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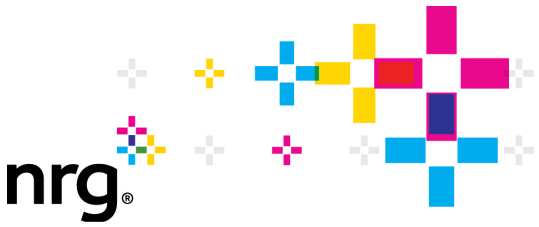


El Segundo Energy Center Project (00-AFC-14C)
Steam Turbine Weatherization Enclosures – Petition to Modify

December 2015

Submitted by: El Segundo Energy Center LLC
Date Submitted: 12-23-2015

Table of Contents

List of Attachments

I. Overview of the Petition

El Segundo Energy Center LLC (ESEC LLC), the Project Owner, a wholly owned subsidiary of NRG Energy, Inc. (NRG), proposes to make modifications to specified equipment licensed by July 8, 2010 Commission Decision for the El Segundo Energy Center (ESEC) Project (Docket No.00-AFC-14C). This Petition to Modify entails the replacement of thermal insulation on steam turbine (ST) casings and installation of weatherization enclosures (i.e., ST weatherization enclosures) over the ESEC steam turbines, located at 301 Vista Del Mar, El Segundo, California. This Petition does not propose any changes to the COCs included in the Final Decision.

ESEC LLC seeks CEC approval to proceed with installation of the ST enclosures as soon as possible to avoid any further maintenance issues with the generating equipment. The timing of this request is made with consideration of the pending El Nino season.

a. Information Requirements for the Post-certification Amendment

This Petition contains the information required under the CEC's Siting Regulations for post-certification project modifications (California Code of Regulations [CCR] Title 20, Section 1769). This Petition, as summarized in Table 1 below, contains the information necessary for staff to determine that that the replacement of the ST thermal insulation and installation of the weatherization enclosures will not (a) significantly affect the environment, (b) cause a change or deletion of a COC, or (c) cause the project not to comply with applicable laws, ordinances, regulations, and standards (LORS).

TABLE 1
Informational Requirements for Post-Certification Modifications

Section 1769 Requirement	Section of Petition Fulfilling Requirement
(A) A complete description of the proposed modifications, including new language for any conditions that will be affected	*I. Overview of Petition* *IV. Analysis of Project Modification, Environmental Analysis Summary - Table 2*
(B) A discussion of the necessity for the proposed modifications	*III. Necessity of Proposed Changes*
(C) If the modification is based on information that was known by the petitioner during the certification proceeding, an explanation why the issue was not raised at that time	*III. Necessity of Proposed Changes*
(D) If the modification is based on new information that changes or undermines the assumptions, rationale, findings, or other bases of the final decision, an explanation of why the change should be permitted	*Not Applicable – final decision not changed*
(E) An analysis of the impacts the modification may have on the environment and proposed measures to mitigate any significant adverse impacts	*IV. Analysis of Project Modifications and Environmental Analysis Summary - Table 2*
(F) A discussion of the impact of the modification on the facility's ability to comply with applicable laws, ordinances, regulations, and standards;	*IV. b. Consistency of Changes with Certification*
(G) A discussion of how the modification affects the public	*V. Potential Offsite Impacts and IV a. Visual Analysis*
(H) A list of property owners potentially affected by the modification	*V. Potential Offsite Impacts and Attachment H*
(I) A discussion of the potential effect on nearby property owners, the public and the parties in the application proceedings.	*V. Potential Offsite Impacts*

II. Project Description

The proposed modifications consist of the replacement of thermal insulation on ST casings and installation of ST weatherization enclosures on Units 6 and 8 at the ESEC site. The weatherization enclosures are proposed improvements suggested by Siemens, the ST manufacture designer. The weatherization enclosures are necessary due to operation and maintenance issues associated with the lengthy removal and replacement requirements of spray on thermal insulation on the ST casings. The originally installed spray on thermal insulation was designed to provide thermal insulation to the ST casing to help maintain consistent temperature across the ST rotor and prevent exposure of ancillary operational equipment and sensor systems to rain and corrosive marine environment.

The ESEC units consist of two 1x1 (one gas turbine generator (GTG) and one HRSG and ST generator (STG)) combined cycle power blocks. The ST's were designed and installed with a spray on thermal insulation and hard shell (plaster-like) coating on the exterior of the ST casing that also encapsulated numerous valves, electric heating mats, and various sensors. Attachment A provides the site general arrangement for reference.

III. Necessity of Proposed Changes

The Siting Regulations require a discussion of the necessity for any revision to a CEC certification and of whether the modification is based on information that was known by the petitioner during the certification proceeding (Title 20, CCR, Sections 1769 [a][1][B] and [C]). The proposed modifications to the ST units were only determined to be necessary after significant operational time and one annual scheduled outage period. The proposed modification was not known to the Petitioner, ESEC LLC at the time of licensing. Descriptions of the necessary modifications are discussed in the following sections.

a. Project Background

ESEC project online date was August 1, 2013. During 2014 the ST casing electric heater mats began to fail prematurely. The failed heater mats were scheduled to be replaced during the 2015 spring outage. During the outage the hard shell spray on thermal insulation was removed. The removal process of the thermal insulation coating damages the coating and requires the coating be reinstalled, a process that takes several days to accomplish. The thermal spray on coating also requires several days of "curing" before the ST could be placed back into service. Information on the spray on thermal insulation is provided in Attachment B.

b. Project Modifications

Due to the difficulty with the removal process of the thermal insulation, maintenance issue with the heater mat, and the long cure time for reinstallation of the thermal insulation a decision was made in consultation with Siemens to reinstall the heater mats directly on the ST casing; covering them with removable insulation pads. The heater elements and the removable insulation pads are not recommended for outdoor use.

Rather than install the hard shell insulation again, ESEC plans to install the weather protection enclosures discussed herein, which will improve future maintenance requirements and reduce the duration or eliminate potential outages associated with replacement/re-installation of the hard shell material.

The weather enclosures would be mounted over each ST unit and would also provide weather protection for sensors and valves that also experienced failure and corrosion from exposure. The ST units have experienced short outages due to failure of control transmitter connections, and controls (i.e., speed probes) from environmental exposure. The original ST casing insulation was designed to protect delicate controls and instrumentation hardware on the top of the ST units.

The proposed ST enclosures are steel framed, canopy type structures that will be bolt mounted to the turbine platform (Attachment C). The enclosures are designed to be bolted in place (not welded) to allow any future major maintenance activity possible by simply unbolting the structure and removing in a single lift in one piece. This greatly increases the efficiency of maintenance activities as compared the hard shell plaster coating as originally designed. The turbine platforms are constructed of steel I-beams and grated walkways. The enclosures were engineered and provided with PE Stamped design calculations and drawings (Attachment D). The enclosures are open on the bottom and will allow complete access around the ST for workers. There will be no enclosed work spaces created, and no electrical, plumbed, or mechanical systems installed on the enclosure. The enclosures were shipped to the site in parts and assembled on the ground in a staging area at the plant. The enclosures would be lifted into place with a crane in a single lift (Attachment E). Installation is estimated to require one day per enclosure.

IV. Analysis of Project Modification

The ST units are located on the eastern half of the ESEC site (Attachment A, Item 2 on Site Arrangement Drawing), east of the air-cooled heat exchangers, and south of combustion turbine air inlets. The proposed enclosures are 21-feet in height, 20.67-feet wide, and 28.1-feet in length. They would be installed on the ST platform which is 14-feet in height. The total structure elevation height will be 35-feet above grade. For comparison, the ST generator is located immediately south of ST. The ST generator enclosure is 17-feet in height for total elevation of 31-feet above grade. Photos of the assembled enclosures, ST, and general installation locations are shown in Attachment F.

ESEC LLC evaluated all the resource disciplines that may have the potential for the insulation replacement and ST weatherization enclosures to impact to public health and safety, or the environment. A summary of the analysis is provided in Table 2 below. Of the resource disciplines, only visual resources may have the potential to be impacted by the installation of the weatherization enclosures. All other resources disciplines were determined to have no impact. An example of potential benefits from the installation of the ST enclosures would be reduced noise profile for the ST unit and improvement to work safety by providing better equipment

maintenance options. The system reliability will be improved due to less maintenance on the ST unit and ancillary equipment located inside the enclosure. Potential visual resource impacts are discussed in the following section.

TABLE 2
Environmental Analysis Summary

Resource Area	Analysis
Air Quality	*No operating equipment. All chemicals used are South Coast Air Quality Management District Compliant. Work activities are operations and maintenance related and/or fabrication of enclosures do no trigger air permit thresholds for permitting. No Impact.*
Biological Resources	*Work is not within habitat area and does not impact local flora or fauna. No Impact.*
Cultural Resources	*Insulation installation and weatherization enclosure do not require any ground disturbance activities. No Impact.*
Geology and Paleontology	*No ground disturbance work. No Impact.*
Hazardous Materials	*No hazardous materials used or storage modifications made to existing facilities. No Impact.*
Land Use	*No change to land use. No Impact.*
Noise and Vibration	*Installation if insulation is all manual labor, no noisy equipment required. Enclosure fabrication requires minimal welding, and bolting during normal work hours 7AM to 6PM. Installation of enclosures will require heavy lift crane, also used during normal work hours. Enclosures may reduce noise in and around the immediate ST area; however, overall no increase in far field noise is anticipated. No Impact.*
Public Health	*No change to emissions. No Impact.*
Socioeconomic Resources	*Operation and maintenance activity. No Impact.*
Soil and Water Resources	*No ground disturbance or water resources*

TABLE 2
Environmental Analysis Summary

Resource Area	Analysis
	needed for installations. No Impact.
Traffic and Transportation	*No offsite work or heavy haul equipment needed. No Impact.*
Visual Resources	*Possible visual impact from weatherization enclosure discussed in following section.*
Waste Management	*Replacing the spray on thermal insulation with removable insulation blankets will actually reduce waste (non-hazardous, municipal waste debris) over the lift of project. No Impact.*
Worker Safety and Fire Projection	*Installation of removable insulation blankets will improve work safety with a more efficient and safe insulation installation and removal option for maintenance. The removable insulation blankets are fire retardant and designed for high temperature industrial use. No Impact.*

a. Visual Analysis

For perspective of whether the protection enclosures proposed for the two ST's would be visible following implementation of this maintenance procedure, photos were taken from Key Observations Points (KOPs) used during the licensing (Attachment G). KOPs 1 (Dockweiler State Beach looking south), 7 (Dockweiler Beach looking east), and 5 (Vista Del Mar south) seem to be the most appropriate. Based on the location of the ST units in the middle of the ESEC facility equipment, and the total height of the final installed equipment, it does not appear that the weatherization enclosures will be visible. In accordance with CEC Condition of Certification VIS-5 the color of the enclosure is gray with a translucent roof panels. The colors are similar to the galvanized and coated equipment around the ST, and the finish on the enclosure is not reflective or glossy.

b. Consistency of Changes with Certification

The CEC Siting Regulations require a discussion of the consistency of a proposed project revision with the LORS and whether the modifications are based on new information that changes or undermines the assumptions, rationale, findings, or other basis for the final decision (Title 20, CCR Section 1769 [a][1][D]). If any such modification would cause a project to be inconsistent with the certification, the Petition must provide an explanation of why the modification should be permitted.

The Petition to Modify the thermal insulation and install weatherization enclosures is consistent with the purpose of ESEC as licensed and amended and is consistent with the applicable LORS and COCs as described in the Final Decision. This Petition is not based on new information that changes or undermines any basis of Final Decision. The findings and conclusions contained in the Final Decision are applicable to the replacement of thermal insulation and installation of weatherization enclosures.

The enclosures are designed by a California Professional Engineer (Civil) to comply with design standards for structural and seismic requirements for the southern California area. The construction, installation, and use of the enclosures are not subject to any other laws, ordinances, regulations, and/or standards.

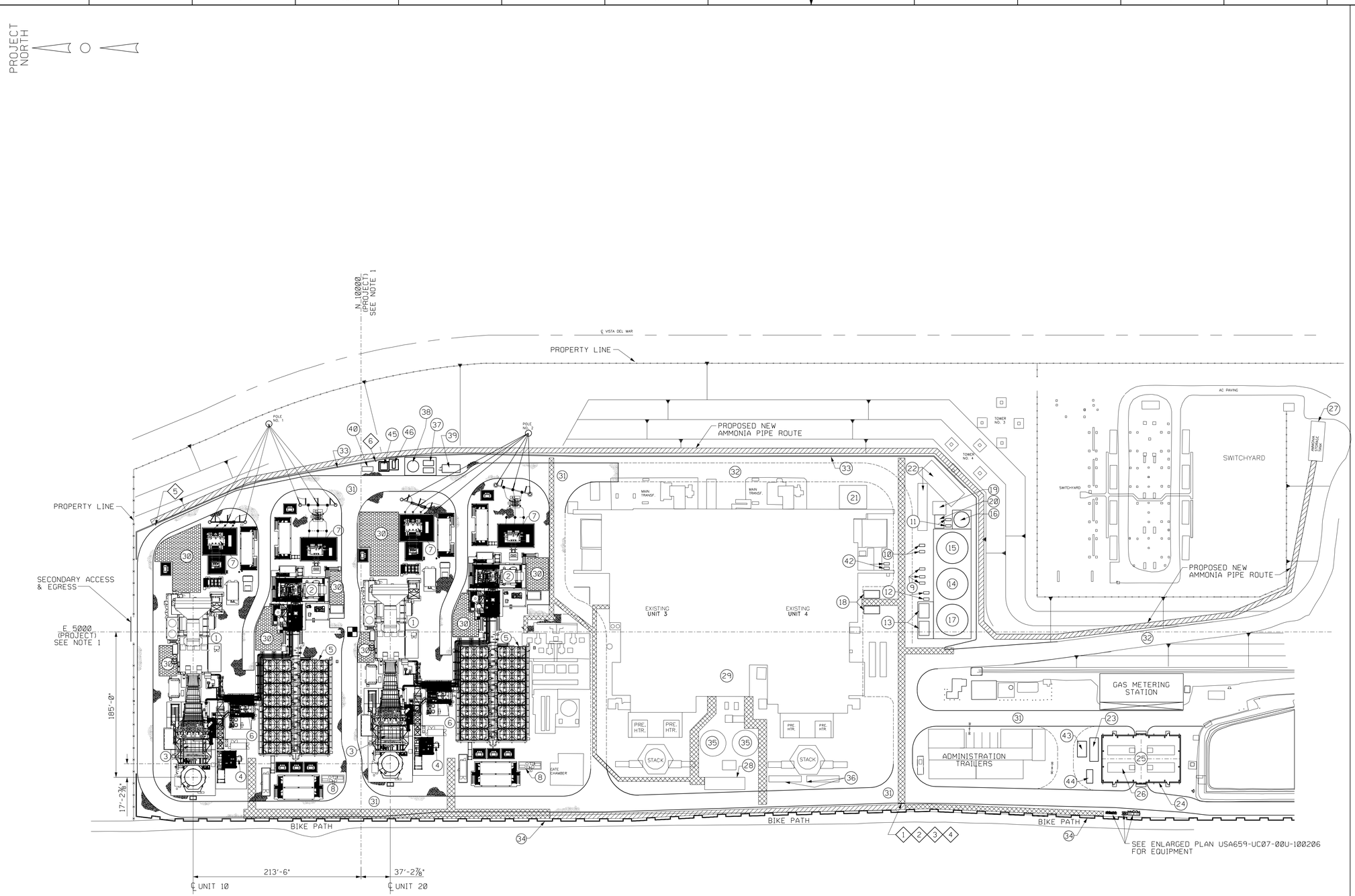
V. Potential Offsite Impacts

The installation and use of the enclosures will have no impact on the public. Construction and installation of the enclosures requires one to two weeks of welding and bolting construction. Installation of the enclosures will only require one day to complete. The weatherization enclosures are simple steel frame and corrugated metal canopy type enclosures that have no electrical, lighting, or air emissions. Although the tops of the enclosures may be visible from very limited vantage points, they will most likely be indistinguishable from the rest of the power block equipment. The enclosures are to be installed to reduce equipment exposure to rain and the coastal marine environment, reducing the frequency of equipment failure and increasing equipment operational availability.

The installation and use of the enclosures has no potential to affect nearby property owners. The enclosures are stationary and designed to engineering standards that ensure stability in earthquake and severe weather conditions. The proof of service list from the last Petition to Amend the ESEC Final Decision is included in Attachment H.

ATTACHMENT A

Site General Arrangement



NOTES

1. PROJECT MONUMENT POINT N 10000.00, E 5000.00 ON DRAWING TITLED "SITE MONUMENT PLAN", DWG NO. USA659-UE00-00U-671601, BY WORLEYPARSONS, EQUALS THE ESTABLISHED PROPERTY MONUMENT POINT 0.00, 0.00 ON DRAWING TITLED "SURVEY CONTROL MAP FOR NRG EL SEGUNDO ENERGY CENTER," BY PSOMAS, 3 HUTTON CENTRE DRIVE, SUITE 200, SANTA ANNA, CA 92707.

PLANT LEGEND

1 11/21UMB/MKA - GAS TURBINE & GENERATOR
2 10/20MA/MKA - STEAM TURBINE & GENERATOR
3 10/20UHA - HRSG (HEAT RECOVERY STEAM GENERATOR)
4 10/20LAC - BOILER FEEDWATER PUMP
5 10/20URC - ACHE (AIR COOLED HEAT EXCHANGER)
6 10/20LCB - DEAERATOR & CONDENSATE TANK
7 10/20BAT - ST GENERATOR TRANSFORMER
8 10/20SCA - AIR COMPRESSOR SKID
9 00UHC - DEMIN. WATER FORWARDING PUMPS
10 00GAF - RAW WATER FORWARDING PUMPS
11 00GAX - MIXED WATER FORWARDING PUMPS
12 SERVICE WATER FORWARDING PUMPS
13 00USG - FIRE WATER PUMPS
14 00UGC - DEMIN. WATER STORAGE TANK
15 00UGA - RAW WATER STORAGE TANK
16 00UGX - MIXING TANK
17 00UGF - FIRE WATER STORAGE TANK
18 00UGD - DEMIN SYSTEM EQUIPMENT (2 TRAILERS)
19 WATER PLANT TRANSFORMER
20 WATER PLANT MCC
21 00UYC - TEMPORARY MAINTAINENCE BUILDING (BY NRG)
22 00UYC - TEMPORARY MAINTAINENCE TRAILER
23 00EKE - FUEL GAS CONDITIONING SKID
24 00UEN - FUEL GAS COMPRESSOR BUILDING
25 00EKH - FUEL GAS COMPRESSORS
26 00URX02 - FUEL GAS COMPRESSOR FIN-FAN COOLERS (ROOF)
27 AMMONIA UNLOADING & STORAGE AREA (EXISTING)
28 RO TRAILER (PERMANENT LOCATION)
29 00UCA - EXISTING CONTROL ROOM
30 CRANE ACCESS/MAINTAINENCE AREA
31 00UZA - NEW ROADS
32 00UZA - EXISTING ROADS
33 00UZM - EXISTING RETAINING WALL
34 00UZ - NEW SEAWALL
35 CONDENSATE TANKS
36 I&E STORAGE
37 NITROGEN VAPORIZATION SKID
38 NITROGEN STORAGE TANK
39 HV REVENUE METERING ENCLOSURE
40 AUTOMATIC TRANSFER SWITCH PANEL
41 NOT USED
42 BLOWDOWN COOLER & PUMPS
43 FUEL GAS FILTER SKID
44 PILOT GAS FIN-FAN COOLER
45 CONSTRUCTION POWER TRANSFORMER
46 CONSTRUCTION POWER MCC

REFERENCES

USA659-UE00-00U-671601 - SITE MONUMENT PLAN
USA659-VA08-00UZ-671710 - ROADS,FENCE,AND SURFACING PLAN
USA659-UC07-00U-100201 SH2 - ENLARGED POWERBLOCK PLAN

SURFACE LEGEND

- ASPHALT PAVING
- OPEN GRADED AGGREGATE (OGA)
- DENSE GRADED AGGREGATE (DGA)
- ABOVEGROUND UTILITY CORRIDOR
- UNDERGROUND UTILITY CORRIDOR
- CUSTOMER TERMINAL POINT

CUSTOMER TERMINAL POINT LIST

TP	SIZE	DESCRIPTION	EASTING	NORTHING	ELEVATION
1	6"	RAW WATER (GAF)	E 4775'-6"	N 9318'-5 13/16"	EL. 19'-6"
2	6"	DEMIN WATER (GHC)	E 4775'-6"	N 9315'-11 13/16"	EL. 19'-6"
3	6"	WASTE DRAINS (GMA)	E 4775'-6"	N 9314'-8 13/16"	EL. 19'-6"
4	6"	HRSG DRAINS (LCL)	E 4775'-6"	N 9317'-2 13/16"	EL. 19'-6"
5	1"	AMMONIA UNIT 10 (HST)	E 5136'-0 11/16"	N 10261'-2 9/16"	EL. 21'-0"
6	1"	AMMONIA UNIT 20 (HST)	E 5214'-7 3/16	N 9886'-0 1/8"	EL. 21'-0"

CBO-U- 101
UNITS: COMMON
ISSUED FOR CONSTRUCTION
PENDING CBO APPROVAL

50 0 50 100 150
SCALE: 1"=50'-0"

Index No.	Datum Date	Search Coord.	ppo*ffi Checked	*nderungshinweis/Details of Revision
4	20120209	CDH /SD		GENERAL UPDATE - REVISED NITROGEN AREA
3	20111206	CDH /SD		GENERAL UPDATE AND REMOVED HOLD ON FUEL GAS COMPRESSOR AREA
2	20110610	CDH /SJR		GENERAL UPDATE
1	20110511	CDH /SJR		INCORPORATED CLIENT COMMENTS
0	20110407	CDH /SJR		ISSUED FOR DESIGN FREEZE

WorleyParsons resources & energy — Zero Harm Leadership No Incidents Safe Behavior

Ursprung/Original | Ursprung-Nr./Original-No. | Ursp.-/PKZ-Nr. Orig.-/PC

Projekt/Project: El Segundo Energy Center | PKZ/PC: USA659

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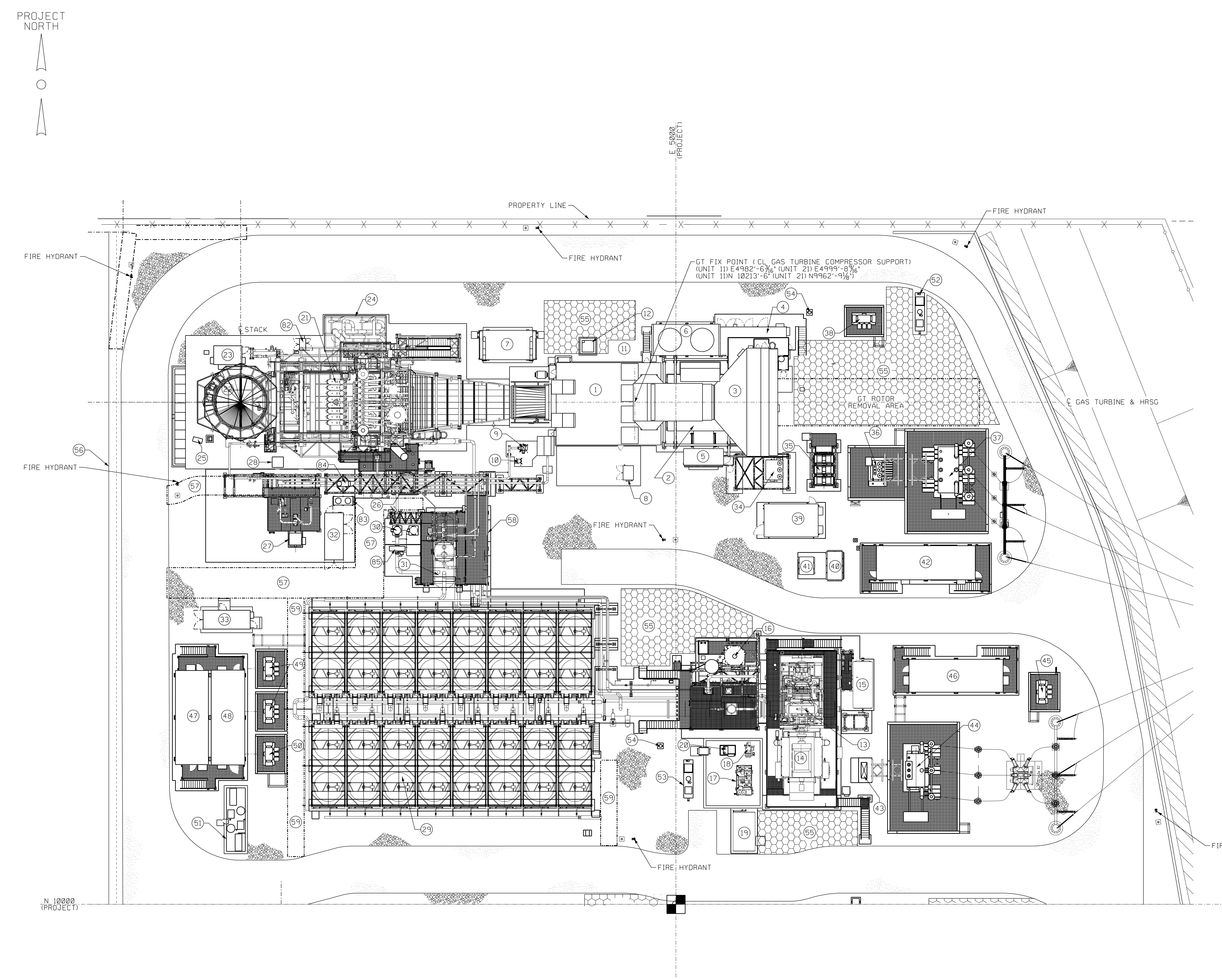


NOTES

1. UNIT 10 SHOWN, UNIT 20 TYPICAL EXCEPT ALL TAGGING SHALL BE PREFIXED WITH "20".

PLANT LEGEND

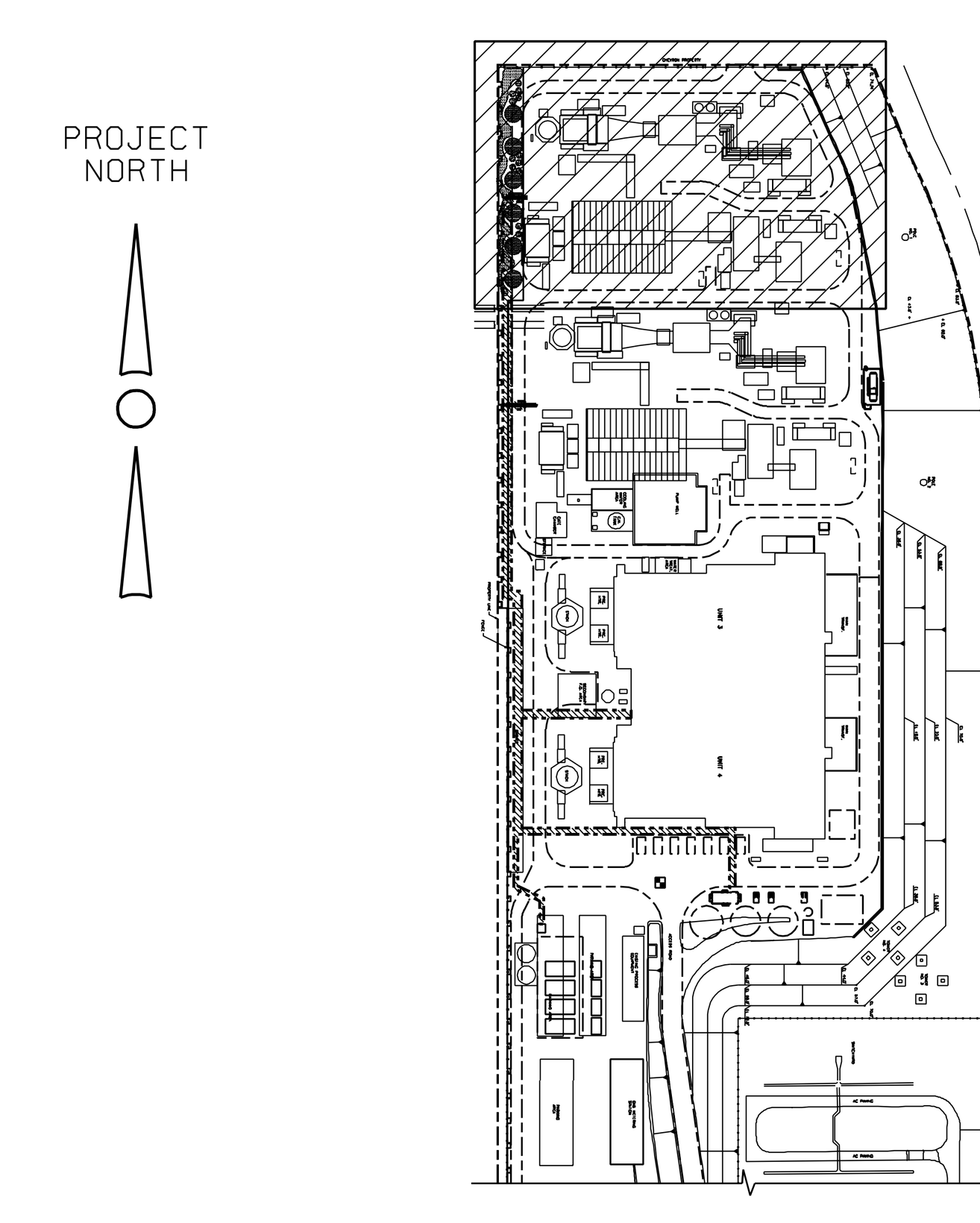
1 11UMB - GAS TURBINE ENCLOSURE
2 11MKA - GAS TURBINE GENERATOR
3 11MBL - INTAKE AIR FILTER HOUSE
4 11UBA01 - GAS TURBINE ELECTRICAL PACKAGE
5 11UMB01 - GT GENERATOR COOLER INLET FILTER
6 11MBV - LUBE OIL COOLER
7 11MBH - ROTOR AIR COOLER
8 11MBX - CONTROL OIL SKID
9 11MBP10 - MAIN GAS FILTER
10 11MBP30 - PILOT GAS FILTER
11 11MBU - PORTABLE COMPRESSOR WATER WASH SKID
12 11UPT - WATER WASH WASTE PIT
13 10MA - STEAM TURBINE
14 10MKA - STEAM TURBINE GENERATOR
15 10MAW - GLAND STEAM CONDENSER
16 10LCM10 - CLEAN DRAIN TANK
17 10MAV - LOW PRESSURE OIL SUPPLY UNIT
18 10MAX - HIGH PRESSURE OIL SUPPLY UNIT
19 10UMA02 - STEAM TURBINE LUBE OIL COOLER
20 10MAX - ST HYDRAULIC CONTROL SKID
21 10UHA - HRSG (HEAT RECOVERY STEAM GENERATOR)
22 10UHA - HRSG STACK
23 10HNE - CEMS SKID
24 10HSJ - AMMONIA & SCR SKID
25 10CPC01/02 - HRSG I/O CABINETS
26 10LBH - HRSG BLOWDOWN TANK
27 10LAC11 - BOILER FEED WATER PUMP
28 10LAC11 - BOILER FEED WATER PUMP LUBE OIL COOLER
29 10URC - ACHE (AIR COOLED HEAT EXCHANGER)
30 10LCB11 - CONDENSATE EXTRACTION PUMP
31 10LDH - DEAEARATOR & CONDENSATE TANK
32 10QU - SAMPLING CONTAINER
33 10ULX - CHEMICAL DOSING SKID
34 11BAB36 - GT GENERATOR VT & SURGE CUBICLE
35 11BAC - GENERATOR CIRCUIT BREAKER
36 11BBT01 - AUXILIARY TRANSFORMER
37 11BAT01 - GT GENERATOR STEP-UP TRANSFORMER
38 11BFT01 - GT LV TRANSFORMER
39 11CJT - SCE-SFC PACKAGE
40 11MBJ - SFC TRANSFORMER
41 11MKC - SEE TRANSFORMER
42 11UBA93 - GT PCC/MV SWITCHGEAR
43 10BAB - ST GENERATOR VT & SURGE CUBICLE
44 10BAT01 - ST GENERATOR STEP-UP TRANSFORMER
45 10BFT01- ST LV TRANSFORMER
46 10UBA01 - ST PCC
47 10UBA21 - BOP & PLANT PCC
48 10UBA81 - ACHE PCC
49 10BFT02/03 - ACHE LV TRANSFORMER
50 10BFT04 - BOP LV TRANSFORMER
51 10USC - AIR COMPRESSOR SKID
52 11UBH - OIL WATER SEPARATOR (UNDERGROUND)
53 10UBH - OIL WATER SEPARATOR (UNDERGROUND)
54 OIL WATER SEPARATOR DISCHARGE FILTER
55 CRANE ACCESS/MAINTAINENCE AREAS
56 NEW SEAWALL
57 ACCESS/MAINTAINENCE ENVELOPE
58 10UMY - PIPE & UTILITY RACK
59 ACHE ACCESS/MAINTAINENCE ENVELOPE
82 10HNE - SCR INLET CEMS CABINET
83 10QUA - SAMPLING SYSTEM FIN-FAN COOLER
84 10QUA - SAMPLING SYSTEM COOLER PUMP SKID
85 10LCA - CONDENSATE STRAINER

REFERENCES

USA659-UC07-00U-100201 SH1 - OVERALL SITE PLAN

SURFACE LEGEND

ASPHALT PAVING
OPEN GRADED AGGREGATE (OGA)
DENSE GRADED AGGREGATE (DGA)
ABOVEGROUND UTILITES
UNDERGROUND UTILITIES



KEY PLAN

CBO-U- 101
UNITS: COMMON
ISSUED FOR CONSTRUCTION
PENDING CBO APPROVAL

16 0 16 32 48
SCALE: 1/16" = 1'

Index Rev.	Datum Date	bearb. Coord.	gepr*ft Checked	*nderungshinweis/Details of Revision
4	2012/02/09	CCH /SD		GENERAL UPDATE
3	2011/12/06	CCH /SD		GENERAL UPDATE
2	2011/08/10	CCH /SJR		GENERAL UPDATE
1	2011/05/11	CCH /SJR		INCORPORATED CLIENT COMMENTS
0	2011/04/07	CCH /SJR		ISSUED FOR DESIGN FREEZE

WorleyParsons
resources & energy

Zero Harm
Leadership
No Incidents
Safe Behavior

Ursprung/Original	Ursprung-Nr./Original-No.	Urspr.-PKZ-Nr. Orig.-PC	
Projekt/Project: El Segundo Energy Center		PKZ/PC: USA659	
	Datum Date	Name	Ma*stab Scale: 1/16" = 1' / SERIAL NUMBER
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UAS Type: UC07

Benennung/Title:
GENERAL ARRANGEMENT PLAN ENLARGED POWERBLOCK

Inhaltskennzeichen Contents Code: 00U

Z*hl.-Nr. Reg.No.: 100201

SIEMENS Energy, Inc.

Dienstst./Dept.

UNID: 477125657

Index/Rev.: 4

Version

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Erstellt mit/designed with: Intergraph

Ersatz f*r Supersedes

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ATTACHMENT B

Original Heater Element Specifications, and Thermal Insulation Information

thermoprozess
Heating-Systems

THERMOPROZESS HEATING-SYSTEMS GMBH
Wiehagen 6 D - 45472 Mülheim
Tel.: +49 208 49539-50 Fax : +49 208 49539-59

Operation and Maintenance Manual for Electric Surface Heating Systems

Personal involved in the installation, testing and maintenance of electric heat-tracing systems must be suitably trained in all special techniques required, as well as in general electrical installation work!

Ensure that the heating cable voltage rating is suitable for the application!

1. Power supply and electrical protection

Size overcurrent protective devices according to the THERMOPROZESS Heating-Systems GmbH design specification.
We require the use of a maximum 300 mA residual current device to provide maximum safety and protection.
Bond the metal sheath or metallic braid of the heating cable to a suitable earth terminal.
Also refer to local standards.
Special regard should be given to electrical safety. All safety aspects need to be proven. Also refer to local standards.

2. Power System testing and operating

After installation of the heating system, it has to be checked for visible damage on the components installed.
Measure the resistance

a.) Insulation resistance
b.) Resistance of heating cable (not required for self regulating tapes)

2.1 Insulation Resistance (IR) testing

IR testing (using a megohmmeter) should be conducted with minimum 500 V and max. 2000 V.
Measure the resistance between the heating cable bus wire and the braid or metal sheath.
All insulation resistance values should be greater than 50 MΩ, regardless of the heating cable length.
The installer should record the values for each circuit on the installation record sheet.

THERMOPROZESS Heating-Systems GmbH recommends insulation resistance test after installing thermal insulation and as part of the periodic maintenance.

Function testing of electrical protection, residual current device and temperature control systems should be carried out at regular intervals.

3. Operation and maintenance

- switch on power
- set value on regulator, controller, limiter etc.
  if the controller setpoint is below the actual value, set values above actual values temporary.
- the same procedure with possibly existing safety controller / limitter
- Measure the current ampere immediately and after 10 minutes of operation with an a-meter.
- if existing, check the low temperature controller by changing the values

Attention !
After commissioning / maintenance set all values back to the required one.

THERMOPROZESS HEATING-SYSTEMS GMBH Wiehagen 6 Tel.: +49 208 49539-50
D - 45472 Mülheim Fax: +49 208 49539-59

[X] Take over certificate [X] Heating circuit list

vessel / area						Heating circuit data												
Circ. No.	Description	area total m²	area heated m²	Insulation mm	Heat loss W / m²	Occup. Coverage m / m²	Heating cable type	Length m	P kW	I (meas. Value) A	R (meas. Value) Ω	U V	Insul-R meas. value MΩ	Connection box type	thermocouples type : TC reference range ° C		reference mark ° C
	turbine case		approx.									480		aluminium	B1*1		
1	heating zone 1		3,4	200-300		14,7	MTC/Q 630	50	7,3	14,1	32,1	0	> 2200	draw.-no.:	B2*1	1 x NiCr-Ni	+ 600
	10MAA50 AH013						laser	(50)		14,4	31,7			.0011		(1 x NiCr-Ni)	
	turbine case		approx.									480		aluminium	B1*1		
2	heating zone 2		5,6	200-300		10,4	MTC/Q 400	58	9,9	20,1	22,4	2-phas.	> 2200	draw.-no.:	B2*1	1 x NiCr-Ni	+ 600
	10MAA50 AH010						laser	(58)		20,0	22,7			.0021		(1 x NiCr-Ni)	
	turbine case		approx.									480		aluminium	B1*1		
3	heating zone 3		3,4	200-300		14,7	MTC/Q 630	50	7,3	14,2	31,7	2-phas.	> 2200	draw.-no.:	B2*1	1 x NiCr-Ni	+ 600
	10MAA50 AH012						laser	(50)		14,3	31,2			.0031		(1 x NiCr-Ni)	
	turbine case		approx.									480		aluminium	B1*1		
4	heating zone 4		5,6	200-300		10,4	MTC/Q 400	58	9,9	20,1	22,4	2-phas.	> 2200	draw.-no.:	B2*1	1 x NiCr-Ni	+ 600
	10MAA50 AH011						laser	(58)		20,3	22,0			.0041		(1 x NiCr-Ni)	
	turbine case		approx.									480		aluminium	B1*1		
5	heating zone 5		7,4	200-300		13,5	MTC/Q 630	2 x 50	14,6	14,6 / 14,7	31,1 / 32,1	3-phas.	> 2200	draw.-no.:	B2*1	2 x NiCr-Ni	+ 600
	10MAA10 AH020						laser	(2 x 50)		14,3 / 14,4	31,0 / 31,4			.0051		(2 x NiCr-Ni)	
								(redundant)								(redundant)	

Object
Heating for turbine case
T 6645 Flex Plant 10 SP A1

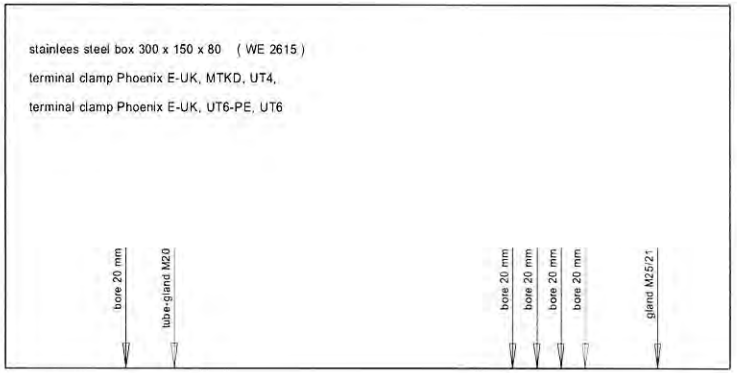
Com.Nr.: 48046x811
Client: Siemens AG - IA - Görlitz
Order-No.: 61-45061470

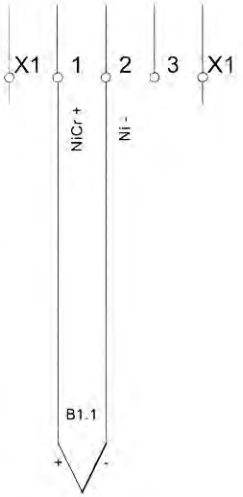
Date 25.06.09
ursl. 28-05-09 fn R. Küpper
THERMOPROZESS

S. Stricker, Siemens
Client Position controller / connectionbox agreed

Rev. 0 / 30.08.01

B1*1 - Controller / B2*1 - safety controller max.temp. heating cable / B3*1 - low temp. control





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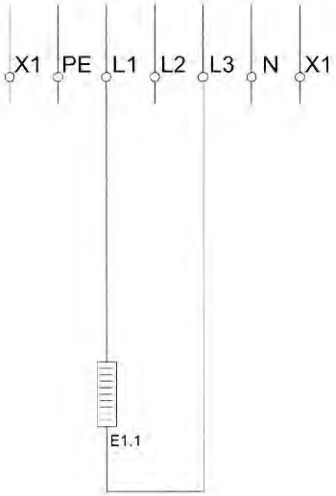

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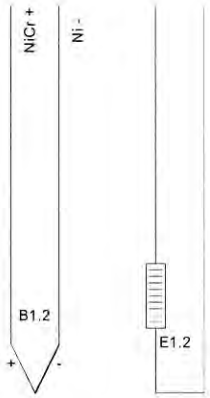


MAA50CT011

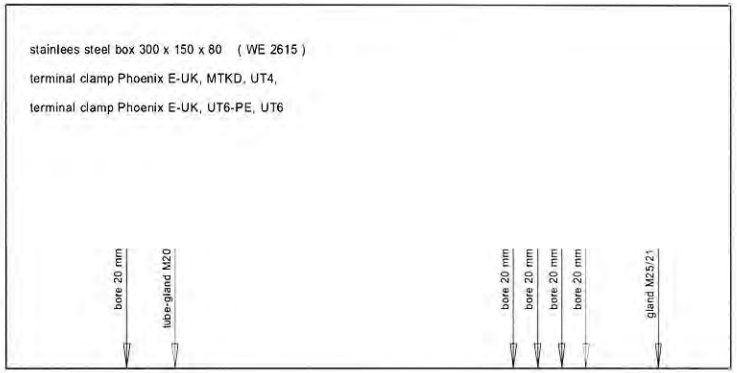
AU16889/8A

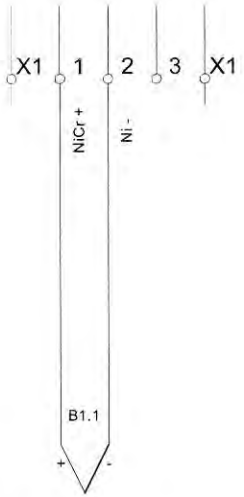
redundant / spare

MAA50AH011

redundant / spare

				THERMOPROZESS HEATING-SYSTEMS GMBH **Wiehagen 6** **D - 45472 Mülheim** Tel.: +49 208 49539-50 Fax: +49 208 49539-59	Turbine heater casing T 6645 heating area 4 Gehäuseschale Oberteil hinten JB 26.4	Kunde	Siemens AG PGI Industrial Applications Görlitz	
			Datum	27.05.2009		Bestell-Nr.	61-45061470	
			gez.	fp		TH-Kom.-Nr.	48046	
Änderung	Datum	Name	gepr.			Zeichn.-Nr.	48046x041	Blatt-Nr.





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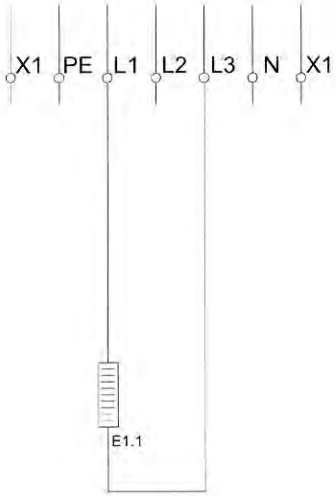

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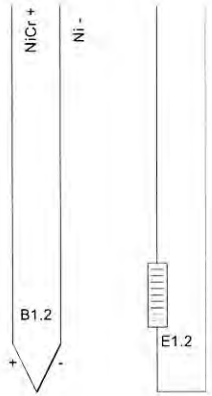


MAA50CT016

AU16889/6A

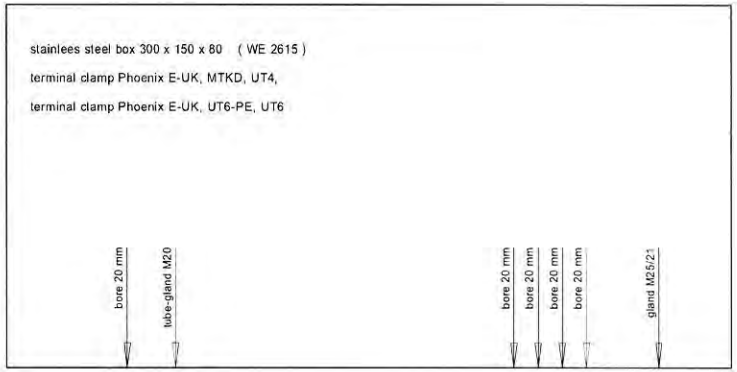
redundant / spare

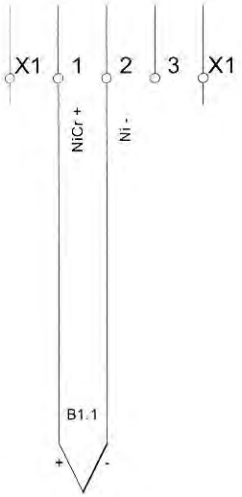
MAA50AH012

redundant / spare

				THERMOPROZESS HEATING-SYSTEMS GMBH	Turbine heater casing
			Datum 28.05.2009	**Wiehagen 6**	T 6645
			gez. fp	**D - 45472 Mülheim**	heating area 3
Änderung	Datum	Name	gepr.	Tel.: +49 208 49539-50	Gehäuseschale Oberteil
				Fax: +49 208 49539-59	vorn
					JB 26.3

Kunde	Siemens AG PGI Industrial Applications Görlitz	
Bestell-Nr.	61-45061470	
TH-Kom.-Nr.	48046	
Zeichn.-Nr.	48046x031	Blatt-Nr.





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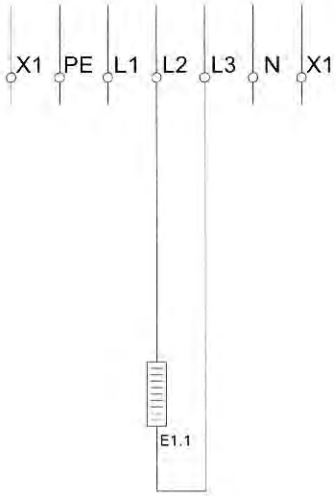

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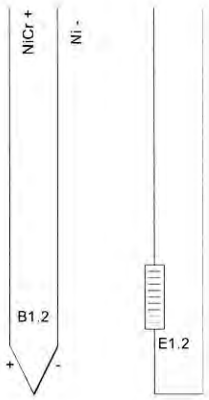


MAA50CT010

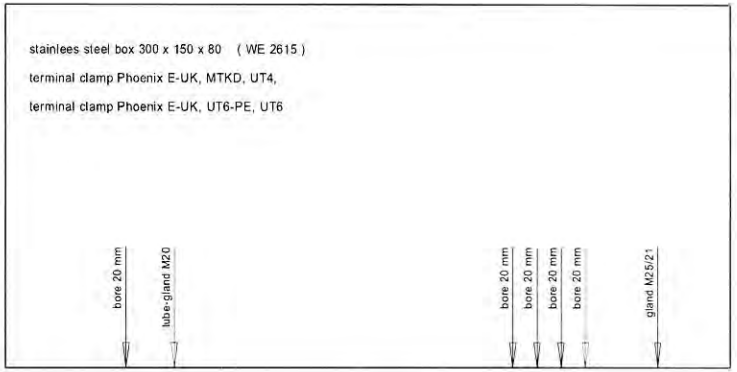
AU16889/4A

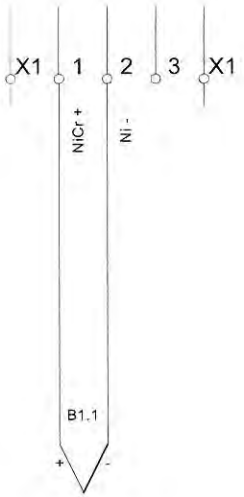
redundant / spare

MAA50AH010

redundant / spare

				THERMOPROZESS HEATING-SYSTEMS GMBH	Turbine heater casing	Kunde	Siemens AG PGI Industrial Applications Görlitz
			Datum 28.05.2009	**Wiehagen 6**	T 6645	Bestell-Nr.	61-45061470
			gez. fp	**D - 45472 Mülheim**	heating area 2	TH-Kom.-Nr.	48046
Änderung	Datum	Name	gepr.	Tel.: +49 208 49539-50	Gehäuseschale Unterteil hinten	Zeichn.-Nr.	48046x021
				Fax: +49 208 49539-59	JB 26.2		Blatt-Nr.





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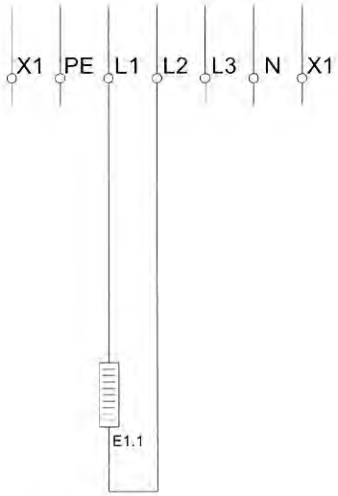

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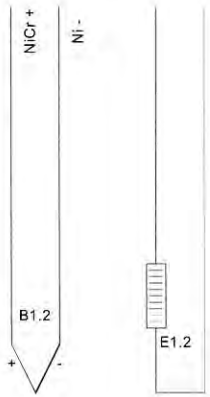


MAA50CT013

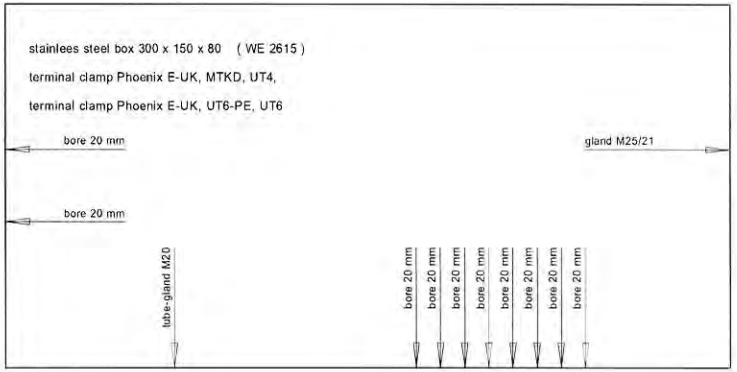
AU16889/2A

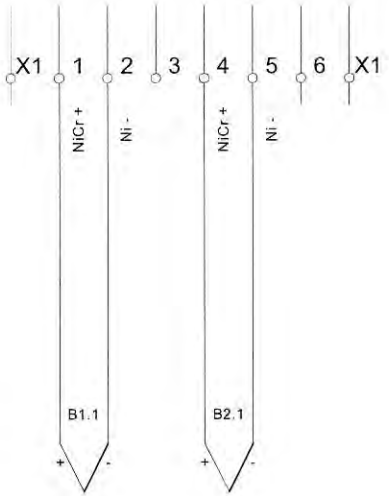
redundant / spare

MAA50AH013

redundant / spare

				THERMOPROZESS HEATING-SYSTEMS GMBH	Turbine heater casing	Kunde	Siemens AG PGI Industrial Applications Görlitz
		Datum	28.05.2009	**Wiehagen 6**	T 6645	Bestell-Nr.	61-45061470
		gez.	fp	**D - 45472 Mülheim**	heating area 1	TH-Kom.-Nr.	48046
Änderung	Datum Name	gepr.		Tel.: +49 208 49539-50	Gehäuseschale Unterteil vorn	Zeichn.-Nr.	48046x011 Blatt-Nr.
				Fax: +49 208 49539-59	JB 26.1		





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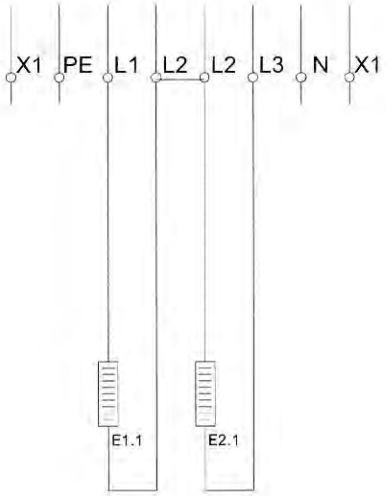
MAA10CT021
AU16889/10A



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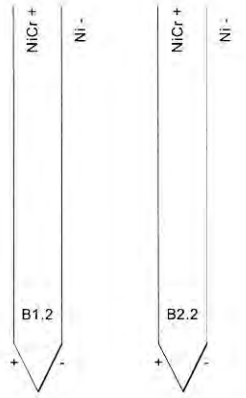

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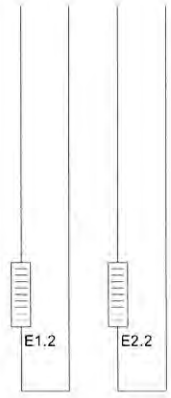
redundant / spare

MAA10CT021
AU16889/12A
redundant / spare



MAA10AH020
redundant / spare

				THERMOPROZESS HEATING-SYSTEMS GMBH	Turbine heater casing	Kunde	Siemens AG PGI Industrial Applications Görlitz
		Datum	27.05.2009	**Wiehagen 6**	T 6645	Bestell-Nr.	61-45061470
		gez.	fp	**D - 45472 Mülheim**	heating area 5	TH-Kom.-Nr.	48046
Änderung	Datum / Name	gepr.		Tel.: +49 208 49539-50 Fax: +49 208 49539-59	Einströmkasten JB 26.5	Zeichn.-Nr.	48046x051 / Blatt-Nr.

thermoprozess
Heating-Systems

THERMOPROZESS HEATING-SYSTEMS GMBH
Wiehagen 6 D - 45472 Mülheim
Tel.: +49 208 49539-50 Fax : +49 208 49539-59

1 Heating conductor
2 Conductor insulation
3 Metal sheath
4 Outer protection sheath

Approvals - for use in hazardous areas

- BASEEFA

- PTB

Applications :

MTC/- range of Mineral Insulated metal sheathed heating cables are primarily used for process maintenance and freeze protection of piping/vessels where high density loadings and high withstanding temperatures are required.

MTC/C Copper sheathed cable.

MTC/CF Copper sheathed cable with outer FEP jacket for highly corrosive areas.

MTC/CH Copper sheathed cable with outer HDPE jacket for corrosive areas.

MTC/F Cupro nickel sheathed cable.

MTCF/Q Konstantan conductor with stainless steel sheathed cable.

MTC/Q Stainless steel sheathed cable.

MTC/I Inconel sheathed cable.

MTC/A Alloy sheathed cable.

Ratings :

MTC/

Max. sheath temperature bare cable	200°C
Max. sheath temperature **CF** overjacket	200°C
Max. sheath temperature **CH** overjacket	80°C
Min. installation temperature	- 20°C

MTC/F and MTCF/Q

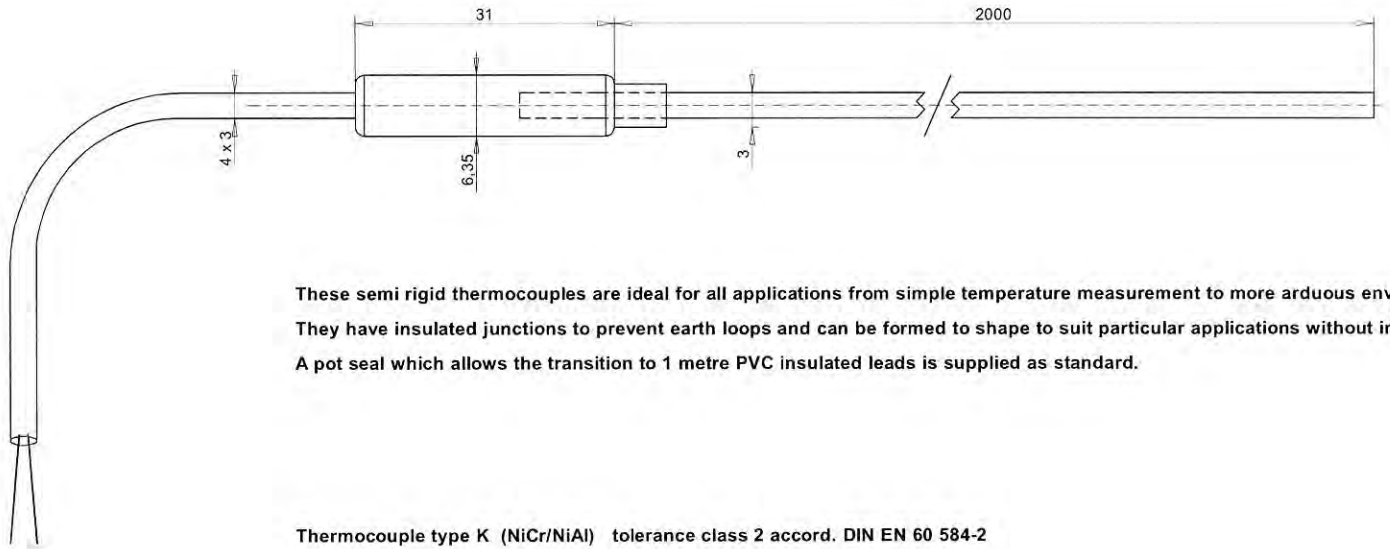
Maximum sheath temperature	400°C
Minimum installation temperature	-20°C

MTC/Q

Maximum sheath temperature	600°C
Minimum installation temperature	- 20°C

MTC/I and MTC/A

Maximum sheath temperature	800°C
Minimum installation temperature	- 20°C



These semi rigid thermocouples are ideal for all applications from simple temperature measurement to more arduous environments.

They have insulated junctions to prevent earth loops and can be formed to shape to suit particular applications without impairing performance.

A pot seal which allows the transition to 1 metre PVC insulated leads is supplied as standard.

Thermocouple type K (NiCr/NiAl) tolerance class 2 accord. DIN EN 60 584-2

Diameter 3,0mm

Length 2000 mm

Sheat material: Inconel 600® W-Nr.2.4816 (1100°C)

Thermocouple will be supplied ungrounded

Compensating leads: 1m with PVC sheat

Protective hose 31mm length made of stainless steel, diameter 6,35mm, suitable for temperatures up to +105°C

			Datum	28-04-09			
			gez.	fp			
Änderung	Datum	Name	gepr.				

THERMOPROZESS HEATING-SYSTEMS GMBH
Wiehagen 6

D - 45472 Mülheim

Tel.: +49 208 49539-50
Fax: +49 208 49539-59

Mineral Insulated Thermocouple

TH / TC 405 - 077

Kunde	x	
Bestell-Nr.	x	
TH-Kom.-Nr.	x	
Zeichn.-Nr.	TH / TC 405	Blatt-Nr.

THERMOPROZESS HEATING-SYSTEMS GMBH
Wiehagen 6
D - 45472 Mülheim

Tel.: +49 208 49539-50 Fax : +49 208 49539-59

www.thermoprozess.de

Messgerätkennung: FLUKE 1550B V1.3

Datum/Zeit: 29.05.2009 11:00:43

Kom.-Nr.: TH 48046x901 Testkennung T6645 aus WE 2613

Bestellung: 61-45061470 Pos. 1

	Prüfnummer	Messergebnisse			Messzeit	Testbedingungen			Test	Heizleiterwiderstand	Bemerkung
	Kennung	Ohm	V Gleichspannung	A Gleichstrom	Dauer	Spannung	Rampe	Zeitlimit	Beendet durch		
1	FP01	7,98 G	2056	258 n	0:02:00		Ein	0:02:00	Zeitlimit	22,4 Ohm	26.2 E1.1
2	FP02	7,81 G	2056	263 n	0:02:00		Ein	0:02:00	Zeitlimit	22,1 Ohm	26.2 E1.2
3	FP03	7,79 G	2056	264 n	0:02:00		Ein	0:02:00	Zeitlimit	22,4 Ohm	26.4 E1.1
4	FP04	7,72 G	2055	266 n	0:02:00		Ein	0:02:00	Zeitlimit	22,0 Ohm	26.4 E1.2
5	FP05	7,71 G	2055	267 n	0:02:00		Ein	0:02:00	Zeitlimit	31,9 Ohm	26.1 E1.1
6	FP06	7,66 G	2055	268 n	0:02:00		Ein	0:02:00	Zeitlimit	31,4 Ohm	26.1 E1.2
7	FP07	7,64 G	2055	269 n	0:02:00		Ein	0:02:00	Zeitlimit	31,4 Ohm	26.3 E1.1
8	FP08	7,67 G	2055	268 n	0:02:00		Ein	0:02:00	Zeitlimit	31,4 Ohm	26.3 E1.1
9	FP09	7,56 G	2055	272 n	0:02:00		Ein	0:02:00	Zeitlimit	31,0 Ohm	26.5 E1.1
10	FP10	7,63 G	2055	269 n	0:02:00		Ein	0:02:00	Zeitlimit	30,8 Ohm	26.5 E2.1
11	FP11	7,59 G	2055	271 n	0:02:00		Ein	0:02:00	Zeitlimit	31,6 Ohm	26.5 E1.2
12	FP12	7,59 G	2055	271 n	0:02:00		Ein	0:02:00	Zeitlimit	30,9 Ohm	26.5 E2.2
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											

Project: El Segundo

PKZ: USA659

Document Number: Erection & Commissioning Documentation, Rev. 1

UNID # 481401471

Contents:

Document #	Revision	File ID
Steam turbine commissioning checklist	-	Steam turbine commissioning checklist
Erection Manual – Turbine	A	Erection Manual – Turbine
MAV – Lubricant supply system commissioning checklist	-	MAV – Lubricant supply system commissioning checklist
MAX – Control oil system commissioning checklist	-	MAX – Control oil system commissioning checklist

URS

Project No.: 29270 Date Received: 10/28/2011

Project Name: El Segundo Repowering Project

* Not Applicable	* Not Applicable	29270-SMN-15-VIOM-000018
Contract Purchase Order	Equipment Tag(s)	Document No

☒ Reviewed with No comments ☐ Reviewed with Comments

☐ For Information ☐ V - Void

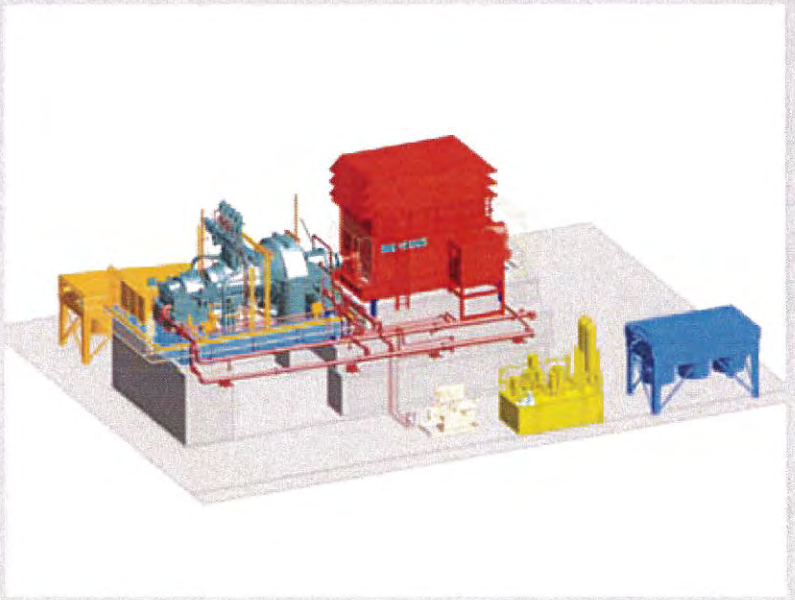
Signature Date 11/1/11

Note: Engineer's review is for general conformance with the design concept and General, Supplemental or Purchase Order Documents, as applicable. Engineer's markings or comments shall not be construed as relieving the Contractor, Supplier or Subcontractor, as applicable, from compliance with the project plans and specifications, nor departures from them. The Contractor, Supplier or Subcontractor, as applicable, remains responsible for details and accuracy, for confirming and coordinating all quantities and dimensions, for selecting fabrication processes, for techniques, assembly and methods of assembly and for performing its work in a safe manner.

P. 2

Turbine Set

Erection Manual (Rev. a_as of 2011-07-29)



Type of Machine:	SST 800
Siemens Order No.:	76692/93
Codeword:	EL SEGUNDO
Maschine No.:	T76645-46

Energy Sector Energy Service

SIEMENS

1. Geltungsbereich

Diese Spezifikation gilt für die Wärmedämmung von Industriedampfturbinen, die als Spritzdämmung mit Hartmantel ausgeführt wird.

2. Allgemeine Anforderungen

Die verwendeten Dämmstoffe dürfen kein Asbest oder asbesthaltiges Material enthalten.
Sollten andere Dämmarten, Befestigungsmethoden und Materialien als die in dieser Spezifikation beschriebenen eingesetzt werden, ist vorher die Genehmigung der Turbinentechnik einzuholen.
Die notwendigen Bescheinigungen nach EU-Recht bzw. gleichwertige Vorschriften sind vorzulegen (EG-Sicherheitsdatenblatt, Bescheinigungen nach aktueller Gefahrenstoffverordnung).

Die auftragsbezogenen Angaben sind der Stückliste 2-31700- T.Nr. -00 zu entnehmen.
T.Nr. = Turbinennummer

3. Spritzdämmung mit Hartmantel

Als Wärmedämmung dienen Mineralfasern mit einem anorganischen Bindemittel, die fugendicht und homogen auf das Außengehäuse aufgespritzt werden. Dabei ist die Spritzdämmung der Kontur des Außengehäuses anzupassen.
Unterschiedliche Dehnungen von Außengehäuse und Ventilen sind zu berücksichtigen.
Die Spritzdämmung darf keinen Kontakt zum Betonfundament oder zum Stahlgrundrahmen haben.
Alle Schraubenverbindungen sind mit Aluminiumfolie abzudecken.
Die Dicke der Dämmung am Außengehäuse-Unterteil, ist 20% stärker auszuführen als am Außengehäuse-Oberteil.

4. Auslegung der Wärmedämmung

Die max. Oberflächentemperatur der Isolierung darf max. 20°C über der Umgebungstemperatur liegen.

1. Scope

This Specification applies to thermal insulation for industrial steam turbines in the form of spray-on insulation with a hard outer covering.

2. General Requirements

The insulating materials employed shall not contain any asbestos.
If forms of insulation, methods of securement and/or materials other than those described in this Specification are to be used, these shall be subject to prior approval by the Turbine Engineering Dept.
The requisite certificates according to EU legislation or equivalent codes and standards shall be submitted (EU safety data sheets and certificates according to the latest edition of the hazardous materials ordinance).
Project-specific data are given in Item List of Materials No. 2-31700- T.Nr. -00.
T.Nr. = turbine number

3. Spray Insulation with Hard Outer Covering

The thermal insulation shall comprise a mixture of mineral wool fibers and inorganic binder which is sprayed onto the outer turbine casing to provide a homogeneous layer with no gaps or joints. The spray insulation shall be applied such as to conform to the contours of the casing.
Due consideration shall be given to differential movement of the casing and the turbine valves.
The spray insulation may not come into contact with the concrete foundation or with the steel baseframe.
All bolted connections (bolts and nuts, etc.) must be covered with aluminum foil (see Figure 1).
The insulation on the outer casing bottom must be 20% thicker than that installed on the outer casing top half.

4. Thermal Insulation Design

The maximum surface temperature of the insulation shall be no more than 20°C above the ambient temperature.

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5. Befestigung (siehe Bild 1)

Die Spritzdämmung ist wie folgt am Außengehäuse befestigt:
Es werden Stege aus verzinktem Bandeisen (30x3) angeschraubt. Um Wärmebrücken zu verhindern sind die Stege mindestens einmal mit einer 5mm Zwischenlage zu unterbrechen. Die Abstandsstege sind umlaufend mit Bandeisen zu verbinden. Im Bereich der Turbinenteilfuge ist die Bandeisenunterkonstruktion zu unterbrechen.
Zur Sicherung der Spritzdämmung und zur Aufnahme des Hartmantels wird zusätzlich ein Rabbitzgeflecht montiert.
Achtung: am Turbinengehäuse darf nicht angeschweißt werden.

6. Hartmantel

Die Spritzdämmung ist mit einem Hartmantel, bestehend aus einer Calcium-Silikat-Zement Komposition (5-10mm), zu versehen. In den Hartmantel ist eine Gewebelage (Gazegewebe) als Armierung einzuarbeiten. Diese soll Haarrissen in der Oberfläche vorbeugen.

7. Anstrich

Nach dem Austrocknen des Hartmantels ist die Oberfläche mit einer dauerelastischen Fugenmasse abzuspachteln.
Anschließend ist der Hartmantel mit einem ölabweisenden Anstrich zu imprägnieren und zu beschichten, Schichtdicke ca. 80 - 100µm.

8. Abschirmblech - Lagerung

Im Bereich der vorderen Lagerungen und bei Gegendruckturbinen der hinteren Lagerung muß ein Abschirmblech vorgesehen werden.
Das Abschirmblech muß die gesamte Stirnfläche der Turbine zum Lagerkörper hin abschirmen. Die Abschirmbleche müssen das ungehinderte Montieren und Demontieren im Lagerbereich ermöglichen, ohne das die Dämmung beschädigt wird.
Die Abmessung und Gestaltung der Abschirmbleche sind den örtlichen Gegebenheiten anzupassen. Das Abschirmblech darf nicht am Lagergehäuse anliegen, Zwischenraum >25mm. Die Abschirmbleche werden mit Winkeleisen 30x30x3, im Bereich des Teilfugenflansches, mit Schrauben M6 x 16 befestigt.
Ausführung der Abschirmbleche:
2 Aluminium-Bleche, je 1mm dick, allseitig geschlossen, mit dazwischenliegender mindestens 4mm dicker Nefalitplatte zusammengenietet.

5. Method of Securement (see Figure 1)

The spray insulation shall be secured to the outer casing of the turbine as follows:
Spacers constructed from galvanized steel flats (30x3) shall be bolted to the casing. To prevent thermal short circuits, the spacers shall be provided with at least one 5-mm-thick intermediate layer of insulating material. The spacers shall be tied together circumferentially by means of steel straps. The spacer/strap structure shall be discontinued in the vicinity of the horizontal joint of the turbine casing. A woven wire netting shall be installed to provide additional securement for the spray insulation and to support the hard outer covering.
Note: No parts shall be welded to the outer casing.

6. Hard Outer Covering

The spray insulation shall be provided with a hard outer covering consisting of a mixture of calcium silicate and cement, applied to a thickness of 5 to 10 mm. A layer of reinforcing cloth shall be embedded in the covering. This is intended to prevent hairline cracks at the surface.

7. Finish Coating

Following curing of the hard outer covering, a permanently elastic sealing compound shall be troweled onto the surface.
The outer covering shall then be coated with an oil-repellent paint (film thickness = approx. 80 - 100 µm).

8. Thermal Shield Plates at Bearings

A shielding plate shall be provided at the front bearings and, in the case of backpressure turbines, also at the rear bearings. This shielding plate shall cover the entire front end of the turbine.
The shielding plates must permit installation and dismantling work to be performed in the vicinity of the bearings without any damage being incurred by the insulation.
The dimensions and geometries of the shielding plates shall be adapted to conform to local site conditions. Shielding plates must not come into contact with the bearing housing (gap of > 25 mm). The shielding plates shall be secured in the vicinity of the casing joint flange using 30x30x3 steel angles and M6 x 16 bolts. Design of the thermal shield plates:
2 Aluminium plates, each 1mm thick, all around closed, with an intermediate Nefalit plate (at least 4mm thick) riveted together.

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9. Besonderheiten

Das Gehäuse-Abdampfteil (K oder WK) ist nur nach Vorgabe zu dämmen.

Die Teilfugenschrauben sind mit abnehmbaren Kappen, mit eingefaßter Wärmedämmung, zu dämmen.

Im Bereich der Ventildeckel der HD- und ND-Ventile, ist die Dämmung als Mattendämmung auszuführen. Eine Demontage der Ventildeckel muss möglich sein, ohne die Spritzdämmung zu zerstören.
Im Bereich von Flanschanschlüssen am Turbinengehäuse ist die Isolierung so zu gestalten, daß ein Wechsel der Dichtungen möglich ist, ohne die Isolierung zu zerstören.
Die Abgrenzung zwischen Mattenisolierung und Spritzisolierung ist mit entsprechenden Blechen zu realisieren.

Die Anschlussköpfe der elektrischen Thermoelemente müssen aus der Dämmung herausragen. (siehe Bild2)

Die Konvektionsöffnungen an den Steuerböcken der Schnellschlussventile und ND-Ventile dürfen nicht von der Isolierung verdeckt, oder anderweitig mit Isoliermaterial verschlossen werden. Der freizuhaltende Bereich ist in den Bildern 3 bis 5 mit **X** gekennzeichnet.
Die Isolierung darf auf der Dampfseite der Steuerböcke nicht wesentlich über die Stiftschrauben des Ventildeckels hinausragen. Vorzugsweise sind dauerhaft formstabile Abschirmbleche als Abschluss zu verwenden. Sollten deshalb in diesem Bereich die erforderlichen Dämmschichtdicken nicht zu realisieren sein, so sind gegebenenfalls höherwertige Isoliermaterialien wie z.B. Microtherm einzusetzen.
Freiliegende Schubstangen als axiale Verbindung zwischen dem Außengehäuse und der vorderen Lagerung sind mit Isolierhalbschalen zu isolieren (siehe Bild 7).

wichtig für den Servicebereich:
Eventuell vorhandene Messstellen, die sich vor dem Einströmkasten im Scheitel der Gehäuseschale des Oberteils befinden, sind mit Schalenelementen zu umschließen.
Die Zugänglichkeit zu allen Verschraubungen dieser Messstellen muss im Nachhinein möglich sein, ohne die Spritzdämmung zu zerstören. Der Zwischenraum zwischen Schalenelement und Messelement ist mit Mineralfasermatten zu dämmen.

9. Special Requirements

Insulation may only be installed on the casing exhaust section (K or WK) as specified.

Insulate the casing joint bolts using removable, insulated caps.

Use mat-type insulation in the region of the valve covers for HP and LP valves. It must be possible to remove the valve cover without destroying the spray insulation.
Within the range of flange connections at the turbine case the insulation is to be arranged in such a way that without destroying the insulation a change of the seals is possible.
The demarcation between mat insulation and spray insulation has to be realized with appropriate sheet metals.

The connection heads for the electric thermocouples must protrude out of the insulation, see Figure 2.

Convection openings at the control blocks for the turbine stop valves and low pressure control valves may not be covered by the insulation, nor in any other manner closed off by insulation material. Areas which must be kept free are marked with **X** in Figures 3 to 5.

At the steam end of the control blocks the insulation may not extend excessively over the pins for the valve cover. Thermal shield plates with permanent dimensional stability should be used as the end item. In the event that insulation with the requisite thickness can not be installed in this area, high-quality insulating materials, such as Microtherm, shall be used if possible.
Exposed push rod (connection between outer casing and front bearing casing) are to be insulated with insulating half-shell (see figure 6).

importantly for the range service:
Place appropriate covering elements over any measuring instrument points that may be located in front of the inlet chest at the top point of the casing top half shell.
All of the bolted connections for such measuring points must still be accessible without destroying the spray insulation. The space between the covering elements and the measuring point elements must be insulated using mineral fiber mats.

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10. Dokumentation

Die Dämmdicken der Anlagenteile ist anzugeben.

Die Abschirmbleche müssen als Konturenzeichnung vorliegen. Diese dient zur Montage und zur Wiederbeschaffung der Abschirmbleche.

Alle notwendigen Bescheinigungen der verwendeten Materialien sind vorzulegen.
Z.B.: EG-Sicherheitsdatenblatt

11. Mitgeltende Normen

VDI 2055	Wärme- und Kälteschutz für betriebstechnische Anlagen
VDI18421	Dämmarbeiten an technischen Anlagen
DIN4140	Dämmarbeiten an betriebs- und haustechnischen Anlagen - Ausführung von Wärme- und Kältedämmung -

10. Dokumentation

All insulation thicknesses shall be stated.

Outline and arrangement drawings shall be provided for the shielding plates. These will be used as a basis for installing the plates and for procuring new plates.

All requisite certificates shall be submitted for the materials employed; e.g. EU safety data sheets.

11. Applicable Codes and Standards

VDI 2055	Thermal insulation for heated and refrigerated industrial and domestic installations
VDI18421	Insulation of technical installations
DIN 4140	Insulation work on industrial installations and building equipment - Execution of thermal and cold insulation -

Bild 1: Befestigung

Figure 1: Method of Securement

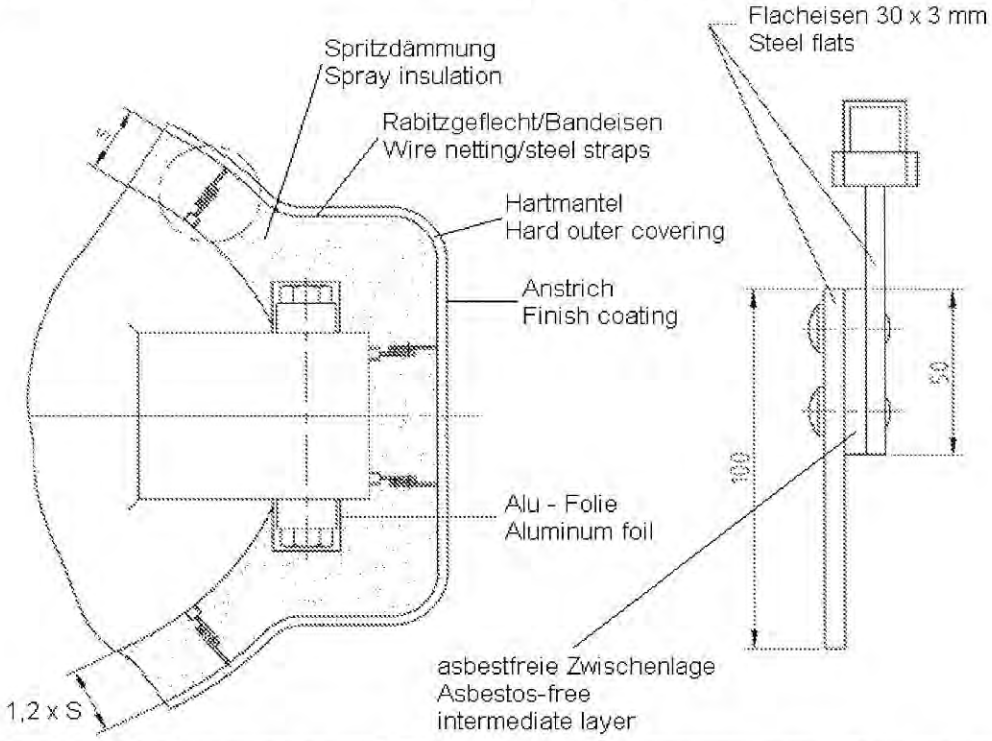

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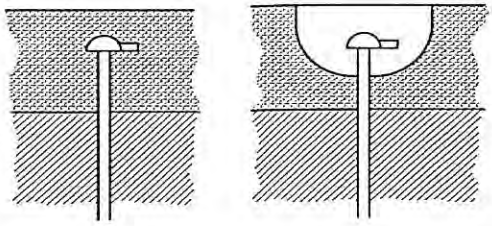
Bild 2: Thermoelemente

Figure 2: Thermocouples



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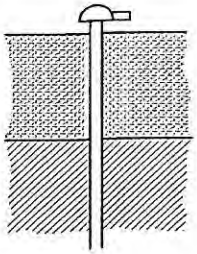

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Permissible

Bild 3: Steuerbock Ausf. 1

Figure 3: Control block, Design 1

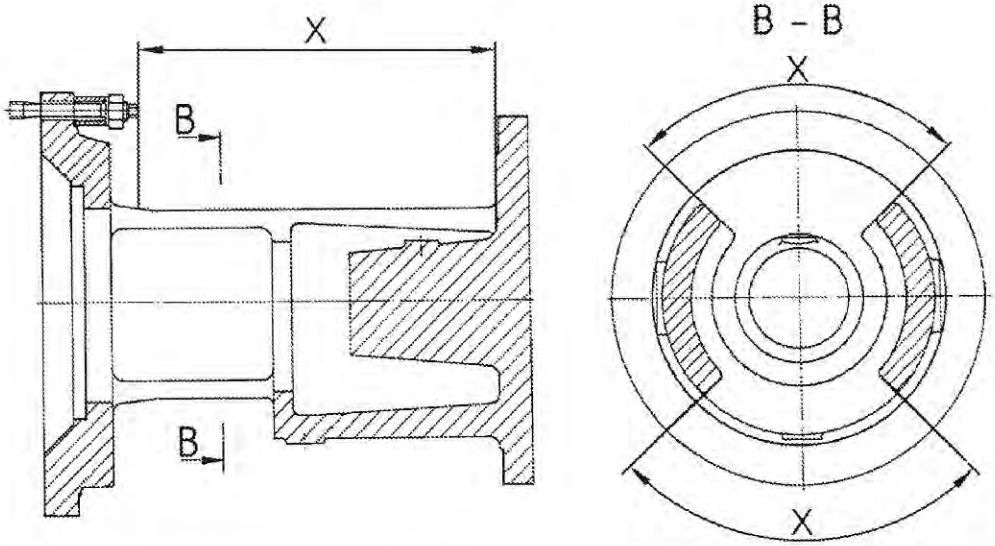

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Bild 4: Steuerbock Ausf. 2

Figure 4: Control block, Design 2

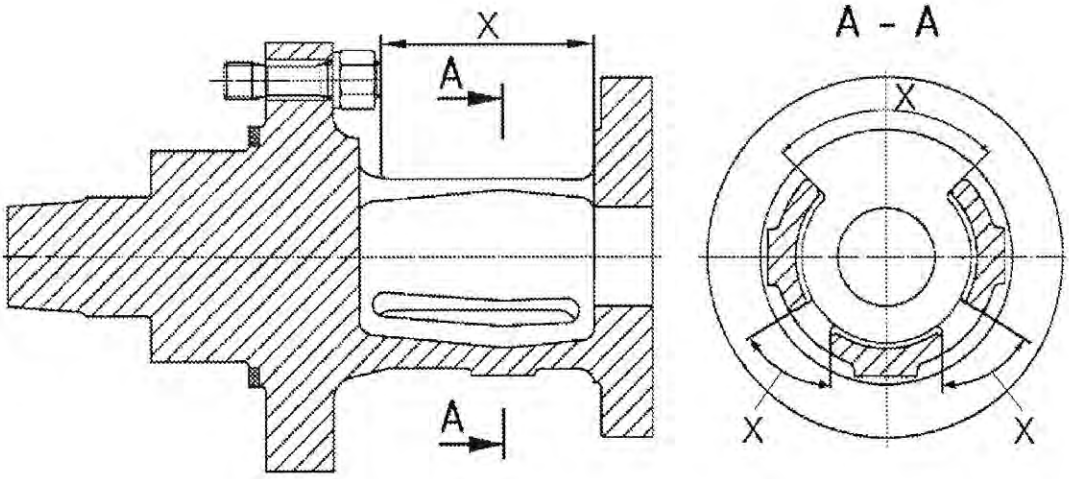

Bild 5: Steuerbock Ausf. 3

Figure 5: Control block, Design 3

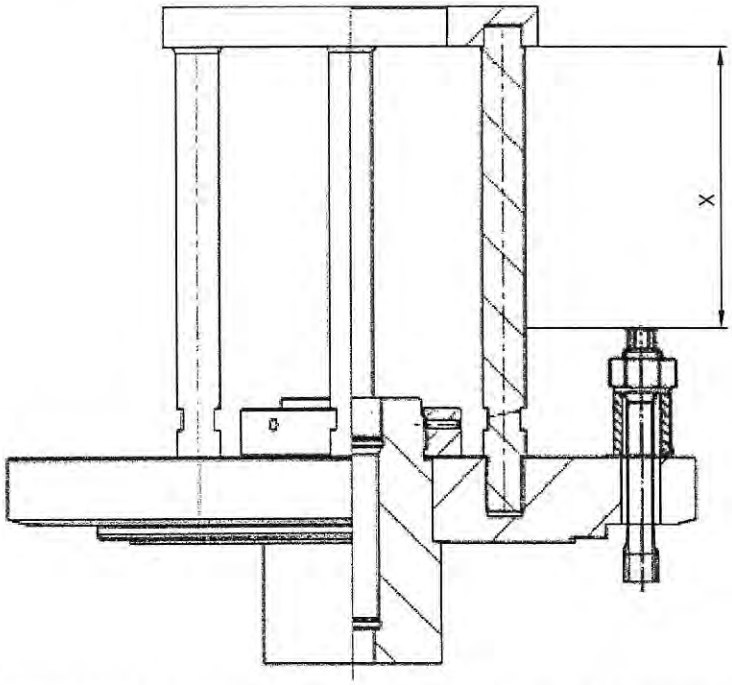

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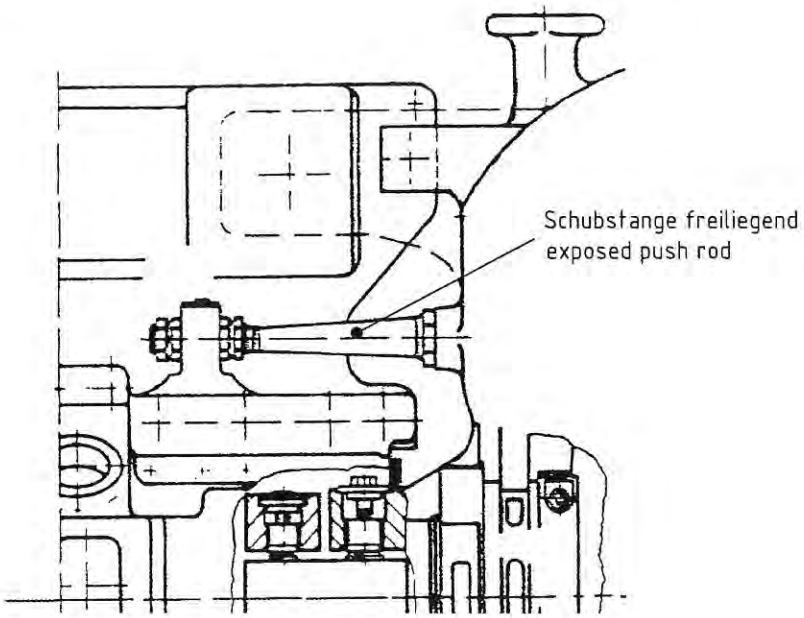
Bild 6: Isolierung der Schubstange

Figure 6: Insulation push rod



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ATTACHMENT C

Steam Turbine Cover Design Drawings

El Segundo Turbine Building
Joe Mazzeo 7/10/14
Rev. 2 8/12/14

General Notes:

Weight of Structure is approximately 14,000 lbs.

Secure all panels to Z sections and to other panels with 1/4" Diam #14 Hex Washer Head self drilling screws. Zinc Steel. For connecting wall panels to Z members use maximum 6" spacing. For connecting roof panels to Z members use maximum 7-1/4" spacing. Screw panels together at overlap edges with 12" max spacing.

Tie rods need to be snug tight with no gaps between the pin and clevis or connecting plate

Where a Z section crosses a structural tube perpendicular, weld top and bottom 1/8" fillet weld top and bottom of the Z.

Side Panels are CorDeck B20 1.5 B Roof deck paneling, G60 galvanized painted gray

Roof panels are Translucent White Mist Enduro Durolite 7.2x1.5 Rib profile. FR450

Full pen welds unless noted

Materials
Lengths are approximate

370' HSS5x5x1/4" Structural Tube
32' HSS6x5x14 Structural Tube 32 feet

200' 1" Diam Tie rod (Threaded RHT and LHT on ends.)

(24) RHT 1" clevis

(24) LHT 1" clevis

Cold Formed structural Components
48' 3x3 angle 12 gauge primed
500' Z sections 6Z52.25x105 with lips primed (Approx 500')
(4) Fixed Louver McMaster 2038K21
(1) Pipe boot for corrugated roofs. (For vent line) McMaster 7503T3

1/4" Diam #14 Hex Washer Head self drilling screws. Zinc Steel

1/2" plate for reinforcement and for clevis attachments

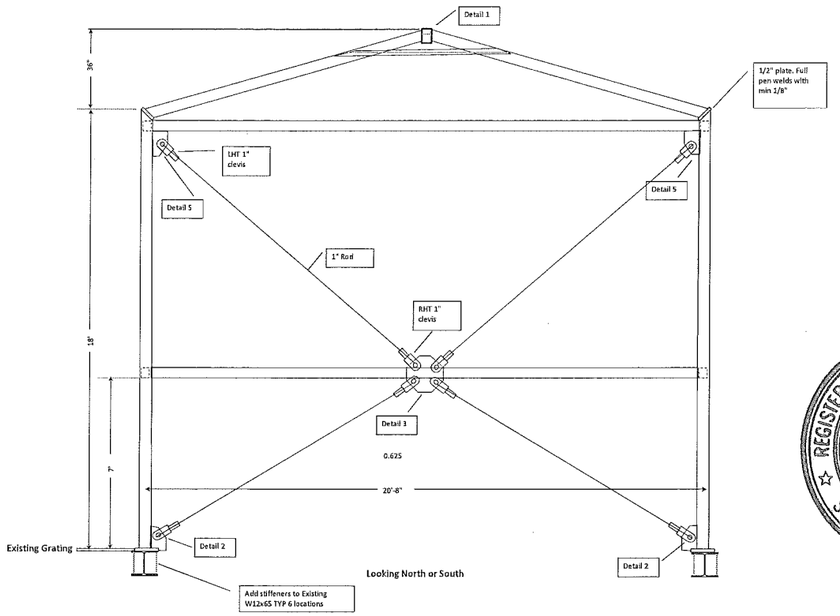
3/4" plate for lifting lugs

3/4" plate for base plate connection to existing W12x65

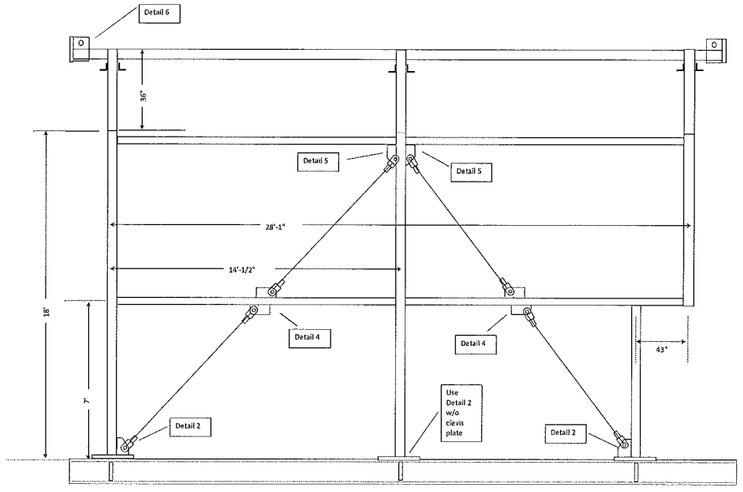
(72) 1" A325 bolts with nuts and washers

(48) 1/2" A325 bolt with nut

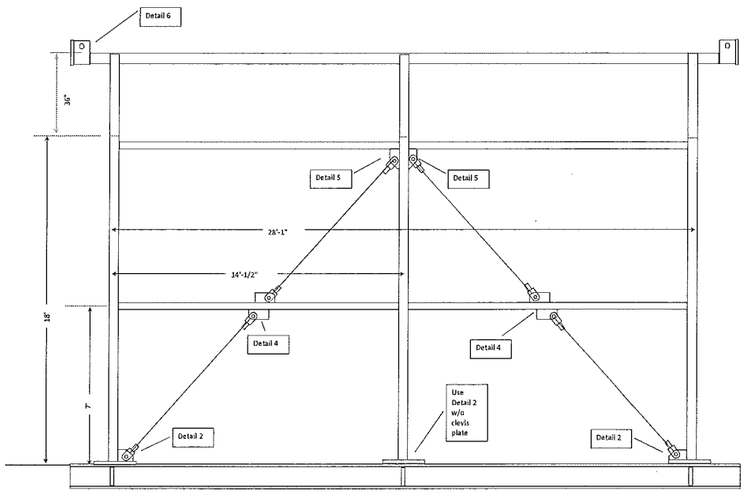
18 gauge Sheet metal galvanized. (For joining panels at top of roof and wall panel corners



Looking North or South

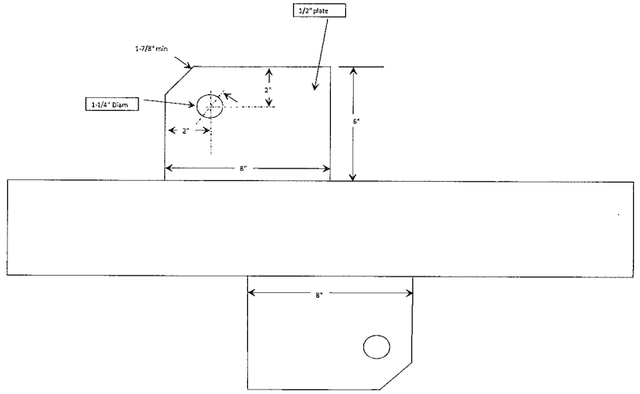


Looking East

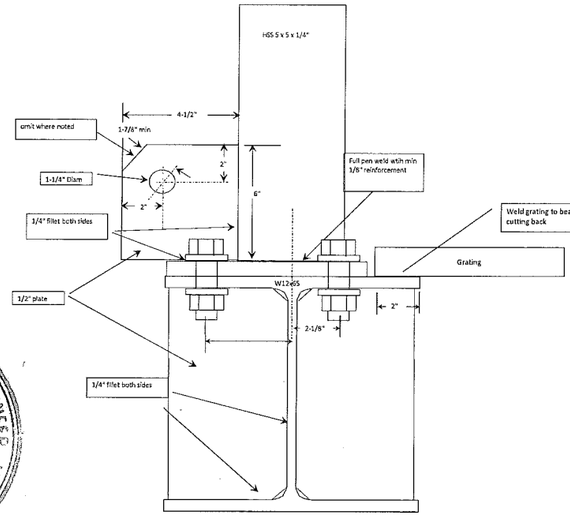


Looking West

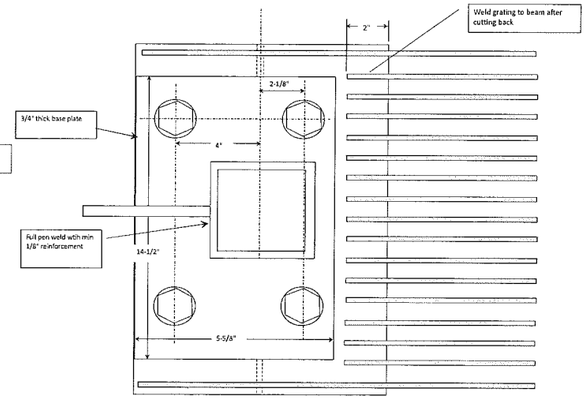
REGISTERED PROFESSIONAL ENGINEER
JOSEPH M. MAZZEO
C055867
Exp. 12/31/16
CIVIL
STATE OF CALIFORNIA



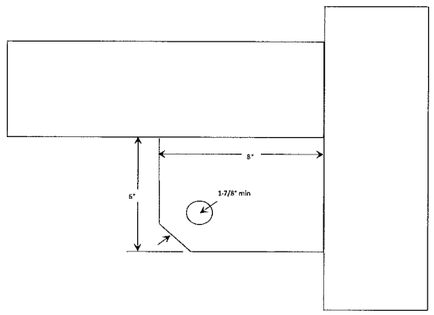
Detail 4



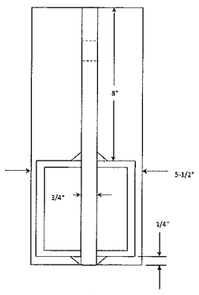
Detail 2 Side View



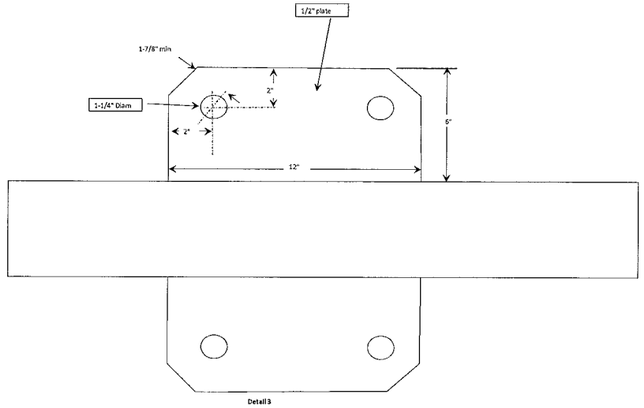
Detail 2 Top View



Detail 5

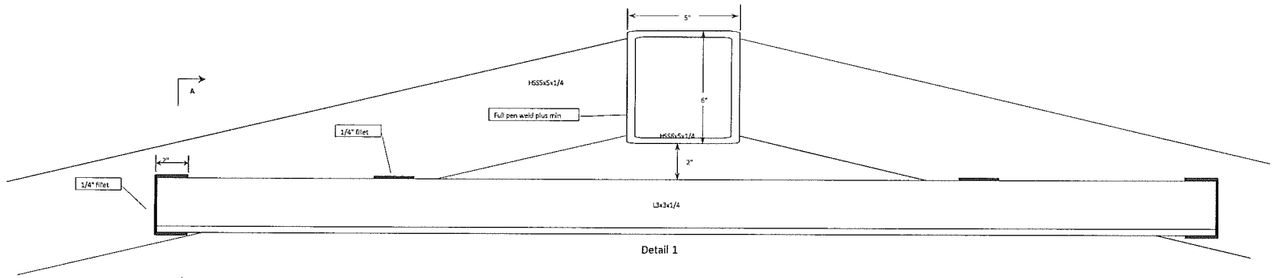


B - B

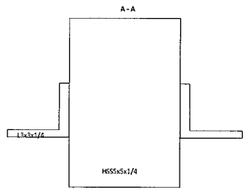


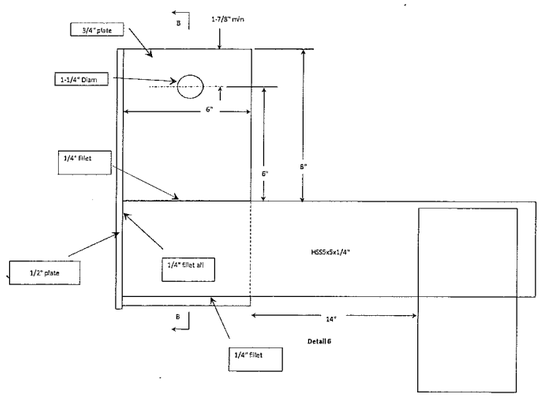
Detail 3

REGISTERED PROFESSIONAL ENGINEER
JOSEPH M. MAZZEO
C055867
EXP. 12/31/16
CIVIL
STATE OF CALIFORNIA



Detail 1





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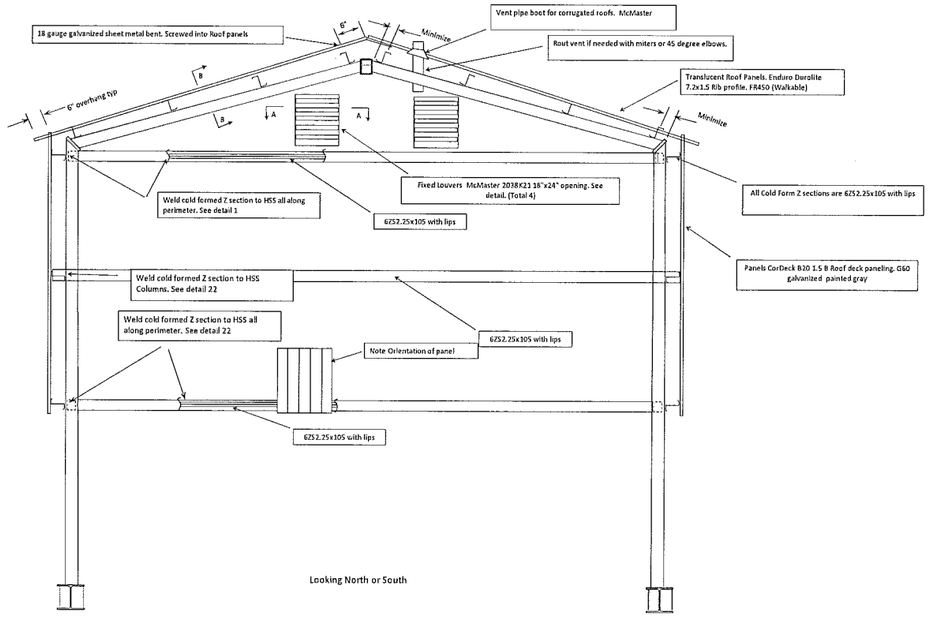
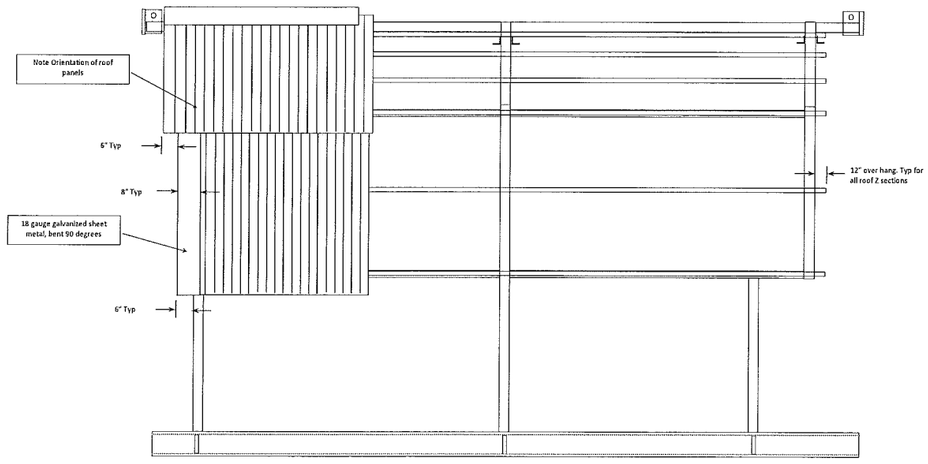
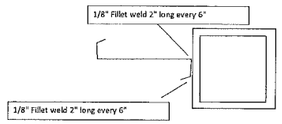


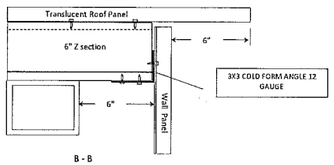
Looking North or South



Looking East



Detail 22



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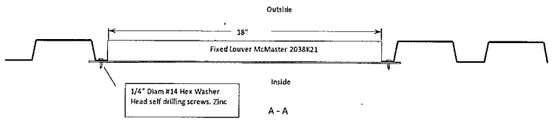


A - A

ATTACHMENT D

Steam Turbine Cover Design Summary

El Segundo Steam Turbine Building Awning Design Summary

Joe Mazzeo 8/25/14

An awning was designed to cover the existing steam turbine to protect it from rain and sun. The awning structure is designed to be 21' tall from the base to the top of the roof. The roof consists of translucent roofing material. The lower 7' of the structure will be open and the rest will be enclosed with cladding. Tie rod assemblies area utilized for shear strength. Conservatively, no shear strength was assumed to be provided by the cladding. The structure is designed to be un-bolted from the base plates in order to be lifted by crane. Lifting lugs attached to a cantilevered section of the roof beam were designed to carry the entire dead load of the structure.

A finite element model was created to evaluate the loads on the new structure. In order to determine the effects of the additional loads onto the existing structure, it too was included in the model. The loads were determined by ASCE 7-05 and the Worley Parsons design report for the Steam Turbine Generator structure.

The following is a summary of the loads utilized in the analysis:

Live Loads

- Existing grating areas 125 PSF
- Roof LL = 20 PSF

Dead Loads

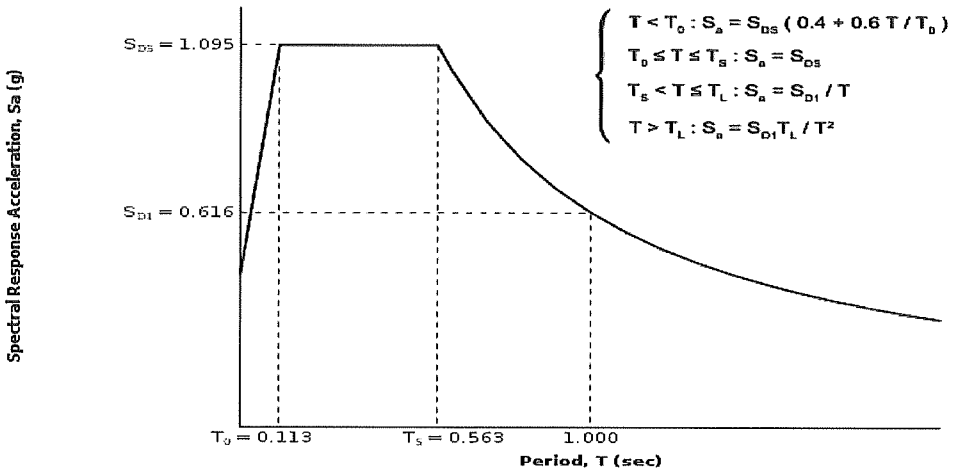
- Weight of all structural components, grating and cladding

Seismic Analysis

Earthquake loads were qualified by response spectra methods. The response spectra was generated based on ASCE *7-10 using the site conditions taken from the Worley Parsons design report for the Steam* Turbine Generator structure. The following is a summary of the report.

Table 2 – Seismic Design Parameters
Site Class D
Site Coefficient, F_a 1.0
Site Coefficient, F_v 1.5
Mapped Short Period Spectral Acceleration, S_s 1.618g
Mapped One-Second Period Spectral Acceleration, S_1 0.658g
Short Period Spectral Acceleration Adjusted For Site Class, S_{MS} 1.618g
One-Second Period Spectral Acceleration Adjusted For Site Class, S_{M1} 0.988g
Design Short Period Spectral Acceleration, S_{DS} 1.079g
Design One-Second Period Spectral Acceleration, S_{D1} 0.658g

Resulting Response Spectra Plot



Modal Analysis

All modes up to 33 Hz were calculated and utilized in the response spectra analysis. The lowest mode found was 4.68 Hz. Mass not captured in the modal analysis was subjected to rigid range acceleration, based on the response spectra acceleration at 33 HZ. The equilibrium condition for the rigid range acceleration was calculated statically.

The AISC generated response spectra was applied independently in the two horizontal directions. For the vertical direction, 2/3 of the response spectra was applied.

The modal responses for each of the 3 directions were combined using the complete quadratic combination (CQC) method with 0.5% critical damping as specified by ASCE requirements. The combined modal results were combined with the rigid range responses with SRSS The response from the 3 directions were combined with SRSS.

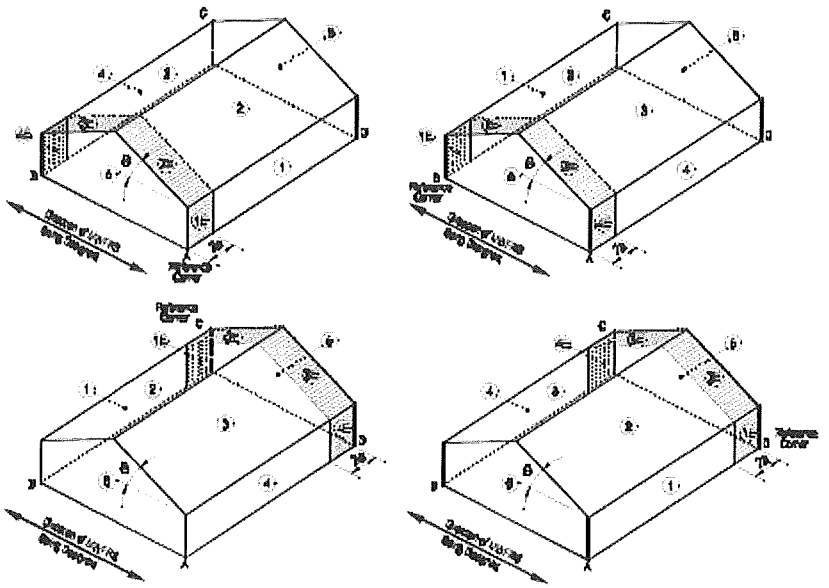
Wind Loads

The following is a summary of the wind load parameters

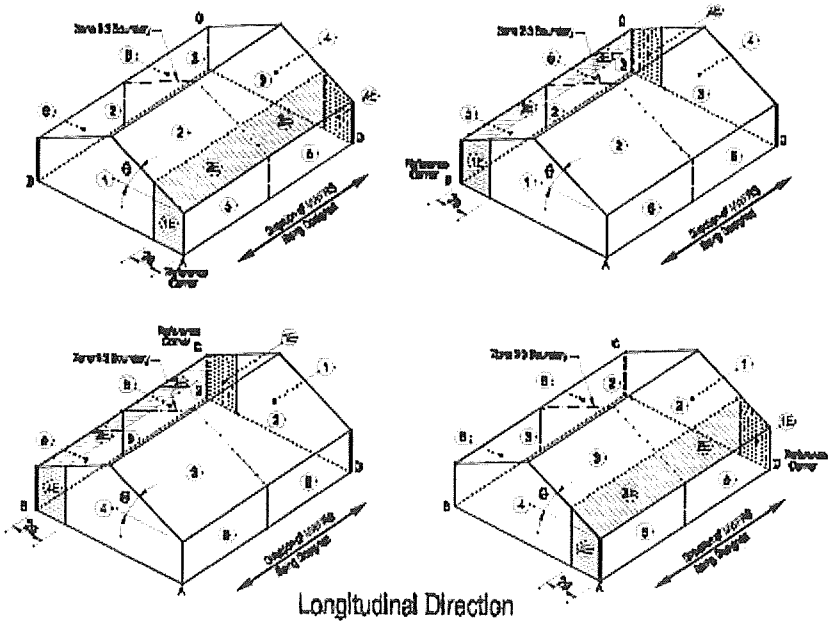
- 100 mph
- Exposure C
- The structure was conservatively assumed to be partially enclosed
- Gable Roof
- Low Rise Criteria
- Rigid Structure Fundamental Mode > 1.0 Hz (see modal analysis discussion)
- Topo factor 1.0
- Qh= 22.45 psf
- Since the structure is < 30' tall, torsional load case analysis is not required per AISC. (Note 5 of figure 6-10

The analysis resulted in the following Wind Pressure Load Cases by Zones:

MWFRS Wind Load for Transverse Direction				MWFRS Wind Load for Longitudinal Direction			
Surface	GCpf	p = Net Pressures (psf) (w/ +GCpi)	(w/ -GCpi)	Surface	*GCpf	p = Net Pressures (psf) (w/ +GCpi)	(w/ -GCpi)
Zone 1	0.49	-1.24	23.46	Zone 1	0.40	-3.37	21.33
Zone 2	-0.69	-27.84	-3.14	Zone 2	-0.69	-27.84	-3.14
Zone 3	-0.45	-22.45	2.24	Zone 3	-0.37	-20.65	4.04
Zone 4	-0.39	-21.15	3.54	Zone 4	-0.29	-18.86	5.84
Zone 5	-0.45	-22.45	2.24	Zone 5	-0.45	-22.45	2.24
Zone 6	-0.45	-22.45	2.24	Zone 6	-0.45	-22.45	2.24
Zone 1E	0.75	4.46	29.15	Zone 1E	0.61	1.35	26.04
Zone 2E	-1.07	-36.37	-11.67	Zone 2E	-1.07	-36.37	-11.67
Zone 3E	-0.65	-26.87	-2.17	Zone 3E	-0.53	-24.24	0.45
Zone 4E	-0.58	-25.44	-0.75	Zone 4E	-0.43	-22.00	2.69



Transverse Direction



Longitudinal Direction

Basic Load Cases

Load Combinations

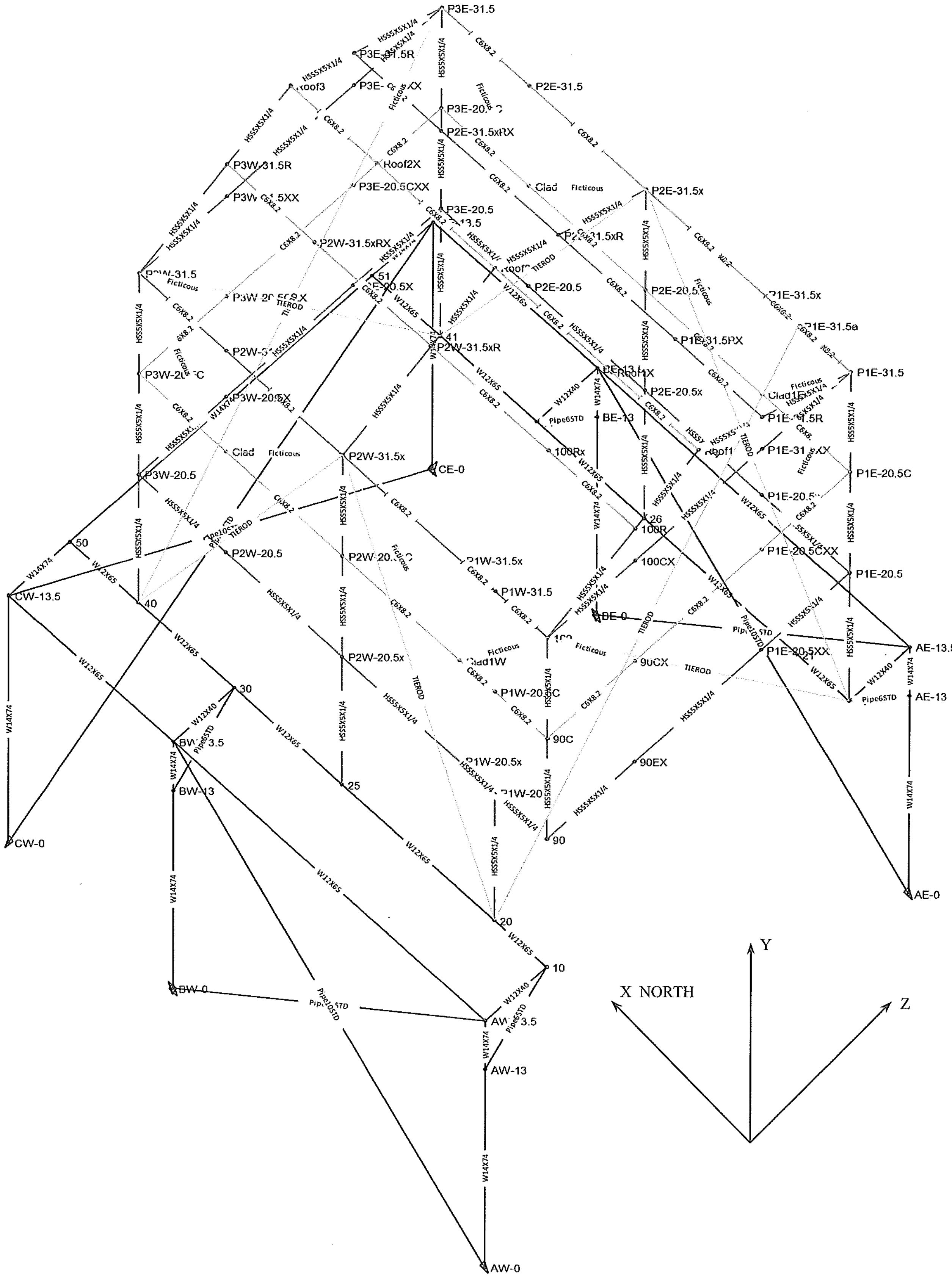
ASCE 2.4.1 Basic Combinations for ASD was used, to combine dead weight, live loads, earthquake and wind. The roof live loads were conservatively considered to act simultaneously with the floor live loads.

Results: The loads on all structural members were determined and evaluated by AISC 05 and 10 specifications and found to be acceptable, the original structure being quite overdesigned. The new structure required cross bracing tie rods to support lateral loads for earthquake and wind.

The cladding was qualified by table provided by the manufacturer for live load and wind.

Conclusions: The existing structure is robust enough to take the additional loads imposed by the new structure. The new structure should adequately perform for any future earthquake or wind storm.

Attach Spreadsheet output.


P3E-31.5
P2E-31.5
P3W-31.5R
P2E-31.5x
P2E-20.5
P1E-31.5x
P1E-31.5a
P1E-31.5
P1E-20.5C
P1E-20.5
P1E-20.5CXX
AE-13.5
AE-13
AE-0
P3W-20.5
P2W-31.5x
P2W-20.5
P2W-20.5x
P1W-31.5x
P1W-31.5
P1W-20.5x
CE-0
CW-13.5
CW-0
BW-13
BW-0
BE-13
BE-0
AW-13
AW-0
100Rx
100R
100CX
90CX
90C
90EX
90
50
40
30
26
25
20
10
41
51
W12X65
W14X74
W12X40
HSS5X5X1/4
C6X8.2
Pipe6STD
Pipe10STD
TIEROD
Ficticous
Clad
X NORTH
Y
Z

ATTACHMENT E

Steam Turbine Lift Plan

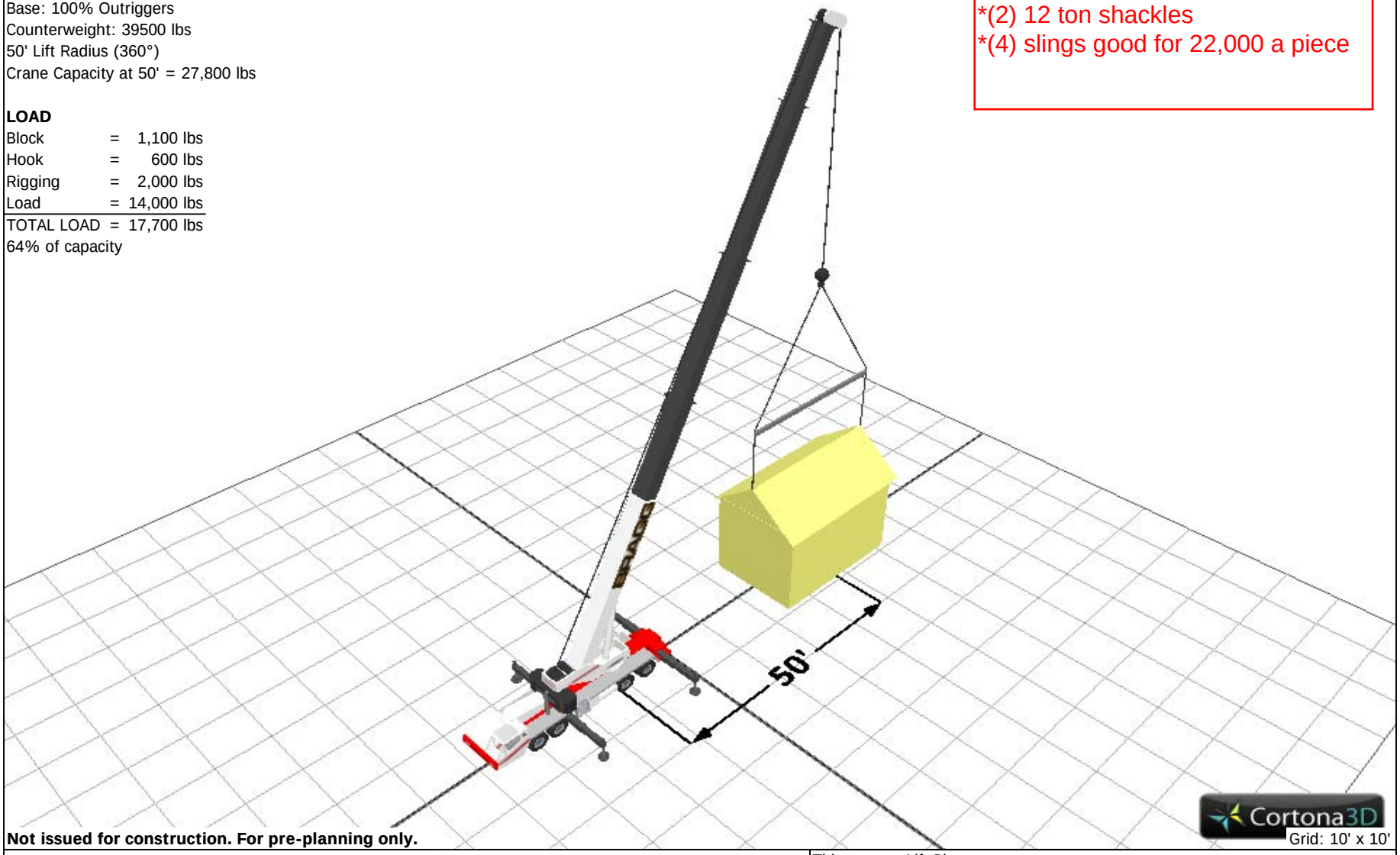
CRANE
Link-Belt HTC-8690
120' Main Boom (Mode EM2) at 63.7°
Base: 100% Outriggers
Counterweight: 39500 lbs
50' Lift Radius (360°)
Crane Capacity at 50' = 27,800 lbs

LOAD

Block	=	1,100 lbs
Hook	=	600 lbs
Rigging	=	2,000 lbs
Load	=	14,000 lbs
TOTAL LOAD	=	17,700 lbs

64% of capacity

*Spreader Bar will be 30' end cap bar with a 50 ton capacity.
*(2) 12 ton shackles
*(4) slings good for 22,000 a piece



Grid: 10' x 10'

Not issued for construction. For pre-planning only.

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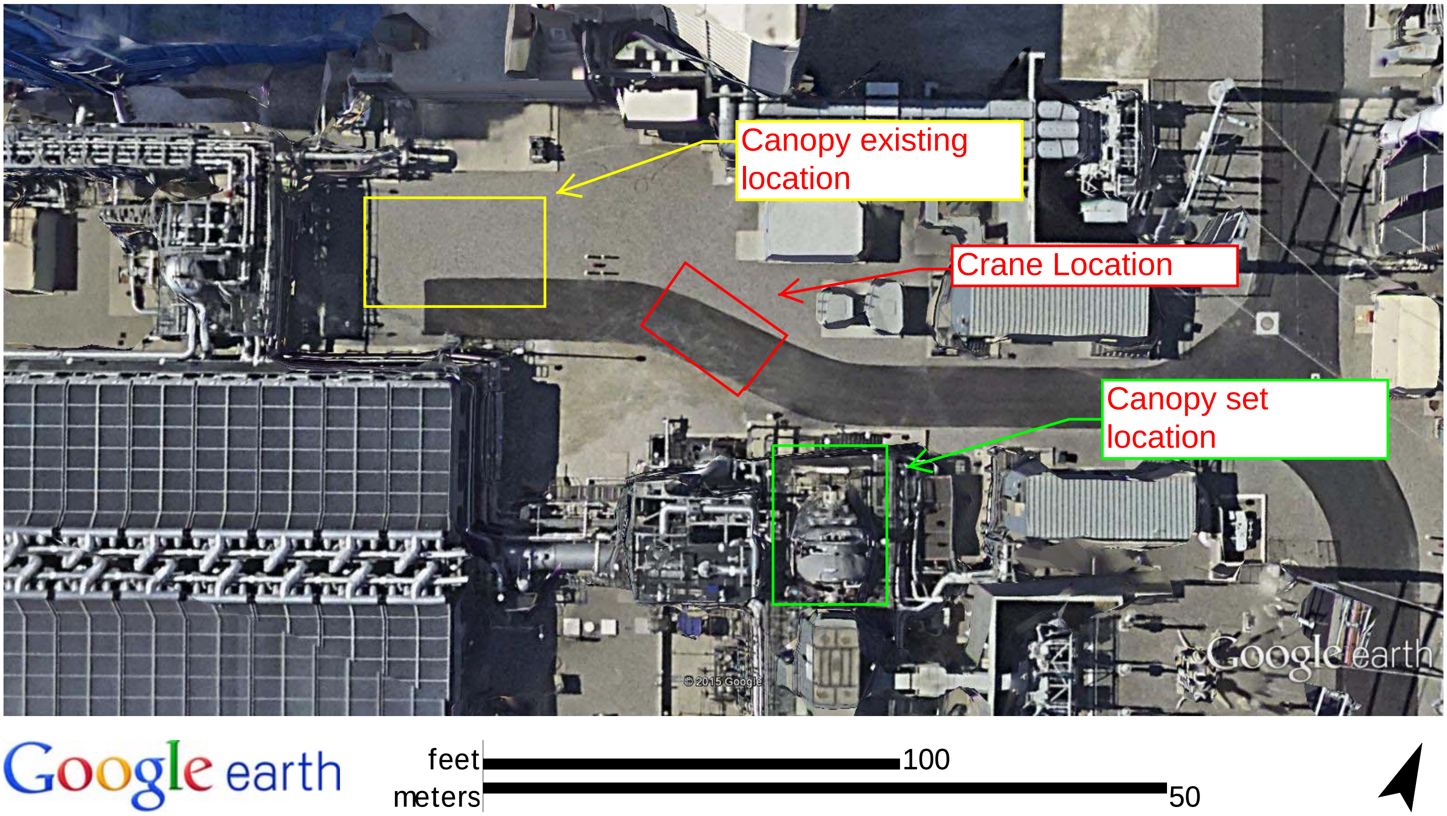
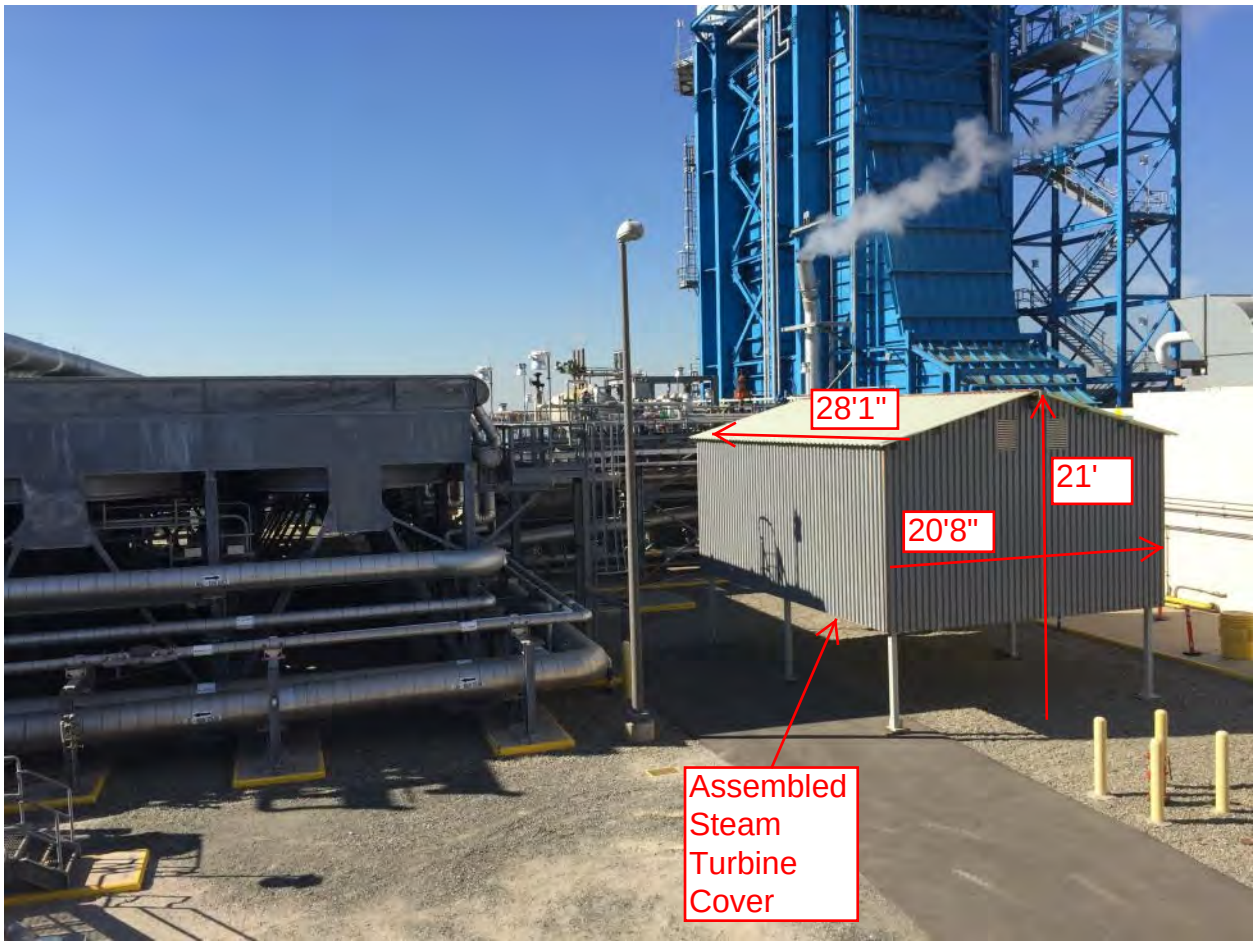
Project:	NRG Canopy
Customer:	NRG
Description:	hoisting
Drawn By:	Kelan Bragg 12/2/2015

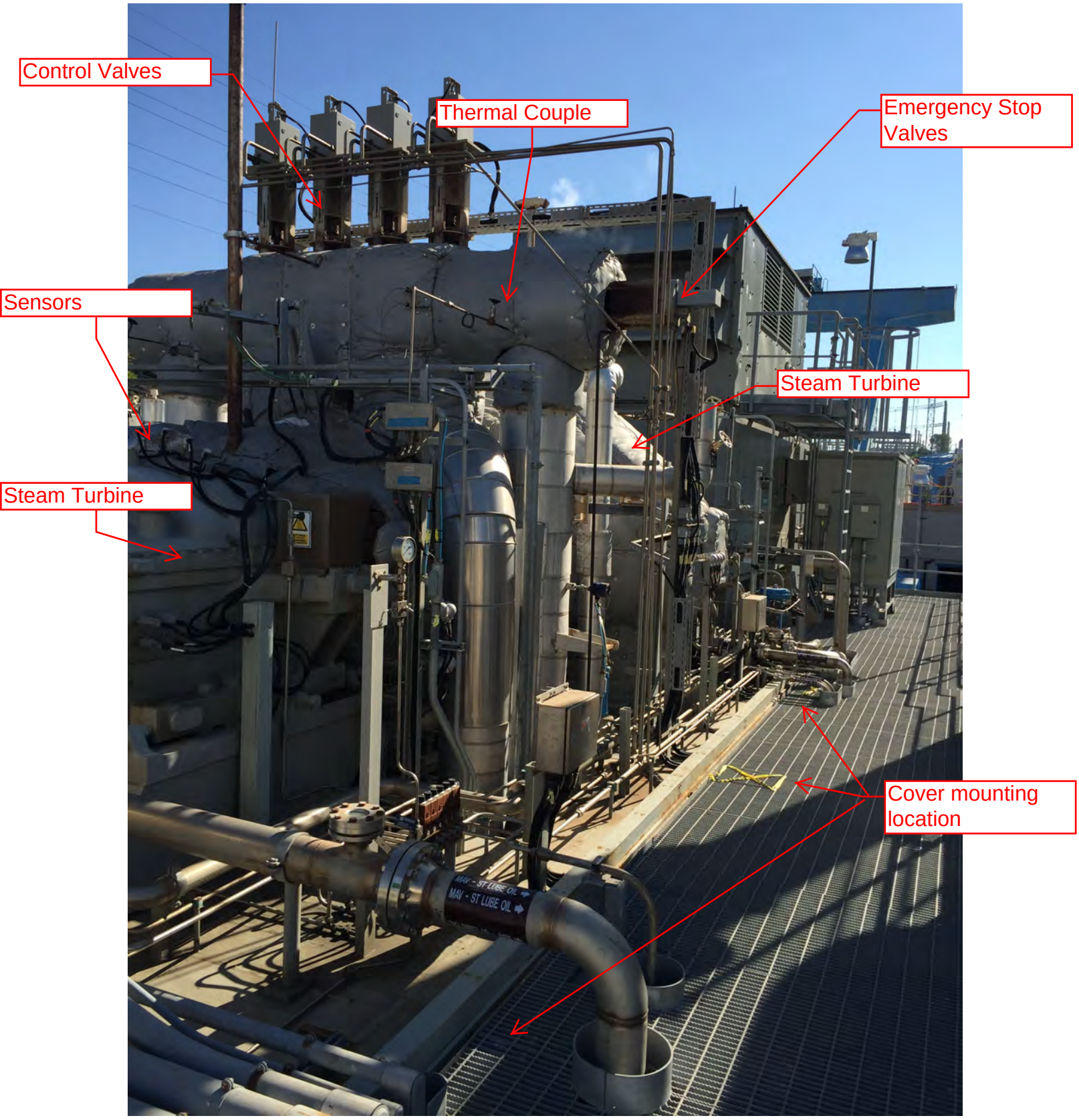


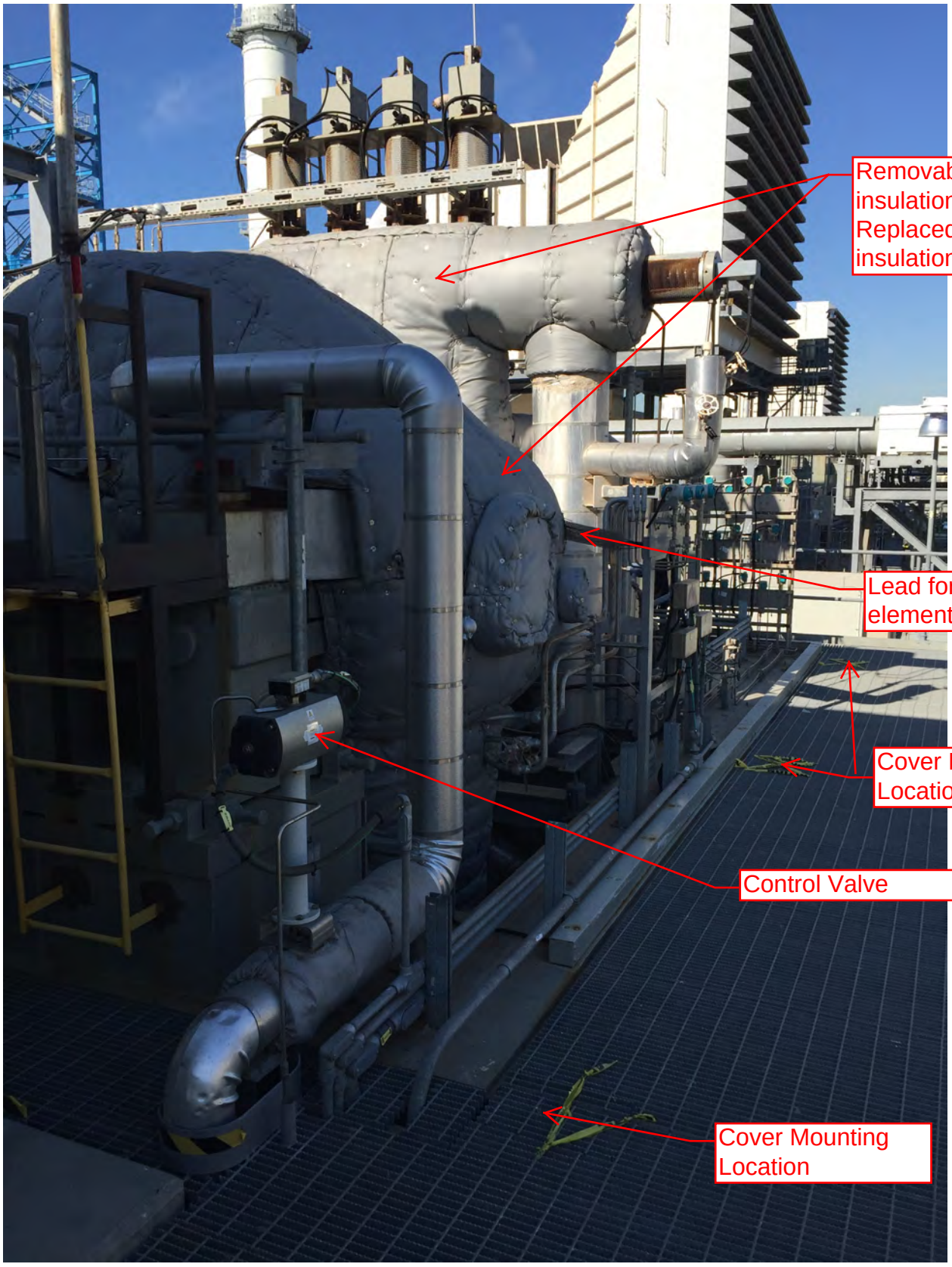
Canopy existing location
Crane Location
Canopy set location
©2015 Google
Google earth
feet
100
meters
50

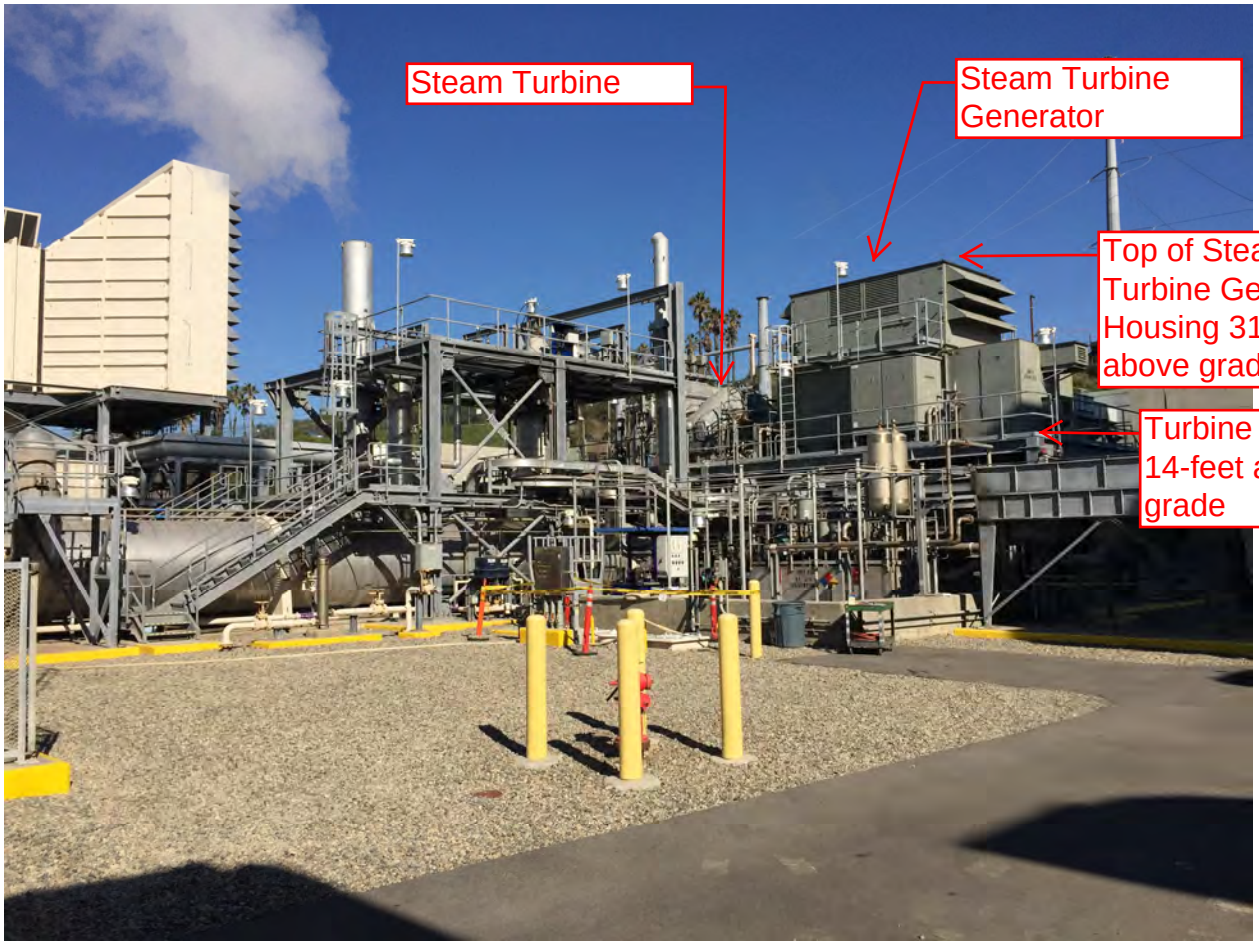
ATTACHMENT F

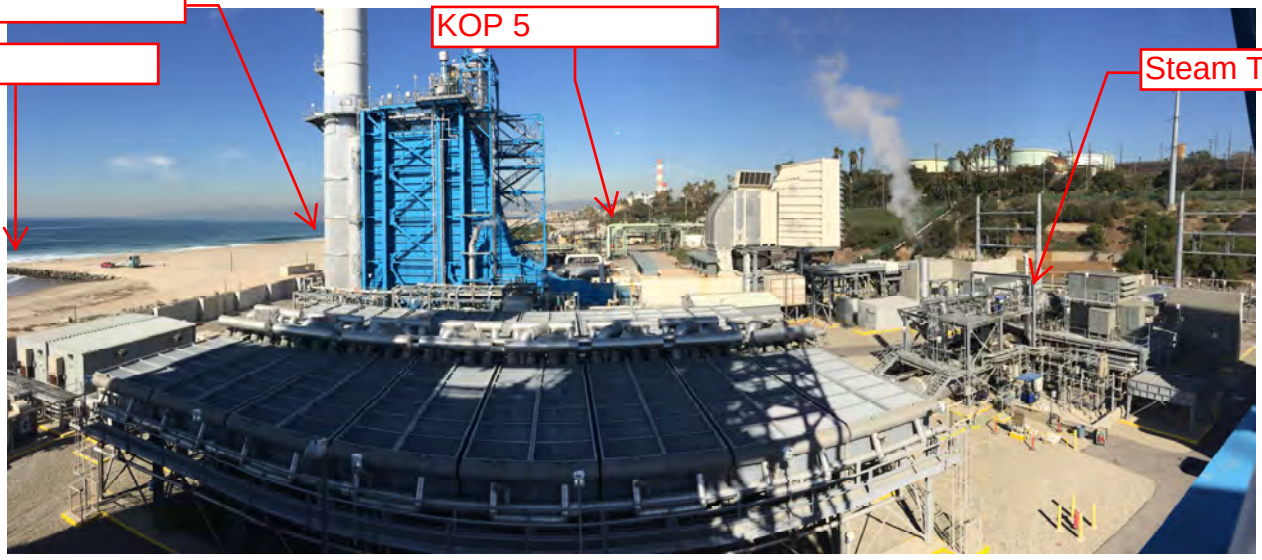
Steam Turbine Cover Photos


28'1"
21'
20'8"
Assembled
Steam
Turbine
Cover


Control Valves
Thermal Couple
Emergency Stop Valves
Sensors
Steam Turbine
Steam Turbine
Cover mounting location
MAY - ST LUBE OIL


Removable insulation pads. Replaced plaster insulation.
Lead for heating element
Cover Mounting Location
Control Valve
Cover Mounting Location


Steam Turbine
Steam Turbine Generator
Top of Steam Turbine Generator Housing 31-feet above grade
Turbine Platform 14-feet above grade


KOP 1
KOP 5
KOP 7
Steam Turbine


KOP 1 view to the south

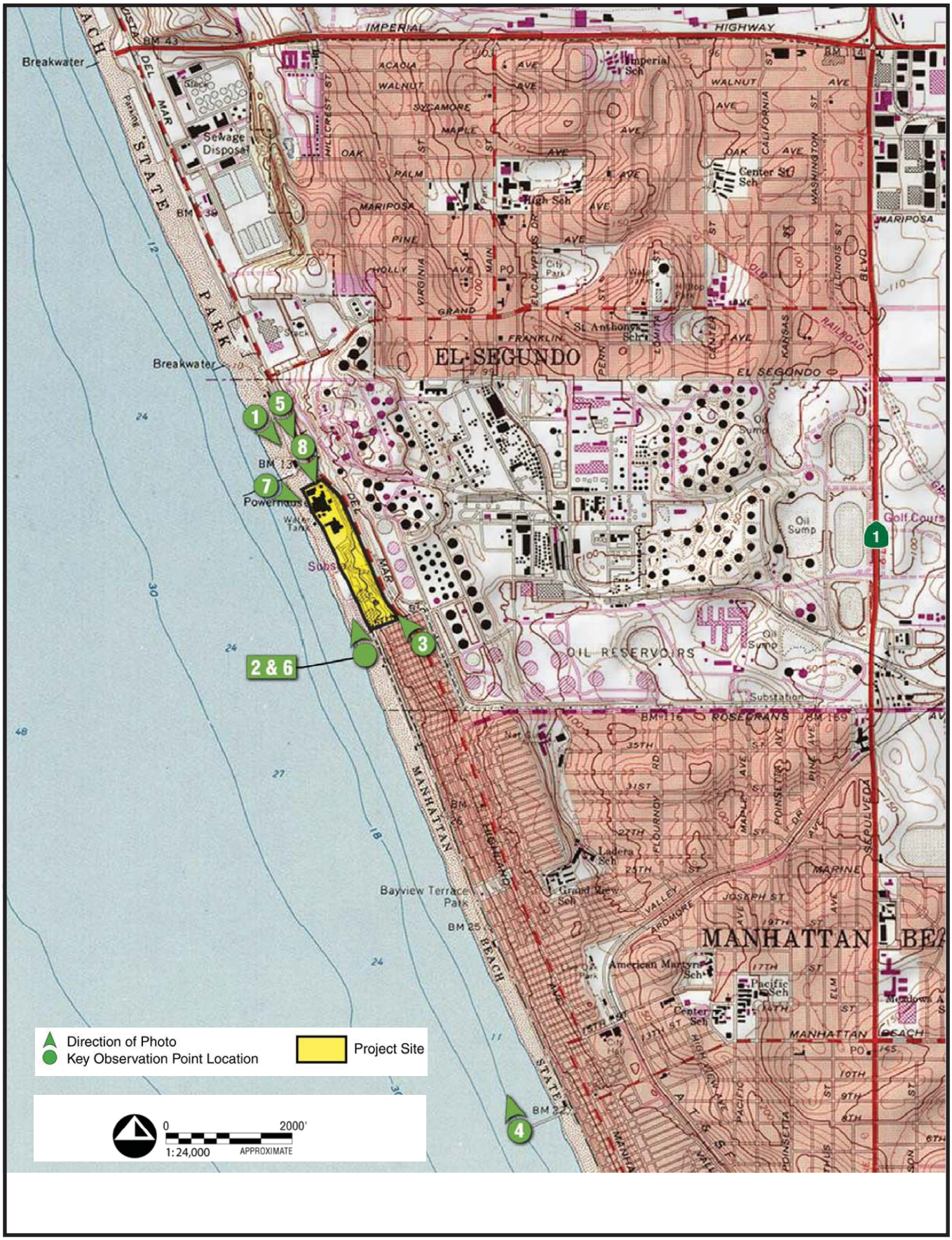

KOP 7, view to the east


KOP 5, view to the south

ATTACHMENT G

El Segundo Energy Center
Final Staff Assessment
Key Observation Point Figures

VISUAL RESOURCES - FIGURE 1
El Segundo Power Redevelopment Project - KOP Location Map



CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, JUNE 2008
SOURCE: El Segundo Power Redevelopment Project Amendment Petition - Figure 3.12-1

VISUAL RESOURCES - FIGURE 2

El Segundo Power Redevelopment Project - Final View KOP 1

ESPR - Approved Application for Certification

ESPR - Petition to Amend

CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, JUNE 2008

SOURCE: El Segundo Power Redevelopment Project Amendment Petition - Figure 3.12-2b

VISUAL RESOURCES - FIGURE 3

El Segundo Power Redevelopment Project - Final View KOP 2

ESPR - Approved Application for Certification

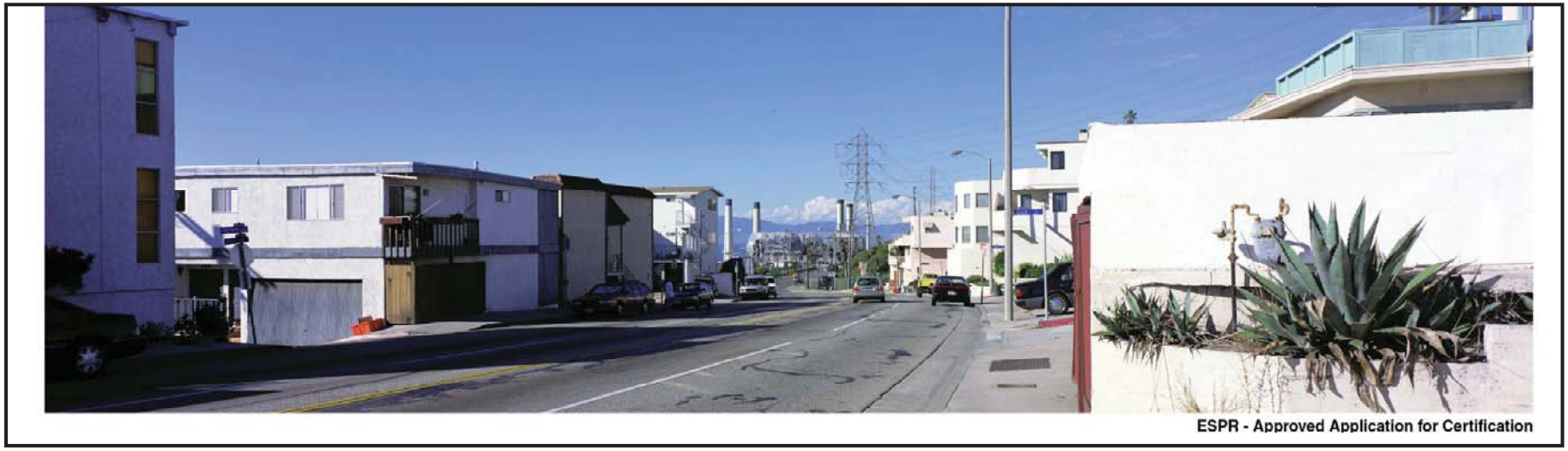
ESPR - Petition to Amend

CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, JUNE 2008

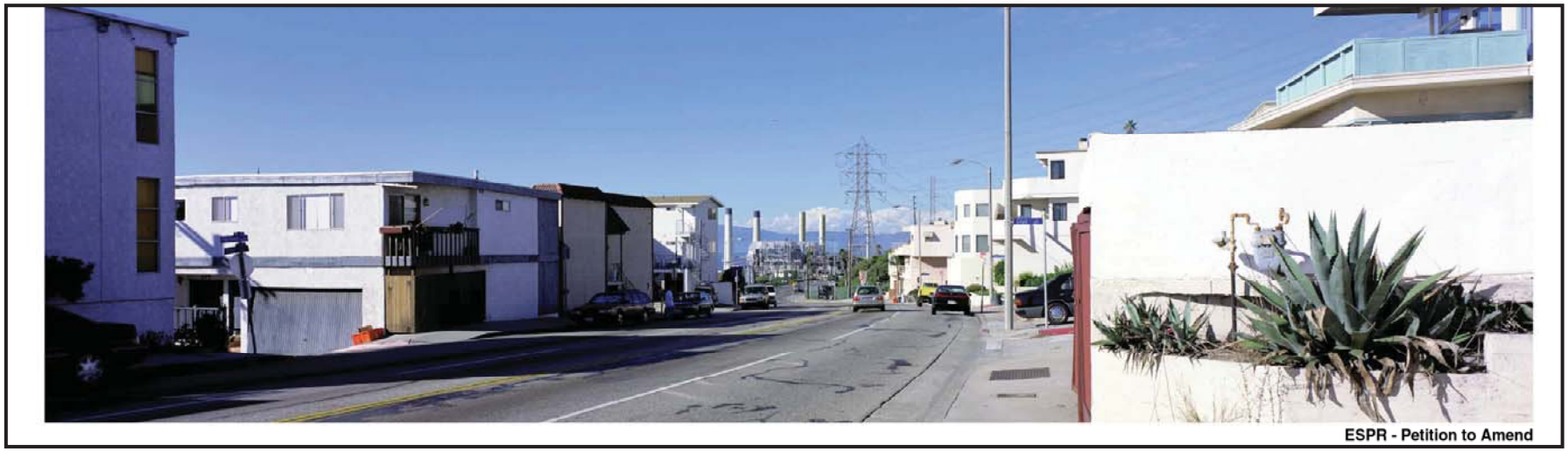
SOURCE: El Segundo Power Redevelopment Project Amendment Petition - Figure 3.12-3b

VISUAL RESOURCES - FIGURE 4

El Segundo Power Redevelopment Project - Final View KOP 3



ESPR - Approved Application for Certification



ESPR - Petition to Amend

CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, JUNE 2008

SOURCE: El Segundo Power Redevelopment Project Amendment Petition - Figure 3.12-4b

VISUAL RESOURCES - FIGURE 5

El Segundo Power Redevelopment Project - Final View KOP 7

ESPR - Approved Application for Certification

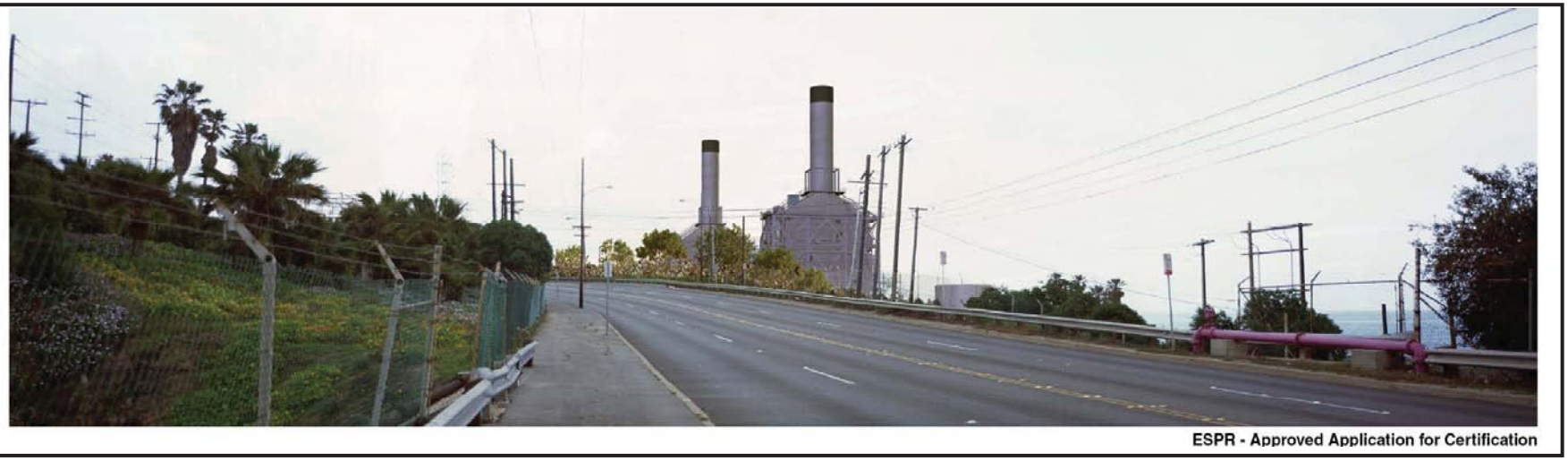
ESPR - Petition to Amend

CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, JUNE 2008

SOURCE: El Segundo Power Redevelopment Project Amendment Petition - Figure 3.12-8b

VISUAL RESOURCES - FIGURE 6

El Segundo Power Redevelopment Project - Final View KOP 8



ESPR - Approved Application for Certification

ESPR - Petition to Amend

CALIFORNIA ENERGY COMMISSION - ENERGY FACILITIES SITING DIVISION, JUNE 2008

SOURCE: El Segundo Power Redevelopment Project Amendment Petition - Figure 3.12-9b

ATTACHMENT H

Proof of Service List

Proof of Service List

Docket: 00-AFC-14C
Project Title: El Segundo Power Redevelopment Project Compliance
Generated On: 12/17/2015 1:52:03 PM

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