City of Pasadena
Department of Water and Power

ADDENDUM NO. 2
to

Specifications LD-13-14
for
PROVIDING LABOR AND MATERIALS FOR
GLENARM REPOWERING BALANCE OF PLANT DESIGN AND CONSTRUCTION

This addendum is issued to correct and clarify the above Specifications. All addenda will be issued electronically. This addendum shall be considered in the bid proposal and become a part of any contract made pursuant thereto:

1. Replace the following documents within Attachment A.2 of the Specification. See Enclosure 1.
    - Ammonia System P&ID, Dwgs SKM1-8 Rev A & SKM1-9 Rev A with the drawing SKM1-8 Rev B & SKM1-9 Rev B accordingly.
    - General Arrangement, Dwg M1-1-1 Rev K with M1-1-1 Rev L.
    - PDC Layout, Dwg E1-2 Rev D with E1-2 Rev E in Section 260533 (Non Segregated-Phase Bus and Section 261200-2 (Medium Voltage Auxiliary Transformers).
    - Electrical One-Line, Dwg E1-1A Rev E with E1-1A Rev G in Section 260533 (Non Segregated-Phase Bus and .Section 261200-2 (Medium Voltage Auxiliary Transformers).
    - Tie Points, Dwg M1-1-6 Rev D with M1-1-6 Rev E.

2. Enclosure 2 is not used.

3. Add the following documents to the Attachment A.3 of the Specification. See Enclosure 3.

- Topographic Survey Dwgs TP-1, TP-2, & TP-3.
- Shin Nippon Steam Turbine Steam Quality Requirements
- IST Engineering Specification – Feedwater Quality Requirements for Superheated Steam Applications – Specification No ES-1000 Rev 9.
- IST Jumper Tube Installation Proposal – P12079-00 Jumper Tubes.
- Prolec GSU Transformer Preliminary Proposal Dwg 221732C1.
- Prolec GSU Transformer Technical Proposal Information Form 3.2.1-D Rev.0.
- SPX Cooling Technologies Preliminary Dwg No. JV4688445 – Schematic View.
- SPX Cooling Technologies Preliminary Dwg No.JV468844B – Basin Plan View.
- SPX Cooling Technologies Preliminary Dwg No. JV468844D – Basin Section & Details.
- Holtec Steam Surface Condenser Dwg SK-8371-0 Rev 0.
- Shin Nippon Steam Turbine Foundation Dwg Sheets 1of4 and 2of4.
- Shin Nippon Steam Turbine Layout Dwg 11415-0002-10 Rev 6.
- Shin Nippon Steam Turbine Foundation Loading Data.
- Hyundai IDEAL Steam Turbine Generator Outline Dwg 5065A0-23 Rev F.
- Hyundai IDEAL Aftermarket Service Bulletin Dated 03-01-08.

4. Add the following documents from the January 8, 2014 Pre-Bid Meeting and Job Walk as part of the Specifications. See Enclosure 4.

- BOP Contractor Pre-Bid Meeting Introduction
- BOP RFP Pre-Bid Presentation
- BOP Contractor Pre-Bid Meeting Outreach
- IST Glenarm Repowering Project OTSG Erection
- GE Power Island Equipment Review
- GE LM 6000 Package Evolution.
- Pre-Bid Meeting Sign Up Sheet

5. Add the following City of Pasadena Department of Public Works Permit Requirement Documents as part of the Specifications. See Enclosure 5.

- Construction Staging and Traffic Management Plan – Template.
- Construction Staging & Traffic Management Plan – Truck Routes.
- Contracts/Purchase Orders/Permits Insurance Requirements.
- City of Pasadena Dept of Public Works Permit Location and Working Hours.
- Moving Permit Application – For Wide Load & Heavy Equipment.
- City of Pasadena Application For a Permit to Conduct an Activity within the Public Right-of-Way.
- City of Pasadena Proposed Storage Container Guideline – Street Occupation.

- City of Pasadena – Department of Public Works Application for a Permit to Place a Storage Container in Public Right of Way.
- City of Pasadena FY 2014 Adopted General Fee Schedule Part 2.

6. Replace Attachments A.2 Document List and A.3 Reference Document List of the Specification with the versions included in Enclosure 6.

7. Add the Q & A Table Rev 0 as part of the Specifications. See Enclosure 7.

8. CAD files for the General Arrangement, Site Plan, and Grading Plan were sent to the following individuals

Abeinsa
Philip Schwarz – philip.schwarz@abeinsabd.abengoa.com
Thomas Cavalcante – thomas.k.cavalcante@sargentlundy.com

ARB
Wayne Truchan – wtruchan@arbinc.com
Bob Anders – bob.anders@worleyparsons.com

I + icon Energy
Geoff Murken – gmurken@iiconenergy.com
Erik McElwain – mcelwaine@zhi.com

WoodGroup
John Smith – jk.smith@woodgroup.com
Ray Stankowski – stankowski@pbworld.com

9. IST's drawing ED-002 "Generic Flowsheet Dual Pressure OTSG w/ Burner, SCR, CO) is included within various IST documents such as their presentation at the Pre-Bid meeting. This drawing is included for illustrative purposes only and the specific IST drawing for this project should be used. To clarify further, this project utilizes a single pressure OTSG with no duct burning.

Dan Angeles

Date: 1/16/14

Dan Angeles
Principal Engineer
City of Pasadena Water and Power Department

Enclosures: Enclosure 1
Enclosure 2
Enclosure 3
Enclosure 4
Enclosure 5
Enclosure 6
Enclosure 7

RECEIPT OF ADDENDUM NO. 2

Specifications LD-13-14

for
PROVIDING LABOR AND MATERIALS FOR
GLENARM REPOWERING BALANCE OF PLANT DESIGN AND CONSTRUCTION
FOR
PASADENA WATER & POWER
PASADENA, CALIFORNIA

This Receipt must be signed and returned with your bid. Failure to include signed acknowledgements of all addenda will cause the bid to be deemed incomplete and nonresponsive.

I hereby acknowledge receipt of Addendum No. 2 for Specifications LD-13-14 for Providing Labor and Materials for Glenarm Repowering Balance of Plant Design and Construction.

_____
Date

_____
Company Name

_____
Authorized Signature

Enclosure 1

VENT/VAP RECOVERY
TANK FILL
SCR SUPPLY
LINE EVACUATION
FILL & VAP RECOVERY LOW POINT DRAIN COLLECTION
AIR SUPPLY

AIR SUPPLY
FI
SS TUBING EC2Y
1/2"
1/2"
NH3
AE
SCS
AI
DETAIL "1"
TYP. DOUBLE WALL PIPING LEAK DETECTION MONITOR

TO SCR AMMONIA INJ. SKID 3-64
3-001
AE-3-984
3-AM9005-1"-EC2Y
AG UG
EC2Q EC2Y
TO SCR AMMONIA INJ. SKID 4-64
4-001
AE-4-984
4-AM9005-1"-EC2Y
AG UG
EC2Q EC2Y

EC2Y EC2Q
FI-984/985
AM9005-1"-EC2Y
UG AG
NOTE 2
PT
986
1/2"
3/4"
LOW POINT
AM9015-3/4"-EC2Q

EC2Q EC2Y
FI-970
PIPE CULVERT
EC2Y EC2Q
AE-970
NOTE 2
HS 970 | XS 971 | XS 972 | PSL 973
HS 980 | XS 981 | XS 982 | PSL 983
HS 990 | XS 991 | XS 992 | PSL 993
SCS

GLENARM PLANT
BROADWAY PLANT
SHELTER (NOTE 4)
FUTURE AMMONIA FORWARDING PUMP SKID
(FOR GTG 1 & 2)
NH3 AE 956
SCS AI 956
LOCATE NEAR AMMONIA FWD PUMP SKID
BY VENDOR
66
AMMONIA FORWARDING PUMP SKID
NOTE 1
1" B
1" D
1" C
1" A
3/4" E
JB
FUTURE CONNECTION
1 1/2"x1"
FUTURE CONNECTION
CURBED AREA AMMONIA FORWARDING PUMPS

SCS AI 957
NH3 AE 957
PIPE CULVERT
AM9003-1"-EC2Q
AM9004-1"-EC2Q
AM9001-3"-EC2Q
AM9002-1 1/2"-EC2Q

S9001
VAPOR RETURN 19% AMMONIA LOADING STATION
2"
2"x1 1/2"
AM9002-1 1/2"-EC2Q
AG UG
UG AG
3/4"
LOW POINT
PIPE CULVERT

S9001
S9002
19% AMMONIA LOADING STATION
2"
2"
2"
3"x2"
1"
AE-975
FI-975
AM9001-3"-EC2Q
AG EC2Q
UG EC2Y
AG EC2Q
LOW POINT
AM9016-3/4"-EC2Q
3/4"

EC2Q EC2Y
FI-973
FI-972
NOTE 2 PIPE CULVERT
EC2Y EC2Q
AE-973
AE-972
NH3 AE
SCS AI (981) (982) (983)
AM9018-3/4"-EC2Q
PIPE CULVERT NOTE 2

XAH 951/960
LI 950-1
HORN & FLASHING LIGHT @ LOADING STATION
XI 951/960
LI 962-1

FI-971
NOTE 2 PIPE CULVERT
AE-971
AM9012-3/4"-EC2Q
EC2Q EC2Y
EC2Y EC2Q

ABANDON IN PLACE
CUT & CAP VENT LINE
VAPOR RETURN 29% AMMONIA LOADING STATION (NOTE 3)
2"
2"x1 1/2"
AM9008-1 1/2"-EC2Q
AG UG
UG AG
3/4"
LOW POINT
FG 963A
FG 963B
CUT & CAP VENT LINE
(NOTE 3)
CURBED AREA AMMONIA LOADING

AM9010-3/4"-EC2Q
AM9013-3/4"-EC2Q
AM9009-3/4"-EC2Q
AM9019-3/4"-EC2Q
AM9014-3/4"-EC2Q
3/4"
ATM
68A AMMONIA RETURN PUMP
68B AMMONIA RETURN PUMP
12"DIAx3'L
12"DIAx3'L
3/4"
AM9011-3/4"-EC2Q
AM9017-3/4"-EC2Q
NOTE 5
IA6016-1 1/2"-EC2Q
IA6016A-3/4"-EC2Q
IA6016B-3/4"-EC2Q
AIR SUPPLY TO LEAK DETECTION FI'S PER DETAIL "1"
BY INSTR.
BY PIPING
1/2" TYP.
2"x1 1/2"
060

FI-974
TO GT-5
EC2Q EC2Y
PIPE CULVERT
EC2Y EC2Q
AE-974
PIPE CULVERT NOTE 2
PIT ON WEST END OF PIPE CULVERT

TEMPORARY GT-5 PUMP LOCATION

SOV 952
XV 952
FC
AS
LOCATE NEAR PLATFORM
NH3 AE 958
SCS AI 958
BD9008-1 1/2"-EC2Q
1 1/2" 2"x1 1/2"
CSO
PSV 965
3"
CSO 2"FP
VRV 966
AM9021-2"-EC2Q
LOCATE @ TANK 65
XI 951
XAH 951
LSHH 951
LSH 951
LIT 950
LG 967
PI 953
TI 954
65
19% AMMONIA STORAGE TANK
12,000 GAL. CAPACITY
NOTE 1
(REF. TEXAS SYSTEMS DWG. XXXXX)
1"x3/4"
2"x1 1/2"
1 1/2"x1" 1 1/2"
DIKED AREA AMMONIA TANK
SCS LI 950

XI 960
XAH 960
LOCATE @ EXISTING TANK
SOV 961
AS
T 11 EXIST. NEW
AM9020-2"-EC2Q
SHUT DOWN
LSHH 960
ALARM
LSH 960
LG 968
LIT 962
T 6
T 7
2"x1 1/2"
3"x2"
NEW EXIST
XV 961
FC
EXISTING 29% AMMONIA TANK
TO B-3 SCR
B-3 PUMP SKID
T 12 EXIST. NEW
SCS LI 962

INTERIM/TEMPORARY CONDITION

USERNAME $$$$$$SYSTIME$$$$$

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT, TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE							
INIT							

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
B	ISSUE FOR INFORMATION ONLY	12/18/13	NJN	*	*	*
A	ISSUE FOR INFORMATION ONLY	12/4/13	NJN	*	*	*

DSGN * *
DRN * *
CKD * *
SCALE: *
FOR 22x34 DWG ONLY

POWER ENGINEERS www.powereng.com

PASADENA WATER & POWER
GLENARM REPOWERING PROJECT (GT-5 COMBINED CYCLE INSTALLATION)
INTERIM / TEMPORARY CONFIGURATION

JOB NUMBER 123374
REV B
DRAWING NUMBER SKM1-8

VENT/VAP RECOVERY
TANK FILL
SCR SUPPLY
LINE EVACUATION
FILL & VAP RECOVERY LOW POINT DRAIN COLLECTION
AIR SUPPLY

AIR SUPPLY
FI
SS TUBING EC2Y
1/2"
1/2"
NH3 AE
SCS AI
DETAIL "1" TYP. DOUBLE WALL PIPING LEAK DETECTION MONITOR

SHELTER (NOTE 4)
GLENARM PLANT
BROADWAY PLANT
FUTURE AMMONIA FORWARDING PUMP SKID (FOR GTG 1 & 2)
NH3 AE 956
SCS AI 956
LOCATE NEAR AMMONIA FWD PUMP SKID

TO SCR AMMONIA INJ. SKID 3-64
3-001
AE-3-984
3-AM9005-1"-EC2Y
AG UG
EC2Q EC2Y
TO SCR AMMONIA INJ. SKID 4-64
4-001
AE-4-984
4-AM9005-1"-EC2Y
AG UG
EC2Q EC2Y
FI-984/985
EC2Y EC2Q
AM9005-1"-EC2Y
UG AG
NOTE 2
PT 986
1/2"
3/4"
LOW POINT
AM9015-3/4"-EC2Q
HS 970 XS 971 XS 972 PSL 973
HS 980 XS 981 XS 982 PSL 983
HS 990 XS 991 XS 992 PSL 993
SCS
EC2Q EC2Y
FI-970
PIPE CULVERT
EC2Y EC2Q
AE-970
1" B
JB
BY VENDOR
66
AMMONIA FORWARDING PUMP SKID
NOTE 1
1" D
1" C
1" A
3/4" E
CURBED AREA AMMONIA FORWARDING PUMPS
FUTURE CONNECTION
1 1/2"x1"
FUTURE CONNECTION

SCS AI 957
NH3 AE 957
PIPE CULVERT
S9001
VAPOR RETURN 19% AMMONIA LOADING STATION
2"
2"x1 1/2"
AM9002-1 1/2"-EC2Q
AG UG
UG AG
3/4"
LOW POINT
PIPE CULVERT
S9001
S9002
19% AMMONIA LOADING STATION
2"
2"
2"
3"x2"
1"
AE-975
FI-975
AM9001-3"-EC2Q
AG UG AG
EC2Q EC2Y EC2Q
LOW POINT
AM9016-3/4"-EC2Q
3/4"
EC2Q EC2Y
FI-973
FI-972
NOTE 2 PIPE CULVERT
EC2Y EC2Q
AE-973
AE-972
AM9018-3/4"-EC2Q
PIPE CULVERT NOTE 2
NH3 AE
SCS AI (981) (982) (983)

AM9003-1"-EC2Q
AM9004-1"-EC2Q
AM9001-3"-EC2Q
AM9002-1 1/2"-EC2Q
3/4"
BD9008-1 1/2"-EC2Q
FC
XV 952
SOV 952
AS
3/4"
1 1/2" 2"x1 1/2"
CSO
LOCATE NEAR PLATFORM
NH3 AE 958
SCS AI 958
PSV 965
3"
CSO 2"FP
VRV 966
2"
AM9021-2"-EC2Q
3/4"
1"x3/4"
1"
3"
2"x1 1/2"
7 1" 1 3" 3 2" 6 2" 8 2" 9 2" 10 2"
2"
PI 953
TI 954
12 1"
13 1 1/2"
65
19% AMMONIA STORAGE TANK
12,000 GAL. CAPACITY
NOTE 1
(REF. TEXAS SYSTEMS DWG. XXXXX)
LG 967
LSHH 951
LSH 951
LIT 950
1 1/2" 2 1 1/2" 5 2" 4 2" 11
1 1/2"x1" 1 1/2"
1 1/2"x1" 1 1/2"
2"
2"
DIKED AREA AMMONIA TANK
LOCATE TANK 65
XI 951
XAH 951
SCS LI 950

XAH 951/960
LI 950-1
HORN & FLASHING LIGHT LOADING STATION
XI 951/960
LI 962-1
FI-971
NOTE 2 PIPE CULVERT
AE-971
AM9012-3/4"-EC2Q
EC2Q EC2Y
EC2Y EC2Q
XI 960
XAH 960
LOCATE EXISTING TANK
SOV 961
AS
T 11
EXIST. NEW
AM9020-2"-EC2Q
2"
SHUT DOWN
LSHH 960
ALARM
LSH 960
LG 968
LIT 962
T 6
2"x1 1/2"
2"
T 7
3"x2"
NEW EXIST
EXISTING 29% AMMONIA TANK
2"
EXIST. NEW
T 12
SCS LI 962

VAPOR RETURN 29% AMMONIA LOADING STATION (NOTE 3)
2"
2"x1 1/2"
AM9008-1 1/2"-EC2Q
AG UG
UG AG
3/4"
LOW POINT
FG 963A
FG 963B
FI-974
TO GT-5
EC2Q EC2Y
PIPE CULVERT
EC2Y EC2Q
AE-974
PIPE CULVERT NOTE 2
XV 961
FC
GT-5 PUMP SKID
(NOTE 3)
CURBED AREA AMMONIA LOADING
AM9010-3/4"-EC2Q
AM9013-3/4"-EC2Q
AM9009-3/4"-EC2Q
AM9014-3/4"-EC2Q
AM9019-3/4"-EC2Q
68A AMMONIA RETURN PUMP
68B AMMONIA RETURN PUMP
ATM
12"DIAx3'L
12"DIAx3'L
AIR SUPPLY TO LEAK DETECTION FI'S PER DETAIL "1"
BY INSTR. BY PIPING
1/2" TYP.
2"x1 1/2"
060
AM9011-3/4"-EC2Q
AM9017-3/4"-EC2Q
IA6016-1 1/2"-EC2Q
IA6016A-3/4"-EC2Q
IA6016B-3/4"-EC2Q
NOTE 5
PIT ON WEST END OF PIPE CULVERT

PROPOSED FINAL

USERNAME $$$$$$$$SYSTIME$$$$$

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INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE							
INIT							

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
B	RE-ISSUE FOR INFORMATION ONLY	12/18/13	NJN	*	*	*
A	ISSUE FOR INFORMATION ONLY	12/4/13	NJN	*	*	*

DSGN	*	*
DRN	*	*
CKD	*	*

SCALE: *
FOR 22x34 DWG ONLY

CITY OF PASADENA INCORPORATED JUNE 1886

POWER ENGINEERS www.powereng.com

PASADENA WATER & POWER
GLENARM REPOWERING PROJECT (GT-5 COMBINED CYCLE INSTALLATION)
FINAL CONFIGURATION

JOB NUMBER 123374
REV B
DRAWING NUMBER SKM1-9

GLENARM BUILDING

GRID NORTH
TRUE NORTH

α = -00°05'08"

GT - 1

GT - 2

GT - 3

GT - 4

PACIFIC ELECTRIC BUILDING

R.O.W. & P.L.

R.O.W. & P.L.

0 10 20 40 60 FEET

1" = 20'

NOTES

1. CONCEPTUAL

LEGEND

1 - GAS TURBINE GENERATOR (GTG)
2 - ONCE THROUGH STEAM GENERATOR (OTSG)
3 - STEAM TURBINE GENERATOR (STG)
4 - SURFACE CONDENSER
5 - OTSG STACK
6 - POWER DISTRIBUTION CENTER (PDC) / CONTROL ROOM
7 - 13.8KV -4.16KV AUX. TRANSFORMER
8 - 4160V -480V AUX. TRANSFORMER
9 - 17.2KV -4.16KV AUX. TRANSFORMER
10 - INLET AIR CHILLER
11 - GSU TRANSFORMER
12 - COOLING TOWER
13 - FUEL GAS COMPRESSOR SKID
14 - CIRCULATING WATER PUMPS
15 - OTSG CHEMICAL FEED SKID
16 - AMMONIA FLOW CONTROL UNIT
17 - BOILER FEEDWATER PUMPS
18 - GTG CO2 BOTTLES
19 - CEMS SKID
20 - DEMINERALIZED WATER TANK/PUMPS
21 - GTG AUXILIARY SKID
22 - CONDENSATE POLISHER
23 - CONDENSATE STORAGE TANK
24 - CONDENSATE PUMPS
25 - INLET AIR HEAT EXCHANGER
26 - FUEL GAS COMPRESSOR DRAINS TANK
27 - AIR COMPRESSOR AND RECEIVER
28 - CONDENSATE MAKE-UP PUMPS
29 - INLET AIR PRE-COOLER
30 - GTG FUEL GAS FINAL FILTER SKID
31 - WASTE WATER TANK/PUMPS
32 - GENERATOR/GEARBOX LUBE OIL SKID
33 - GTG LUBE OIL COOLER SKID
34 - STEAM TURBINE ENCLOSURE
35 - BEARING COOLING WATER PUMPS
36 - AUXILIARY COOLING WATER PUMPS
37 - AUXILIARY COOLING WATER HEAT EXCHANGER
38 - DEMINERALIZED WATER FORWARDING PUMPS
39 - WASTE WATER LIFT STATION
40 - GLENARM WEIR (EXISTING)
41 - COOLING TOWER CHEMICAL TREATMENT
42 - GT 3 & 4 OILY WATER SEPARATOR (EXISTING)
43 - GLENARM BROADWAY TUNNEL (EXISTING)
44 - GT 3 & 4 DEMIN TANK (EXISTING)
45 - STEAM & WATER SAMPLING PANEL
46 - POTABLE WATER RECIRCULATION SKID
47 - ATMOSPHERIC FLASH TANK/TRANSFER PUMPS
48 - COIL CONDENSATE SUMP
49 - GTG WATER WASH DRAINS TANK (IN OPEN VAULT)
50 - CONTROL BUILDING
51 - PURGE/TEMPERING AIR FANS
52 - WATER LAB BUILDING
53 - SPRINT SKID

kcourson 01/06/2014 07:02 AM \\boifs1\projects\123374\0D\CAD\dwg\mech\55pam1-1-1.dgn

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE							
INIT							

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
L	RE-ISSUED FOR BID	01/06/2014	KAC	KAC	TRC	GTH
K	RE-ISSUED FOR BID	12/06/2013	VBD	KAC	TRC	GTH
J	RE-ISSUED FOR BID	10/15/2013	VBD	KAC	TRC	GTH
I	RE-ISSUED FOR BID	09/27/2013	VBD	KAC	ADD	SLH
H	RE-ISSUED FOR REVIEW	07/18/2013	VBD	KAC	ADD	SLH

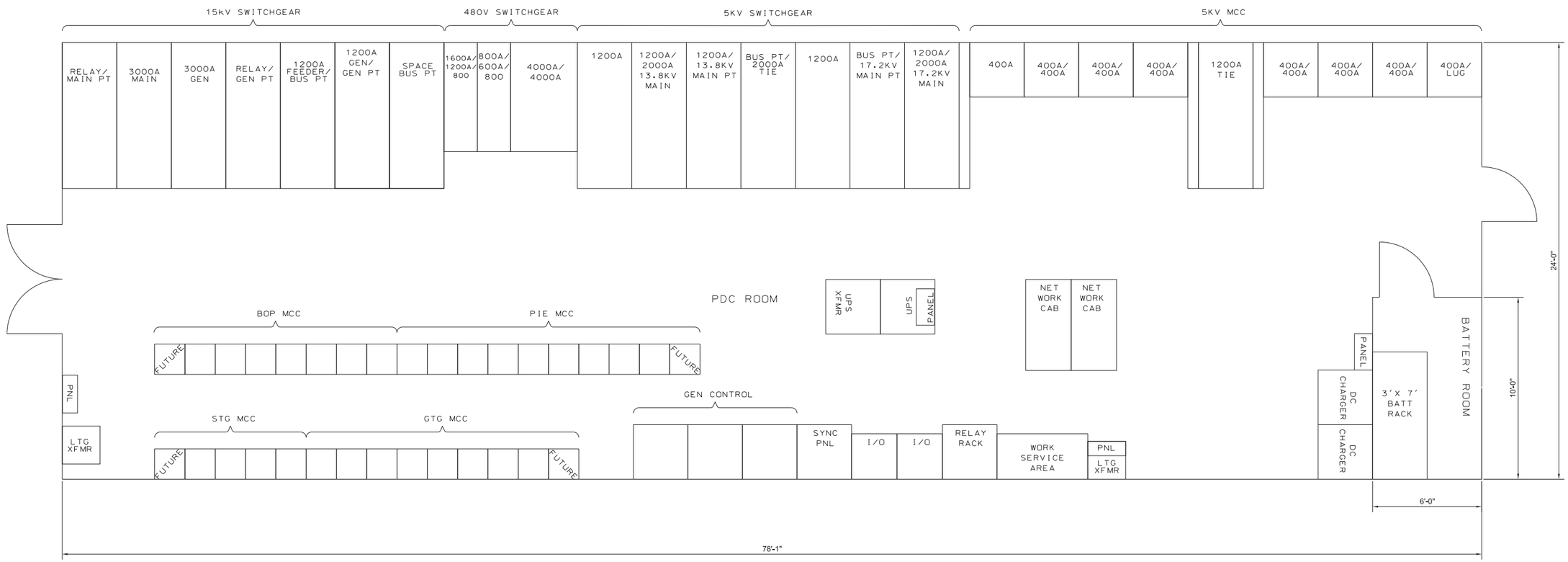
DSGN	KAC	01/06/2014	KAC	TRC	GTH	DSGN	DPB	04/12/2011
DRN	VBD	12/06/2013	VBD	KAC	TRC	DRN	DPB	04/12/2011
CKD	VBD	10/15/2013	VBD	KAC	TRC	CKD	RVK	04/12/2011

SCALE: 1" = 20'-0"
FOR 22x34 DWG ONLY

POWER ENGINEERS
www.powereng.com

PASADENA WATER & POWER
GLENARM REPOWERING PROJECT
(GT-5 COMBINED CYCLE INSTALLATION)
GENERAL ARRANGEMENT
GAS TURBINE/AXIAL EXHAUST

JOB NUMBER 123374
REV L
DRAWING NUMBER M1-1-1



0 1 2 3 4 5 10 FEET

1/4"= 1'- 0"

tmartichusK2/09/2013 03:45 PM W:*123374*DD*CAD*dwg*elec*54paseE1.2.dgn

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE							
INIT							

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
E	RE-ISSUED FOR BID	12/10/13	TLM	FD	RL	GH
D	ISSUED FOR BID	09/06/13	RLA	FD	RL	GH
C	RE-ISSUED FOR REVIEW	07/18/13	TLM	FD	RL	GH
B	RE-ISSUED FOR REVIEW	06/21/13	RLA	RL	RL	GH
A	ISSUED FOR REVIEW	01/18/13	RDQ	FD	CH	GH

DSGN	FD	09/04/12
DRN	MD	09/04/12
CKD	JR	09/07/12

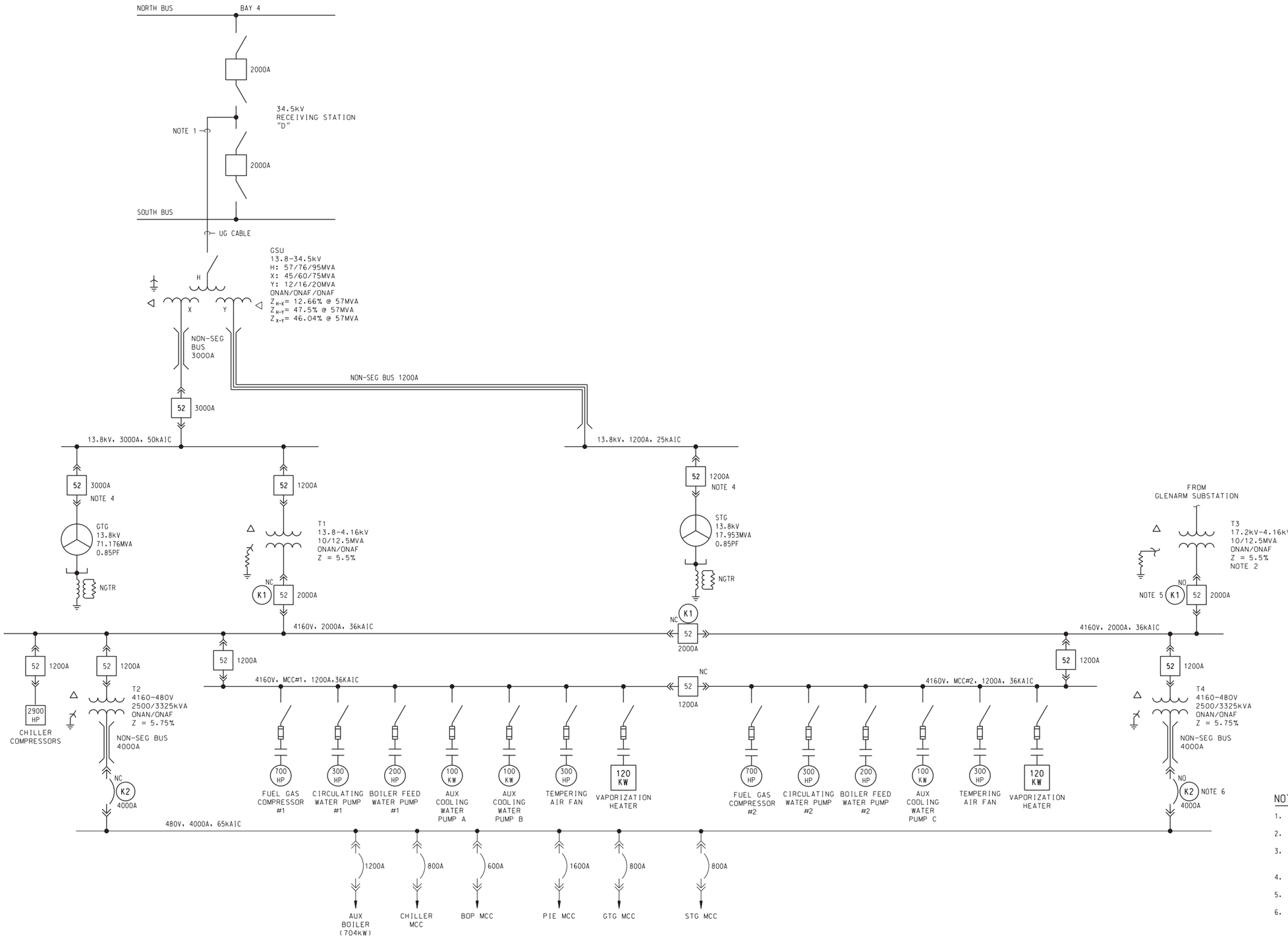
SCALE: * *
FOR 22x34 DWG ONLY

CITY OF PASADENA INCORPORATED JUNE 1886

POWER ENGINEERS

PASADENA WATER & POWER
GLENARM REPOWERING PROJECT
(GT-5 COMBINED CYCLE INSTALLATION)
ELECTRICAL OVERALL CONCEPTUAL
PDC BUILDING LAYOUT

JOB NUMBER 123374
REV E
DRAWING NUMBER E1-2



NOTES

1. REPLACES EXISTING FEED TO B3.
2. TRANSFORMER TO PROVIDE A 60° PHASE SHIFT VIA Dzn2 PHASE RELATIONSHIP.
3. ALL EQUIPMENT RATINGS TO BE CONFIRMED BY BOP CONTRACTOR DURING BID AND/OR DETAILED DESIGN.
4. GENERATOR BREAKERS NEED TO BE RATED FOR GENERATOR BREAKER SERVICE.
5. 2-KEY, 3-LOCK INTERLOCK SYSTEM TO BE INSTALLED.
6. 1-KEY, 2-LOCK INTERLOCK SYSTEM TO BE INSTALLED.

INTER-DISCIPLINE REVIEW							
DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
G	RE-ISSUED FOR BID	01/07/14	TLM	FD	RL	GH
F	RE-ISSUED FOR BID	12/10/13	TLM	FD	RL	GH
E	ISSUED FOR BID	09/06/13	RLA	FD	RL	GH
D	RE-ISSUED FOR REVIEW	07/18/13	TLM	FD	RL	GH
C	RE-ISSUED FOR REVIEW	10/17/12	RDQ	FD	CH	GH

DSGN	CH	05/13/11
DRN	RDQ	05/16/11
CKD	BT	05/17/11

SCALE: NONE

FOR 22x34 DWG ONLY

POWER ENGINEERS

PASADENA WATER & POWER

GLENARM REPOWERING PROJECT (GT-5 COMBINED CYCLE INSTALLATION)

ELECTRICAL OVERALL CONCEPTUAL ONE-LINE DIAGRAM (LM 6000)

JOB NUMBER 123374

REV G

DRAWING NUMBER E1-1A

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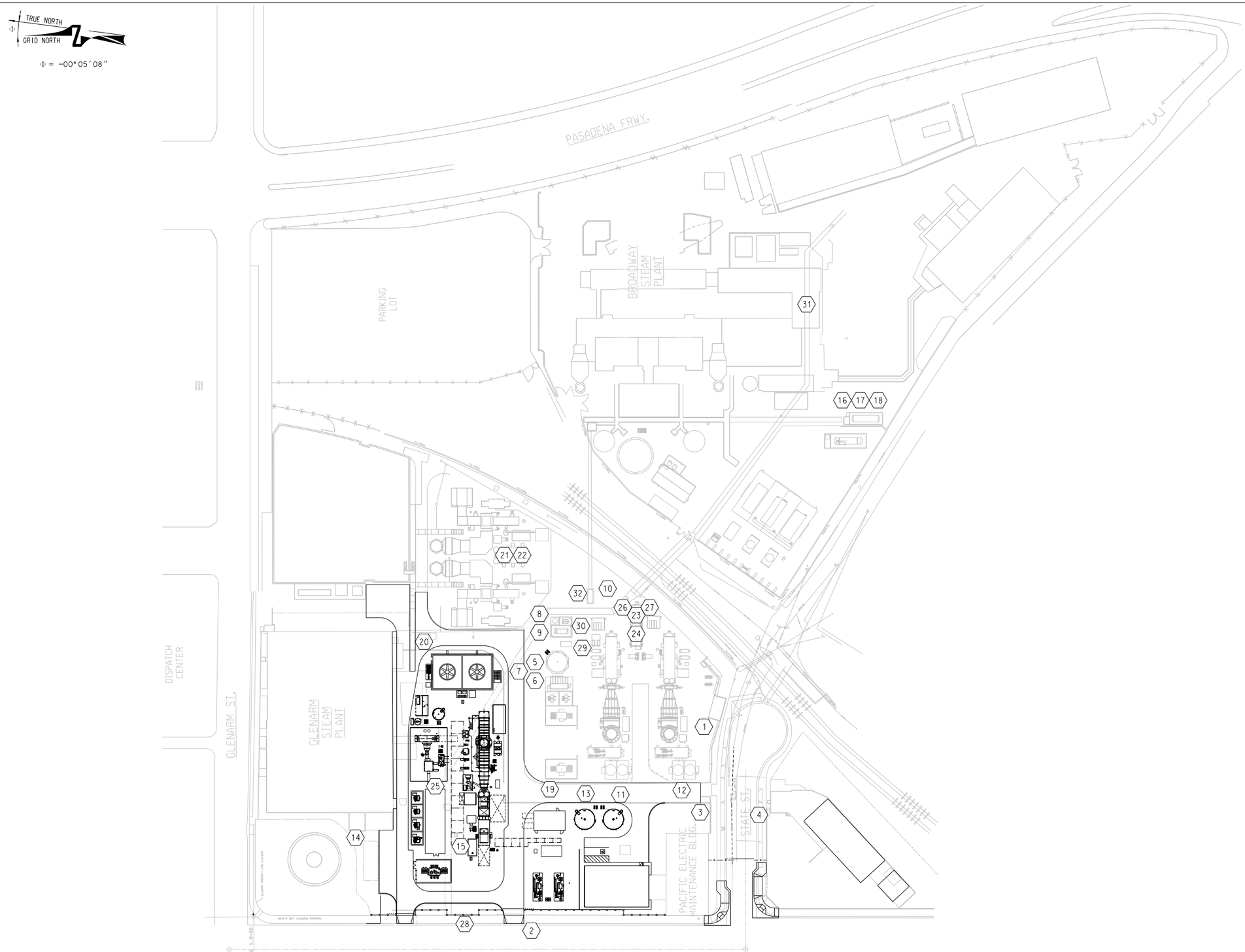

LEGEND

1. – FUEL GAS SUPPLY
2. – CITY WATER CONNECTION – POTABLE/SERVICE WATER
3. – CITY WATER CONNECTION – FIRE WATER LOOP
4. – CITY WATER CONNECTION – MAINTENANCE BLDG
5. – DEMINERALIZED WATER FROM TANK 157B
6. – DEMINERALIZED WATER RECIRCULATION TO TANK 157B
7. – DEMINERALIZED WATER FROM TANK 157A
8. – EQUIPMENT DRAIN SUMP TO OWS
9. – OWS EFFLUENT TO WASTEWATER STORAGE TANK
10. – GT-5 WASTEWATER TO EXISTING DISCHARGE PIPE
11. – CT 3 BLOWDOWN
12. – CT 4 BLOWDOWN
13. – WASTEWATER STORAGE TANK TO DISCHARGE PIPE
14. – FOUNTAIN DRAIN
15. – GTG WASH WATER DRAINS TANK PUMP-OUT
16. – AQUEOUS AMMONIA SUPPLY
17. – AQUEOUS AMMONIA PUMP MINIMUM FLOW
18. – AQUEOUS AMMONIA PUMP SKID RECIRCULATION
19. – 34.5 KV
20. – 17 KV
21. – GT1 CONTROL SYSTEM
22. – GT2 CONTROL SYSTEM
23. – GT3 CONTROL SYSTEM
24. – GT4 CONTROL SYSTEM
25. – 34.5 KV RELAY PANEL
26. – PHONE
27. – INTERNET
28. – SANITARY SEWER
29. – INTRUMENT AIR
30. – OWS LEVEL INSTRUMENT
31. – EXISTING B3 CONTROL ROOM
32. – NEW AMMONIA FEED CONNECTION

NOTES:
1. REFER TO DRAWING M9-10 TIE IN POINT INDEX FOR FURTHER DETAILS.
2. TIE POINT LOCATIONS SHOWN ARE APPROXIMATE. BOP CONTRACTOR TO FIELD LOCATE.

0 30 60 120 180 FEET
1"= 60'

kcourson 01/06/2014 06:59 AM \\doifs1\projects\123374\DD\CAD\dwg\mech\55parm1-1-6.dgn

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE							
INIT							

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
E	ISSUED FOR BID	01/03/14	KAC	KAC	TRC	TRC
D	ISSUED FOR BID	12/09/2013	VBD	SEG	TRC	TRC
C	ISSUED FOR BID	10/15/2013	VBD	SEG	TRC	TRC
B	ISSUED FOR BID	09/27/2013	VBD	SEG	TRC	TRC
A	ISSUED FOR REVIEW	12/07/2012	DPB	SEG	ADD	TRC

DSGN	DPB	12/05/2012
DRN	DPB	12/05/2012
CKD	SEG	12/05/2012

SCALE: 1" = 60'-0"
FOR 22x34 DWG ONLY

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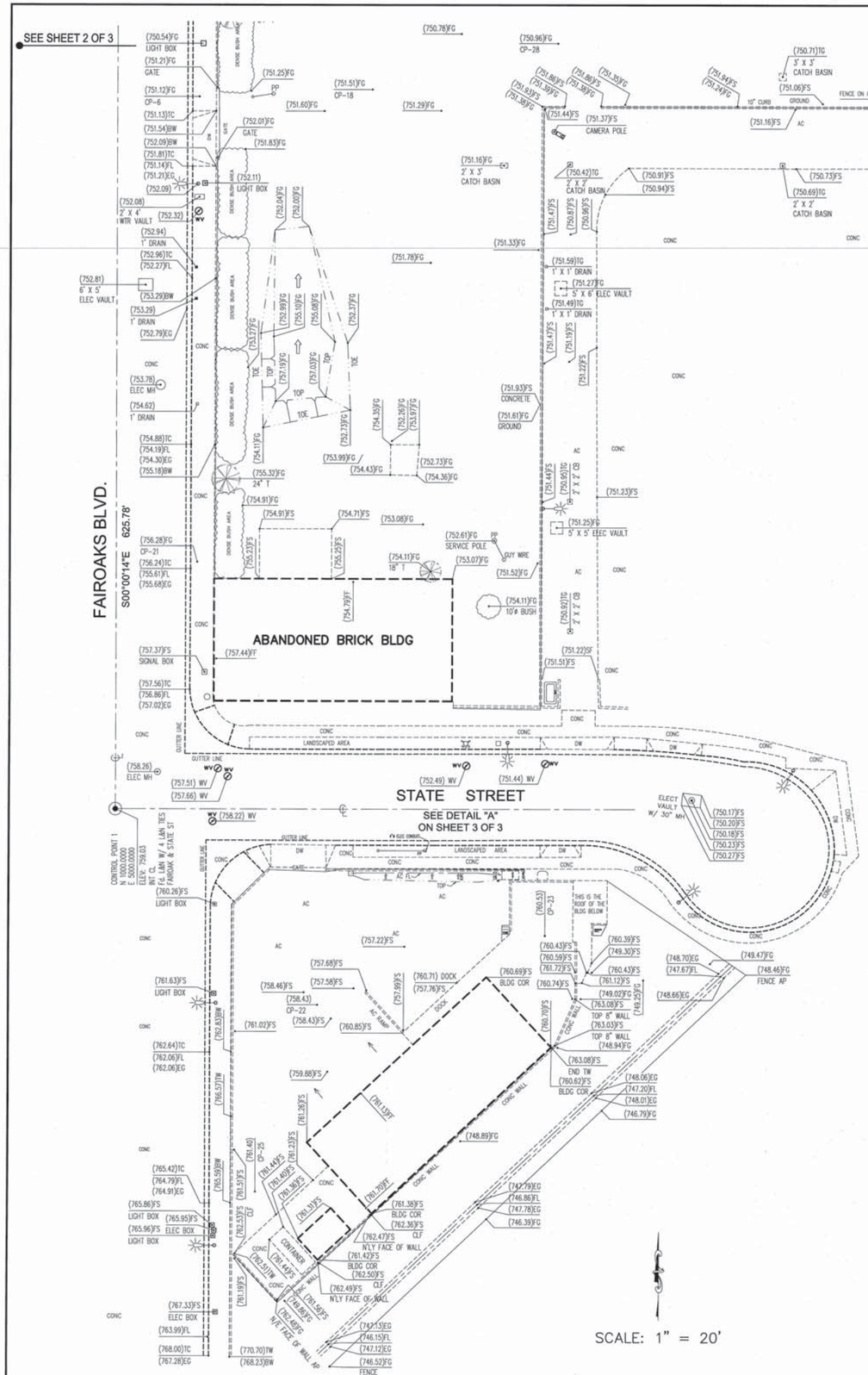
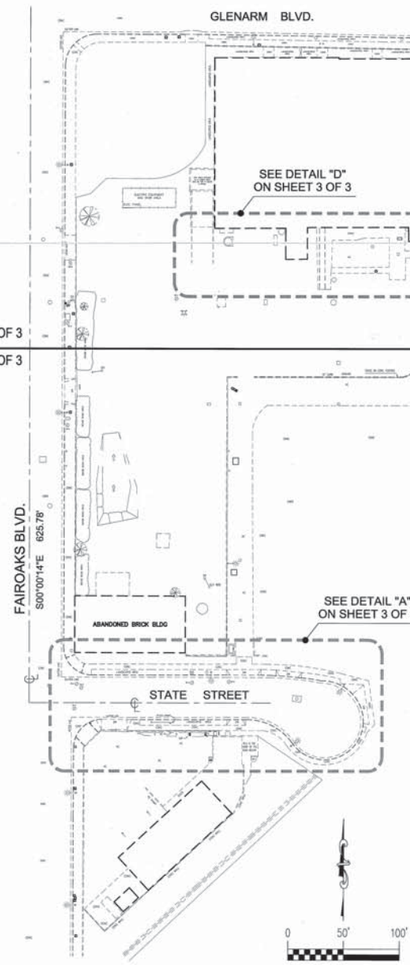
PASADENA WATER & POWER
GLENARM REPOWERING PROJECT
(GT-5 COMBINED CYCLE INSTALLATION)
TIE POINT DRAWING
GAS TURBINE/AXIAL EXHAUST

JOB NUMBER 123374
REV E
DRAWING NUMBER M1-1-6

Enclosure 2
(Not Used)

Enclosure 3





KEY MAP
SCALE: 1" = 50'

ABBREVIATIONS

AB	= AGGREGATE BASE
AC	= ASPHALTIC CONCRETE
ACD	= ASBESTOS CEMENT DUCT
AP	= ANGLE POINT
BC	= BEGINNING CURVE
BFP	= BACKFLOW PREVENTER
BLDG	= BUILDING
BLK	= BLOCK
BM	= BENCH MARK
BS	= BUS STOP
BW	= BACK OF WALK
CAB	= CRUSHED AGGREGATE BASE
CB	= CATCH BASIN
CC	= CONCRETE CURB
CF	= CONCRETE FILL
C&G	= CURB & GUTTER
CI	= CAST IRON
CL	= CENTER LINE
CLF	= CHAIN LINK FENCE
CLR	= CLEAR
CMB	= CRUSHED MISCELLANEOUS BASE
CO	= CLEAN OUT
COL	= COLUMN
CONC	= CONCRETE
CP	= CONTROL POINT
CPCP	= CONCRETE PIPE
DC	= DETECTOR CHECK
DCL	= DOUBLE CHECK LINED
DI	= DUCTILE IRON
DWY	= DRIVEWAY
E	= ELECTRICAL
EC	= END CURVE
EG	= EDGE OF GUTTER
ELEC	= ELECTRIC
ELEC MH	= ELECTRICAL MANHOLE
E/O	= EAST OF
EP	= EDGE OF PAVEMENT
EV	= ELECTRICAL VAULT
EX	= EXISTING
FAPB	= FIRE ALARM PULL BOX
F/C	= FOUND
FF	= FINISH FLOOR
FG	= FINISH GROUND
FH	= FIRE HYDRANT
FL	= FLOW LINE
FS	= FINISH SURFACE
GB	= GRADE BREAK
GM	= GAS METER
GP	= GAS PIPE SPK.
GV	= GAS VALVE
HB	= HOSE BIBB
HC	= HANDICAP
HI	= HIGH
HP	= HIGH POINT
HVPB	= HIGH VOLTAGE PANEL BOX
HVV	= HIGH VOLTAGE CONTROL VALVE
INV	= INVERT ELEVATION
IP	= IRON PIPE
IRM	= IRRIGATION WATER METER
LP	= LOW POINT
LT. STD.	= LIGHT STANDARD
L&R	= LEAD AND RAIL
L&T	= LEAD AND TAG
MH	= MANH
MO	= MOBIL OIL
MP	= METAL POST
NG	= NATURAL GROUND ELEVATION
N/O	= NORTH OF
O.H.	= OVERHEAD
OHT	= OVERHEAD TELEPHONE LINE
OHU	= OVERHEAD UTILITIES (POWER, CABLE, TELEPHONE, ETC)
OLE	= ORNAMENTAL LIGHTING CONDUIT
PB	= PULL BOX
PED.	= PEDESTAL
PL	= PROPERTY LINE
PM	= PARKING METER POST
POB	= POINT OF BEGINNING
POC	= POINT OF CONNECTION
PCC	= POINT OF COMPOUND CURVE
PP	= POWER POLE
PS	= PEDESTRIAN SIGNAL
PWR	= POWER
R	= RIDGE
RCE	= REGISTERED CIVIL ENGINEER
RCP	= REINFORCED CONCRETE PIPE
RCV	= REMOTE CONTROL VALVE
R/W	= RIGHT-OF-WAY
SCG	= SOUTHERN CALIF. GAS
SDMH	= STORM DRAIN MANHOLE
SL	= STREET LIGHT
SMH	= SEWER MANHOLE
SS	= SANITARY SEWER
SSS	= UNDERGROUND SEWER LINE
ST	= STREET
STLT	= STREET LIGHT
STA.	= STATION
STC	= SEPTIC TANK COVER
STD	= STANDARD
SWK	= SIDEWALK
TBM	= TEMPORARY BENCH MARK
TC	= TOP OF CURB
TCB	= TOP OF CATCH BASIN
TE	= TRASH ENCLOSURE
TEL	= TELEPHONE
TH	= TOP OF STEAM HYDRANT
TG	= TOP OF GRATE ELEVATION
TMH	= TELEPHONE MANHOLE
TP	= TELEPHONE POLE
TS	= TRAFFIC SIGN
TSPB	= TRAFFIC SIGNAL PULL BOX
TSIG	= TRAFFIC SIGNAL
TW	= TOP OF WALL
VB	= VENTILATION BOX
VCP	= VITRIFIED CLAY PIPE
W	= UNDERGROUND WATER LINE
WI	= WROUGHT IRON
WM	= WATER METER
WM	= WATER METER
WMH	= WATER MAIN HOLE
W/O	= WEST OF
WS	= WHEEL STOP
WV	= WATER VALVE
YD	= YARD
YD. LT.	= YARD LIGHT
(000.00)	= EXISTING ELEVATION
000.00	= PROPOSED ELEVATION
(000)	= PROPOSED CONTOUR
E	= ELECTRICAL
FW	= FIRE LINE "WATER"
G	= GAS
GB	= GRADE BREAK
R	= RIDGE
RW	= RECLAIMED WATER
S	= SEWER
SD	= STORM DRAIN
T	= TELEPHONE
W	= WATER
X	= CHAIN LINK FENCE
R/W	= RIGHT-OF-WAY
P/L	= PROPERTY LINE
C/L	= CENTER LINE
RW	= REDWOOD HEADER
	= BLOCK WALL

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REVISIONS			
NO	DESCRIPTION	BY	APPROVED	DATE
1				
2				
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4				
5				
6				
7				
8				

TOPOGRAPHIC SURVEY
PASADENA GLENARM FACILITY

PASADENA, CA

PREPARED FOR:	PASADENA WATER AND POWER		
DRAWN BY: SAS	SCALE: 1" = 20'	SHEET: 1 OF 3	TP-1
CHECKED BY: SMK	JOB NO: 505-101		
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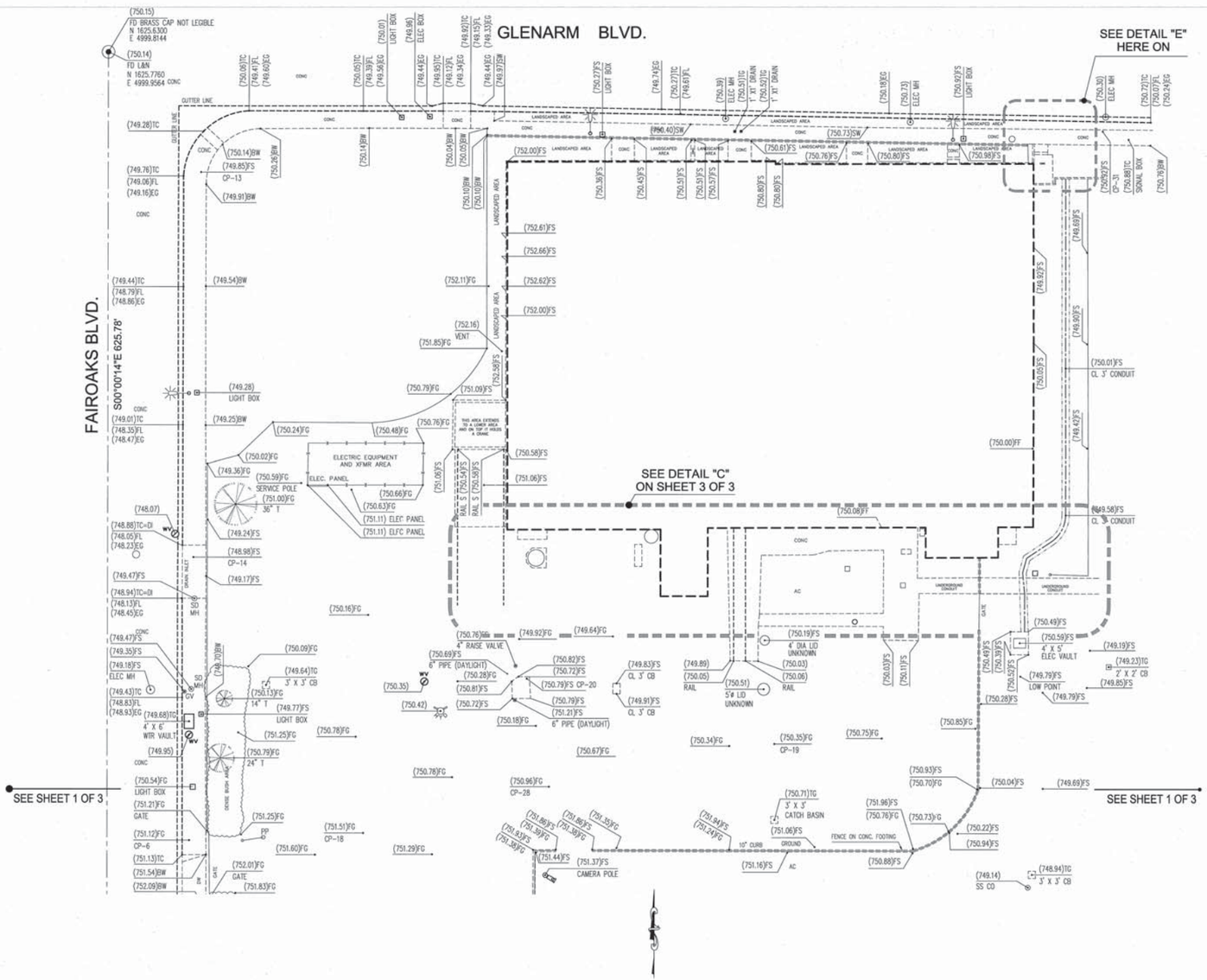

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REVISIONS				
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TOPOGRAPHIC SURVEY
PASADENA GLENARM FACILITY
PASADENA, CA

PREPARED FOR:	PASADENA WATER AND POWER		
DRAWN BY: SAS	SCALE: 1" = 20'	SHEET: 2 OF 3	TP-2
CHECKED BY: SMK	JOB NO: 505-101		
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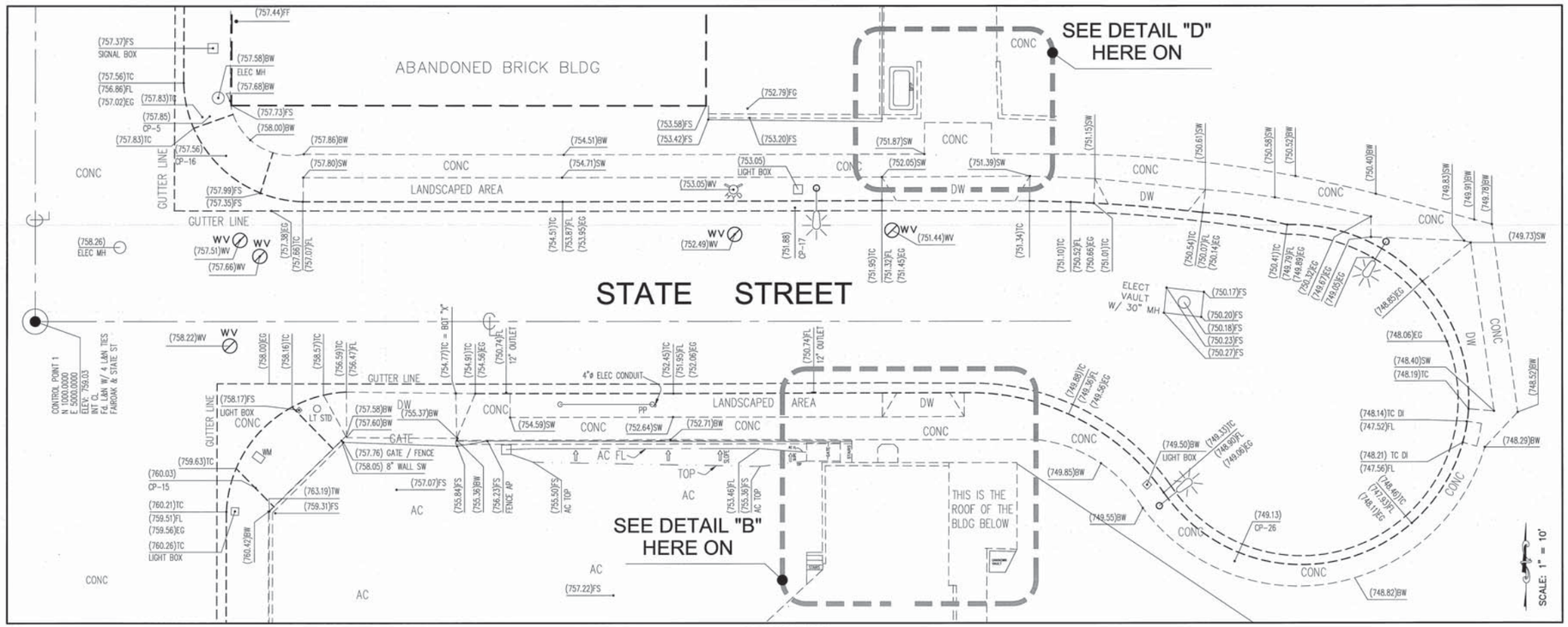

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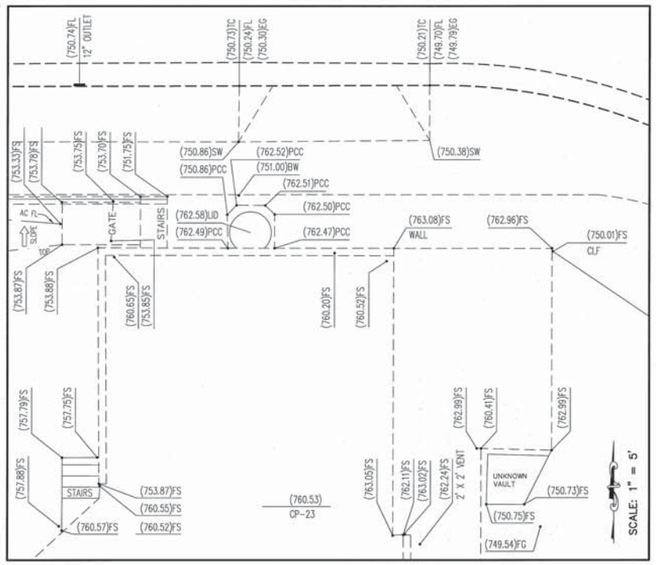

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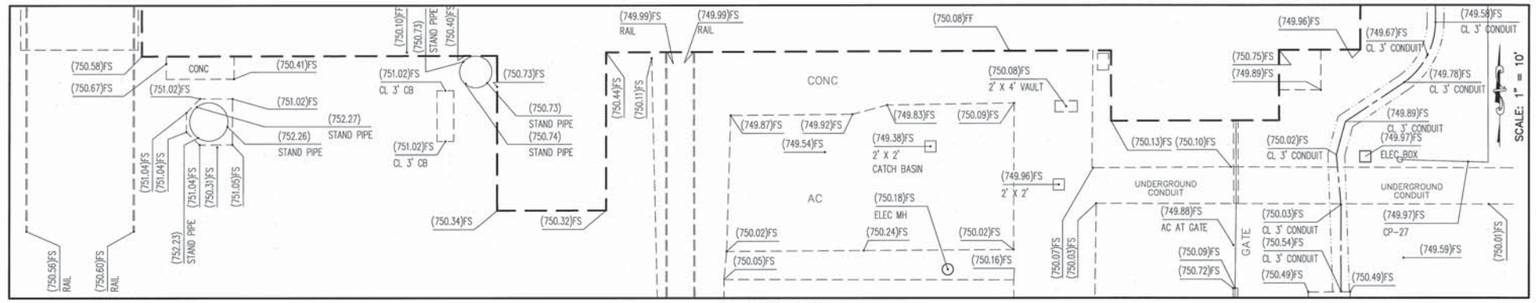

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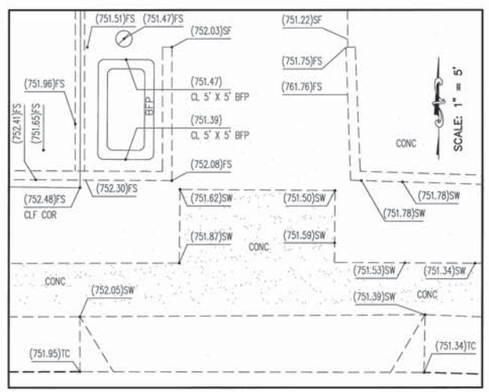

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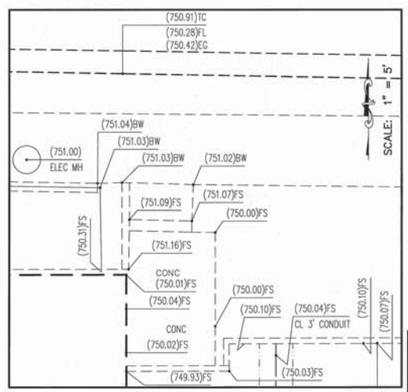

DETAIL "E"
SCALE: 1" = 5'

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REVISIONS				
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TOPOGRAPHIC SURVEY
PASADENA GLENARM FACILITY

PASADENA, CA

PREPARED FOR:	PASADENA WATER AND POWER		
DRAWN BY: SAS	SCALE: 1" = 10'	SHEET: 3 OF 3	TP-3
CHECKED BY: SMK	JOB NO: 505-101		
DISREGARD PRINTS BEARING EARLIER REVISION DATES →	04-04-11		

14. STEAM QUALITY

Deposits on the turbine blading due to steam contamination may bring about thermodynamical and mechanical disturbances. Moreover, if chlorides are involved under certain circumstances blade fractures might occur.
Corrosion depending strain, caused by aggressive deposites, affects above all in the state of commencing steam wetness the alternating bending strength of the blade material.

These recommendations concerning the steam quality are in line with the guide lines for continuous turbine operation issued by the VGB(Vereinigung der Groβkesselbetreiber in Deutschland).

On principle the guide lines should be complied with as far as practicable. The expenses for the relevant water treatment are to be seen in comparison with possible repair and stoppage costs if the turbine suffers damage from contaminated steam.

To avoid misunderstandings we point out that even full compliance with the guide lines does not guarantee absolutely safe a depositfree turbine.
The steam contaminations and their portion of mixture represent the most essential factor as to precipitation, however, this problem is not fully solved up to now. If there is a chance to improve the steam cleanliness in comparison with the guide lines, make use of it.

Guide Lines for inlet steam condensate

Testing as to	Unit	Guide Lines	
		Continuous Operation +)	Start-up Operation ++)
Conductivity at 25℃ for CO_2-free waters	μS/cm	≦ 0.2	< 0.5
Silica (SiO_2)	p.p.m	< 0.02	< 0.05
Total-iron (Fe)	p.p.m	< 0.02	< 0.05
Copper (Cu)	p.p.m	< 0.003	< 0.01
Sodium + Potassium (Na) (K)	p.p.m	< 0.01	< 0.02

+) The values are in line with the VGB-guide lines, edition April 1972. As to further details and descriptions see also there.

++) A falling tendency must be noticeable. On commissioning of new plants the values for continuous operation must be achieved after two days and the values for for start-up operation after two hours. Routine commissioning requires full compliance with the start-up values at the point of roll-off whereas the continuous operation values must be attained after 2 hours.

Supervision
Continuous monitoring of the water/steam system by means of recording instruments is recommended for the electrical conductivity at 25℃ and for the Silica content. The monitoring instruments should be provided on the inlet steam or on the exhaust steam side.

ENGINEERING SPECIFICATION

Feedwater Quality Requirements for Superheated Steam Applications

SPECIFICATION NO. ES-1000 REVISION 09

simply generates more profit

Innovative Steam Technologies
549 Conestoga Blvd.
Cambridge, ON
Canada N1R 7P4

An AECON Company

P: +1.519.740.0036
F: +1.519.740.2051
www.otsg.com

Revision Page

Revision Number	Description of Revision	Developed By	Approved By	Approval Date
01	General Revision	--------	--------	Sept 11/96
02	General Revision	--------	--------	Sept 23/96
03	Updated address to Conestoga Blvd	--------	--------	Nov 13/00
04	Revision of entire specification	--------	--------	April 3/02
05	Revision of oxygen levels Added Notes to Table 1 and Table 2	--------	--------	Sept 17/02
06	Added note (7) following cycle chemistry limits regarding pH values	--------	--------	Nov 20/02
07	Table 1.0, 2.0, Note (3) for Tables 1.0 and 2.0, Section 2.2	AB	JM	Aug 8/03
08	Format change update to new logo/font	SV		March 5/07
09	Removed specific conductivity	JM	CK	July 22/11

Table of Contents

1.0 INTRODUCTION 2
1.1 BACKGROUND 2
1.2 TREATMENT OPTIONS 2
1.3 MAKEUP AND CONDENSATE RETURN TREATMENT 3
1.4 DEMINERALIZER AND POLISHER 3
1.5 ORGANIC COMPOUNDS 3
1.6 CONTROL PARAMETERS 3
1.7 CHEMICAL FEED POINTS 4
1.8 SAMPLE POINTS 4
2.0 CONTROL PARAMETERS AND LIMITS 4
2.1 CYCLE CHEMISTRY LIMITS 4
2.2 ACTION LEVELS 8
2.3 CORRECTIVE ACTIONS 8

1.0 INTRODUCTION

1.1 Background

This specification details the requirements of feedwater quality for Innovative Steam Technologies Once Through Steam Generators (OTSG's) producing superheated steam. Deviations from the limits and requirements must have specific written approval from Innovative Steam Technologies.

This specification addresses the following:
- all-volatile treatment (AVT) for applications with and without copper alloys in the pre-boiler and steam user systems
- oxygenated treatment for applications with all ferrous (no copper) pre-boiler systems

The technical criteria for formulating these guidelines includes:
- Avoidance of scale formation in the OTSG. Solids (dissolved or suspended) which are carried into the OTSG are either deposited in the tubing or carried through as a solid or vapour into the dry out zone where deposition may occur. Deposits may restrict flow as well as heat transfer and potentially act as corrosion sites.
- Suspended solids could end up plugging the stabilization orifices, which would restrict the flow to individual circuits.
- Prevention of corrosion and deposition in the OTSG. If necessary, more stringent limits can be used based on the requirements for other components in the system, which may be more sensitive to impurities.
- Generation of high purity steam

This specification is not a substitute for complete cycle chemistry guidelines, which should include monitoring of additional cycle streams as required. Successful implementation of this specification requires proper training of operators and is the responsibility of the owner.

1.2 Treatment Options

In once-through boilers, there are only two available options for water treatment, all volatile treatment (AVT) and oxygenated treatment (OT). Both treatments are feedwater treatments.

If copper alloys are used, OT cannot be used because the presence of oxygen accelerates copper alloy corrosion. If polishers are not to be used, or copper is present in the pre-boiler cycle, then AVT is the only option. With polishers and all ferrous pre-boiler metallurgy, either AVT or OT can be used.

Some of the chemicals referred to in this specification are hazardous to human health and/or environment and should be handled with care.

All-Volatile Treatment (AVT) is used to minimize corrosion and erosion corrosion in the pre-boiler system by using deaerated high purity water with an elevated pH. The pH elevation is achieved by the addition of ammonia. The target range for pH depends upon the metallurgy of the pre-boiler system (all-ferrous or Fe-Cu mixed). The oxygen concentration in the feedwater is reduced using an oxygen scavenger, such as hydrazine or carbohydrazide. The result of AVT treatment is a layer of magnetite (Fe_3O_4) on all steel surfaces which protects the metal from corrosion.

Oxygenated Treatment (OT) uses oxygenated high purity water to minimize corrosion and erosion-corrosion in the pre-boiler system. Oxygen, hydrogen peroxide, or air is injected into the feedwater to achieve an oxidizing environment. The pH is adjusted using ammonia, but the target pH range is lower than in AVT. IST has no operating experience to date with oxygenated treatment and as such IST has not

provided recommended feedwater limits for OT.

1.3 Makeup and Condensate Return Treatment

Raw water used for makeup contains impurities that must be removed before the water enters the OTSG. The extent of makeup water purification is system dependent (dependent on makeup rate) and site specific (dependent on raw water quality).

Condensate return water may contain impurities that must be removed before the water enters the OTSG. The extent of purification is system dependent (dependent on where steam is being used and how it is being contaminated).

1.4 Demineralizer and Polisher

The production of good quality feedwater is usually a function of a makeup demineralizer and a condensate polisher, although depending on system requirements, one of these items can sometimes be eliminated. Where demineralizer or polisher requirements are minimal, replacement resin bottles can minimize system capital and operating costs. This can eliminate the need for onsite acid and caustic facilities used for regeneration.

1.5 Organic Compounds

Precautions must be taken to eliminate organics prior to the water reaching the boiler since they can break down to acid type compounds at boiler operating temperatures. These acids can be harmful to the tubing of the OTSG and may have a negative affect on the feedwater treatment system resins.

Corrosion and flow-accelerated corrosion effects and removal of harmful decomposition products must be considered when selecting the type of feedwater treatment and the water treatment chemicals. Use of organic feedwater treatment chemicals (amines and oxygen scavengers) needs to be thoroughly evaluated concerning their decomposition, monitoring, analytical interferences, and toxicity.

Amines are not recommended for control of feedwater pH. They thermally decompose in the boiler and the steam circuits, forming organic acids, carbon dioxide, ammonia, and other decomposition products. This also happens to oxygen scavengers other than hydrazine. The harmful effects of some of the decomposition products may be reduced when condensate polishers are used. Hydrazine or carbohydrazide can be used for oxygen scavenging. Hydrazine is preferred since carbohydrazide decomposes forming acid species making it difficult to meet cation conductivity limits.

1.6 Control Parameters

The most important control parameter for the IST OTSG proper is feedwater cation conductivity. Dissolved oxygen and pH are to be continuously monitored to control corrosion in the pre-boiler system. Conductivity measurement is recommended because there is a direct correlation between dissolved solids and conductivity. The purpose of the cation conductivity measurement is to remove the masking effect of the ammonia/amines and its derivatives, in the water. Specific conductivity is not recommended and is not addressed in this specification.

ORP (oxidation reduction potential) is a method of grading a solution as oxidizing or reducing. The ORP value is a direct reading of the activity of the oxidizing and reducing agents in the water as they correspond to oxidation-reduction reactions. The oxidation-reduction reaction is an electrochemical process in which metal atoms are oxidized to form positive ions (cations) while other chemical species (O_2, H_2O, H+ and other cations) are reduced. This results in a flow of electrons from one site on the metal surface to another. For example, if the ORP is negative, a reducing environment exists that can reduce or eliminate a protective layer of magnetite.

Steam and feedwater conductivity measurements are both required to alert the operator of any components breaking down in the OTSG.

1.7 Chemical Feed Points

The chemical feed points for ammonia and the oxygen scavenger should be after the condensate polishers, since these compounds can be removed by the polisher. However, if the polishers are operated in the ammonia form, the ammonia addition can be at the exit of the condensate pumps. If there is a deaerator in the pre-boiler system, the best location to add the oxygen scavenger is into the drop leg of the deaerator. This allows a greater residence time of the scavenger in the feedwater, increasing its effectiveness.

1.8 Sample Points

To monitor the OTSG, it is recommended that sample points be located on the feedwater piping at the OTSG inlet and on the steam piping at the exit of the OTSG, after attemperating sprays (if installed). In cycles with reheat, hot reheat steam can be monitored instead.

It has been shown that for sampling of superheated steam, an isokinetic sampling nozzle is needed. Multi-port nozzles which are installed in the superheated steam piping are not isokinetic and do not give a representative sample. The same isokinetic sampling is needed when sampling feedwater for suspended oxides (Fe, Cu oxides) to ensure a representative sample.

When sampling cation conductivity a calibration check of the measuring instrument should be made using a standard solution of known value. If the reading is high, the measurement probe may need replacing.

2.0 CONTROL PARAMETERS AND LIMITS

2.1 Cycle Chemistry Limits

The rationale for determination of the cycle chemistry limits for these guidelines is based on the requirements for the OTSG. If necessary, more stringent limits can be used based on the requirements for other components in the system, which may be more sensitive to impurities.

The control limits to be used during normal operation are shown in Tables 1 and 2 for units on AVT. Oxygenated treatment (OT) is presently under investigation and limits have not been provided. These tables also include recommended monitoring frequencies and action levels, which allow exceeding the normal limits for short durations.

Parameter		Monitoring Frequency	Target Value	Action Level 1	Action Level 2	Action Level 3	Action Level 4
pH (see Note 7)	All ferrous	C	9.3 to 9.6	<9.3 or >9.6	-	-	-
	All stainless	C	8.0 to 8.5	<8.0 or >8.5	-	-	-
	Mixed Fe-Cu	C	8.8 to 9.1	<8.8 or >9.1	-	-	-
Water Cation Conductivity (µS/cm)		C	< 0.25	0.25 to 0.45	>0.45 to 0.85	>0.85 to 1.0	> 1.0
Steam Cation Conductivity (µS/cm)		W	< 0.25	0.25 to 0.45	>0.45 to 0.85	>0.85 to 1.0	>1.0
ORP (mV)	All ferrous	T	0 to +100	-	-	-	-
	Mixed Fe-Cu	T	-350 to -300	-	-	-	-
Hydrazine (ppb)	All ferrous	T	0 to 10	> 10	-	-	-
	Mixed Fe-Cu	T	< 20	> 20	-	-	-
Dissolved Oxygen (ppb) (see Notes 5 and 6)	All ferrous	C	< 7	> 7	-	-	-
	All stainless (Water Temp ≤ 50 C) (Water Temp ≤ 100 C)	C C	< 800 < 300	> 800 > 300	- -	- -	- -
	Mixed Fe-Cu	C	< 5	> 5	-	-	-
Sodium (ppb)		W	< 6	6 to 12	>12 to 24	> 24 to 30	> 30
Chloride (Organic and inorganic) (ppb)		T	< 6	6 to 12	>12 to 24	> 24 to 30	> 30
Sulfate (Organic and Inorganic) (ppb)		T	< 6	6 to 12	>12 to 24	> 24 to 30	> 30
Silica (ppb)		D	< 20	20 to 40	>40 to 80	> 80 to 100	> 100
Iron (ppb)		W	< 10	10 – 20	>20 to 40	> 40 to 50	> 50
Copper (ppb)		W	< 2	2 to 4	>4 to 8	> 8 to 10	> 10
Total Organic Carbon (TOC) (ppb)		W	< 100	> 100	-	-	-
Hardness (ppb)		T	< 1	> 1	-	-	-
Suspended Solids (ppb) (see Note 4)		T	Not detectable	-	-	-	-

* Nomenclature and notes follow Table 2. Action levels are given in Section 2.2.

Table 1.0 - All volatile Treatment (AVT) without Reheat

Parameter	Monitoring Frequency	Target Value	Action Level 1	Action Level 2	Action Level 3	Action Level 4

pH (see Note 7)	All ferrous	C	9.3 to 9.6	<9.3 or > 9.6	-	-	-
	All stainless	C	8.0 to 8.5	<8.0 or >8.5	-	-	-
	Mixed Fe-Cu	C	8.8 to 9.1	<8.8 or >9.1	-	-	-
Water Cation Conductivity (µS/cm)		C	< 0.15	0.15 to 0.25	0.25 to 0.45	>0.45 to 0.5	>0.5
Steam Cation Conductivity (µS/cm)		W	< 0.15	0.15 to 0.25	0.25 to 0.45	>0.45 to 0.5	>0.5
ORP (mV)	All ferrous	T	0 to +100	-	-	-	-
	Mixed Fe-Cu	T	-350 to -300	-	-	-	-
Hydrazine (ppb)	All ferrous	T	0 to 10	> 10	-	-	-
	Mixed Fe-Cu	T	< 20	> 20	-	-	-
Dissolved Oxygen (ppb) (see Notes 5 and 6)	All ferrous	C	< 7	> 7	-	-	-
	All stainless (Water Temp ≤ 50 C)	C	< 800	> 800	-	-	-
	(Water Temp ≤ 100 C)	C	< 300	> 300	-	-	-
	Mixed Fe-Cu	C	< 5	> 5	-	-	-
Sodium (ppb)		W	< 3	3 to 6	6 to 12	> 12 to 15	>15
Chloride (organic and inorganic) (ppb)		T	< 3	3 to 6	6 to 12	> 12 to 15	>15
Sulfate (organic and inorganic) (ppb)		T	< 3	3 to 6	6 to 12	> 12 to 15	>15
Silica (ppb)		D	< 10	10 to 20	20 to 40	> 40 to 50	>50
Iron (ppb)		W	< 10	10 to 20	20 to 40	> 40 to 50	>50
Copper (ppb)		W	< 2	2 to 4	4 to 8	> 8 to 10	>10
Total Organic Carbon (TOC) (ppb)		W	< 100	> 100	-	-	-
Hardness (ppb)		T	< 1	> 1	-	-	-
Suspended Solids (see Note 4)		T	Not detectable	--	-	-	-

* Nomenclature and notes follow Table 2. Action levels are given in Section 2.2.

Table 2.0 - All-volatile Treatment (AVT) with Reheat

Nomenclature:

C = continuous
D = grab sample, once per day
W = grab sample, once per week
T = troubleshooting and commissioning

Notes (Table 1 and Table 2):

1) Conductivity and pH measured at 25°C.
2) Grab samples are to be more frequent during startup. Grab samples should be once per day until benchmark levels are obtained.
3) In start-up situations feedwater must be circulated to reduce the dissolved material and suspended particles and should not be introduced into the OTSG until the cation conductivity is below 1.0 µS/cm (or 0.27 µS/cm for specific conductivity)
4) Suspended solids must be prevented to avoid clogging of feedwater orifices. Suspended solids is commonly measured by examining the undissolved material trapped on a 0.45 micrometer filter after filtration. Material that passes through is referred to as dissolved solids.
5) IST can review the allowable oxygen levels for feedwater temperatures less than 50°C.
6) IST can review the allowable oxygen levels for systems with feedwater piping fabricated from stabilized stainless steel material (i.e. 347SS, 321SS etc.).
7) The recommended pH value for all stainless metallurgy is based on achieving improved condensate polisher performance. The pH values recommended for all ferrous metallurgy (i.e. 9.3 to 9.6) are also acceptable for all stainless metallurgy. The pH values recommended for all ferrous metallurgy (i.e. 9.3 to 9.6) should be used for a system with both ferrous and stainless metallurgy.

2.2 Action Levels

Operation at the lowest achievable impurity levels, with the shortest and least frequent excursions, is the most desirable mode of operation. The probability of corrosion damage and deposit formation grows significantly with increasing impurity concentration, and the damage is proportional to the exposure time. When corrosive impurities concentrate on metal surfaces, the breakdown of passivity (damage to the protective oxide layer) occurs within a few minutes to several hours.

To give more flexibility in the water and steam chemistry control, particularly during startups, three action levels are recommended. The target values for Action Levels 1, 2, and 3 were established to allow for and provide guidance during transient or abnormal operating conditions. If the problem is not corrected within the time allotted to each action level, the next higher action level takes effect.

Normal - Values are consistent with long-term system reliability. A safety margin has been provided to avoid concentration of contaminants at surfaces.

Action Level 1 - There is potential for the accumulation of contaminants and corrosion. Normal Limit can be exceeded for one week with the total yearly accumulation of two weeks. If the time allotted is exceeded an orderly shutdown should occur.

Action Level 2 - The accumulation of impurities and corrosion will occur. Operation is limited to 24 hours with the total yearly accumulation of 48 hours. If the time allotted is exceeded an orderly shutdown should occur.

Action Level 3 - The accumulation of impurities and corrosion will occur very quickly. Operation is limited to 4 hours maximum with the total yearly accumulation of 8 hours. Damage to the OTSG can occur when operating in this condition and immediate action is required to return the feedwater to the target value.

During excursions, when the impurity concentration increases sharply, the accumulation of impurities in the cycle occurs quickly, but the subsequent cleanup upon return to good chemistry may take weeks. Therefore, yearly time accumulations were also established as a guide. If the unit is shutdown due to water or steam chemistry (i.e. a major condenser leak), it should be an orderly shutdown, not a trip.

Action Level 4 – Impurity levels are too high and severe damage may occur to the OTSG. Immediate orderly shutdown of the OTSG is recommended.

2.3 Corrective Actions

Typical corrective actions to respond to out-of-specification steam and/or water chemistry conditions are listed in this Section. These corrective actions are not meant to be all-inclusive or universally applicable. Each utility and/or plant should establish plant-specific corrective actions that consider plant design features and other plant-specific concerns. Successful implementation of this specification requires proper training of operators and is the responsibility of the owner. ONLY AFTER DETERMINING THE ROOT CAUSES OF AN EXCURSION CAN A PERMANENT SOLUTION BE SELECTED.

The action to be taken to confirm and correct water and the time to confirm and correct a water chemistry upset depends on the severity of the chemical excursion. On-line and grab sample analysis data must be used to determine the source(s) of ingress of various impurities. Possible causes of feedwater chemistry excursions are described below. Corrective actions for each monitored parameter are listed below

Jumper Tube Installation Proposal

Date:	November 27, 2013
Customer Reference:	Glenarm Repowering – Jumper tube installation
IST Reference:	P12079-00 Jumper Tubes

To the BOP contractor bidding the construction of the Glenarm Repowering Project:

The following estimate is based on working a 6 x 10-hr/dy workweek Monday through Saturday, with Sunday as a scheduled off-day. Two (2) travel days (one in & one out) have also been included for all three (3) IST personnel. If additional weekend work or overtime is required, additional charges will be invoiced per the IST standard rate sheet, based on the approved signed time sheets from site. No stat-holiday period work time has been accounted for in this quotation. Any unforeseeable circumstances beyond our control causing delays will be charged based on the standard rate sheet, in accordance with the signed timesheets.

No allowance has been given for time on site for hydrostatic testing after the jumper tube welding is completed, as the external pipe welding to each unit cannot commence until after the tube welding is completed. Therefore it is presumed that this testing will be performed at a later date. IST representation for the witness of the final Sect-1 hydrostatic test that includes the boiler external piping is presumed to be performed at a later visit (which is not included in this pricing). Test plugs for steam and feedwater headers can be made available for shipment with the tools, and a pneumatic test can be performed on the site jumper welds prior to IST personnel's departure from site.

Innovative Steam Technologies
549 Conestoga Blvd.
Cambridge, ON
Canada N1R 7P4

An AECON Company

P: +1.519.740.0036
F: +1.519.740.2051
www.otsg.com

IST field service scope included in this proposal:

- Removal and reinstatement (if required) of any restraint assemblies, end-seal floors, or other OTSG components necessary to provide access to the press-part working area.
- Installation and welding of (41) jumper tube assemblies per OTSG Unit, totaling 123 x 1.25"-diameter welds, and 41 x ½"-diameter welds per boiler. All tube welding will be performed using an automatic 'tig' orbital welding process.
- Installation of 41-each per boiler, packing-gland seal bushings at the lower SCR catalyst rear floor jumper-tube penetrations.
- Engineering and administration time for the implementation of the above scope.
- All IST personnel travel & labour time, air & ground transportation costs, and subsistence for two weeks.
- Packing and shipment (return) of tools and equipment to implement the installation.
- Consumables, excluding argon gas.
- Preparation of job Quality Package including ASME Section I Data Report Forms, for submission and review by the local Authorized Inspector in the jurisdiction.

IST personnel will come prepared with all the tools necessary to execute the internal jumper tube pressure-part work, but will require some logistical support from the customer and their contractor personnel during the execution. To clarify responsibilities required by the customer / contractor for support provisions, please note the following:

Customer's Scope:

In order to accomplish the necessary tasks it will be necessary for the customer to provide the following:

1. Provision of electric power for IST portable transformers requiring 480V, 30 Amp service to support operation of orbital welding units and electric tools.
2. Electrician for initial hook up and disconnect. (3 hrs total est'd)
3. Provision of compressed air for use of hand operated pneumatic milling tools.
4. Provision of argon gas; estimated requirement is (1) x 12 bottle - manifold pack, plus four (4) individual loose bottles of 2300 psi argon per boiler.
5. Availability of a propane tank (if req'd), in the event feedwater header lines require to be tag torched dry, if evidence of moisture is apparent.
6. Site safety induction of IST personnel.
7. Designated dry laydown area for IST tool crate in close proximity to the OTSG's (preferably beneath the inlet plenum).
8. Disposal container for miscellaneous refuse (if req'd).
9. Provision of air quality testing for confined space prior to access into unit.
10. Provision of safety door watch personnel throughout the work period.
11. Provision of (2) x supplemental workers (boilermaker or similar trades designation) for support setting-up equipment and providing mechanical/trades support throughout the job as the need dictates.
12. Access to lunchroom and toilette facilities for on-site personnel.
13. Provision of off-loading capabilities for equipment arriving at site.
14. Provision of scaffolding/platforms as required for access to all internal working area levels where orbital welding is to be completed.
15. Provision of external scaffolding access at feedwater inlet box if platform access is not in place. This is required to access the HP feedwater inlet header and flex tubes.
16. All rear internal joint kits in the proximity of the jumper tube installation must be in place prior to the welding technicians arrival on site.
17. Provision of on-site permits and safe lock-out of any relevant equipment.

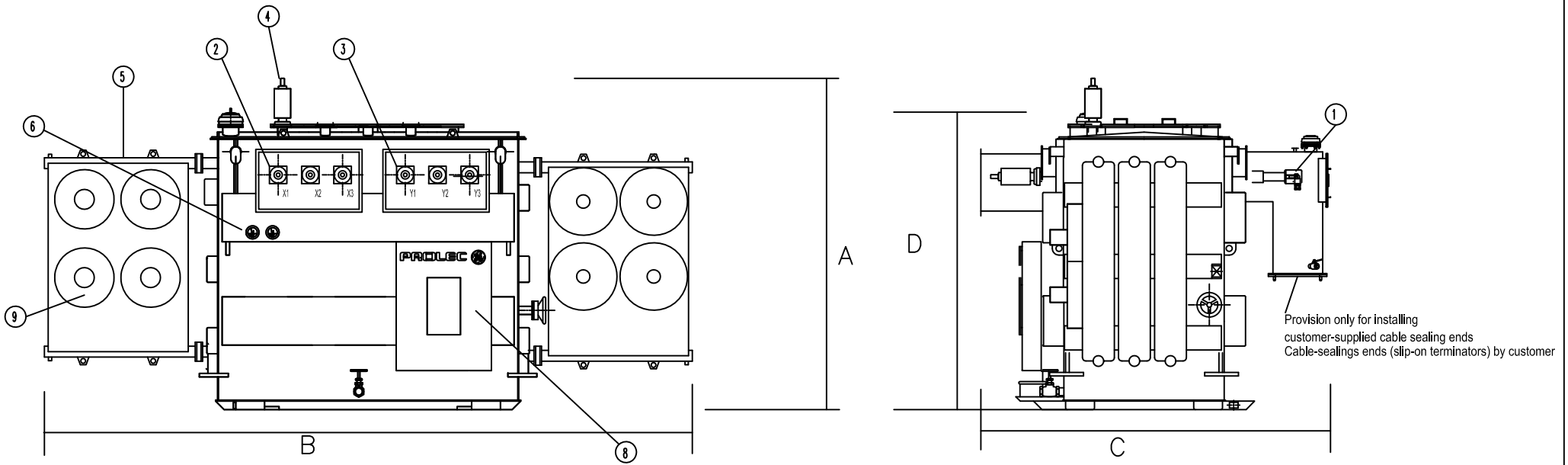
For hydrostatic testing activities at a later point in time, and not included in this price, following the completion of jumper-tube welding and boiler external piping, the customer / contractor will be responsible for the following:

a) Supply of ample demineralized water and pressurizing equipment to perform a hydrostatic test of the steam generator(s) once installation is complete.
b) Any temporary boiler internal propane heating (if req'd-seasonal), to raise feedwater and tubing temperature to the acceptable code level of 21°C.
c) Coordination with and contracting of local AI in the jurisdiction.

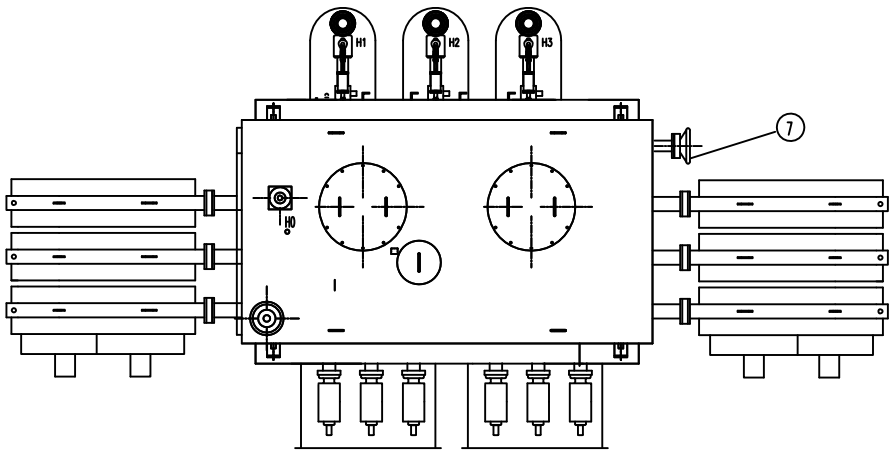
Estimated cost for the above work is $75,000 CAD

Best Regards,

Richard Welk,
Field Service Technical Advisor



1.- H. V. BUSHINGS "H"
2.- L. V. BUSHINGS "X"
3.- L. V. BUSHINGS "Y"
4.- NEUTRAL BUSHING
5.- RADIATORS
6.- INSTRUMENTS
7.- NO LOAD TAP CHANGER
8.- CONTROL CABINET
9.- FANS (IF SUPPLY)



NOTE: THIS DRAWING IS A PRELIMINARY PROPOSAL AND DOES NOT INDICATE THE EXACT DETAILS OF CONSTRUCTION, ARRANGEMENT OF ACCESSORIES OR THE FINAL DIMENSIONS OF THE TRANSFORMER. THIS INFORMATION SHOULD NOT BE USED FOR FINAL CONSTRUCTION ARRANGEMENTS OR FOR THE FOUNDATION UNLESS SPECIFICALLY APPROVED BY THE FACTORY. ALL DIMENSIONS AND WEIGHTS ARE APPROXIMATE

PROLEC

Drawing:
No. 221732C1

PROLEC *ISO 9001 CERTIFIED*

Form 3.2.1-D Rev. 0

TECHNICAL PROPOSAL INFORMATION

Customer: ***GE AERO*** Date: **08/20/13**

Proposal No: **131-03751** Spec No: **SECTION 261200** Item No: **2217321/D**

RATING								
Type	Transformer	Class	H Winding		X Winding		Y Winding	
Phase	3		34.5 Wye	kV	13.8 Delta	kV	13.8 Delta	kV
Hertz	60	KNAN	57,000	KVA	45,000	KVA	12,000	KVA
Temp Rise	65 °C	KNAF	76,000	KVA	60,000	KVA	16,000	KVA
Insul Liquid	FR-3	KNAF	95,000	KVA	75,000	KVA	20,000	KVA
		-	-	KVA	-	KVA	-	KVA

ADDITIONAL TAP VOLTAGES							
H Winding (Kv)	-	DETC					
X Winding (Kv)	-	-					
Y Winding (Kv)	-						
CONNECTIONS FOR OPERATION							
Transformers in Bank	To Transformer From	Phase	Connected	To Transformer To	Phase	Connected	
-	-	-	-	-	-	-	

PERFORMANCE BASED ON A LOADING OF					DIELECTRIC TESTS				INSULATION LEVELS		
									ITEMS	Basic Lightning Impulse (kV)	
										Winding	Bushing
H Winding	34.5	kV	57.0	MVA	Applied Voltage	H Winding	50	kV	H Line	200	200
X Winding	13.8	kV	45.0	MVA	(To other wind-	X Winding	34	kV	H neutral	150	150
Y Winding	13.8	kV	12.0	MVA	ing and ground)	Y Winding	34	kV	X line	110	110
-	-	-	-	-	Induced	7200 cycles	69	kV	Y line	110	110
-	-	-	-	-	Voltage	-	-	kV	-	-	-

PERFORMANCE DATA, Based on **85** °C Reference Temperature, **57** MVA Altitude: **1000** Mts.

Losses and Exciting Current				Regulation Approximate	
Excitation	% Ex	No Load Kw (20°C)	Total Loss Kw	Power Factor	% Regulation
100%	0.355	36	253	0.80	8.387
110%	0.512	47 *	264 *	1.0	1.181
-	-	* Not Guaranteed		-	-

AUXILIARY (COOLING) LOSSES			
Transformer KVA	Class	KWatts Loss	
57,000 -	KNAN	0.0	
76,000 -	KNAF	2.5	
95,000 -	KNAF	5.0	
- -	-	-	
- -	-	-	
Average Sound Level	76/78/79	dB ONAN/ONAF/ONAF	

PERCENT IMPEDANCE VOLTS					
% IZ	Between Windings	At kVA	% IZ Zero	Between Windings	At kVA
12.66	H-X	57,000	-	-	-
47.5*	H-Y	57,000	-	-	-
35.1*	X-Y	57,000	-	-	-

* APPROXIMATE ONLY, NOT GUARANTEED

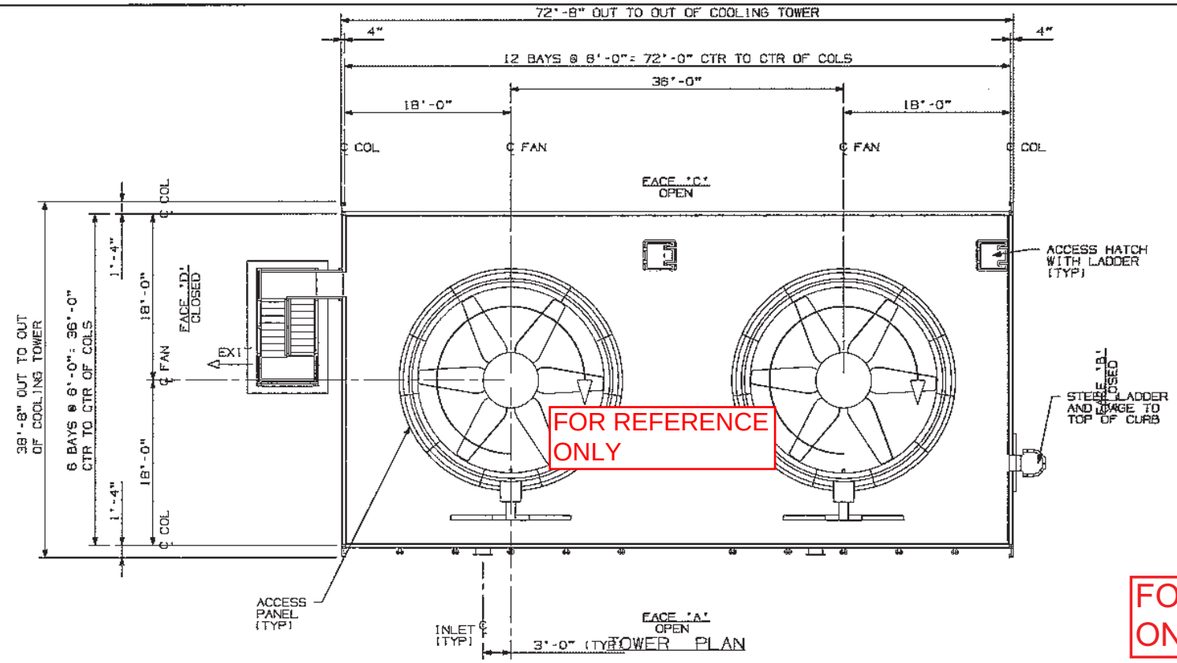
EFFICIENCIES (p.f = 1) AT 57 MVA				
Load	Full Load	3/4 Load	1/2 Load	1/4 Load
%	99.558	99.632	99.684	99.653

MECHANICAL DATA
Not for Construction Purposes

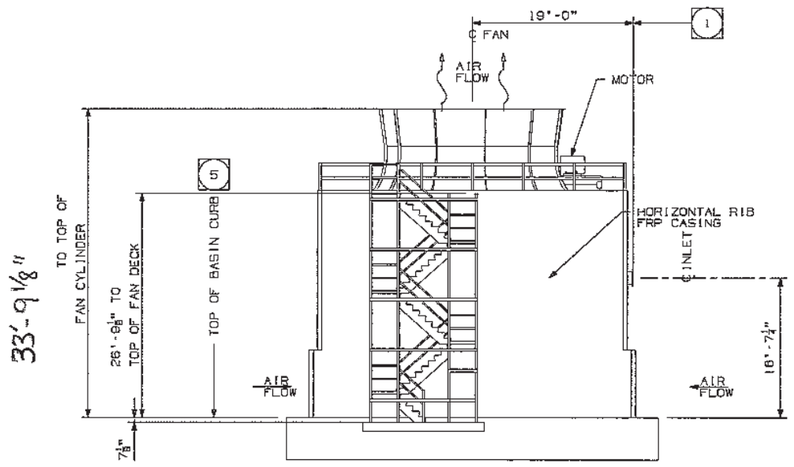
Outline Dwg No: 221732D1

Dimensions (Approximate)		Ft. (Mts.)
Height	(A)	17.5 (5.32)
Width	(B)	31.7 (9.65)
Depth	(C)	16.5 (5.02)
Height over Cover	(D)	14.0 (4.27)
Untanking (Plus slings)	(E)	25.0 (7.61)
Shipping Dimensions:Ft	WxDxH	21.6 x 12.0 x 14.1
Masses (Approximate)		pounds (Kg)
Core and Coils		143,360 (65,030)
Tank and Fittings		63,210 (28,680)
Liquid 11,580	Gal	89,180 (40,450)
Total Mass		295,750 (134,160)
Shipping without OIL		189,840 (86,110)
Shipping with OIL		-

3D CAD MASTER PART NAME:



FOR REFERENCE ONLY



TOWER ELEVATION
FACE 'D'

REFER TO GENERAL NOTE

FAN DIAMETER	216
# FAN BLADES	9
MOTOR SIZE	100 HP
INLET DIAMETER	18"
AIR INLET ELEV	8.0'

GENERAL NOTES

1. INLET INFORMATION: SPX CT PIPING STOPS AT THE FACE OF A 18 in. DIAMETER, 25 PSI, FLAT-FACED RTR FLANGE WHICH IS 15/16 in. (+1/2 in.,-1/8 in.) THICK. THERE ARE 18 - 1 1/4 in. DIAMETER BOLT HOLES ON A 22 3/4 in. DIAMETER BOLT CIRCLE. BOLT HOLES STRADDLE THE PIPE CENTERLINES. PURCHASER IS TO FURNISH ALL CONNECTING HARDWARE INCLUDING STANDARD CUT WASHERS FOR THE RTR FLANGE. FLANGE DRILLING CONFORMS TO CLASS 150 ASME B16.5 SPECIFICATIONS. THE FLANGE GASKET IS 3/8 in. THICK FULL-FACE SOFT NEOPRENE OF SHORE DUROMETER 50 +/-5 (FURNISHED BY SPX CT).

2. CAUTION: SPX CT PIPE SUPPORTS ARE DESIGNED TO SUPPORT ONLY THE WEIGHT OF THE PIPE AND WATER WITHIN THE LIMITS OF THE INLET FLANGE. CARE MUST BE TAKEN WHEN INSTALLING THE CONNECTING PIPING TO AVOID OVERLOADING OR DAMAGING THE TOWER STRUCTURE.

3. INSTALLER NOTE: CONNECTING PIPING MUST BE PROPERLY ALIGNED AT INSTALLATION TO AVOID DAMAGING OR MOVING THE RTR PIPE WHEN TIGHTENING THE FLANGE BOLTS.

4. BYPASS SYSTEM: REDUCED WATER FLOW OVER A COOLING TOWER IN COLD CLIMATES CAN RESULT IN ICE FORMATION IN THE FILL. IF THE PURCHASER'S APPLICATION REQUIRES A BYPASS SYSTEM, ITS DESIGN MUST BE REVIEWED BY SPX CT ENGINEERING.

5. CURB REFERENCE: TOP OF BASIN CURB REFERENCE IS TO BE THE HIGHEST POINT OF THE BASIN CURB WALL. FAILURE TO NOTE THIS COULD RESULT IN A MISALIGNMENT OF THE RISER TO INLET CONNECTION(S), AN INCORRECT STAIRPAD ELEVATION, AND A DECREASE IN THE AIR INLET ELEVATION THUS DECREASING COOLING TOWER PERFORMANCE.

FOR REFERENCE ONLY

Preliminary Drawing

Information only for preparatory consideration and discussion.

SPX COOLING TECHNOLOGIES

GE - Glenarm Repowering
LOS ANGELES, CA, United States

SCHEMATIC VIEWS
F436A36A5.302A COUNTERFLOW TOWER

SPX COOLING TECHNOLOGIES

ECO NUMBER	REV. BY	CHECKED	REV. DATE	DRAWN BY	DATE	CHECKED	APPROVED	CHOK NUMBER	PLOT	DRAWING NUMBER	REV.
				OTC	10/22/12			154213807	1=160	JX4888445	-

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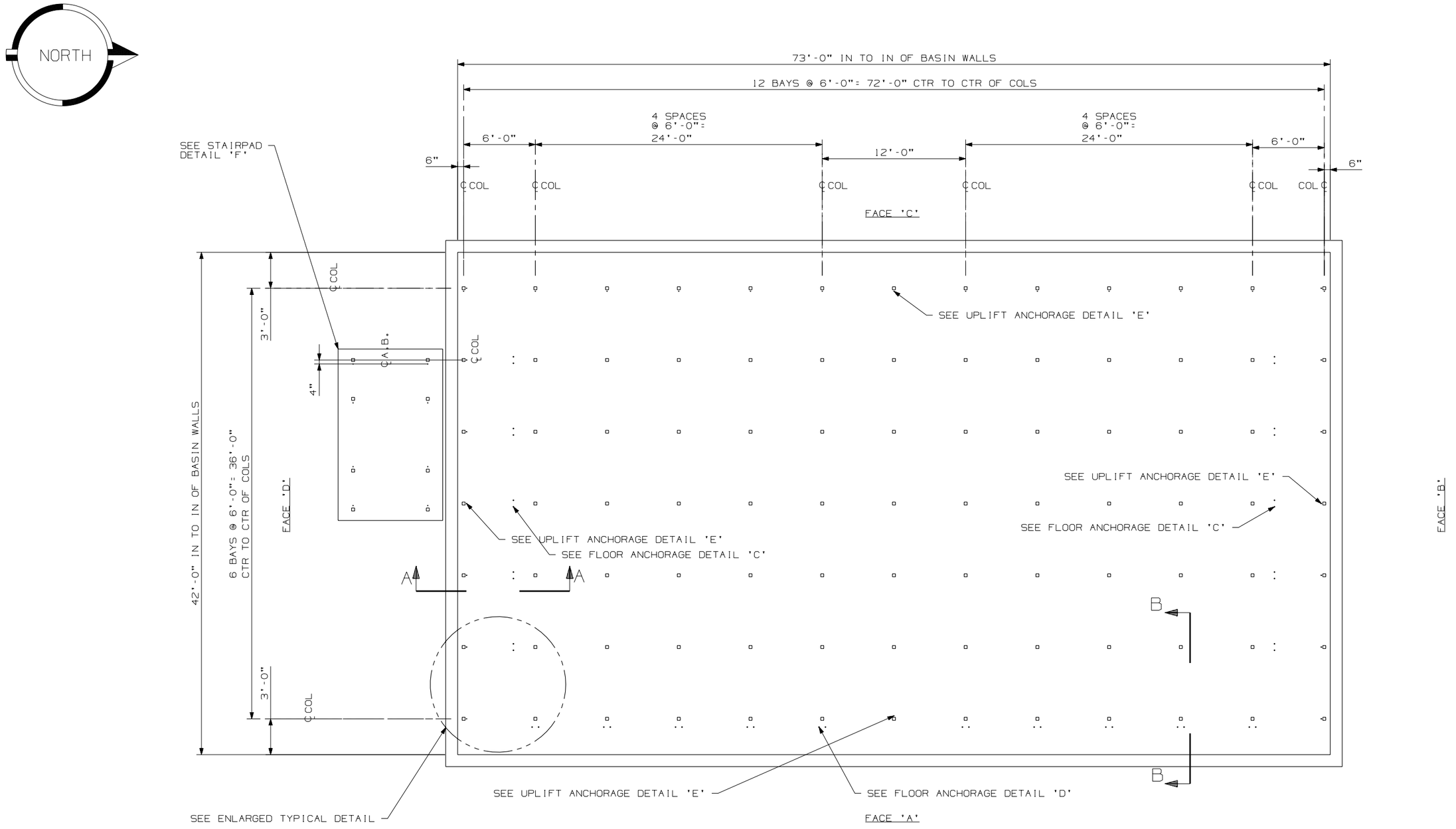

BASIN PLAN VIEW

FOR BASIN SECTIONS, DETAILS AND GENERAL NOTES SEE DRAWING JV468844D

Preliminary Drawing

Information only for preparatory consideration and discussion.

SPX COOLING TECHNOLOGIES

GE - Glenarm Repowering
LOS ANGELES, CA, United States

BASIN PLAN VIEW
F436A36A5.302A COUNTERFLOW TOWER

SPX COOLING TECHNOLOGIES

ECO NUMBER	REV. BY	CHECKED	REV. DATE	DRAWN BY	DATE	CHECKED	APPROVED	ORDER NUMBER	PLOT	DRAWING NUMBER	REV.
				OTC	10/22/12			154213807	1=101	JV468844B	-

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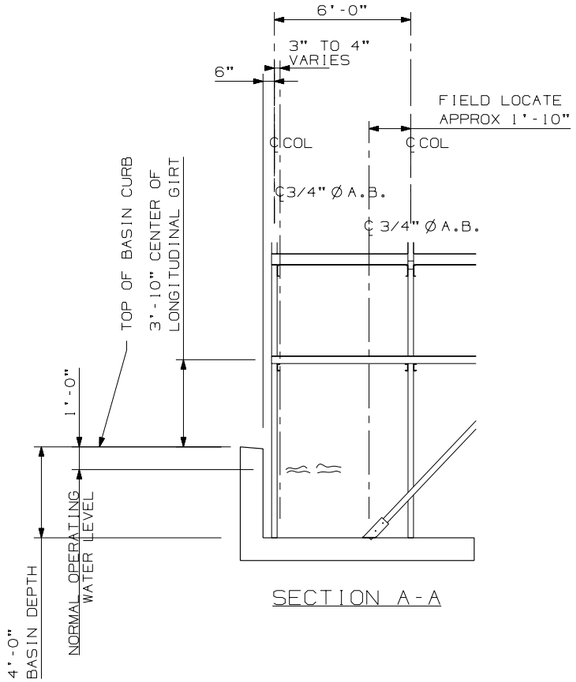
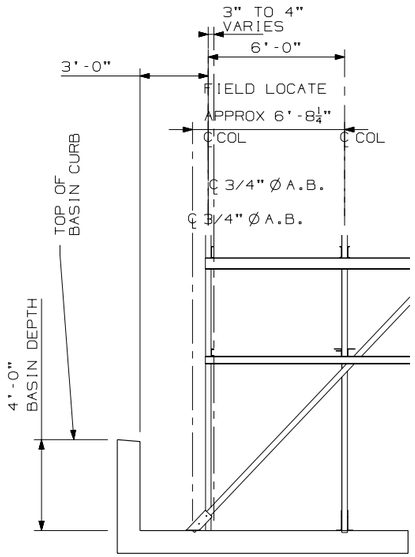


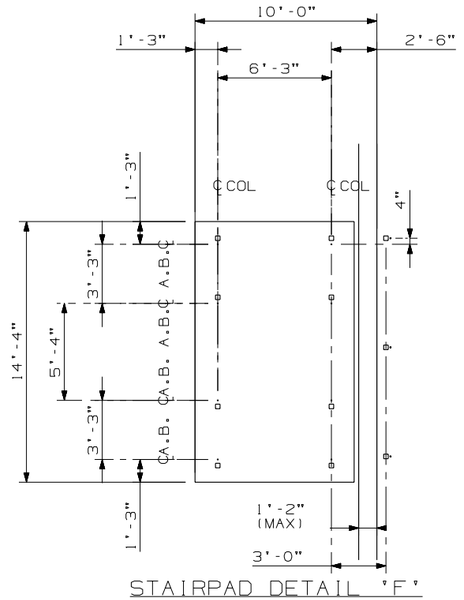
SECTION A-A



SECTION B-B

FACE 'A'

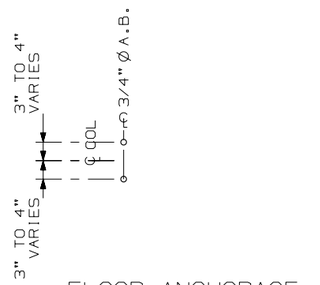
ENLARGED TYPICAL DETAIL



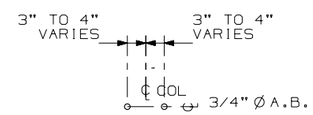
STAIRPAD DETAIL 'F'

STAIRPAD NOTES

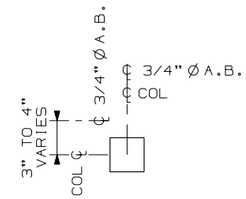
REFER TO BASIN PLAN FOR STAIRPAD ORIENTATION.
TOP OF STAIRPAD TO BE 7 1/8 BELOW TOP OF BASIN CURB.
MAXIMUM DEAD LOAD ON ANY STAIR COLUMN IS 1250 POUNDS.



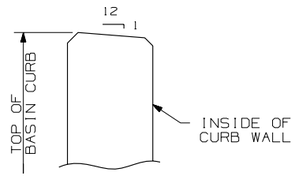
FLOOR ANCHORAGE DETAIL 'C'
(REQUIRED AT 10 PLACES)



FLOOR ANCHORAGE DETAIL 'D'
(REQUIRED AT 10 PLACES)



UPLIFT ANCHORAGE DETAIL 'E'
(REQUIRED AT 28 PLACES)



TOP OF CURB WALL DETAIL

GENERAL NOTES

1. BASIN CONSTRUCTION: PURCHASER TO DESIGN, CONSTRUCT, AND FURNISH THE COOLING TOWER FOUNDATION TO SUIT THE DIMENSIONS OF THESE DRAWINGS. THE BASIN DESIGNER SHOULD REFER TO THE SCHEMATIC DRAWING AND AVOID LOCATION OF SUMP SCREENS, PUMPS AND ADJACENT EQUIPMENT THAT WILL INTERFERE WITH THE STAIRWAY, LADDER, OR OTHER TOWER EQUIPMENT.

2. PURCHASER TO DESIGN, LOCATE, AND FURNISH THE SUMP TO SUIT THE JOB REQUIREMENTS.

3. CONCRETE FINISH: CONCRETE SURFACES AT THE TOWER ANCHORAGE POINTS MUST BE TROWELLED TO A SMOOTH FINISH BY PURCHASER. THIS WORK MUST BE COMPLETED BEFORE TOWER CONSTRUCTION BEGINS. TOWER COLUMNS ARE FIELD CUT TO FIT THE BASIN FLOOR A MAXIMUM OF 4'-0 INCH BELOW THE TOP OF THE BASIN CURB.

4. BASIN FLOOR TO BE FLAT.

5. ANCHOR BOLTS: TOWER AND STAIR ANCHOR BOLTS ARE 3/4 INCH DIAMETER (76 REQUIRED) ALL THREAD WITH 6 5/8 INCHES MINIMUM EMBEDMENT AND 2 INCHES MINIMUM PROJECTION 1/8 INCH ABOVE THE FINISHED CONCRETE.

6. UPLIFT ANCHORAGE ON PERIMETER TOWER COLUMNS CAN BE INSTALLED ON ANY FACE OF THE COLUMN PROVIDED IT DOES NOT INTERFERE WITH THE DIAGONAL ANCHORAGE AND IS LOCATED WITH THE ANCHOR BOLT A MINIMUM OF 6 INCHES FROM ANY CONCRETE EDGE.

7. SPX CT TO FURNISH AND INSTALL ALL ADHESIVE ANCHORS COMPLETE WITH NUT AND WASHER AT TIME OF TOWER ERECTION.

8. FOR ANCHOR BOLT DESIGN, THE MINIMUM 28-DAY CONCRETE COMPRESSIVE STRENGTH IS TO BE 4,000 PSI. DESIGN IS BASED ON UNCRACKED CONCRETE.

9. CURB REFERENCE: TOP OF BASIN CURB REFERENCE IS TO BE THE HIGHEST POINT OF THE BASIN CURB WALL. FAILURE TO NOTE THIS COULD RESULT IN A MISALIGNMENT OF THE RISER TO INLET CONNECTION(S), AN INCORRECT STAIRPAD ELEVATION, AND A DECREASE IN THE AIR INLET ELEVATION THUS DECREASING COOLING TOWER PERFORMANCE.

10. DIFFERENTIAL SETTLEMENT CRITERIA: THE MAXIMUM SETTLEMENT THAT THE COOLING TOWER CAN ABSORB IS 1/8 INCH IN 6 FEET-0 INCHES, UP TO 1/2 INCH MAXIMUM IN TOWER WIDTH AND 1 INCH MAXIMUM IN TOWER LENGTH.

11. BASIN DESIGNER REBAR NOTE: LOCATE REINFORCING STEEL TO PREVENT INTERFERENCE WITH ANCHOR BOLTS. ANCHOR BOLT DIMENSIONS ARE LISTED AS APPROXIMATE TO ACCOUNT FOR MINOR IMPERFECTIONS IN BASIN LEVELNESS. LOCATE REINFORCING STEEL TO ALLOW 3 INCHES MINIMUM CLEARANCE TO ANCHOR BOLTS.

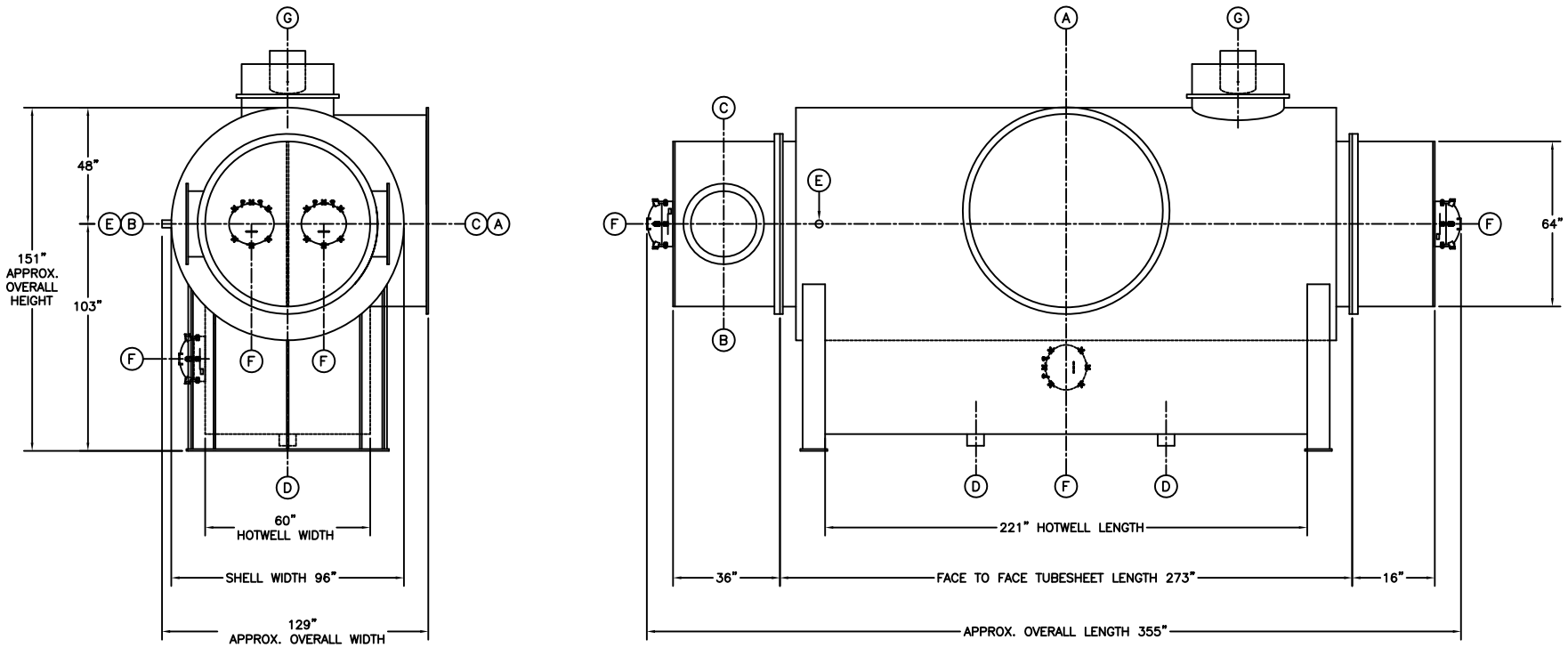
Preliminary Drawing

Information only for preparatory consideration and discussion.

SPX COOLING TECHNOLOGIES

GE - Glenarm Repowering
LOS ANGELES, CA, United States

ECO NUMBER		BASIN SECTIONS & DETAILS			SPX COOLING TECHNOLOGIES			
REV. BY	CHECKED	F436A36A5.302A COUNTERFLOW TOWER						
REV. DATE		DRAWN BY	DATE	CHECKED	APPROVED	ORDER NUMBER	PLOT	DRAWING NUMBER	REV.
		OTC	10/22/12			154213807	VARIES	JV468844D	-



MARK	SIZE	RATING	PURPOSE
A	70"	FLANGED	STEAM INLET
B	24"	125# FFSO	C.W. INLET
C	24"	125# FFSO	C.W. OUTLET
D	6"	B.W.	CONDENSATE OUTLET
E	6"	B.W.	AIR OUTLET
F	24"	75#	MANWAY
G	14"	B.W.	BYPASS INLET

FOR REFERENCE ONLY

GENERAL NOTES:
(1) – DRAWING IS NOT TO SCALE.
(2) – ALL DIMENSIONS ARE IN INCHES.
(3) – ANY DEVIATIONS FROM THIS DRAWING MUST BE APPROVED BY HOLTEC INTERNATIONAL PRIOR TO FABRICATION.

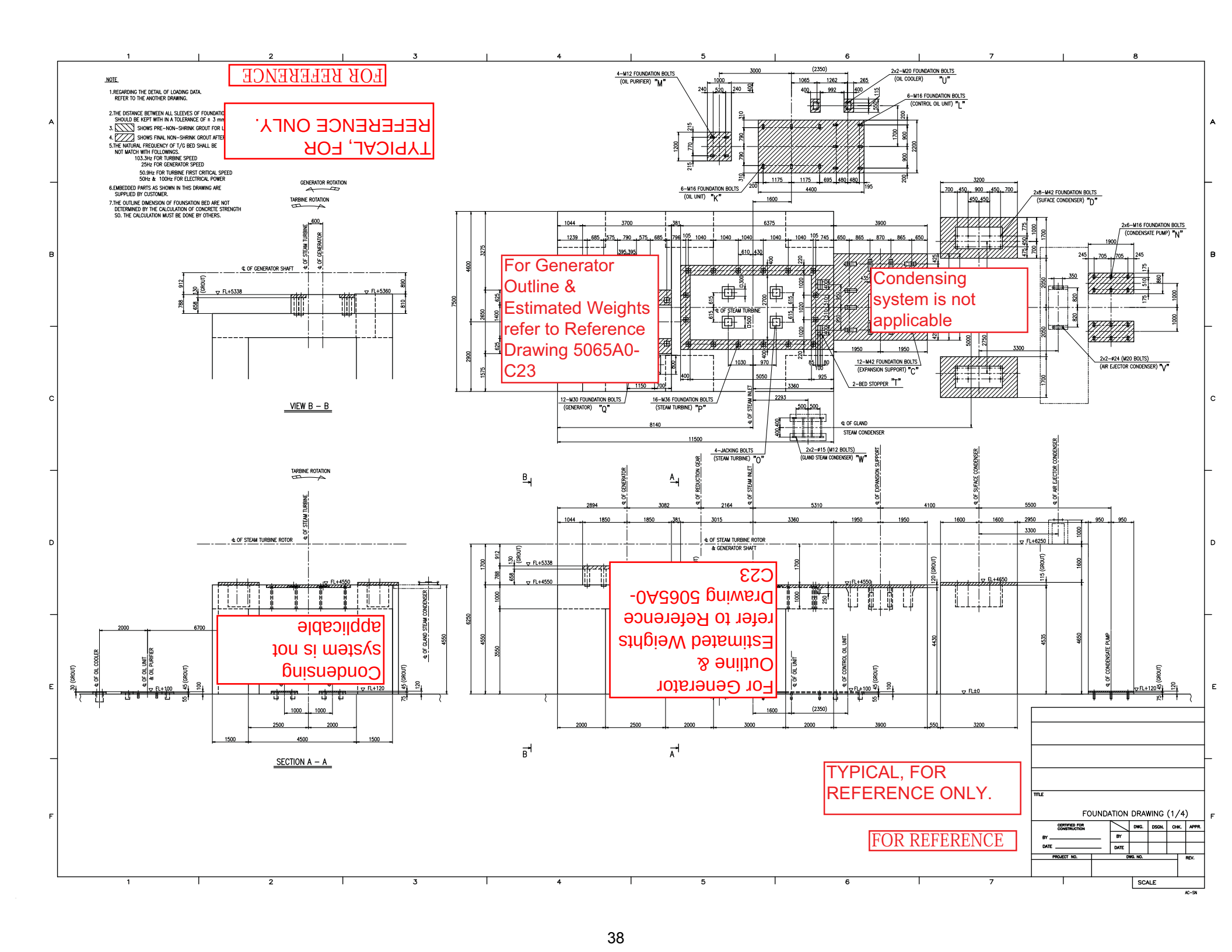
HOLTEC INTERNATIONAL
Power Plant Components Division
Holtec International
555 Lincoln Drive West
Marlton, New Jersey 08053 (USA)
Phn: 856-797-0900
Fax: 856-797-1931
www.holtecinternational.com

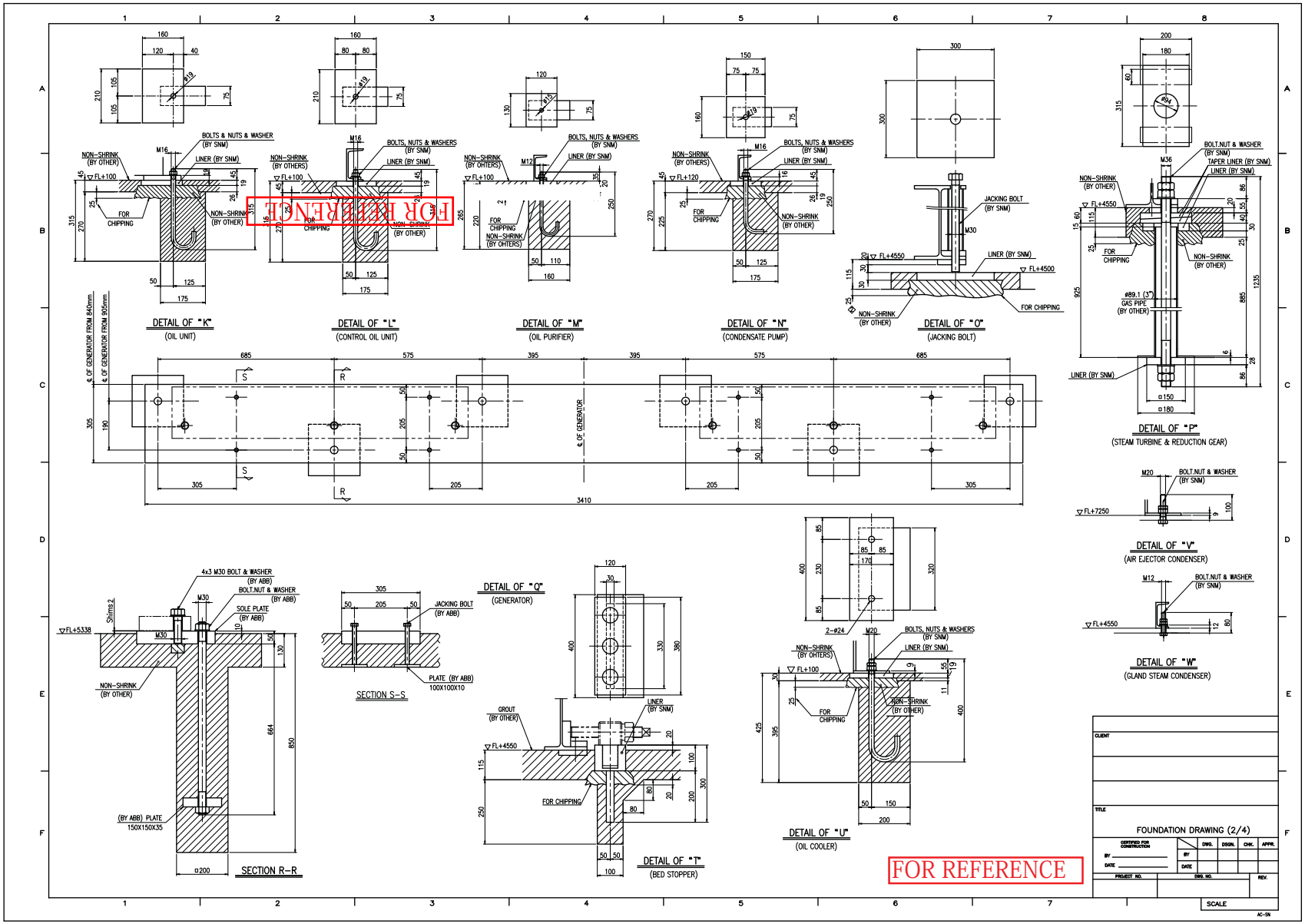
DESCRIPTION: STEAM SURFACE CONDENSER
GLENARM REPOWERING PROJECT
PASADENA, CA

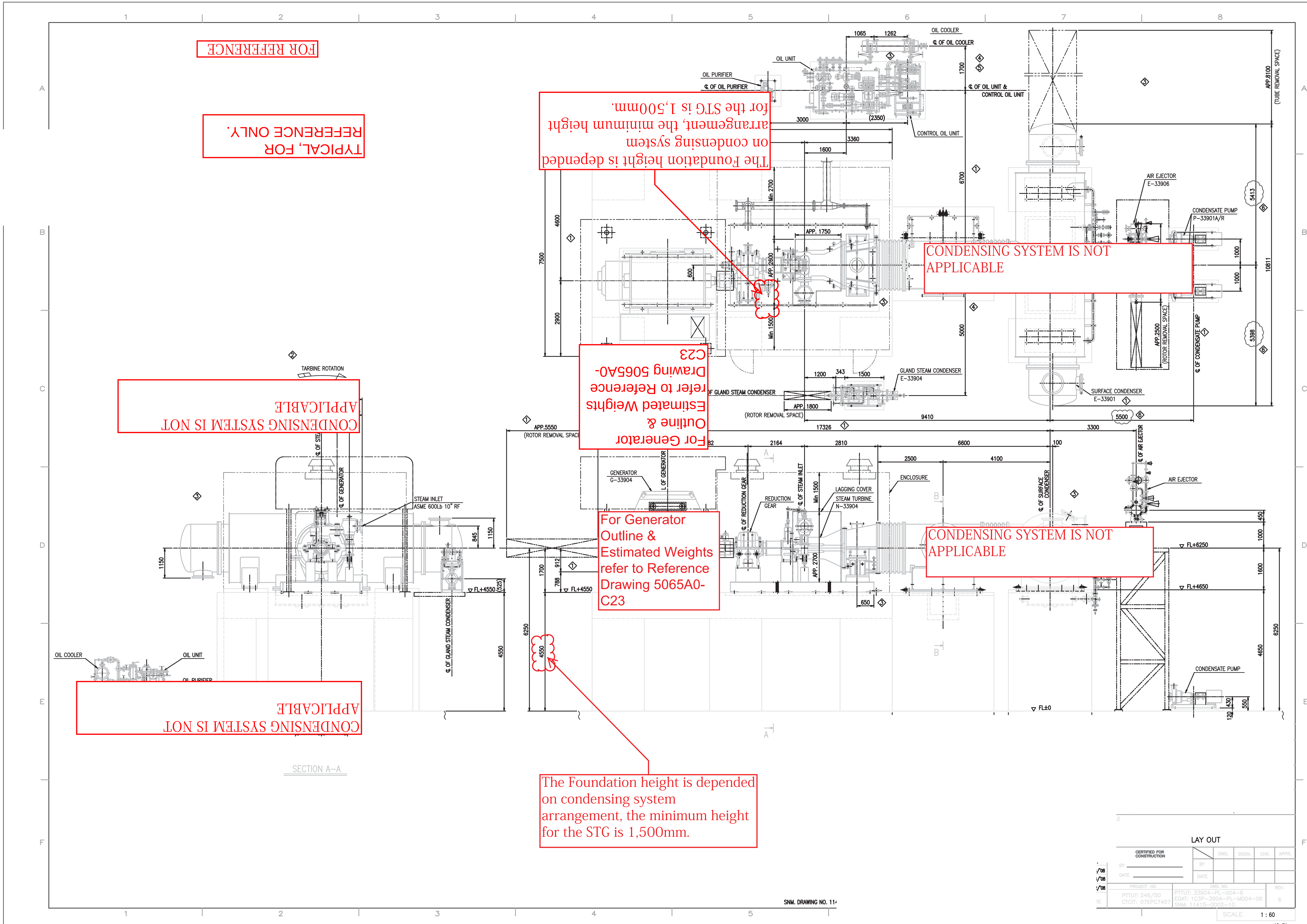
FOR: GE POWER & WATER
SCHENECTADY, NY

PROPOSAL NO.:	DRAWING NO.	REV.
H-8371.HX	SK-8371-0	0

Page 6 of 8


FOR REFERENCE
TYPICAL, FOR REFERENCE ONLY.
NOTE
1.REGARDING THE DETAIL OF LOADING DATA. REFER TO THE ANOTHER DRAWING.
2.THE DISTANCE BETWEEN ALL SLEEVES OF FOUNDATIO SHOULD BE KEPT WITH IN A TOLERANCE OF ± 3 mm
3. SHOWS PRE-NON-SHRINK GROUT FOR L
4. SHOWS FINAL NON-SHRINK GROUT AFTEI
5.THE NATURAL FREQUENCY OF T/G BED SHALL BE NOT MATCH WITH FOLLOWINGS.
103.3Hz FOR TURBINE SPEED
25Hz FOR GENERATOR SPEED
50.9Hz FOR TURBINE FIRST CRITICAL SPEED
50Hz & 100Hz FOR ELECTRICAL POWER
6.EMBEDDED PARTS AS SHOWN IN THIS DRAWING ARE SUPPLIED BY CUSTOMER.
7.THE OUTLINE DIMENSION OF FOUNSATION BED ARE NOT DETERMINED BY THE CALCULATION OF CONCRETE STRENGTH SO. THE CALCULATION MUST BE DONE BY OTHERS.
GENERATOR ROTATION
TARBINE ROTATION
VIEW B – B
TARBINE ROTATION
SECTION A – A
4-M12 FOUNDATION BOLTS (OIL PURIFIER) "M"
2x2-M20 FOUNDATION BOLTS (OIL COOLER) "U"
6-M16 FOUNDATION BOLTS (CONTROL OIL UNIT) "L"
6-M16 FOUNDATION BOLTS (OIL UNIT) "K"
2x8-M42 FOUNDATION BOLTS (SUFACE CONDENSER) "D"
2x6-M16 FOUNDATION BOLTS (CONDENSATE PUMP) "N"
For Generator Outline & Estimated Weights refer to Reference Drawing 5065A0-C23
Condensing system is not applicable
12-M42 FOUNDATION BOLTS (EXPANSION SUPPORT) "C"
2-BED STOPPER "I"
2x2-#24 (M20 BOLTS) (AIR EJECTOR CONDENSER) "V"
12-M30 FOUNDATION BOLTS (GENERATOR) "Q"
16-M36 FOUNDATION BOLTS (STEAM TURBINE) "P"
4-JACKING BOLTS (STEAM TURBINE) "O"
2x2-#15 (M12 BOLTS) (GLAND STEAM CONDENSER) "W"
℄ OF GLAND STEAM CONDENSER
℄ OF GENERATOR
℄ OF REDUCTION GEAR
℄ OF STEAM INLET
℄ OF EXPANSION SUPPORT
℄ OF SUFACE CONDENSER
℄ OF AIR EJECTOR CONDENSER
℄ OF STEAM TURBINE ROTOR & GENERATOR SHAFT
℄ OF STEAM TURBINE ROTOR
℄ OF GLAND STEAM CONDENSER
℄ OF OIL COOLER
℄ OF OIL UNIT & OIL PURIFIER
℄ OF OIL UNIT
℄ OF CONTROL OIL UNIT
℄ OF CONDENSATE PUMP
Condensing system is not applicable
For Generator Outline & Estimated Weights refer to Reference Drawing 5065A0-C23
TYPICAL, FOR REFERENCE ONLY.
FOR REFERENCE
TITLE
FOUNDATION DRAWING (1/4)
CERTIFIED FOR CONSTRUCTION
BY
DATE
DWG.
DSGN.
CHK.
APPR.
PROJECT NO.
DWG. NO.
REV.
SCALE
AC-SN


DETAIL OF "K"
(OIL UNIT)
DETAIL OF "L"
(CONTROL OIL UNIT)
DETAIL OF "M"
(OIL PURIFIER)
DETAIL OF "N"
(CONDENSATE PUMP)
DETAIL OF "O"
(JACKING BOLT)
DETAIL OF "P"
(STEAM TURBINE & REDUCTION GEAR)
DETAIL OF "Q"
(GENERATOR)
DETAIL OF "R"
(BED STOPPER)
DETAIL OF "S"
(OIL COOLER)
DETAIL OF "V"
(AIR EJECTOR CONDENSER)
DETAIL OF "W"
(GLAND STEAM CONDENSER)
SECTION R–R
SECTION S–S
FOR REFERENCE
FOR REFERENCE
FOUNDATION DRAWING (2/4)
CLIENT
TITLE
SCALE


FOR REFERENCE
TYPICAL, FOR REFERENCE ONLY.
The Foundation height is depended on condensing system arrangement, the minimum height for the STG is 1,500mm.
CONDENSING SYSTEM IS NOT APPLICABLE
For Generator Outline & Estimated Weights refer to Reference Drawing 5065A0-C23
CONDENSING SYSTEM IS NOT APPLICABLE
CONDENSING SYSTEM IS NOT APPLICABLE
For Generator Outline & Estimated Weights refer to Reference Drawing 5065A0-C23
CONDENSING SYSTEM IS NOT APPLICABLE
The Foundation height is depended on condensing system arrangement, the minimum height for the STG is 1,500mm.
OIL COOLER
OIL UNIT
OIL PURIFIER
CONTROL OIL UNIT
AIR EJECTOR E-33906
CONDENSATE PUMP P-33901A/R
GLAND STEAM CONDENSER E-33904
SURFACE CONDENSER E-33901
GENERATOR G-33904
REDUCTION GEAR
STEAM TURBINE N-33904
LAGGING COVER
ENCLOSURE
STEAM INLET ASME 600Lb 10" RF
TARBINE ROTATION
SECTION A–A
LAY OUT
SCALE 1 : 60

Loading Data [kN]

Name	Position	Static Load	Dynamic Load(+/-)*			Vacuum Load
			Vertical	Horizontal	Axial	Axial
Steam turbine and Reduction gear with base plate	A1	15.86	23.79	3.97	1.59	+/- 16.12
	A2	15.86	23.79	3.97	1.59	+/- 16.12
	A3	43.70	65.55	10.93	4.37	+/- 16.12
	A4	43.70	65.55	10.93	4.37	+/- 16.12
	A5	31.85	47.78	7.96	3.19	+/- 16.12
	A6	31.85	47.78	7.96	3.19	+/- 16.12
	A7	31.85	47.78	7.96	3.19	+/- 16.12
	A8	31.85	47.78	7.96	3.19	+/- 16.12
	A9	31.85	47.78	7.96	3.19	+/- 16.12
	A10	31.85	47.78	7.96	3.19	+/- 16.12
	A11	43.70	65.55	10.93	4.37	+/- 16.12
	A12	43.70	65.55	10.93	4.37	+/- 16.12
	A13	15.86	23.79	3.97	1.59	+/- 16.12
	A14	15.86	23.79	3.97	1.59	+/- 16.12
	A15	15.86	23.79	3.97	1.59	+/- 16.12
	A16	15.86	23.79	3.97	1.59	+/- 16.12
Generator	B1	28.60	- (AT RATED TORQUE)	28.60 (TOTAL (TO OPERATION))	N/A	- (Short Circuit Load (+/-))
	B2	28.60	12.20	40.80	N/A	101
	B3	28.60	12.20	40.80	N/A	101
	B4	28.60	12.20	40.80	N/A	101
	B5	28.60	12.20	40.80	N/A	101
	B6	28.60	-	28.60	N/A	-
	B7	28.60	-	28.60	N/A	-
	B8	28.60	-12.20	16.40	N/A	101
	B9	28.60	-12.20	16.40	N/A	101
	B10	28.60	-12.20	16.40	N/A	101
	B11	28.60	-12.20	16.40	N/A	101
	B12	28.60	-	28.60	N/A	-
Connection piece	C1	17.58	17.58	0.74	1.07	N/A
	C2	17.58	17.58	0.74	1.07	N/A
	C3	17.58	17.58	0.74	1.07	N/A
	C4	17.58	17.58	0.74	1.07	N/A
	C5	17.58	17.58	0.74	1.07	N/A
	C6	17.58	17.58	0.74	1.07	N/A
	C7	17.58	17.58	0.74	1.07	N/A
	C8	17.58	17.58	0.74	1.07	N/A
	C9	17.58	17.58	0.74	1.07	N/A
	C10	17.58	17.58	0.74	1.07	N/A
	C11	17.58	17.58	0.74	1.07	N/A
	C12	17.58	17.58	0.74	1.07	N/A
Surface Condenser	D1	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D2	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D3	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D4	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D5	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D6	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D7	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D8	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D9	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D10	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D11	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D12	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D13	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D14	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D15	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12
	D16	31.88	Full(app.) 67.43	N/A	N/A	-/+ 16.12

Loading Data [kN]

Name	Position	Static Load	Dynamic Load(+/-)*			Vacuum Load
			Vertical	Horizontal	Axial	Axial
Oil unit	E1	Dry(app.) 8.01	Working(app.) 12.67	N/A	N/A	N/A
	E2	Dry(app.) 8.01	Working(app.) 12.67	N/A	N/A	N/A
	E3	Dry(app.) 8.01	Working(app.) 12.67	N/A	N/A	N/A
	E4	Dry(app.) 8.01	Working(app.) 12.67	N/A	N/A	N/A
	E5	Dry(app.) 8.01	Working(app.) 12.67	N/A	N/A	N/A
	E6	Dry(app.) 8.01	Working(app.) 12.67	N/A	N/A	N/A
Control oil pump unit	F1	Dry(app.) 1.15	Working(app.) 1.23	N/A	N/A	N/A
	F2	Dry(app.) 1.15	Working(app.) 1.23	N/A	N/A	N/A
	F3	Dry(app.) 1.15	Working(app.) 1.23	N/A	N/A	N/A
	F4	Dry(app.) 1.15	Working(app.) 1.23	N/A	N/A	N/A
	F5	Dry(app.) 1.15	Working(app.) 1.23	N/A	N/A	N/A
	F6	Dry(app.) 1.15	Working(app.) 1.23	N/A	N/A	N/A
Oil purifier	G1	Dry(app.) 0.99	Working(app.) 1.28	N/A	N/A	N/A
	G2	Dry(app.) 0.99	Working(app.) 1.28	N/A	N/A	N/A
	G3	Dry(app.) 0.99	Working(app.) 1.28	N/A	N/A	N/A
	G4	Dry(app.) 0.99	Working(app.) 1.28	N/A	N/A	N/A
Condensate Pump	H1	1.38	2.07	0.35	0.14	N/A
	H2	1.38	2.07	0.35	0.14	N/A
	H3	1.38	2.07	0.35	0.14	N/A
	H4	1.38	2.07	0.35	0.14	N/A
	H5	1.38	2.07	0.35	0.14	N/A
	H6	1.38	2.07	0.35	0.14	N/A
	H7	1.38	2.07	0.35	0.14	N/A
	H8	1.38	2.07	0.35	0.14	N/A
	H9	1.38	2.07	0.35	0.14	N/A
	H10	1.38	2.07	0.35	0.14	N/A
	H11	1.38	2.07	0.35	0.14	N/A
	H12	1.38	2.07	0.35	0.14	N/A
Gland condenser	I1	2.70	Full(app.) 3.44	N/A	N/A	N/A
	I2	2.70	Full(app.) 3.44	N/A	N/A	N/A
	I3	2.70	Full(app.) 3.44	N/A	N/A	N/A
	I4	2.70	Full(app.) 3.44	N/A	N/A	N/A
Ejector condenser	J1	Later		N/A	N/A	N/A
	J2			N/A	N/A	N/A
	J3			N/A	N/A	N/A
	J4			N/A	N/A	N/A

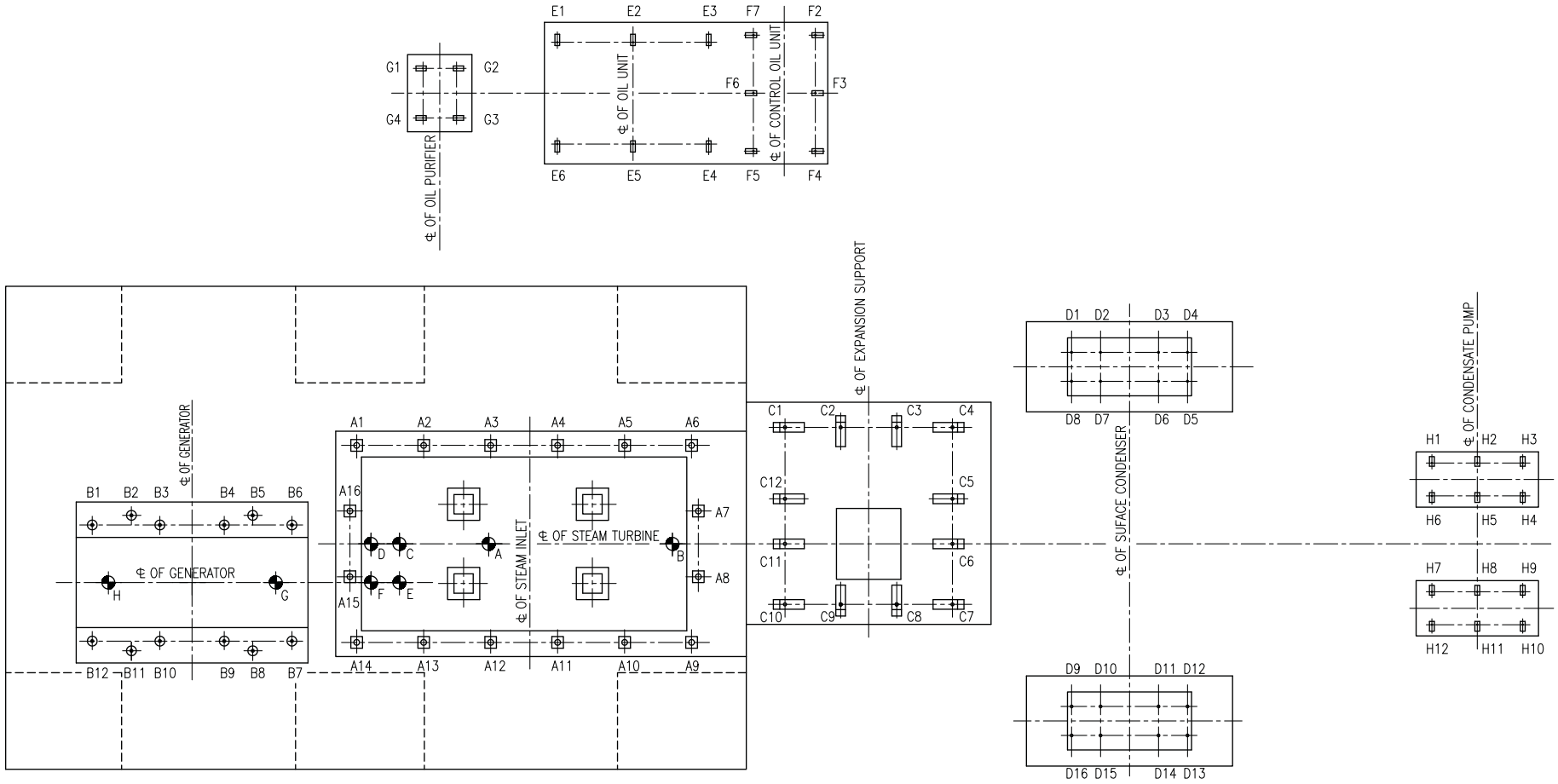
Note; * This Load is included within e.g. piping force and any other conditions not mentioned in this load data.

Unbalance load [kN]

Name	Position		Rotating Weight on Bearing	Unbalance Load
Steam turbine and Reduction gear with base plate	A	Turbine front side	11.88	2.02
	B	Turbine rear side	12.37	2.10
	C	Reduction gear pinion turbine side	1.96	0.34
	D	Reduction gear pinion generator side	1.96	0.34
	E	Reduction gear wheel turbine side	14.21	0.59
	F	Reduction gear wheel generator side	14.21	0.59
Generator	G	Generator front side	60.27	2.45
	H	Generator rear side	60.27	2.45

Note;
We have not considered weight of Turbine enclosure and Generator roof.
When you design strength calculation of foundation,

FOR REFERENCE



FOR REFERENCE

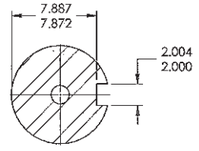
SCALE N/A

AC-SN

FILE NO. TB-01

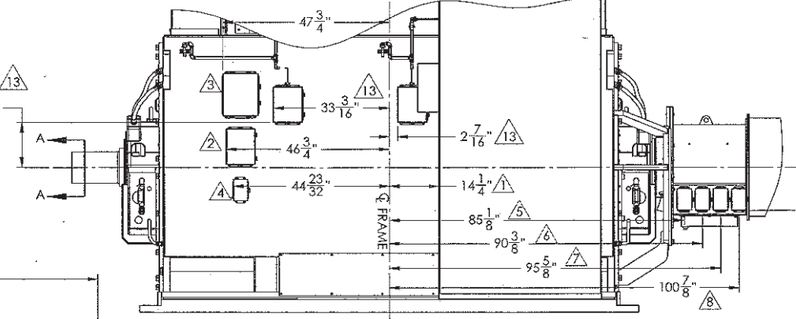
REVISIONS						
REV.	ECN	ZONE	CHANGED BY	DESCRIPTION	APPROVED BY	DATE
C	E12-0153		DBJ	UPDATED ICLC TO BOTTOM ENTRY PER C.O. #6	DMD	3/20/2012
D	E12-0247		JDT	CHANGED JACKING PORT LOCATION PER RENK	DMD	5/2/2012
E	E13-0146		JDT	COUNTERCLOCKWISE WAS CLOCKWISE	DMD	2/19/2013
F	E13-0340		JDT	HYDROSTATIC LIFT MODIFICATION	DMD	5/6/2013

REFERENCE ONLY



SECTION A-A

SHAFT END DETAIL



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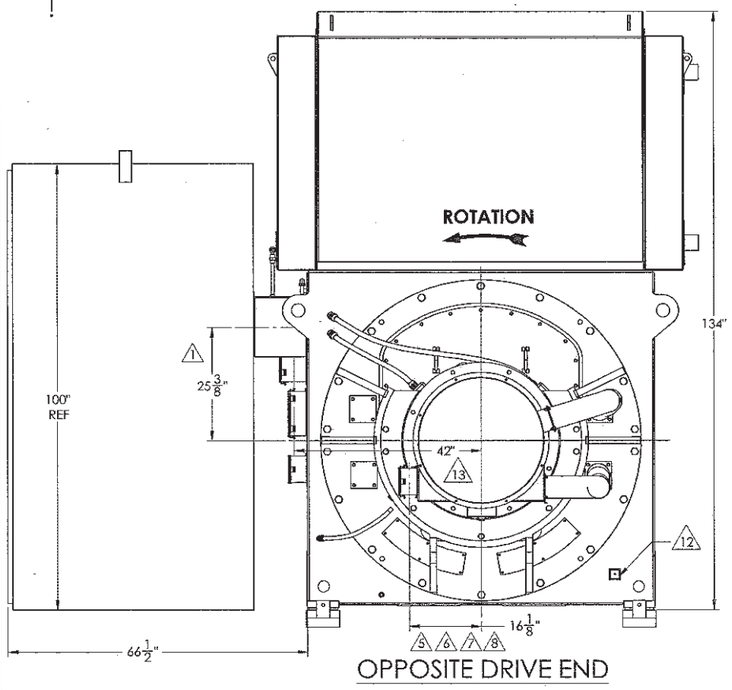
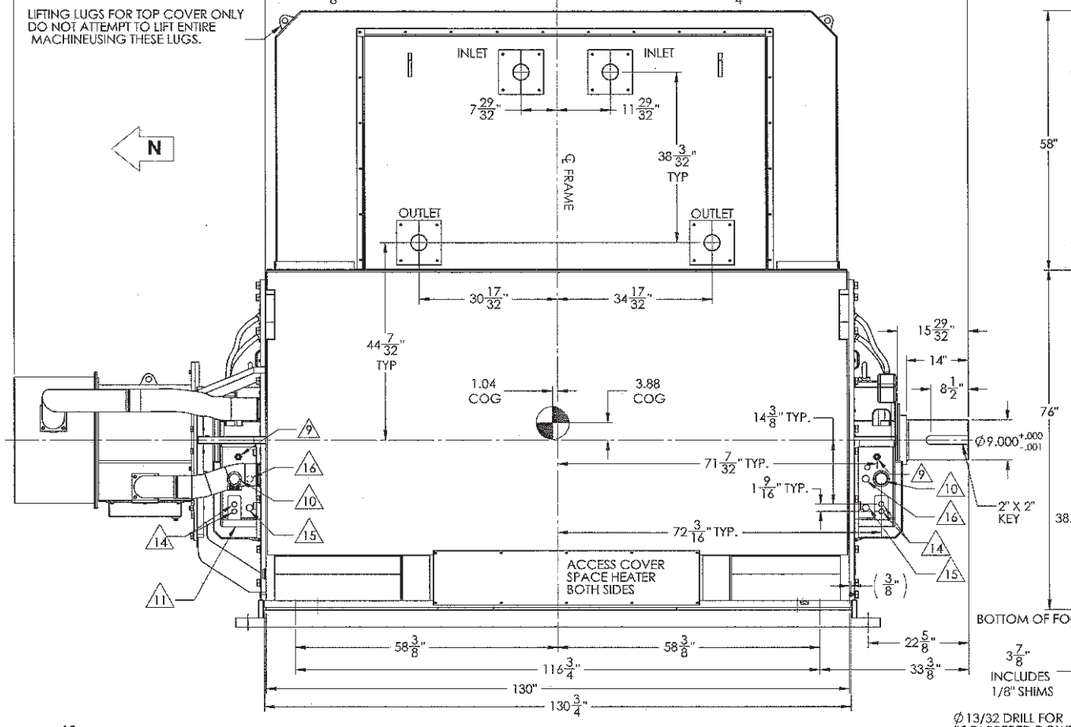
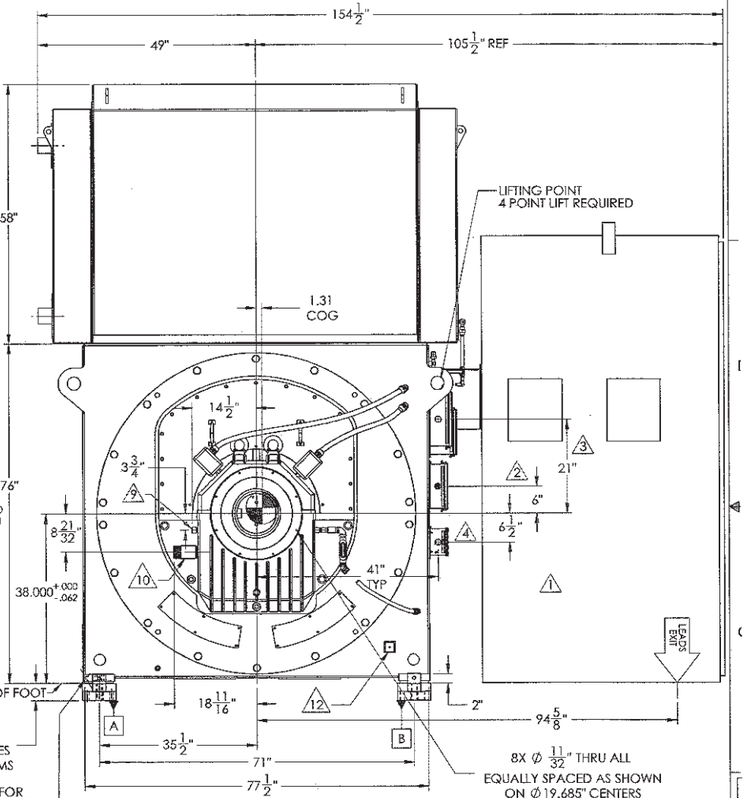
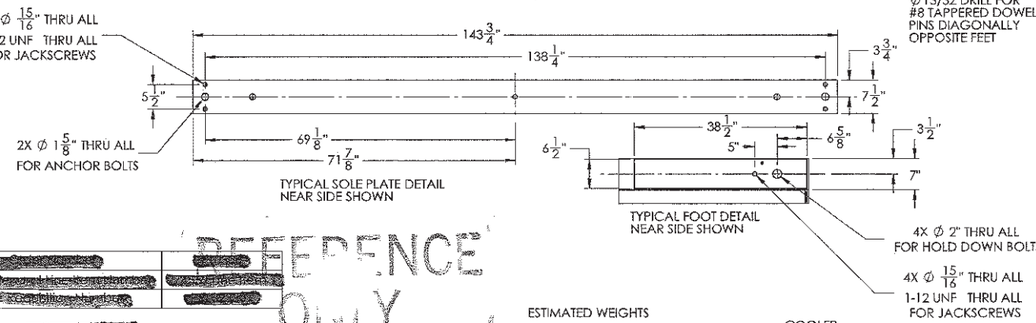


OPPOSITE DRIVE END





DRIVE END



1. CONDUIT BOX FOR STATOR LEADS, SEE INCOMING LINE CUBICLE DRAWING 14DSB-2623.
2. ONE HOLE FOR 1" CONDUIT FOR STATOR AND BEARING TEMPERATURE DETECTOR LEADS.
3. ONE HOLE FOR 1" CONDUIT FOR VIBRATION PROXIMITORS, 2 PER BEARING, KEY PHASOR.
4. ONE HOLE FOR 1" CONDUIT FOR GENERATOR SPACE HEATER LEADS.
5. ONE HOLE FOR 1" CONDUIT FOR PERMANENT MAGNETIC ALTERNATOR LEADS.
6. ONE HOLE FOR 1" CONDUIT FOR EXCITER SPACE HEATER LEADS.
7. ONE HOLE FOR 1" CONDUIT FOR GENERATOR EXCITER FIELD LEADS.
8. ONE HOLE FOR 1" CONDUIT FOR ROTOR GROUND DETECTION LEADS.
9. OIL INLET CONNECTION IS 3/4" NPT FEMALE CONNECTION.
10. OIL RETURN CONNECTION IS 3" NPT MALE CONNECTION.
11. THIS BEARING IS ELECTRICALLY INSULATED FROM GROUND INTERNALLY AT THE BEARING HOUSING, NO CUSTOMER CONNECTIONS SHOULD BE MADE TO THE INTERNAL BEARING SHELL TO PRESERVE THE INTEGRITY OF THE INSULATION.
12. TWO GROUNDING PADS WITH 5/16-18 x 3/4" DEEP TAPPED HOLES LOCATED DIAGONALLY OPPOSITE OF EACH OTHER.
13. ONE HOLE FOR 1" CONDUIT FOR LEAK DETECTOR LEADS.
14. HYDROSTATIC JACKING PORTS, 1/4" NPT, TWO LINES PER BEARING REQUIRED.
15. (F) HYDROSTATIC JACKING SUCTION PORT 3/4" NPT
16. (F) PLUGGED PRESSURE RELIEF PORT

FOOT LOADS ± 10%			
PAD	STATIC LOAD	FULL LOAD TORQUE	SHORT CIRCUIT LOAD
A	38,319 ▼	28,998 ▼	39,884 ▼ 116,521 ▲
B	38,319 ▼	47,639 ▼	39,884 ▼ 116,521 ▲

BEARING OIL REQUIREMENTS
OPPOSITE DRIVE END

VISCOSITY ..... ISO VG 32
PRESSURE..... 8-12 PSI (15 PSI MAX.)
FLOW..... 4.0 GPM
LOSSES..... 34,151 BTU/HR

BEARING OIL REQUIREMENTS
DRIVE END

VISCOSITY ..... ISO VG 32
PRESSURE..... 8-12 PSI (15 PSI MAX.)
FLOW..... 4.0 GPM
LOSSES..... 34,151 BTU/HR

[redacted]

REFERENCE ONLY

CERTIFICATION FOR: [redacted] D.O. OT
[redacted] NORTH FOURTH STREET, CUST. NO 274559
[redacted] LANNETTE, PA 15644

[redacted]

TYPE "SAB" HORIZONTAL BRUSHLESS SYNCHRONOUS GENERATOR RATED AS FOLLOWS.

[redacted] 1800 KW, 2250 KVA, 3 PHASE, 60 HERTZ, 3,300 VOLTS, WYE CONNECTED, [redacted] DETECTOR, 40°C A 40° C AMBIENT, CONTINUOUS DUTY, CLASS F INSULATION.

PRODUCES NEMA STANDARD PHASE SEQUENCE 1(A),3(C),2(B) FOR COUNTERCLOCKWISE SHAFT ROTATION FACING OPPOSITE DRIVE END.

ESTIMATED WEIGHTS

ICLC BOX	2,500 LBS
ROTOR	22,960 LBS
STATOR	45,877 LBS
TOP COVER	3,000 LBS
COOLERS	4,800 LBS
TOTAL	79,137 LBS (± 10%)
SOLE PLATES	2,354 LBS

AIR REQUIREMENT: 24,500 CFM

VERTICAL THERMAL GROWTH IS 2.9 MILS

COOLER

CONNECTIONS ARE 3" NPT

WATER REQUIREMENTS:

125 USGM OF 90° F. MAX. OF CLEAN FILTERED WATER AT 150 PSIG

WATER PRESSURE DROP THRU COOLER IS 4.3 PSI

WATER TEMPERATURE OUT OF COOLER IS 106° F.

THIS UNIT IS EQUIPPED WITH SLEEVE BEARINGS ALLOWING A NOMINAL 1/2 INCH TOTAL END FLOAT. MAXIMUM TOTAL COUPLING END FLOAT MUST BE 0.19 INCHES PER MG1-2003 20.29.2

WORKING TOLERANCES, UNLESS OTHERWISE SPECIFIED

MACHINING	FABRICATION	FINISH
± .01 THRU 2.00" ± .015 OVER 2.00 THRU 10.00" ± .03 OVER 10.00" ANGLE ±0.5°	± .12 THRU 24.00" ± .24 OVER 24.00"	125 MICRO √ INCHES

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED
ALL THREADS TO BE CLASS 2 UNIFIED

FILE NO. 15-01
LIBRARY AG-65
REF NO. -

FIRST USED ON [redacted]
HIEC ORDER No. [redacted]

BY	DATE
DR. JDT	8/23/2011
CK. DMD	8/25/2011
APP. DMD	8/25/2011
APP.	

HYUNDAI IDEAL ELECTRIC CO.
MANSFIELD OPERATION 1200 EAST FIRST STREET MANSFIELD, OHIO 44902-7706

TEWAC 21520-4-55 / BE15-3 / PMA15-3

OUTLINE

RENK 28-250 SLEEVE BEARINGS

SIZE D | DRG NO. 5065A0-C23
WEIGHT - | SHEET 1 OF 1 | REVISION F

HYUNDAI IDEAL
ELECTRIC CO.

MANSFIELD OPERATION
330 East First Street
Mansfield, Ohio 44902
Phone: (419) 520-3245
Fax: (419) 522-8427
www.idealelectricco.com

AFTERMARKET SERVICE BULLETIN

GENERAL INSTRUCTIONS FOR ROTOR REMOVAL (SKID PAN METHOD)

Motor or Generator Rotor removal

1. Prepare Site for set up for any associated rigging, timbers, crane and/or gantry as necessary to complete this job.

2. Disconnect and/or lockout all electrical service to the motor. Ensure DE and ODE oil is drained out of the bearing housing. Uncouple the DE from any other unit.

3. Remove the entire exciter assembly from the shaft.

4. Remove the DE and ODE upper and lower bearing bracket covers, if applicable ensure to remove all vibration probe and connections that are mounted on the inner bearing brackets.

5. Remove the DE and ODE upper half bearing brackets. Ensure to remember that the ODE bearing bracket may be insulated from the bearing housing.

6. Remove DE and ODE fan baffles.

7. Remove the DE and ODE upper bearing housing along with the upper bearing half. Inspect the bearing half's for any damage.

8. Remove DE and ODE Bearing temperature probes from the bearing housing.

9. Lift and support the ODE rotor until the lower bearing can be removed from the lower bearing housing. During this process ensure not to lift no more the .010 – .020 inch to allow the bearing to roll. After the lower bearing have has been removed, place G10 blocks spaced apart at 135 degree and 225 degree between the rotor bars and the stator winding iron core (G10 blocks are to be place on the iron core and not the windings) to support the weight of the ODE rotor.

10. Lift and support the DE rotor until the lower bearing can be removed from the lower bearing housing. During this process ensure not to lift no more the .010 – .020 inch to allow the bearing to roll. After the lower bearing have has been removed, place G10 blocks spaced apart at 135 degree and 225 degree between the rotor bars and the stator winding iron core (G10 blocks are to be place on the iron core and not the windings) to support the weight of the DE rotor.

11. Remove ODE and DE lower half bearing bracket.

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12. Build the necessary cribbing timber up to the bottom of the ODE stator winding iron core. Ensure to place cribbing timber in the ODE stator inboard for skidpan support.

13. Prepare inside surface of skidpan by brushing melted paraffin over entire area.

14. Hoist the ODE rotor up not to exceed the top of the rotor to mesh the top of the stator winding iron core. Remove the G10 block from the ODE, place the skidpan on to the cribbing and slide the skidpan in between the rotor bars and the stator winding iron core until. Let the rotor down to set on the skidpan and repeat the same process for the G10 blocks on the DE.

15. Secure pan with cables and clevises to prevent axial movement

16. Attach a ratchet hoist between the exciter end of the rotor and a substantial anchor point; begin removing rotor out of stator.

17. If lifting means is available, utilize to relieve weight as rotor is removed out of stator.

18. Reassembly is basically the reverse of the above procedure.

Job Notes:

1. Do not substitute other lubricants in place of paraffin.

2. Keep rotor level when removing or reassembling to prevent fan damage.

3. Do not allow skidpan to move in stator.

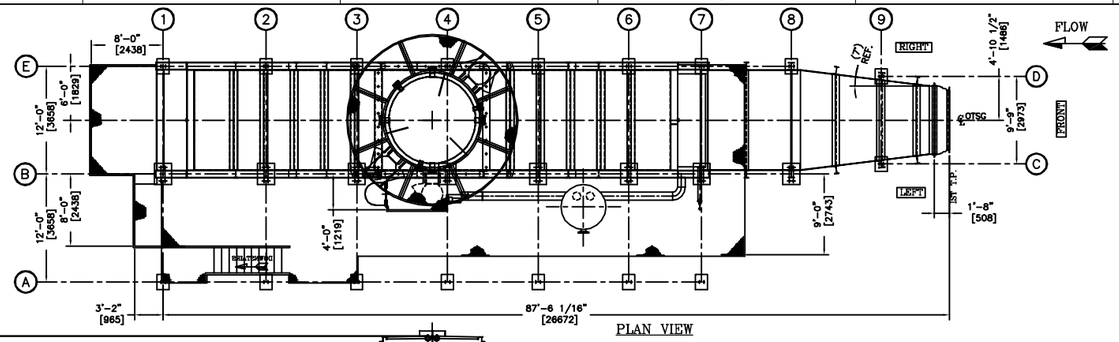
4. After removing bearings protect journals.

5. Do not lift or pull on journals or other fit surfaces.

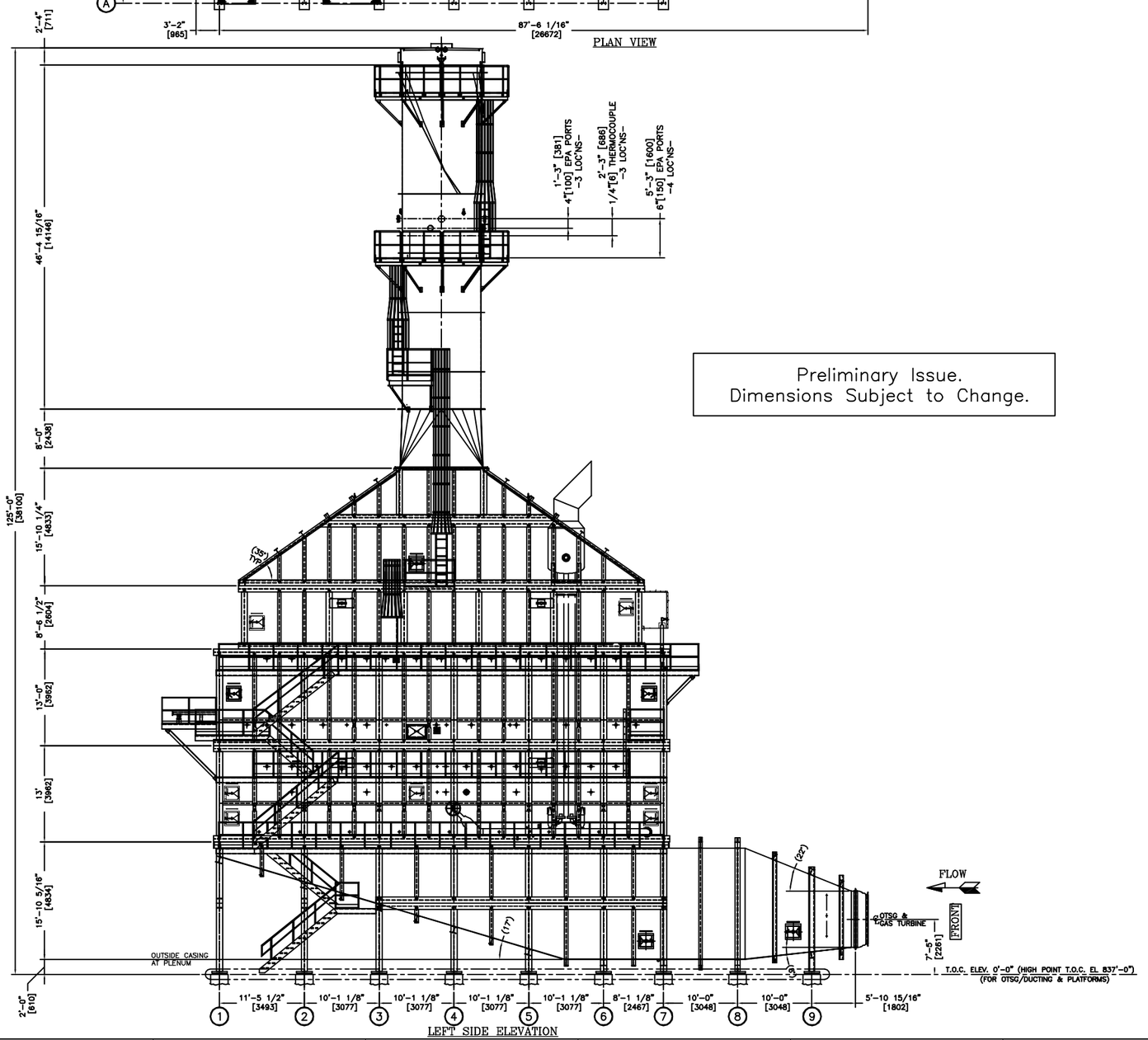
6. Before disassembling, for ease of reassembly, establish a reference for shaft extension to determine the approximate axial position of the rotor during assembly.

03-01-08

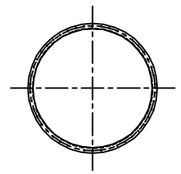
REVISIONS					
REV	ECR	DESCRIPTION	BY	APP	DATE
P	N/A	PRELIMINARY ISSUE. DIMENSIONS ARE SUBJECT TO CHANGE.	JH	JH	11/01/13
P.1	N/A	PRELIMINARY ISSUE. DIMENSIONS ARE SUBJECT TO CHANGE.	JH	JH	12/20/13



PLAN VIEW



LEFT SIDE ELEVATION



Preliminary Issue.
Dimensions Subject to Change.

REFERENCE DRAWINGS
FOUNDATION LOADINGS.....11303-0002
BASEPLATE LAYOUT ASSEMBLY.....11303-0003
FEEDWATER & STEAM FLOWSHEET....11303-0004

NOTES:
1. HEADERS LOCATED ON SAME END AS GAS INLET.
2. STEAM OUTLET WILL BE ON THE LEFT WHEN FACING HEADER END OF UNIT.
3. TYP. 12.00[305] CLEARANCE FOR EXTERNAL STIFFENING MUST BE NOTED AND ADHERED TO BY OTHERS.
4. ALL PRIMARY DIMENSIONS & ELEVATIONS ARE IN FEET & INCHES. ALL SECONDARY DIMENSIONS ARE IN mm.
5. IST T.P. DESIGNATES IST TERMINAL POINT.
6. ALL EXTERNAL PIPING WELDS TO BE IN ACCORDANCE WITH ASME B31.1 2007 EDITION.
7. A 28.00[712] SWING CLEARANCE IS REQUIRED AT ALL ACCESS DOORS.
8. STRUCTURAL STEEL DESIGN TO COMPLY WITH IBC 2010, AISC 13TH ED, AND CALIFORNIA BUILDING STANDARDS CODE 2010 EDITION (CCR TITLE 24).
9. PLATFORM GRATINGS TO HAVE FULL EDGE BANDING, INCLUDING CUT-OUTS. GRATING SERRATED TYPE.
10. ALL PLATFORM GRATING AND STAIR TREADS ARE TO BE GALVANIZED.
11. ALL LADDERS AND PLATFORMS TO CONFORM TO US OSHA AND CAL/OSHA STANDARDS (CCR TITLE 8).
12. SEE PIPING ASSEMBLY DRAWINGS FOR TERMINAL POINT DETAILS, MAXIMUM THERMAL DISPLACEMENTS AND ALLOWABLE LOADS ON PIPING.
13. ALL PAINTING TO COMPLY WITH IST STANDARD 11303-0450.

QUANTITIES SHOWN ARE FOR (1) ONE UNIT ONLY.

QTY.	U/M	ITEM	PART NO.	PART NAME	DESCRIPTION	MATERIAL	ZONE
1	EA	20	11303-300	EQUIPMENT	EQUIPMENT LIST		
1	EA	19	11303-200	VALVES	VALVE ASSEMBLY LIST		
1	EA	18	11303-100	INSTRUMENTS	INSTRUMENT ASSEMBLY LIST		
1	EA	17	11303-0024	PLATFORM ERECTION	PLATFORM ERECTION ASEMBLY AND DETAILS		
1	EA	16	11303-0023	OTSG/DUCTING ERECTION	OTSG/DUCTING ERECTION DIAGRAM AND DETAILS		
1	EA	15	11303-0022	PIPING ASSEMBLY	HP VENT STACK PIPING ASSY		
1	EA	14	11303-0021	PIPING ASSEMBLY	HP STEAM PIPING ASSEMBLY		
1	EA	13	11303-0020	PIPING ASSEMBLY	HP FEEDWATER PIPING ASSEMBLY		
1	EA	12	11303-0019	EXHAUST STACK	EXHAUST STACK ASSEMBLY		
1	EA	11	11303-0018	STACK ADAPTER	EXHAUST STACK ADAPTER		
1	EA	10	11303-0017	U. EXHAUST HOOD	UPPER EXHAUST HOOD ASSEMBLY		
1	EA	09	11303-0016	L. EXHAUST HOOD	LOWER EXHAUST HOOD ASSEMBLY		
1	EA	08	11303-0009	UPPER MODULE	UPPER MODULE ASSEMBLY		
1	EA	07	11303-XXXX	SCR MODULE	SCR MODULE ASSEMBLY		
1	EA	06	11303-0006	LOWER MODULE	LOWER/CO/AIG MODULE ASSEMBLY		
1	EA	05	11303-0015	UPPER INLET PLENUM	UPPER INLET PLENUM ASSEMBLY		
1	EA	04	11303-0014	LOWER INLET PLENUM	LOWER INLET PLENUM ASSEMBLY		
1	EA	03	11303-0013	AIR DILUTION DUCT	AIR DILUTION DUCT ASSEMBLY		
1	EA	02	11303-0012	INLET TRANS. DUCT	INLET TRANSITION DUCT ASSEMBLY		
1	EA	01	11303-0003	BASE PLATE LAYOUT	BASE PLATE LAYOUT/ASSEMBLY		

BILL OF MATERIAL AND PARTS LIST

TOLERANCES
UNLESS OTHERWISE SPECIFIED
LINEAR DIMENSIONS ARE IN INCHES
METRIC UNDER TEN 1.0mm
TEN OR 1 PLACE DECIMALS +/- 0.100"
TEN OR 2 PLACE DECIMALS +/- 0.030"
TEN OR 3 PLACE DECIMALS +/- 0.030"
ANGULAR TOLERANCE +/- 0.5°

THIRD ANGLE PROJECTION

QUALITY	N/A	CUSTOMER	GLENARM
MFR.	N/A	DATE:	
ENGINEER	N/A	DATE:	
J. TONG		11/01/13	
CHK.		DATE:	
J. HUNTER		11/01/13	
APPR.		DATE:	
J. HUNTER		11/01/13	
U.O.M.	SCALE/SIZE	DRAWING	
VARIABLE	LM6000 PG	C12079	

TITLE: GENERAL ARRANGEMENT LM6000 PC OTSG

DWG. NO. 11303-0001 SIZE E REV. P1
SCALE: 1 : 64 SHEET NO. 01 OF 01

CADD I.D. P:\C12079\11303-0001