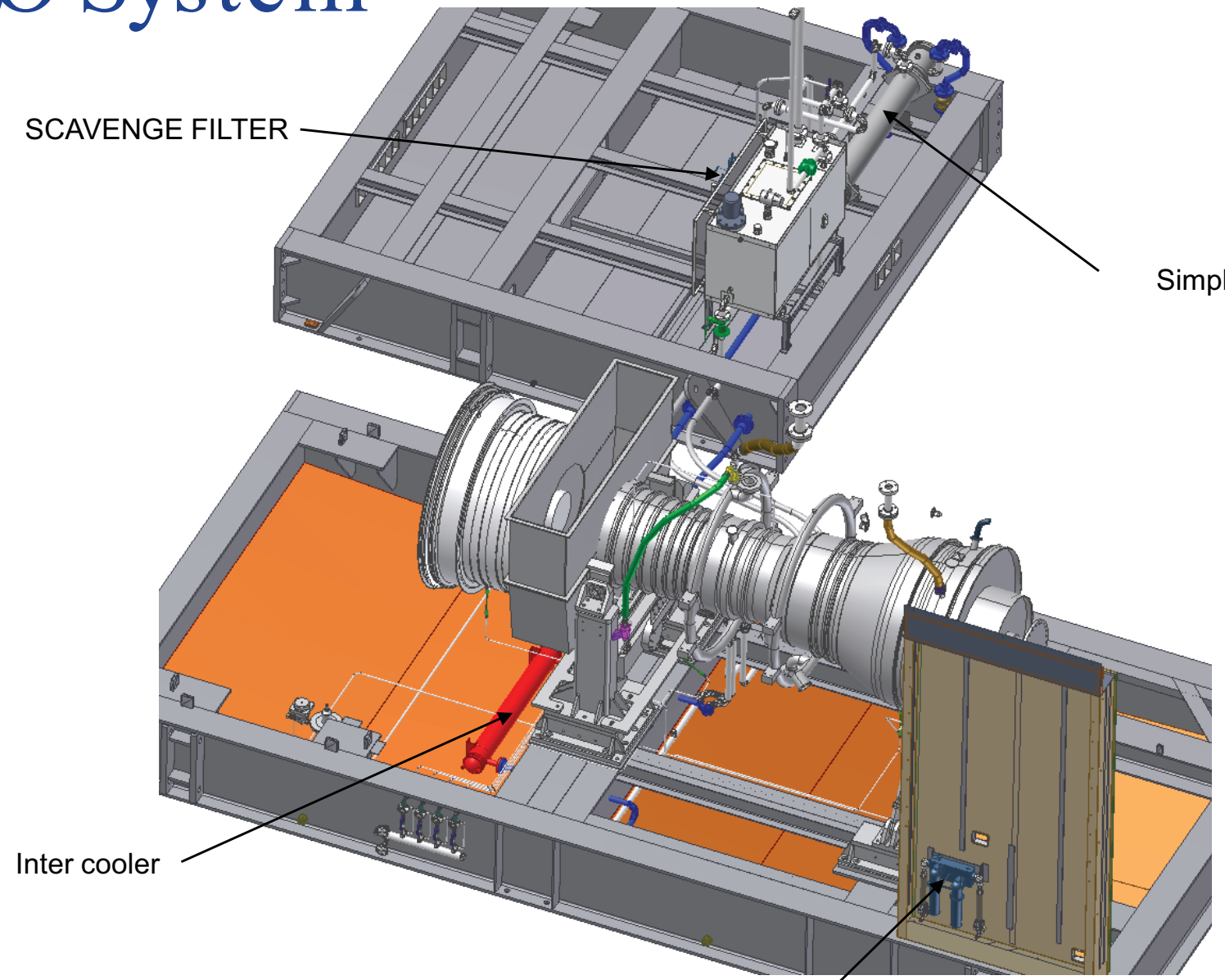
Hyd. Start System



TLO System



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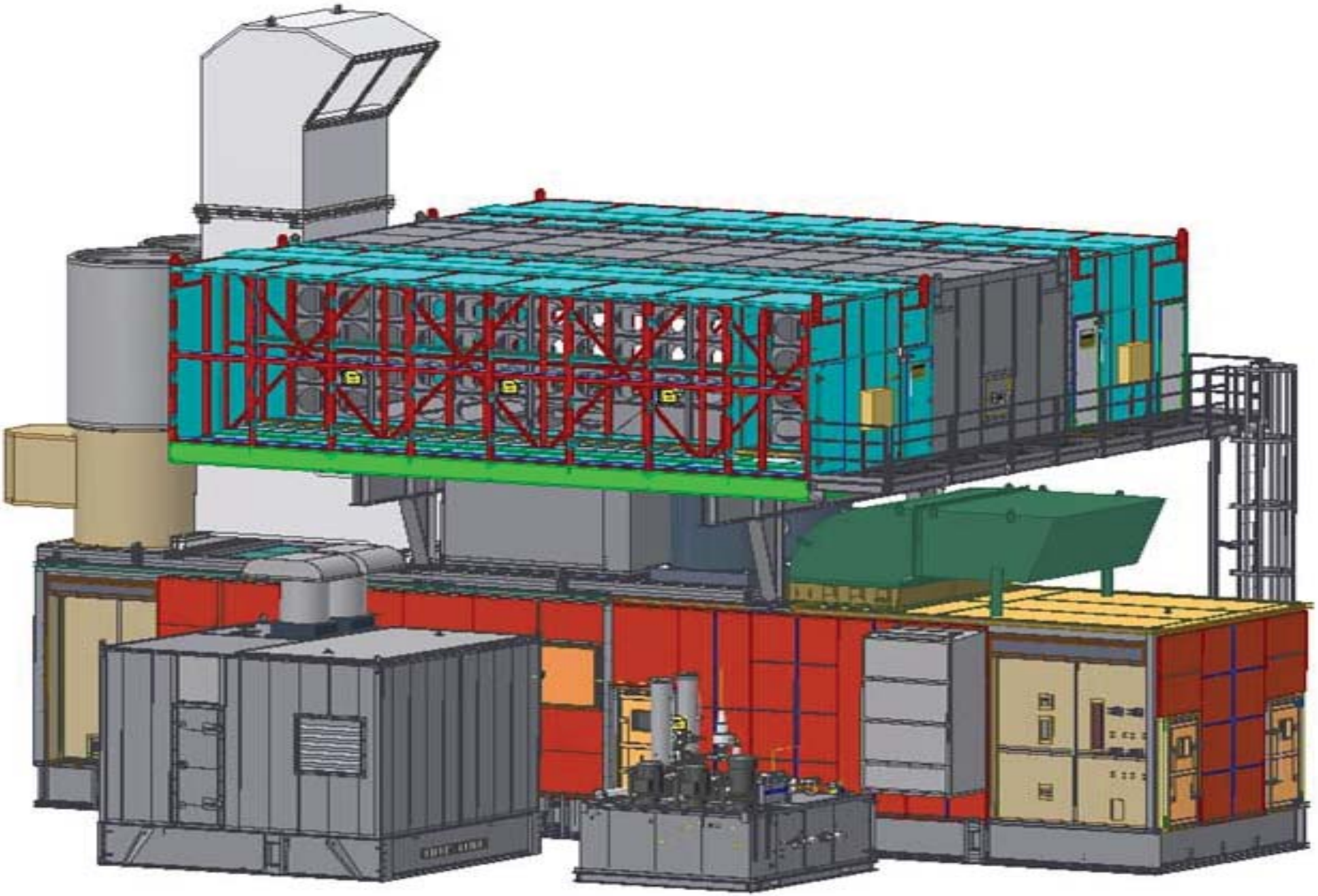
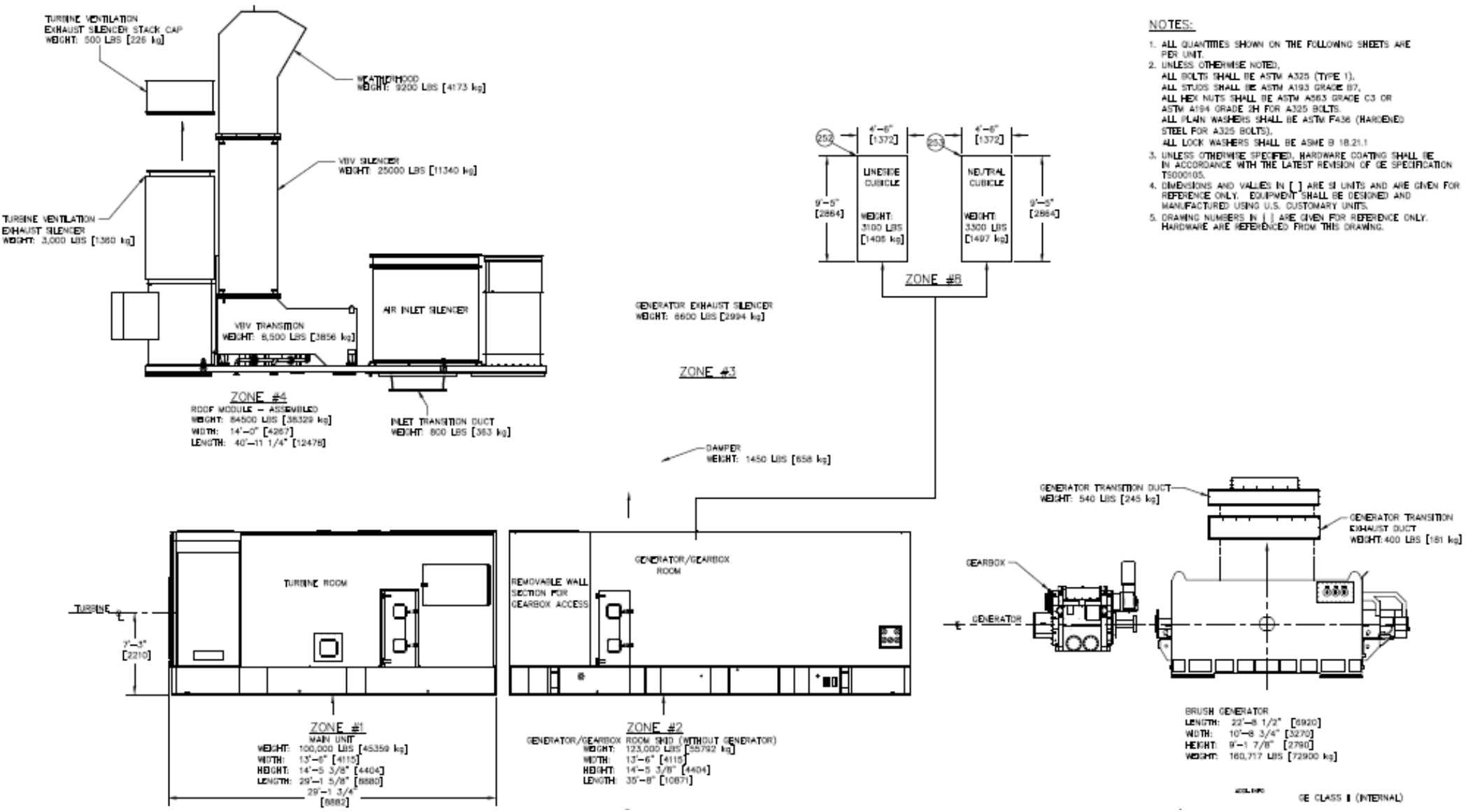


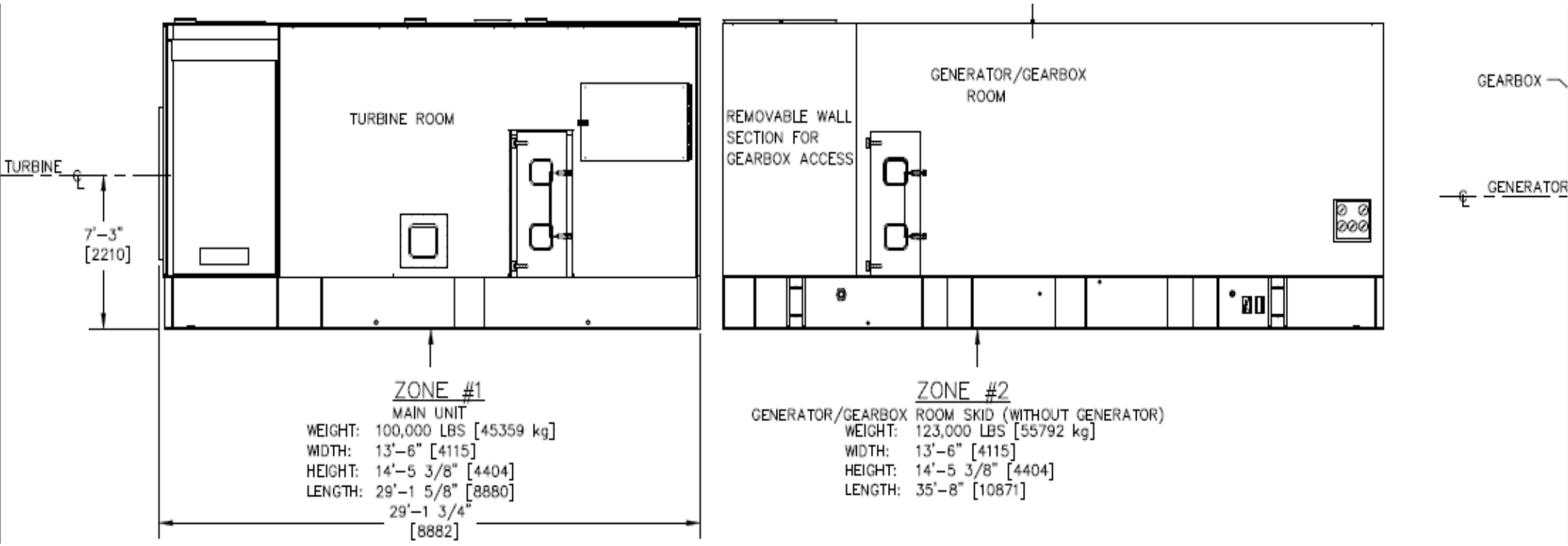
Main Package Assembly Overview



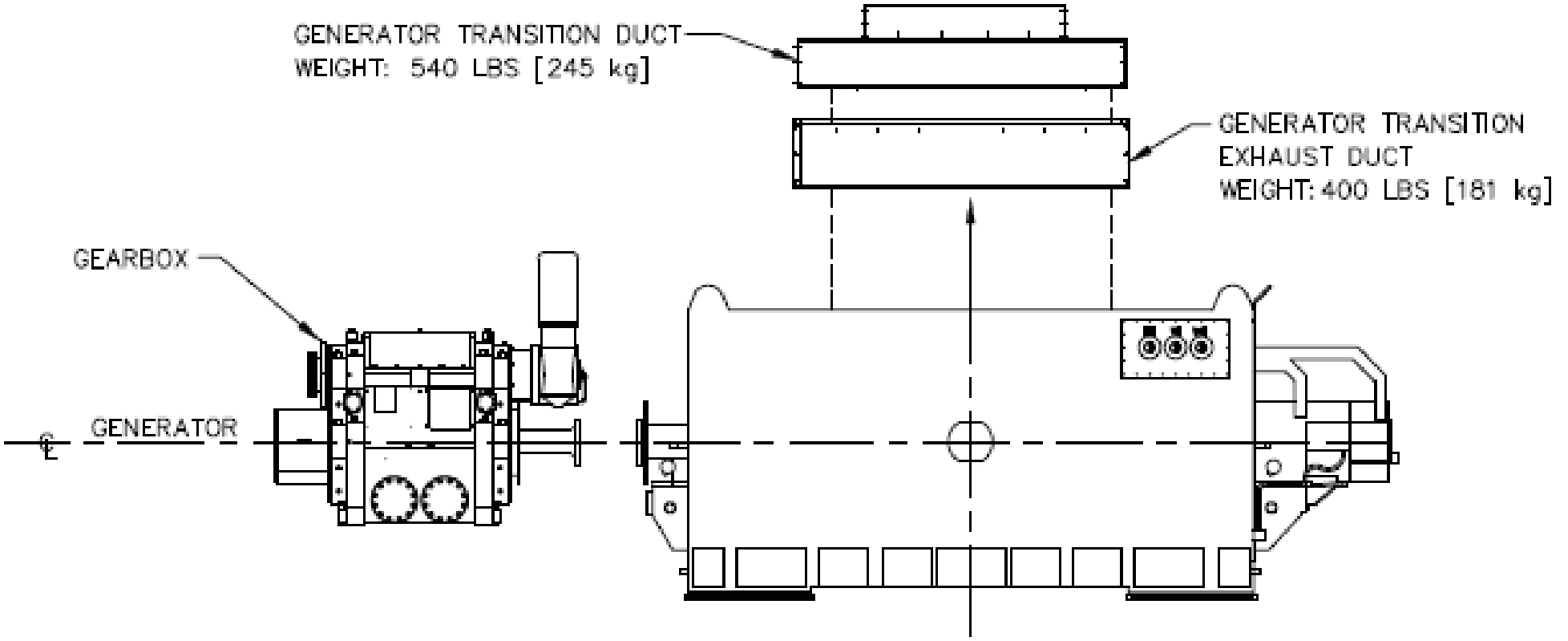
NOTES:

1. ALL QUANTITIES SHOWN ON THE FOLLOWING SHEETS ARE PER UNIT.
2. UNLESS OTHERWISE NOTED,
   ALL BOLTS SHALL BE ASTM A325 (TYPE 1).
   ALL STUDS SHALL BE ASTM A193 GRADE B7,
   ALL HEX NUTS SHALL BE ASTM A563 GRADE C3 OR ASTM A194 GRADE 2H FOR A325 BOLTS.
   ALL PLAIN WASHERS SHALL BE ASTM F436 (HARDENED STEEL FOR A325 BOLTS).
   ALL LOCK WASHERS SHALL BE ASME B 18.21.1
3. UNLESS OTHERWISE SPECIFIED, HARDWARE COATING SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF GE SPECIFICATION TS000105.
4. DIMENSIONS AND VALUES IN [ ] ARE SI UNITS AND ARE GIVEN FOR REFERENCE ONLY. EQUIPMENT SHALL BE DESIGNED AND MANUFACTURED USING U.S. CUSTOMARY UNITS.
5. DRAWING NUMBERS IN ( ) ARE GIVEN FOR REFERENCE ONLY. HARDWARE ARE REFERENCED FROM THIS DRAWING.

Turbine and Generator Main Base Assembly

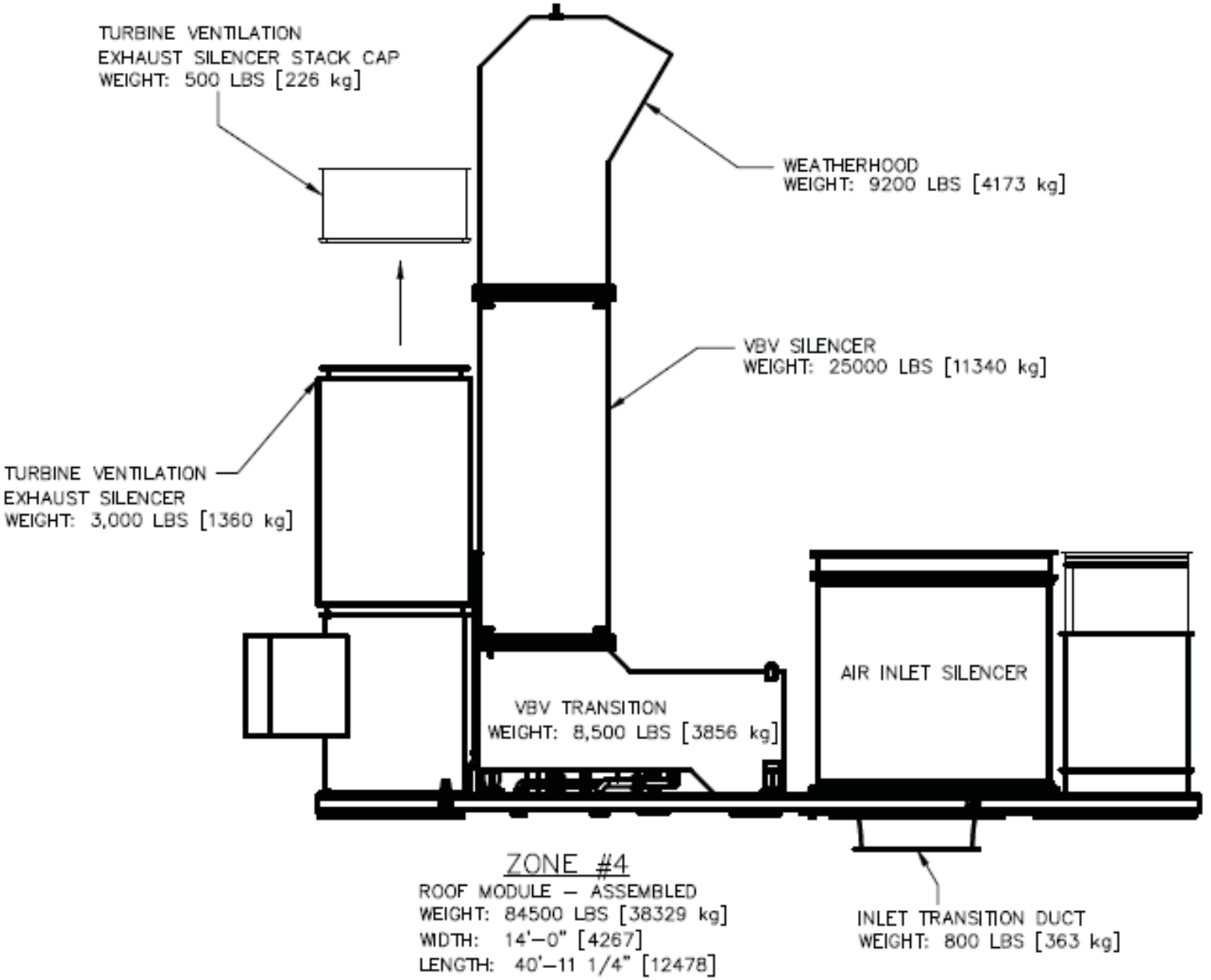


Gearbox and Generator Assembly

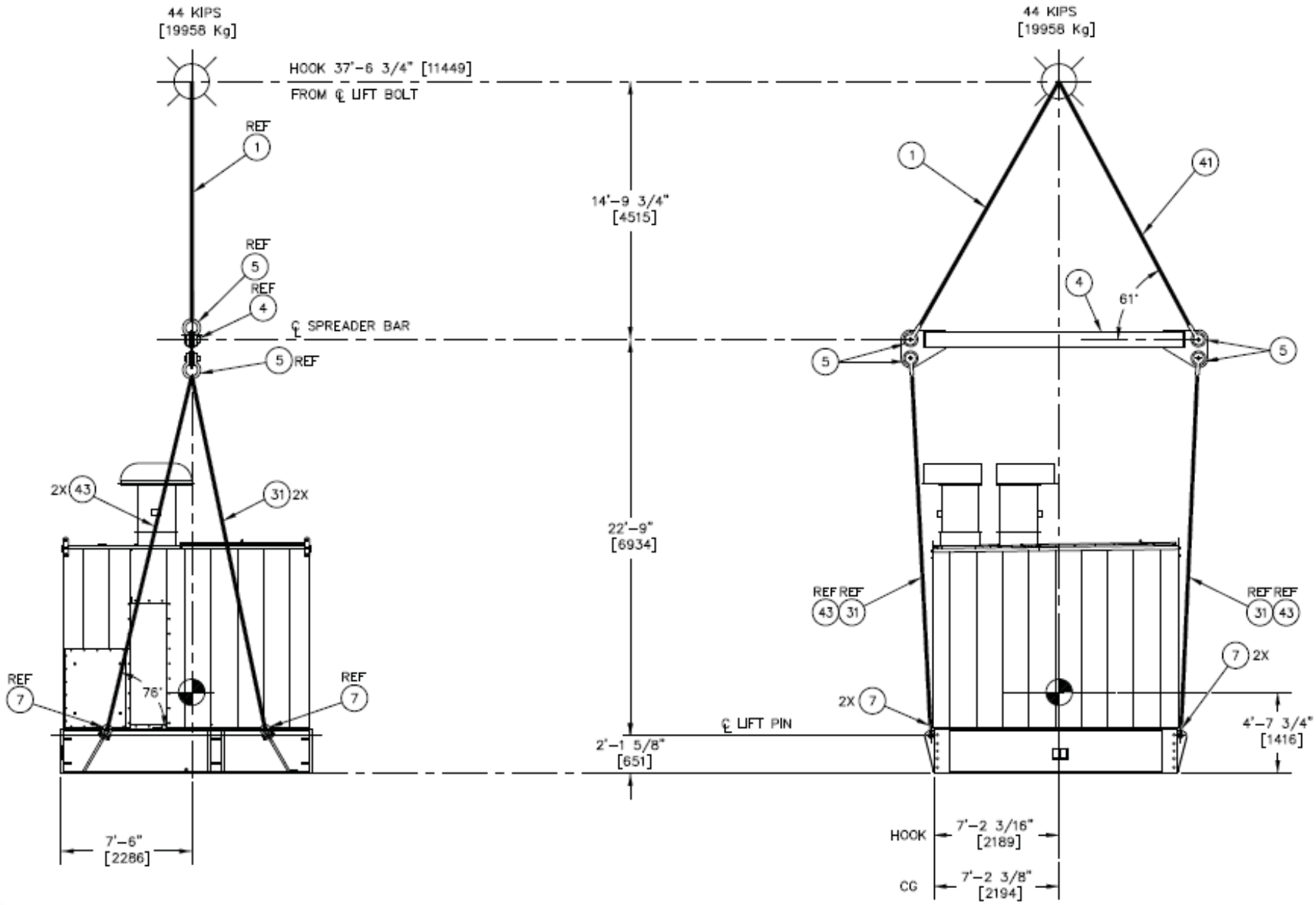


BRUSH GENERATOR
LENGTH: 22'–8 1/2" [6920]
WIDTH: 10'–8 3/4" [3270]
HEIGHT: 9'–1 7/8" [2790]
WEIGHT: 160,717 LBS [72900 kg]

Package Roof Skid Assembly



PG Package Auxiliary Skid Lift Plan



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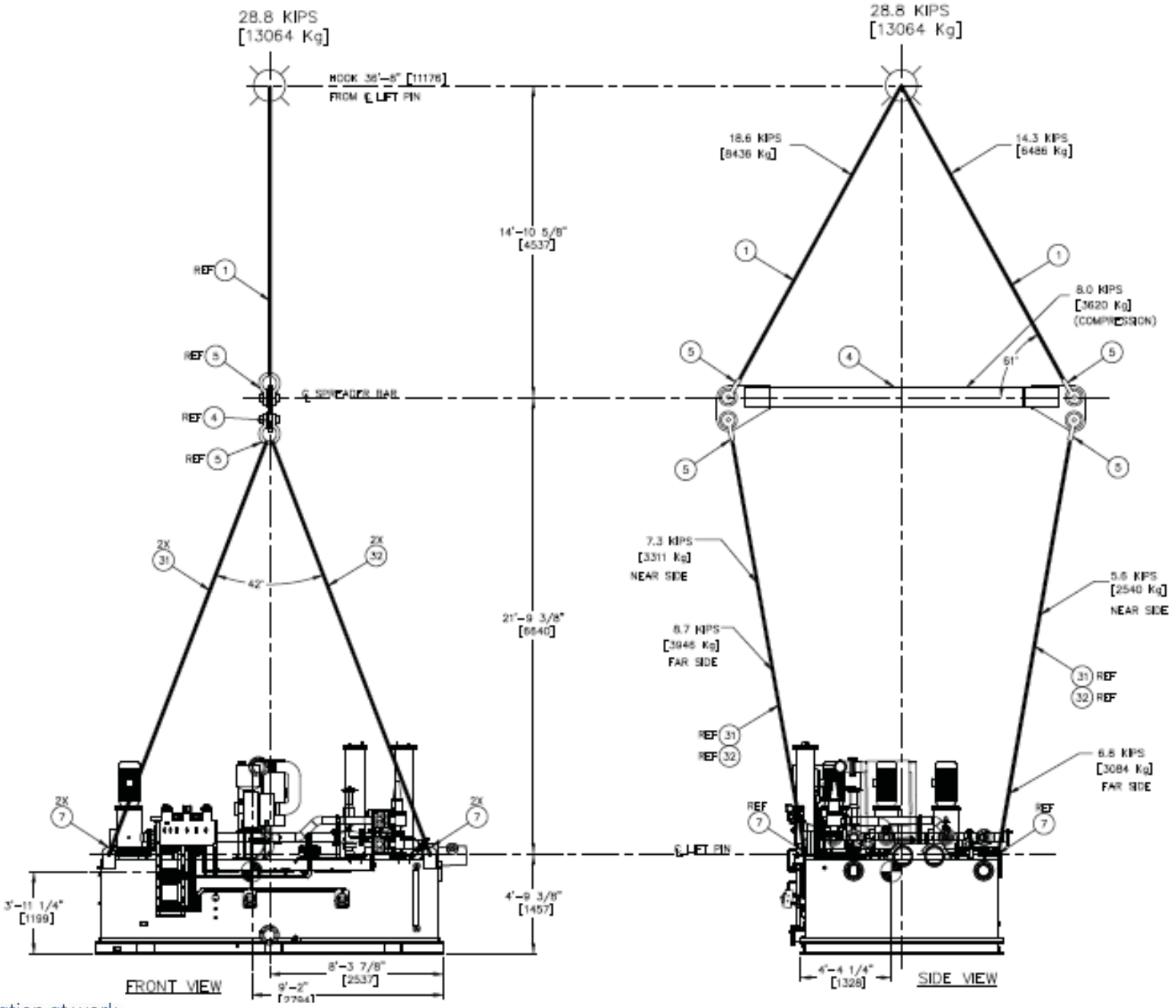
PG Package Mineral Lube Oil Skid Lift Plan



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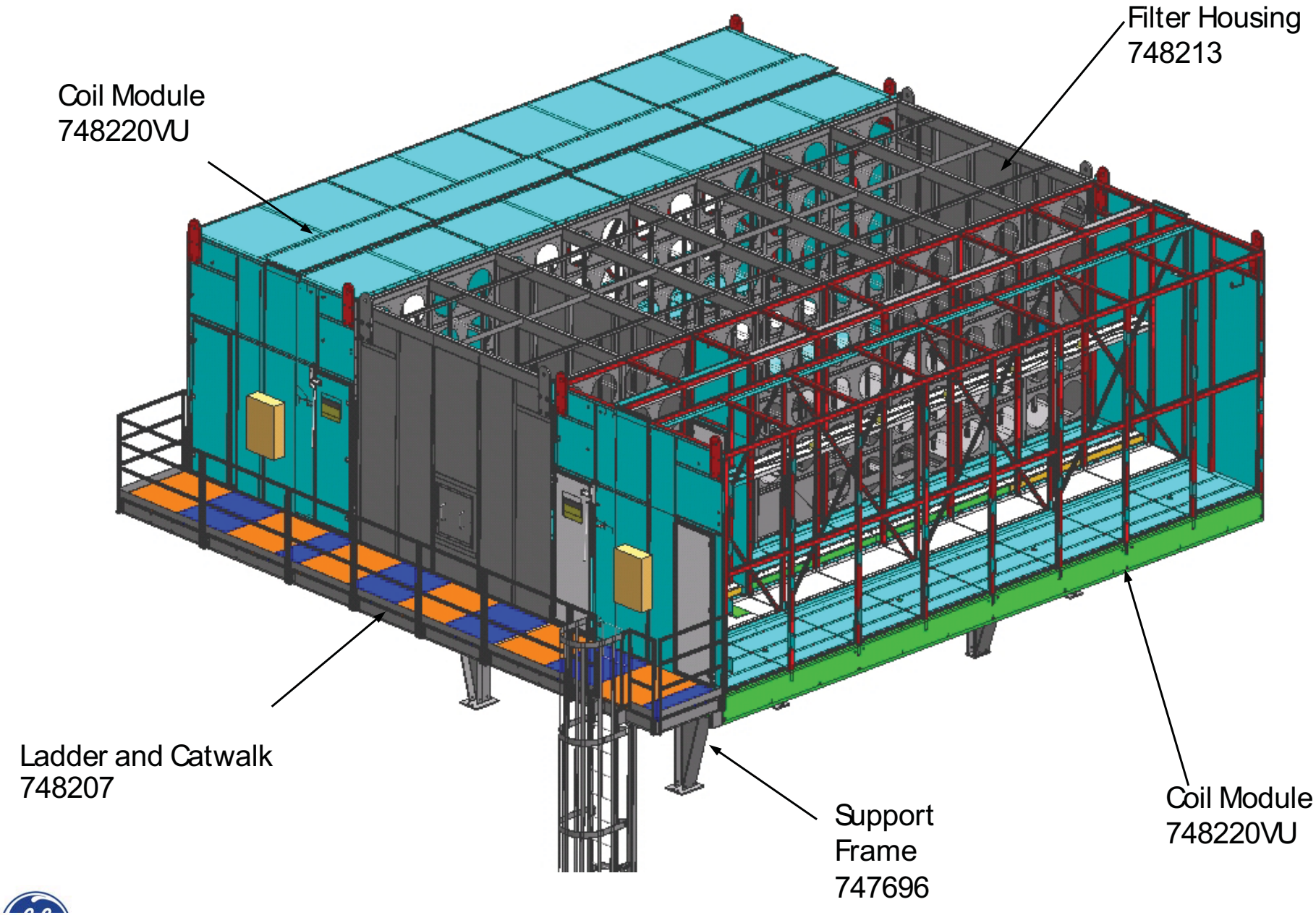
ISO View – Air Filter



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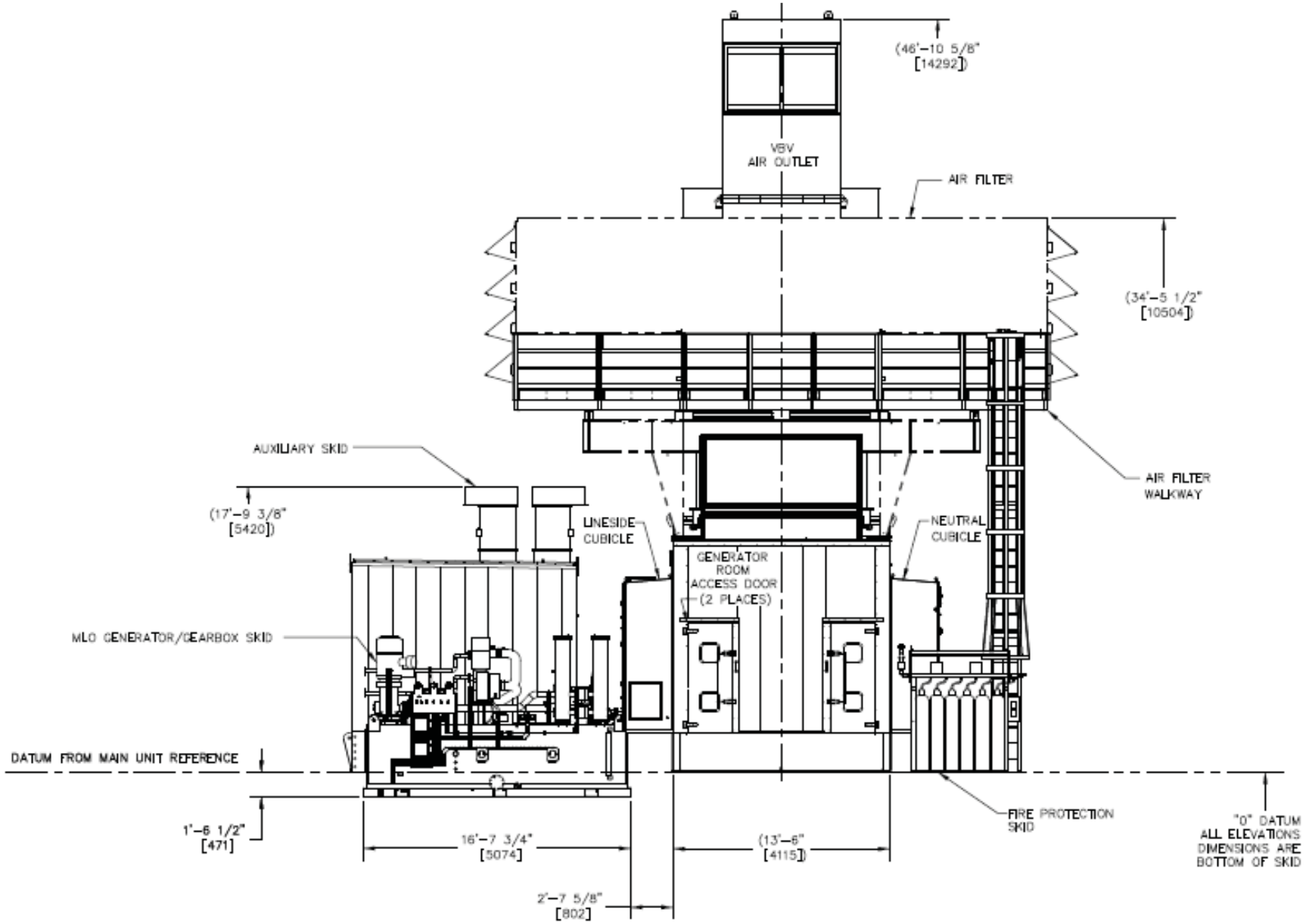
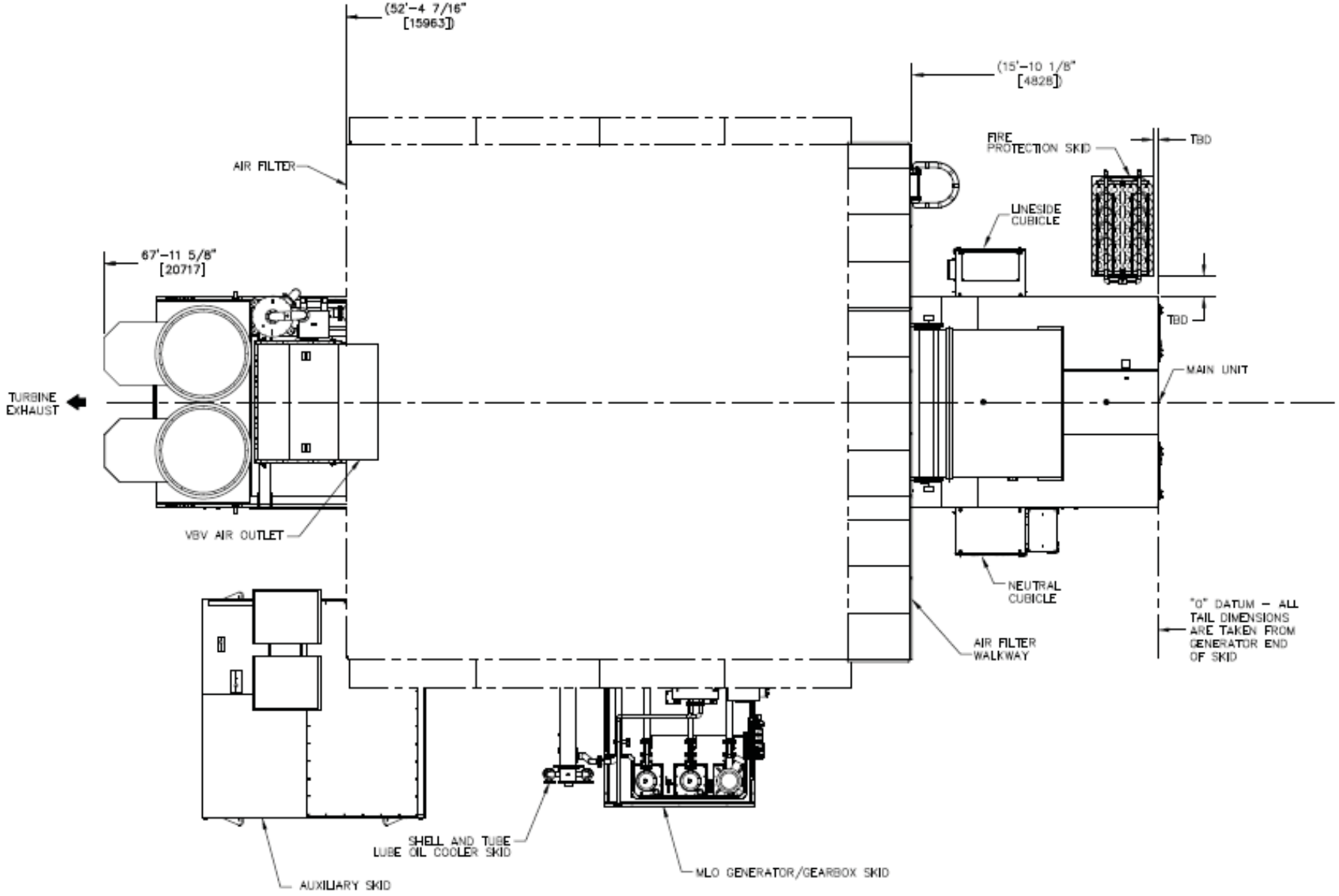
Package Assembly Generator End View



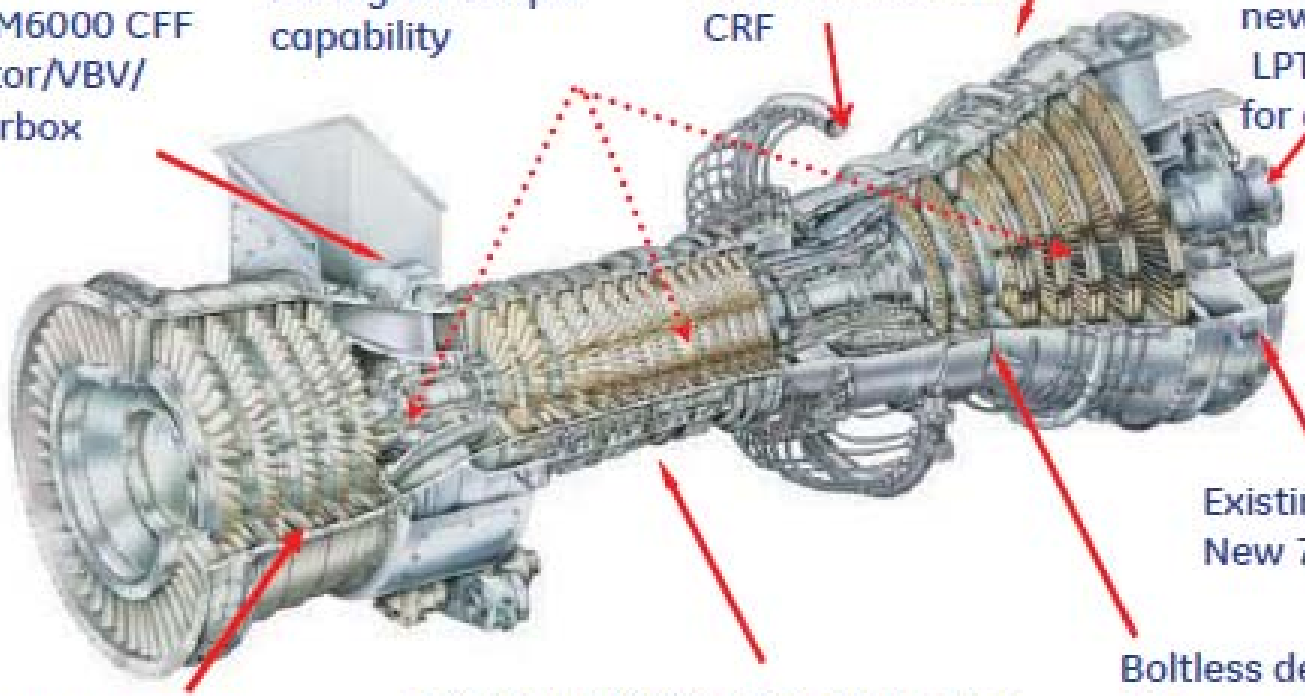
GENERATOR END VIEW

Package Assembly Plan View



PLAN VIEW

PG engine modifications



Improved LM6000 stator
Mew case material
LPT airfoils optimized
for efficiency

LP shaft
spline improvements
for higher torque
capability

Improved
SAC combustor &
CRF

Improved LM6000 rotor
new disk material
LPT airfoils optimized
for efficiency

Existing LM6000 CFF
/collector/VBV/
gearbox

Existing LM6000 TRF
New 7R bearing

Boltless design HPT (CF6-80E)
Disks and interstage seal
New airfoils

Existing LM6000 booster
@ 3930RPM
Premium material disks/shafts

Existing LM6000 HPC blades and
vanes
S11 from CF6-80E
New spool/disk and seal materials
Case bleed modifications

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5

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City of Pasadena
Water and Power Department

Pre-bid Conference for BOP
Glenarm Repowering Project

8:00 a.m. January 8, 2014

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