DOCKETED

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Description:	Revised Responses to Data Requests 160, 161, and 163
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Alamitos Energy Center

(13-AFC-01)

Data Responses, Set 6A

(Revised Responses to Data Requests 160, 161, and 163)

Submitted to

California Energy Commission

Prepared by

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With Assistance from

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February 2016

Contents

Introduction

Attached are AES Southland Development, LLC's (AES or the Applicant) responses to the California Energy Commission (CEC) Staff Data Request, Set 6 (numbers 83 through 168) regarding the Alamitos Energy Center (AEC) (13-AFC-01) Supplemental Application for Certification (SAFC).

The responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as the CEC presented them and are keyed to the Data Request numbers (83 through 168).

New or revised graphics or tables are numbered in reference to the Data Request number. For example, the first table used in response to Data Request 83 would be numbered Table DR83-1. The first figure used in response to Data Request 90 would be Figure DR90-1, and so on. Figures or tables from the AEC SAFC that have been revised have "R" following the original number, indicating revision.

Additional tables, figures, or documents submitted in response to a data request (for example, supporting data, stand-alone documents such as plans, folding graphics, etc.) are found at the end of each discipline-specific section and are not sequentially page-numbered consistently with the remainder of the document, though they may have their own internal page numbering system.

Transmission System Engineering (160 to 168)

Staff needs to determine the transmission system impacts of the project and to identify the interconnection facilities, including downstream facilities, needed to support the reliable interconnection of the proposed Alamitos Energy Center (AEC) in the Southern California Edison Company (SCE) System. The proposed interconnection facilities must comply with the utility (SCE) rules for new interconnection, California Public Utilities Commission (CPUC) General Order (GO) 95 and the CPUC GO 128. The interconnection must also comply with the SCE Reliability and Planning Criteria, North American Electric Reliability Corporation (NERC) Reliability Standards, Western Electricity Coordinating Council (WECC) Regional System Performance Criteria, and the California Independent System Operator (California ISO) Planning Standards for impacts in the California ISO system. In addition, the California Environmental Quality Act (CEQA) requires the identification and description of the "Direct and indirect significant effects of the project on the environment." For the compliance with planning and reliability standards and the identification of indirect or downstream transmission impacts, staff relies on the System Impact Study (SIS) and Facilities Study (FS) as well as review of these studies by the agencies responsible for insuring the interconnecting transmission grid meets reliability standards. The studies analyze the effect of the proposed project on the ability of the transmission network to meet reliability standards. When the studies determine that the project will cause the transmission system to violate reliability requirements, the potential mitigation or upgrades required to bring the system into compliance are identified. The mitigation measures often include modification and construction of downstream transmission facilities. The CEQA requires environmental analysis of any downstream facilities for potential indirect impacts of the proposed project.

BACKGROUND

The description of the AEC switchyard and interconnection facilities between the generators and the SCE Alamitos 230 kV switchyard, including the generators, major equipment and their ratings in the October, 2015 Supplemental Application, is incomplete (Section 3.1, Pages 3-1 to 3-2, Figures 3.1-1 & 3.1-2).

DATA REQUEST

160. Resubmit the Electrical System One-Line Diagram, Figure 3.1-1, and provide a complete and labeled electrical one-line diagram of the proposed AEC switchyard showing the generators with their respective nominal MW ratings, and all equipment for each generator's interconnection with the switchyard. The diagram should show:

a. Each Generator's nominal MW rating and voltage.

b. Any bus duct connectors or cables with ampere ratings from the 13.8 kV/16 kV breaker/switchgear to each new generator and to low side of each generator step-up transformer.

c. The percentage impedance of each generator step-up transformer at its base MVA rating.

d. The short overhead lines or conductors on the 230 kV side of each step-up transformer with their respective size, ampere rating, and configuration between each generator step-up transformer high side and each AEC switchyard 230 kV bus.

e. Provide ampere ratings of each AEC 230 kV switchyard bus with their configuration including generator tie lines and their respective ratings.

Response: Revised Figure 3.1-1R presents a revised electrical system one-line diagram of the proposed AEC switchyard.

161. Provide a legible physical layout drawing (plan view) of the pre and post-project AEC switchyard along with the SCE Alamitos center 230 kV switchyard showing fence lines, all major equipment, gen tie lines and transmission line outlet(s) with proper labeling.

Response: Revised Figure DR161-1R presents a legible plan view of the pre- and post-project AEC switchyard along with the SCE Alamitos center 230 kilovolt (kV) switchyard showing fence lines, all major equipment, gen tie lines and transmission line outlet(s) with proper labeling.

163. Refer to the Typical Transmission Tower Design Figure 3.1.2 and submit new, legible drawings of the transmission structures including dead- end and intermediate structures which will be used for construction of the two Gen Tie overhead lines.

Response: Revised Figures 3.1-2aR and 3.12bR presents a legible drawing of the transmission structures, including dead-end and intermediate structures which will be used for construction of the two gen tie overhead lines.

LEGEND

- Lightning / Surge Arrestor
- CAISO Revenue Metering
- Circuit Breaker
- Power Transformer
- Potential Transformer
- Current Transformer
- Medium Voltage 13.8 or 16 kV
- 230 kV
- GT — Gas Turbine Generator
- ST — Steam Turbine Generator
- Switch Disconnect
- Motor Operated Disconnect Switch with Ground

Southern California Edison (SCE)
230 kV Alamitos Switching Station

To 230/66 kV Trans. bank #1A SCE Dwg. #597417
To 230/66 kV Trans. bank #2A SCE Dwg. #597417
Lighthipe Line
#2 Barre Line
Center Line
#1 Barre Line

230 kV North Bus - Section A
230 kV South Bus - Section A
230 kV North Bus - Section B
230 kV South Bus - Section B

3000A 452/17

3000A 452/1, 452/9, 452/13, 452/25, 452/27
2500A 452/3, 452/7, 452/11, 452/15, 452/21
3000A 452/5, 452/23
2500A 452/2, 452/4, 452/6, 452/8, 452/10, 452/12, 452/14, 452/16, 452/22, 452/24, 452/26, 452/28

Transmission Tie Line, ~0.16 mile,
1192.5 kcmil Bunting ACSS
Z1 = 0.000024 + j 0.000223 P.U.
Z0 = 0.000146 + j 0.000612 P.U.
At 100 MVA Base
806 MVA Normal / 913 MVA Emergency

Transmission Tie Line, ~0.31 mile,
1192.5 kcmil Bunting ACSS, 2-bundle
Z1 = 0.000024 + j 0.000305 P.U.
Z0 = 0.000260 + j 0.001059 P.U.
At 100 MVA Base
1613 MVA Normal / 1827 MVA Emergency

230 kV, 2000 A
52 CB6 230 kV, 2000 A

50 feet

BLOCK 1:
689.0 MW (Net Capacity @ 230 kV)

230 kV, 2000 A
52 CB1 230 kV, 2000 A
230 kV, 2000 A
100 feet | 100 feet

SW1-3 230 kV, 600 A
SW1-2 230 kV, 600 A
SW1-1 230 kV, 600 A

CBG2-1 230 kV 2,000 A
CBS2 230 kV 2,000 A
CBG1-1 230 kV 2,000 A

18kV-230 kV 162/215/270 MVA ONAN/ONAF/ONAF Z = 17%
18kV-230 kV 171/228/285 MVA ONAN/ONAF/ONAF Z = 17%
18kV-230 kV 162/215/270 MVA ONAN/ONAF/ONAF Z = 17%

ISO Phase Bus 10,000 A, 18 kV 100 ft long
IS0 Phase Bus 10,000 A, 18 kV 100 ft long
IS0 Phase Bus 10,000 A, 18 kV 100 ft long

CBG2-2 18 kV 10,000 A
CBS1 18 kV 9,000 A
CBG1-2 18 kV 10,000 A

16 kV Δ / Y 6900 V
CTG UAT 2 18kV/6.9kV 25/33/42 MVA ONAN/ONAF/ONAF Z=6.5%
CTG UAT 1 18kV/6.9kV 25/33/42 MVA ONAN/ONAF/ONAF Z=6.5%

CTG 2 234.5 MW 0.85 PF 18 kV 60HZ
STG 241.1 MW 0.85 PF 18 kV 60HZ
CTG 1 234.5 MW 0.85 PF 18 kV 60HZ

To Aux Load

BLOCK 2a:
100.8 MW (Net Capacity @ 230 kV)

230 kV, 2000 A
52 CB2 230 kV, 2000 A
230/13.8kV 72/96/120 MVA 65°C ONAN/ONAF/ONAF Z=17%
IS0 Phase Bus 6,000 A, 13.8 kV 100 ft long
CBG3 13,8 kV 8,000 A
13.8 kV Δ / Y 4160 V
SAT-2 STA AUX TR 13,8/4,16kV 10/12 /15 MVA 65° C ONAN/ONAF/ONAF
GT3 CT-GEN 1 103,3MW 0,85PF 13,8kV, 3Ø, 60HZ
To Aux Load

BLOCK 2b:
100.8 MW (Net Capacity @ 230 kV)

230 kV, 2000 A
52 CB3 230 kV, 2000 A
230/13.8kV 72/96/120 MVA 65°C ONAN/ONAF/ONAF Z=17%
IS0 Phase Bus 6,000 A, 13.8 kV 100 ft long
CBG4 13,8 kV 8,000 A
13.8 kV Δ / Y 4160 V
SAT-2 STA AUX TR 13,8/4,16kV 10/12 /15 MVA 65° C ONAN/ONAF/ONAF
GT4 CT-GEN 2 103,3MW 0,85PF 13,8kV, 3Ø, 60HZ
To Aux Load

BLOCK 2c:
100.8 MW (Net Capacity @ 230 kV)

230 kV, 2000 A
52 CB4 230 kV, 2000 A
230/13.8kV 72/96/120 MVA 65°C ONAN/ONAF/ONAF Z=17%
IS0 Phase Bus 6,000 A, 13.8 kV 100 ft long
CBG5 13,8 kV 8,000 A
13.8 kV Δ / Y 4160 V
SAT-2 STA AUX TR 13,8/4,16kV 10/12 /15 MVA 65° C ONAN/ONAF/ONAF
GT5 CT-GEN 3 103,3MW 0,85PF 13,8kV, 3Ø, 60HZ
To Aux Load

BLOCK 2d:
100.8 MW (Net Capacity @ 230 kV)

230 kV, 2000 A
52 CB5 230 kV, 2000 A
230/13.8kV 72/96/120 MVA 65°C ONAN/ONAF/ONAF Z=17%
IS0 Phase Bus 6,000 A, 13.8 kV 100 ft long
CBG6 13.8 kV 8,000 A
13.8 kV Δ / Y 4160 V
SAT-2 STA AUX TR 13,8/4,16kV 10/12 /15 MVA 65° C ONAN/ONAF/ONAF
GT6 CT-GEN 1 103,3MW 0,85PF 13,8kV, 3Ø, 60HZ
To Aux Load

Note: If the length of a conductor is not shown then the length of that conductor segment is less than 50 feet.

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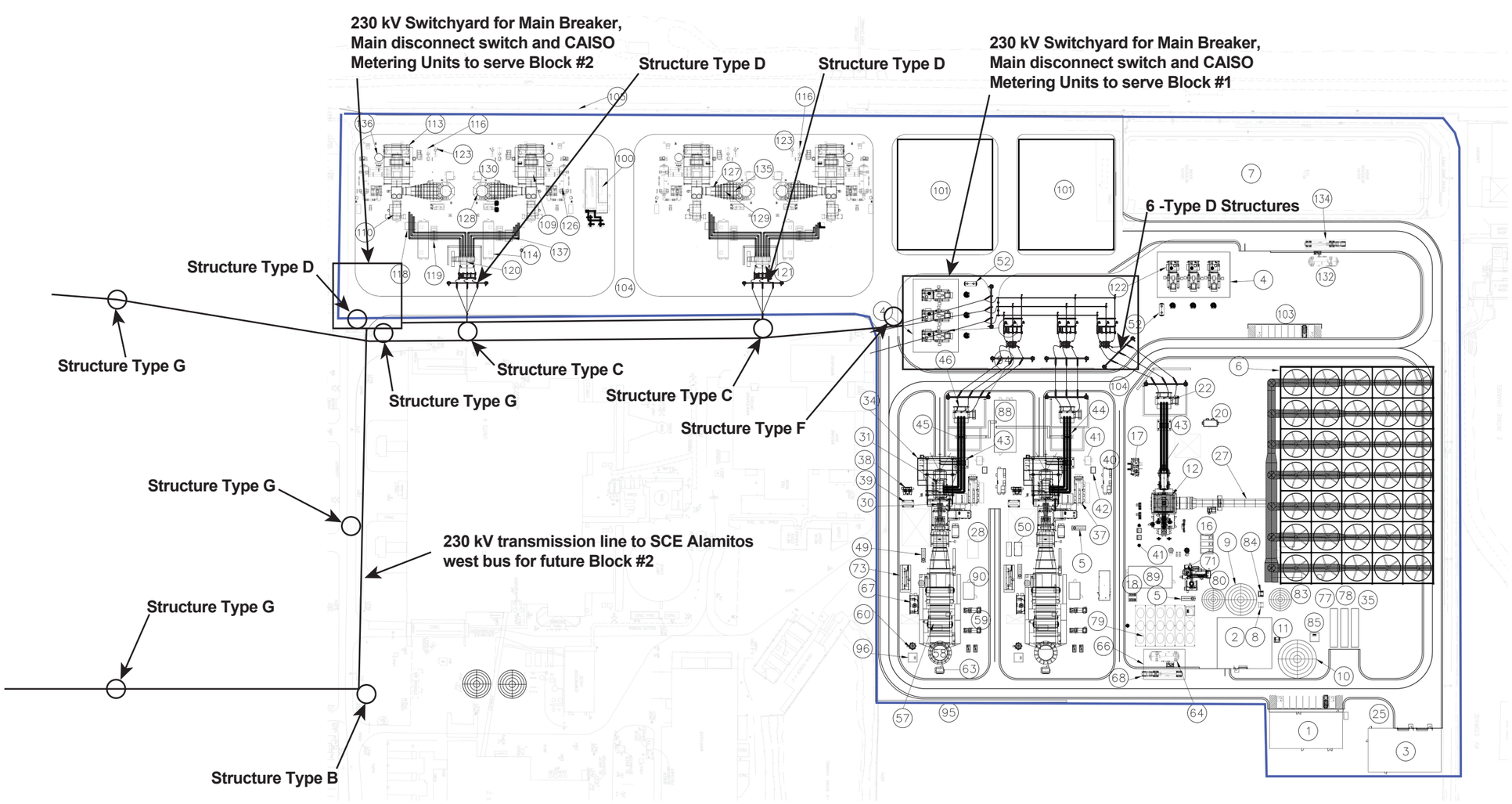
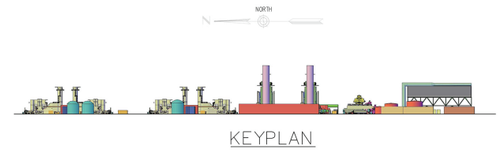
"The seal appearing on this document was authorized by Hugo E. Mena, P.E. 110112, on October 20, 2015."

DATE	REVISIONS
12/11/15	Update CC & LMS Block Ratings

FIGURE 3.1-1R
Electrical System One-Line Diagram
Alamitos Energy Center
Long Beach, California
January 2016

ELECTRIC POWER ENGINEERS, INC. AUSTIN, TEXAS





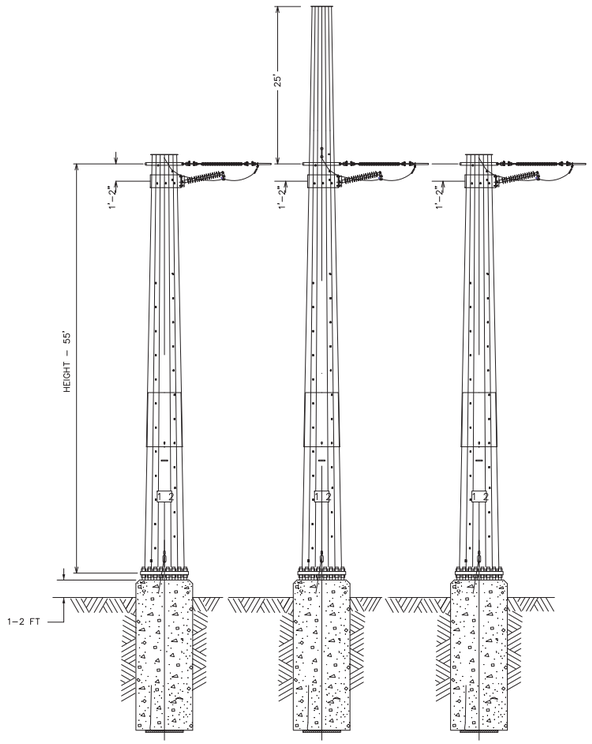
LMS 100 LEGEND	
NO.	DESCRIPTION
99	
100	MEDIUM VOLTAGE ELECTRICAL ENCLOSURE
101	FIN FAN COOLER
102	
103	PARKING AREA
104	ROADWAY
105	SITE FENCE
106	
107	
108	
109	COMBUSTION TURBINE
110	COMBUSTION TURBINE GENERATOR
111	
112	
113	AIR INLET FILTER
114	PACKAGED ELECTRICAL ELECTRONIC CONTROL CENTER (PEECC)
115	
116	FUEL GAS HEATER
117	
118	GENERATOR BREAKER
119	AUXILIARY TRANSFORMER
120	CTG STEP-UP TRANSFORMER
121	TRANSFORMER WALL
122	FUEL GAS COMPR. BUILDING
123	FUEL GAS REGULATOR
124	
125	
126	INTERCOOLER SKID
127	CTG EXHAUST DUCT
128	STACK
129	SCR
130	CONTINUOUS EMISSIONS MONITORING SYS. EQUIP.
131	
132	AMMONIA STORAGE TANK
133	AMMONIA INJECTION SKID
134	AMMONIA UNLOADING CONTAINMENT AREA
135	CO CATALYST (BY OWNER)
136	COMBUSTION TURBINE VBV SILENCER STACK
137	ISO-PHASE BUS DUCT

2X1 7FA LEGEND	
NO.	DESCRIPTION
1	ADMINISTRATION BUILDING
2	WATER TREATMENT BUILDING
3	WAREHOUSE BUILDING
4	GAS COMPRESSOR BUILDING
5	OIL/WATER SEPERATOR
6	AIR COOLED CONDENSER
7	RETENTION BASIN
8	DEMIN WATER PUMPS
9	DEMIN WATER STORAGE TANK
10	SERVICE WATER STORAGE TANK
11	SERVICE WATER PUMPS
12	STEAM TURBINE AND GENERATOR
13	
14	
15	
16	CONDENSATE PUMPS
17	STG LUBE OIL MODULE
18	CLOSED COOLING WATER PUMPS
19	
20	STG EXCITATION UNIT EQUIPMENT (GEC)
21	
22	STG STEP-UP TRANSFORMER
23	
24	
25	PARKING AREA
26	
27	ACC STEAM DUCT
28	CHEMICAL FEED CANOPY
29	
30	COMBUSTION TURBINE
31	COMBUSTION TURBINE GENERATOR
32	
33	
34	AIR INLET FILTER
35	HYDROGEN STORAGE
36	
37	PEECC
38	FUEL GAS FILTER/SEPERATOR
39	FUEL GAS STARTUP HEATER
40	UNIT EXCITATION/LCI EQUIPMENT
41	ISOLATION TRANSFORMER
42	EXCITATION TRANSFORMER
43	GENERATOR BREAKER
44	ISO PHASE BUS DUCT
45	AUXILIARY TRANSFORMER
46	CTG STEP-UP TRANSFORMER
47	
48	
49	WATER WASH DRAINS TANK
50	WATER WASH SKID
51	FUEL GAS COMPRESSORS
52	FUEL GAS COMPRESSOR DRAINS TANK
53	
54	
55	
56	
57	HRSG
58	STACK
59	BOILER FEEDWATER PUMPS
60	BLOWDOWN TANK
61	
62	
63	CEMS
64	AMMONIA STORAGE TANK
65	
66	AMMONIA CONTAINMENT AREA
67	AMMONIA INJECTION SKID
68	AMMONIA UNLOADING CONTAINMENT AREA
69	
70	
71	AUXILIARY BOILER AND ASSOCIATED EQUIPMENT
72	
73	IP WATER FUEL GAS HEATER
74	
75	
76	
77	CO2 STORAGE TANK
78	NITROGEN STORAGE
79	AIR COOLED HEAT EXCHANGER
80	WASTE WATER TANK
81	
82	
83	CONDENSATE TANK
84	CONDENSATE TRANSFER PUMPS
85	RECYCLE SYSTEM SUMP
86	
87	
88	MEDIUM VOLTAGE ELECTRICAL ENCLOSURE
89	STG ELECTRICAL ENCLOSURE
90	HRSG ELECTRICAL ENCLOSURE
91	
92	
93	
94	TRANSFORMER WALL
95	ACOUSTICAL BARRIER
96	CEMS CABINET
97	
98	

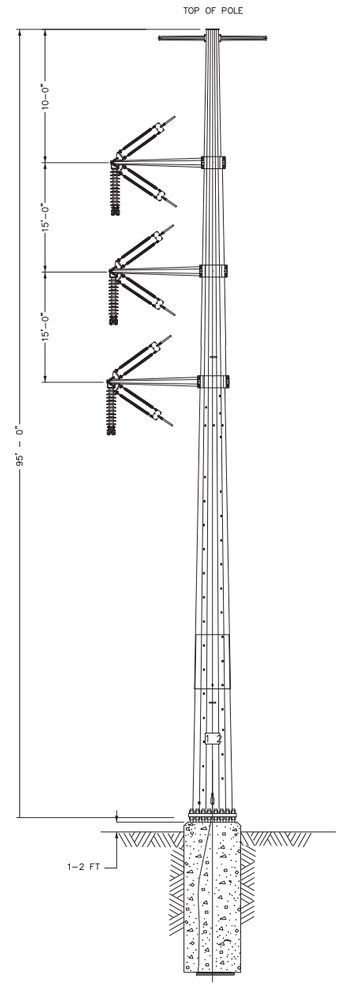
FIGURE DR161-1R
Transmission Structure Locations
Alamitos Energy Center
Long Beach, California
January 2016

CH2MHILL

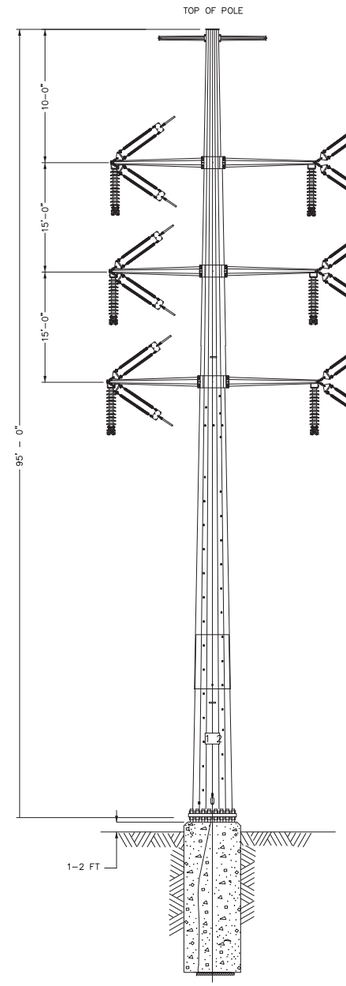
NOT TO SCALE



Single Circuit Horizontal Dead End
Structure Type A



Single Circuit Dead End
Structure Type B



Double Circuit Dead End
Structure Type C

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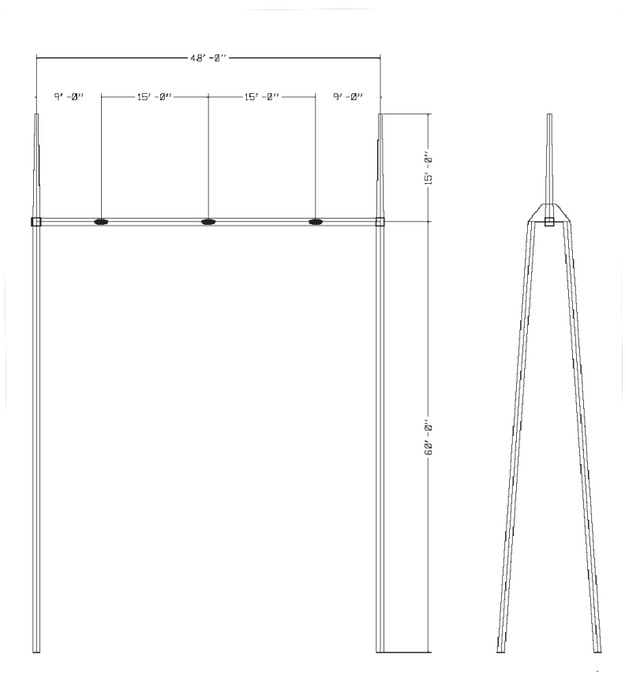
DATE	REVISIONS
1/13/2016	Update Structure Types

FIGURE 3.1-2aR
Typical Transmission Tower Design *Alamitos Energy Center*
Long Beach, California
January 2016

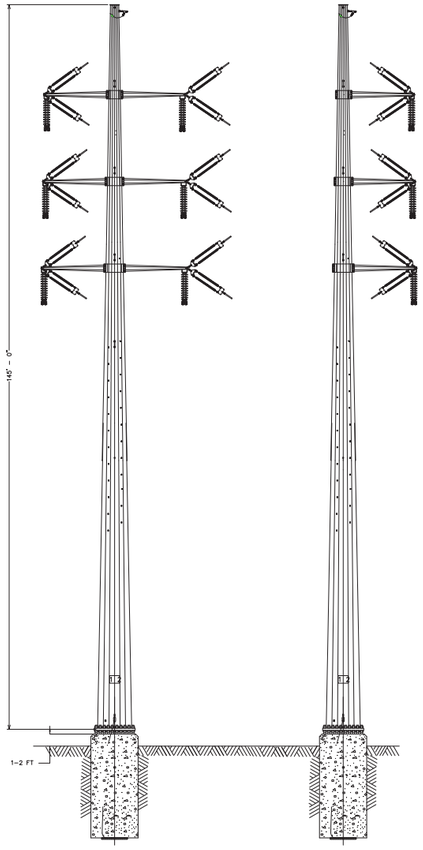
ELECTRIC POWER ENGINEERS, INC. AUSTIN, TEXAS

FILENAME: Alamitos Structure Configuration 1.dwg | DWN BY: M&S Engineering | DATE: 10/15/2013 | Figure 3.1-2

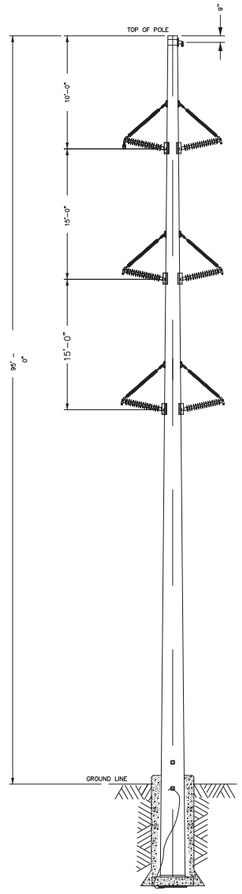
NOT TO SCALE



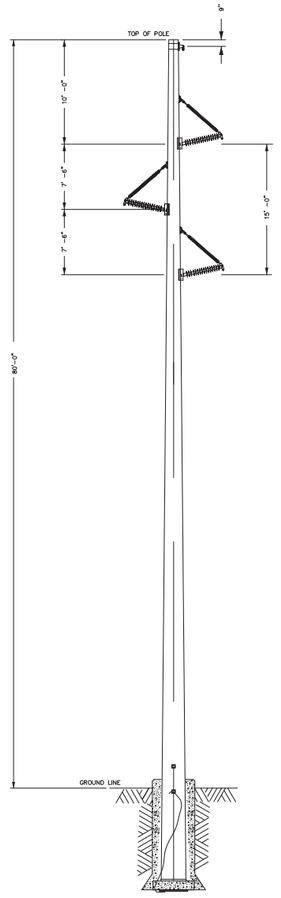
230 kV 60' A–Frame Dead End
Structure Type D



Three Circuit Dead End
Structure Type E



Double Circuit Braced Post
Structure Type F



Single Circuit Braced Post Delta
Structure Type G

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DATE	REVISIONS
1/13/2016	Update Structure Type

FIGURE 3.1-2bR
Typical Transmission Tower Design
Alamitos Energy Center
Long Beach, California
January 2016

ELECTRIC POWER ENGINEERS, INC. AUSTIN, TEXAS

FILENAME: Alamitos Structure Configuration 2.dwg | DWN BY: M&S Engineering | DATE: 10/15/13 | SCALE: NONE