DOCKETED

Docket Number:	09-AFC-08C
Project Title:	Genesis Solar Energy Project
TN #:	206940
Document Title:	Genesis Solar, LLC's Petition to Amend for Spare Main GSU Transformer
Description:	Petition to Amend (PTA) for Genesis Solar Energy Project (GSEP) to store spare main transformer on site
Filer:	Eric Veerkamp
Organization:	Nextera Energy Resouces
Submitter Role:	Applicant
Submission Date:	12/11/2015 4:06:16 PM
Docketed Date:	12/11/2015

NEXTera ENERGY RESOURCES

November 18, 2015

Genesis Solar, LLC
11995 Wiley's Well Road
Blythe, CA 92225

California Energy Commission
Compliance Project Manager
1516 9th Street, MS 2000
Sacramento, California 95814

RE: Request for Spare GSU Transformer for Genesis Solar, LLC.

Dear Mr. Veerkamp:

Genesis Solar, LLC is requesting a review of the attached information to install a spare GSU Transformer on site. Our proposal is to install the spare transformer on site to eliminate long lead and transit time and prevent the plant from producing expected power to the customer due to delays. We submit that having this spare unit on site will increase plant reliability and expected electrical power to the customer. Please contact me with any questions.

Thank you,

Charlyn Mosley

Charlyn Mosley
SR PGD Environmental Specialist

NEXTera ENERGY

November 17, 2015

Eric Veerkamp
California Energy Commission
Siting, Transmission & Environmental Protection Division
1516 Ninth Street, MS-2000
Sacramento, CA 95814-5515

Dear Mr. Veerkamp,

The Genesis Solar, LLC facility operates under Conditions of Certification from the California Energy Commission (CEC). This submittal is intended to support the CEC's review and approval of the proposed modification and CEC's determination of whether any changes to our Conditions of Certification are necessary as the Genesis Solar, LLC facility request the addition to facilitate a spare transformer on site. Pursuant to Section 1769 please review the following statements that address the statutes of said section.

A request for an amendment to the Conditions of Certification for Genesis Solar, LLC (09-AFC-8) located at 11995 Wiley's Well Road, Blythe, CA 92225 follows,

1. (1.a) Description of the proposed modification: NextEra Energy is proposing to construct a foundation and containment structure for storage of a spare main power transformer to be located at the North end of the Well "0" area in the commons. In order to improve the plants' reliability we are purchasing a spare main transformer to be ready and available on site in the event of failure of one of the existing main power transformers. This would allow us to minimize any plant downtime in the event of such a failure. The foundation and containment structure will be approximately 34' X 30' in size and will include lightning protection as well as connection to the existing grounding grid. The foundation and containment structure would be constructed in compliance with existing laws, ordinances, regulations and statutes. As per the attached excerpt of Section 1769, this corresponds to Item 1.A under project modifications.
2. (1.b) As per the excerpt of section 1769, item1.B, this request is to approve this minor amendment respectfully as expeditiously as is possible to allow for final containment design work and construction to be completed prior to the expected transformer delivery in the 4rd Quarter 2015. All applicable permits will be obtained for this project.
3. (1.c) As per the excerpt of Section 1769, item 1.C, proposed modifications based on information not available prior to certification: The modification is based on information that was not available at the time of certification. Plans to acquire a spare main transformer were not included in the planning stages of the pre-operations/post operations discussions.
4. (1.d) To ensure reliability and reduce down time, which would affect the consumers, this equipment is vital for the customer supply in the event a power outage occurs due to main transformer failure. The lead time and transportation time to ship a backup transformer to our

facility would take weeks. Equipping the site with a backup main transformer eliminates lead time and increases site efficiency during critical transformer failure.

5. (1.e) Environmental Impacts; The proposed project will not result in any significant adverse environmental impacts. No mitigation will be required since there will be no additional environmental impact.

   A) Air quality: minimal short-term air quality impacts are possible during construction of the foundations, power and control electrical wiring. Minor dust emissions and vehicle exhaust are possible. NextEra Energy will mitigate dust emissions using standard dust control practices, including watering. Further, our practice is to ensure that minimal vehicle idling occurs, thereby minimizing vehicle exhaust. Furthermore, all equipment used on site is required to be in proper working order, including properly tuned engines. We believe these measures, coupled with the short-term nature of the construction, will result in air emissions that are not significant.

   B) Noise: No significant noise impacts will result from the proposed project. Based on our knowledge of practices for construction of this type, no activities associated with the project have the potential to generate significant noise levels at or beyond the facility boundary.

   C) Cultural resources: No adverse impacts on cultural resources (archeological or paleontological) will result from the proposed project. During CEC review of the original project, a complete paleontological survey was conducted on the proposed site. The supporting documentation is available in the project files on site if necessary. No cultural resources were identified within the area of the proposed project location. Furthermore, excavation, grading and other construction activities in the vicinity of the currently proposed project were carried out during the original construction of the project. Therefore, the area has already been disturbed, and no cultural resources were discovered during construction of the existing plant.

   D) Biological resources: No adverse impacts on biological resources will result from the proposed project. During CEC review of the original project a complete biological survey was conducted on the overall project. As part of our normal contractor orientation program, NextEra Energy awareness training and information on the possible presence and the proper response to wildlife sightings, per our existing Conditions of Certification.

   E) Visual impacts: No significant adverse visual impacts will result from the proposed project. The construction is in a location that is shielded visually by other existing structures and equipment at the site, minimizing incremental visual impacts and rendering the proposed project insignificant with regard to the existing project profile.

   F) Hazardous materials: The proposed project will not result in any potential adverse environmental impacts associated with hazardous materials use. The transformer will contain oil but will not be energized except for low voltage for periodic cycling of cooling fans. The containment will be designed to comply with all spill containment requirements, will be inspected daily and will have provisions for removal of any rainwater accumulation.

   G) Water Resources: The proposed project will not result in any significant adverse impact to water resources.

6. (1.f) All applicable laws, ordinances, regulations and standards will be adhered to. Proper applications, fees and certifications will be obtained prior to construction.

7. Socioeconomics: The daily local work force will average 10 for the construction of the foundation and containment for a period of approximately one week. Additionally, there will be a crew of approximately 10 people to unload and set the transformer on the foundation over a period of two days. The project is currently out for bid to local companies. These companies generally utilize the local labor force from Riverside County to include the city of Blythe and surrounding area.
8. Transportation: For the foundation and containment structure, about 4 trucks will be used to haul concrete and rebar for foundations across a period of one week and about 3 trucks and one large capacity crane will set the transformer on the foundation during a period of two days. This will have little adverse impact to traffic. The Transformer will be transported from SEGS, in the high desert by Performance Transport. The dimensions of the haul are 16' 1" on the trailer, taking one (1) day to transport. Performance Transport will accommodate the permits, pilots and any other incidentals for the haul.
9. (1.g and h)Effect on the public: This minor amendment will not affect the public since this change does not change the operation of the facility. Per excerpt 1.I and 1.F, Genesis Solar, LLC's location has no residences, schools or farmlands within 20 miles of the site boundaries. Due the remote location of the site, there are no potential effects to the public. Consistent with the overall intent of the Decision, the proposed modification is a minor amendment to the original Certification of Conditions and is consistent with the overall intent of the Decision. The property surrounding the area is owned by the BLM.

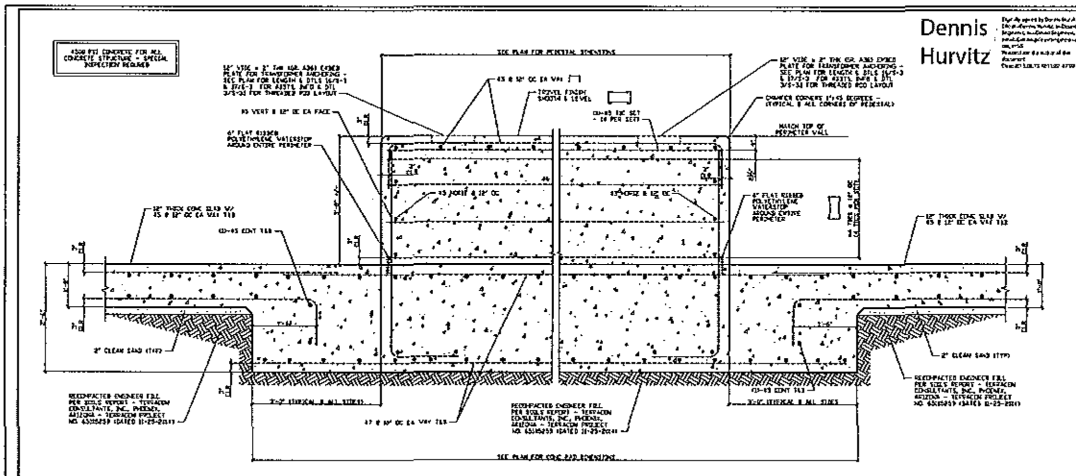
Should you have any questions or require additional information please contact me at (760) 921-1401, or (760) 831-2651.

Respectfully,

Charlyn Mosley

Charlyn Mosley
Sr. PGD Environmental Specialist

Dennis Hurvitz



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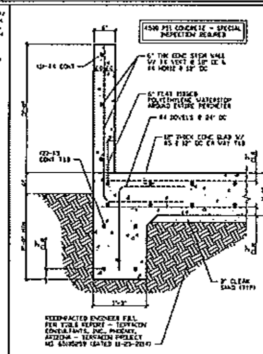

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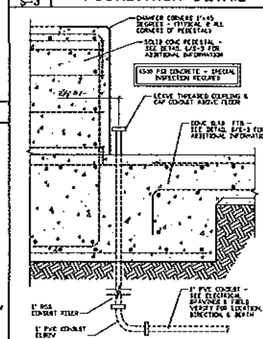

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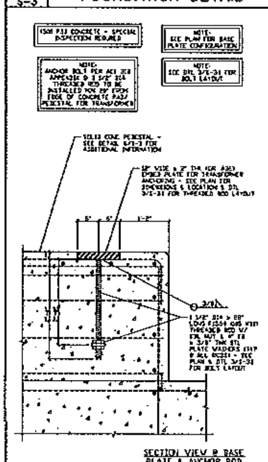

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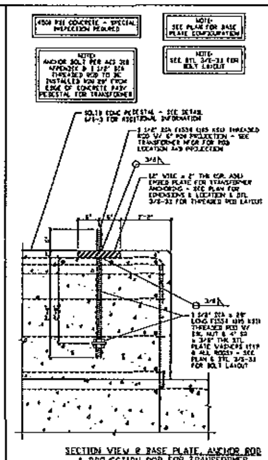

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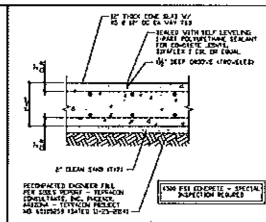

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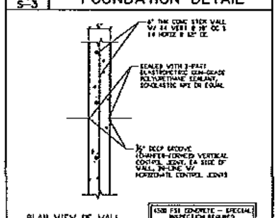

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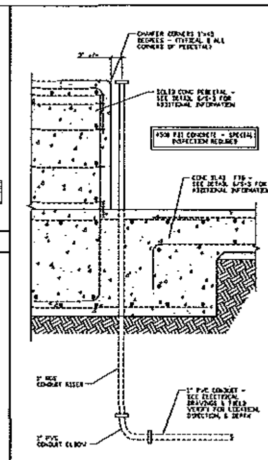

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NO.#	REMARKS	DATE

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LIC NO. C3447
BRIAN GOTTLIEB - CIVIL ENGINEER
PALM DESERT, CA

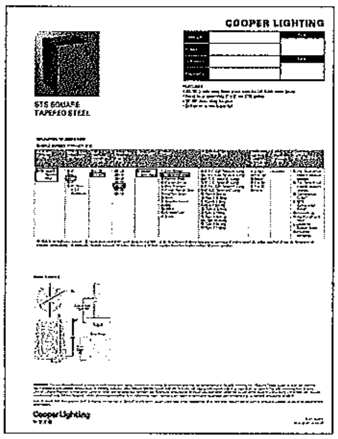
DESERT ENGINEERS
CONSULTING ENGINEERS

FOUNDATION DETAILS

TRANSFORMER #2 SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA. 92225

DRAWN BY:	SC
DATE	08/12/16
SCALE	N.T.S.
JOB NO.	600,1515
SHEET	S-3
OF	SHEETS

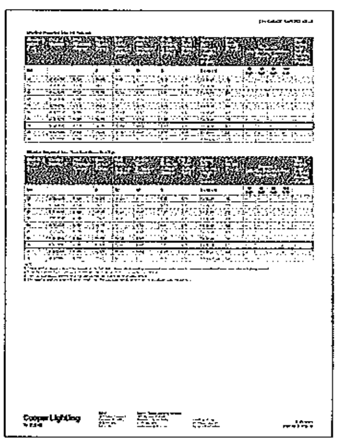
SEE ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION - LIGHTING POLES, BASE PLATES, & ANCHORAGES BY MFGR


COOPER LIGHTING

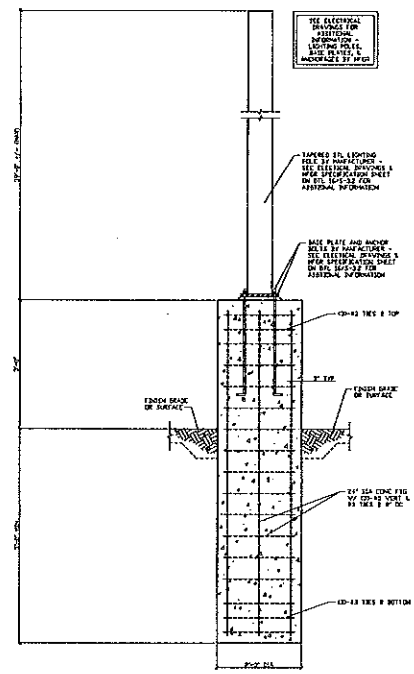
STS SQUARE TAPERED STEEL

Cooper Lighting

SEE ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION - LIGHTING POLES, BASE PLATES, & ANCHORAGES BY MFGR


Cooper Lighting

16 / S-3.2 MFGR SPECIFICATION SHEET FOR LIGHTING POLES



13 / S-3.2 FOUNDATION DETAIL @ LIGHTING POLE

18 / S-3.2 NOT USED

19 / S-3.2 NOT USED

Dennis Hurvitz

Digitally signed by Dennis Hurvitz
Date: 2015.08.13

5 / S-3.2 NOT USED

10 / S-3.2 NOT USED

15 / S-3.2 NOT USED

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20 / S-3.2 BG DISCLAIMER

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B.G. STRUCTURAL ENGINEERING, INC.
LIC. NO. C53947
BRIAN GOTTLIEB - CIVIL ENGINEER
(760) 346-3813
(760) 346-9481 FAX
EMAIL: Craig@bgstructural.com
73-175 MERKLE DRIVE, SUITE 204,
PALM DESERT, CA 92211

DESERT ENGINEERS
CONSULTING ENGINEERS
MECHANICAL, ELECTRICAL, PLUMBING AND STRUCTURAL DESIGN
http://desertengineers.com

FOUNDATION DETAILS

TRANSFORMER #2 SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA. 92225

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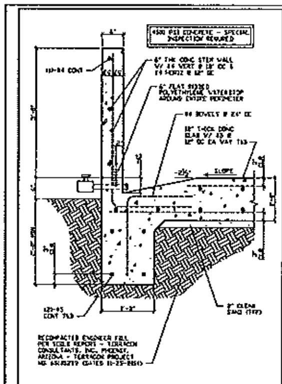

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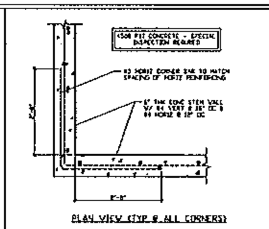

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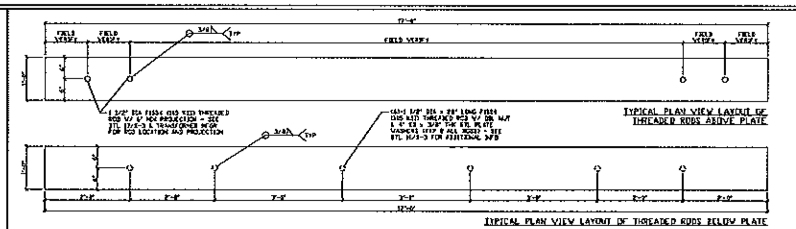

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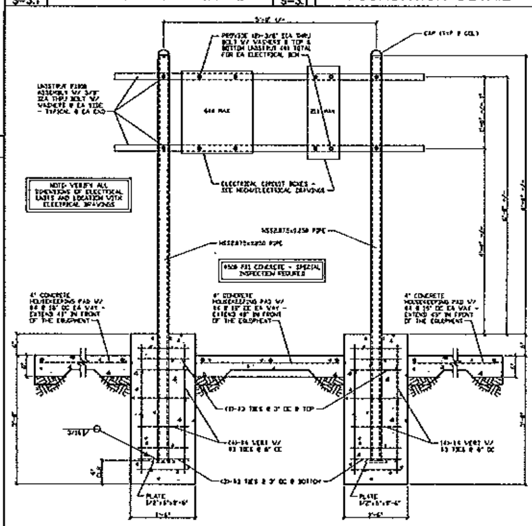

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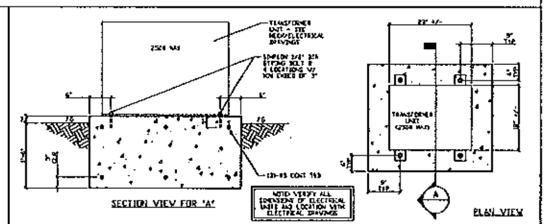

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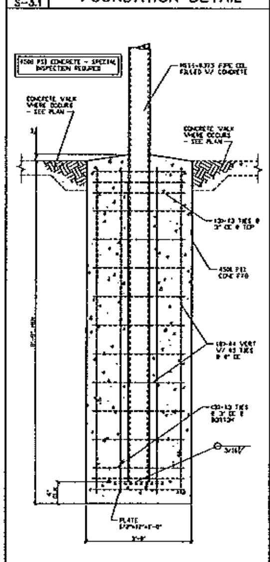

16 / S-3.1 FOUNDATION DETAIL

17 / S-3.1 NOT USED

18 / S-3.1 NOT USED

Dennis Hurvitz

19 / S-3.1 NOT USED

20 / S-3.1 BG DISCLAIMER

NO.#	REMARKS	DATE

B.G. STRUCTURAL ENGINEERING, INC.
BRIAN GOTTLIEB - CIVIL ENGINEER

DESERT ENGINEERS

FOUNDATION DETAILS

TRANSFORMER #2 SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA. 92225

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JOB NO.	800.1915
SHEET	S-3.1
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GENESIS SOLAR LLC

SPARE 150 MVA TRANSFORMER SITE PREPARATION AND FOUNDATION

SGN-7209

11995 WILEY'S WELL ROAD
BLYTHE, CALIFORNIA 92225

SCOPE OF WORK STATEMENT:

THESE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND SPECIFICATIONS. PROVIDE POWER FEED TO NEW SPARE 150 MVA TRANSFORMER AND CIRCUIT BREAKER PANEL. DESIGN TRANSFORMER FOUNDATION AND OIL CONTAINMENT.

PROJECT ADDRESS:

SGN-7209
11995 WILEY'S WELL ROAD
BLYTHE, CALIFORNIA 92225

OWNER

GENESIS SOLAR LLC

700 UNIVERSE BLVD
JUNO BEACH, FL 33408
TELEPHONE: (561) 691-7171

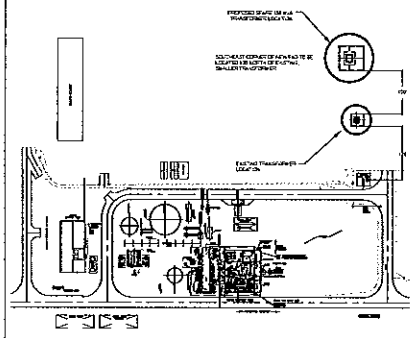
ENGINEERING CONTACTS

DESERT ENGINEERS
75-125 FAIRWAY DESERT DRIVE
INDIAN WELLS, CALIFORNIA 92210
(760)568-3600

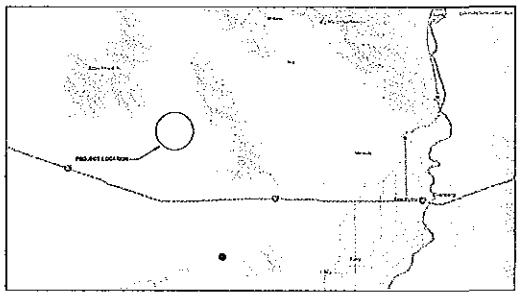
CIVIL ENGINEER – RON PEEPS, PE

STRUCTURAL ENGINEER – BRIAN GOTTLIEB, PE

ELECTRICAL ENGINEER – FELIX ROTH, PE



SITE/FACILITY PLAN



VICINITY MAP

SHEET INDEX

APPLICABLE CODES

THE WORK SHOWN ON THESE DRAWINGS SHALL BE USED FOR CONSTRUCTION.

APPLICABLE CODES:
2013 CALIFORNIA BUILDING CODE (CBC), TITLE 24 PART 2
2013 CALIFORNIA ELECTRICAL CODE (CEC), TITLE 24 PART 3
2013 CALIFORNIA MECHANICAL CODE (CMC), TITLE 24, PART 4
2013 CALIFORNIA PLUMBING CODE (CPC), TITLE 24, PART 5
2013 CALIFORNIA FIRE CODE, TITLE 24 PART 9.

Dennis Hurvitz

NO.	REMARKS	DATE

DESERT ENGINEERS
CIVIL • STRUCTURAL • PLANNING • CONSTRUCTION MANAGEMENT
75-125 FAIRWAY DESERT DRIVE, INDIAN WELLS, CA. 92210
(760) 568-3600

SPARE 150 MVA TRANSFORMER SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA. 92225

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T-1.0
OF SHEETS

B.G. STRUCTURAL ENGINEERING
BRIAN GOTTLIEB - CIVIL ENGINEER - Lic. No. C33047
75-175 Merle Drive, Suite 200
Palm Desert, CA 92211
(760) 568-3553 (760) 568-5681 Fax

Genesis Solar Energy Center - Transformer 2 Foundation

Desert Engineers
75401 Painted Desert Drive
Indian Wells, CA 92210

Job Number: 800.1915

August 12, 2015

VALID ONLY IF SIGNED IN RED

Dennis Hurvitz

Digitally signed by Dennis Hurvitz
DN: cn=Dennis Hurvitz, o=Desert Engineers, ou=Desert Engineers, email=Dennis@desertengineers.com, c=US
Reason: I am the author of this document
Date: 2015.08.13 10:16:15 -07'00'

Sheet Index

Genesis Solar Energy Center

Secondary Containment Calculation
Transformer-2

Containment Sump:

Width =	**28.666**	ft
Length =	**34.666**	ft
Gross Area =	994	sq ft
Generator Pedestal Width =	**11**	ft
Generator Pedestal Width =	**19**	ft
Net Containment Sump Area=	785	sq ft

Volumes:

Transformer Oil Volume	12,470	gallons	=	1667 cf
24-hour, 25-year storm	170	cf / 1000 sf	=	169 cf
Fire Flow	3	gallons/sq ft	=	399 cf

Total required retention: 110% Oil_Volume + GreatestOf(Rainfall or Fire_Flow)

Total Required Sump Volume =	2232	cf
Depth of Sump =	**2.845**	ft.

B.G Structural Engineering, Inc.
75-175 Merle Drive, Suite 200
Palm Desert, CA 92211
760-568-3553 Voice
760-568-5681 Fax

Printed: 12 AUG 2015, 4:24PM
File = s:\EC6-DA~1\805ADF~1.EC6
ENERCALC, INC. 1983-2015, Build:6.15.7.30, Ver:6.15.7.30

Point Load on Slab

Lic. # : KW-06008402 Licensee : BG STRUCTURAL ENGINEERING INC

Description : Containment Slab Check

Code References

Calculations per ACI 318-11, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2012

Analytical Values

d - Slab Thickness	12.0 in	Ks - Soil Modulus of Subgrade Reaction	40.0 pci
FS - Req'd Factor of Safety	3.0 : 1	Ec - Concrete Elastic Modulus	3,122.0 ksi
		f'c - Concrete Compressive Strength	4.50 ksi
		μ - Poisson's Ratio	0.150
		ϕ - LRFD Reduction Factor	0.850
		Min. Adjacent Load Distance	87.347 in

Analysis Formulas

Pn = 1.72 [(Ks R1 / Ec) 10,000 + 3.6] Fr d^2

Ks = Soil modulus of subgrade reaction
R1 = 50% plate average dimension = sqrt(PlWid * PlLen) /2
Ec = Concrete elastic modulus
Fr - Concrete modulus of rupture = 7.5 * sqrt(f'c)
d - Slab Thickness

Min Adjacent Column Distance = 1.5 * ([Ec d^3 / (12 * (1- u^2) Ks] ^ 1/4)

Ec = Concrete elastic modulus
d - Slab Thickness
u - Poisson's ratio
Ks = Soil modulus of subgrade reaction

Load & Capacity Table

Load ID	Plate (in) Wid	Len	R1 (in)	Applied Concentrated Load on Plate - (kip) D	Lr	L	S	W	E	Governing Ld Comb	Pu (kip)	Phi*Pn (kip)	Check
Service Load	24.00	24.00	12.00	4.00		2.00				+1.20D+0.50Lr+1.60L	8.0	544.2	Pass, FS=68.02 >= 3

RetainPro 10 (c) 1987-2014, Build 10.14.8.26
License : KW-06064200
License To :

Cantilevered Retaining Wall Design

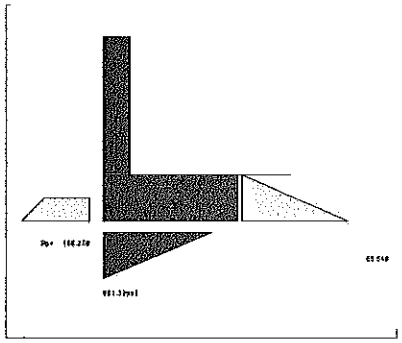
Code: CBC 2013,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	0.00 ft
Wall height above soil	=	3.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	6.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.350
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0 psf
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Stem Weight Seismic Load

F_p / W_p Weight Multiplier = 0.305 g

Added seismic base force 48.0 lbs

Design Summary

Wall Stability Ratios

Overturning	=	4.17 OK
Sliding	=	5.59 OK
Total Bearing Load	=	600 lbs
...resultant ecc.	=	7.02 in
Soil Pressure @ Toe	=	601 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	722 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	0.0 psi OK
Footing Shear @ Heel	=	0.4 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component NOT Used)

Lateral Sliding Force	=	65.5 lbs
less 100% Passive Force	= -	156.3 lbs
less 100% Friction Force	= -	210.0 lbs
Added Force Req'd	=	0.0 lbs OK
....for 1.5 : 1 Stability	=	0.0 lbs OK

Load Factors

Building Code	CBC 2013,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

Stem Construction

Top Stem

			Stem OK
Design Height Above Ftg	ft =		0.00
Wall Material Above "Ht"	=		Concrete
Thickness	=		6.00
Rebar Size	=		# 4
Rebar Spacing	=		18.00
Rebar Placed at	=		Center
Design Data			
fb/FB + fa/Fa	=		**0.060**
Total Force @ Section	lbs =		68.6
Moment....Actual	ft-# =		102.9
Moment.....Allowable	=		1,705.6
Shear.....Actual	psi =		1.9
Shear.....Allowable	psi =		75.0
Wall Weight	=		75.0
Rebar Depth 'd'	in =		3.00
LAP SPLICE IF ABOVE	in =		18.72
LAP SPLICE IF BELOW	in =		
HOOK EMBED INTO FTG	in =		6.00

Hook embedment reduced by stress ratio

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Short Term Factor	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	Medium Weight
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0

RetainPro 10 (c) 1987-2014, Build 10.14.8.25
License : KW-06054200
License To :

Cantilevered Retaining Wall Design

Code: CBC 2013,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	0.00 ft
Heel Width	=	2.50
Total Footing Width	=	2.50
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.92 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	722	0 psf
Mu' : Upward	=	0	202 ft-#
Mu' : Downward	=	0	360 ft-#
Mu: Design	=	0	158 ft-#
Actual 1-Way Shear	=	0.00	0.39 psi
Allow 1-Way Shear	=	0.00	75.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	

Other Acceptable Sizes & Spacings

Toe: Not req'd, Mu < S * Fr
Heel: Not req'd, Mu < S * Fr
Key: Not req'd, Mu < S * Fr

Summary of Overturning & Resisting Forces & Moments

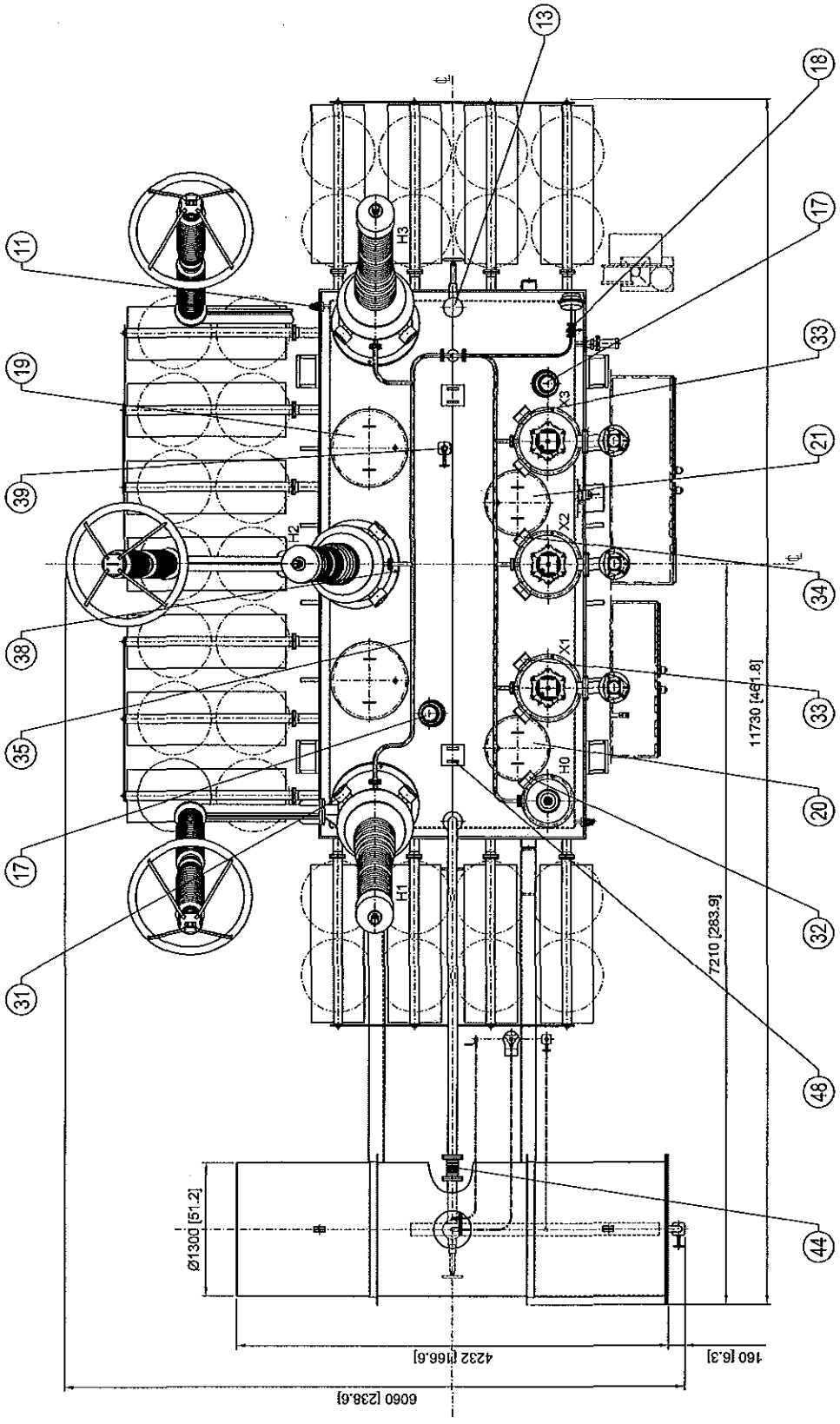
		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	17.5	0.33	5.8	Soil Over Heel	=	0.0	1.50	0.0
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Surcharge Over Toe	=				Surcharge Over Heel	=			
Adjacent Footing Load	=				Adjacent Footing Load	=			
Added Lateral Load	=				Axial Dead Load on Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
Seismic Stem Self Wt		48.0	2.50	120.1	Surcharge Over Toe	=			
Total		65.5	**O.T.M.**	125.9	Stem Weight(s)	=	225.0	0.25	56.3
	=		=		Earth @ Stem Transitions	=			
Resisting/Overturning Ratio		=	**4.17**		Footing Weight	=	375.0	1.25	468.8
Vertical Loads used for Soil Pressure	=	600.0 lbs			Key Weight	=		1.42	
					Vert. Component	=			
					Total	=	600.0 lbs	**R.M.=**	525.0

If seismic is included, the OTM and sliding ratios be 1.1 per section 1807.2.3 of IBC 2009 or IBC 201

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

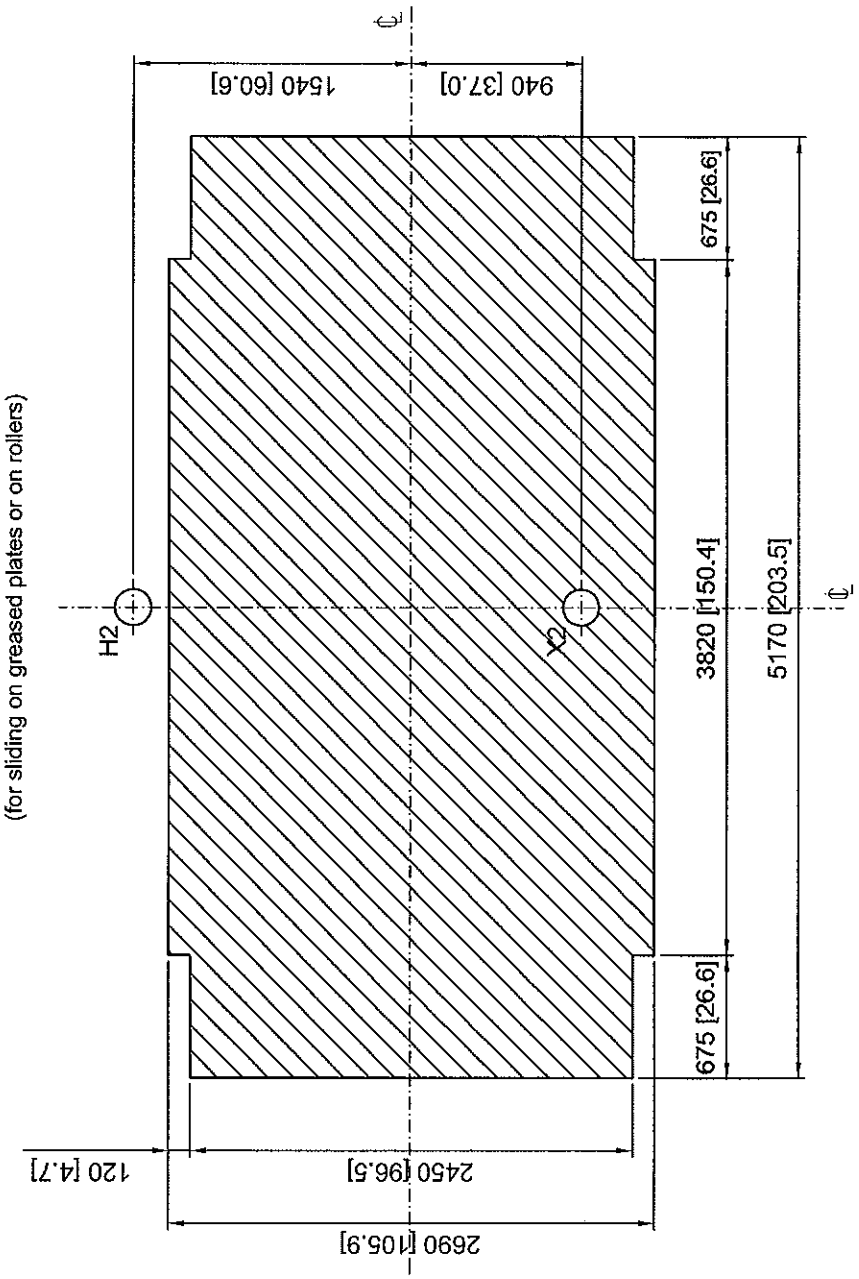
Genesis Solar Energy Center

Transformer-2 Foundation and Containment



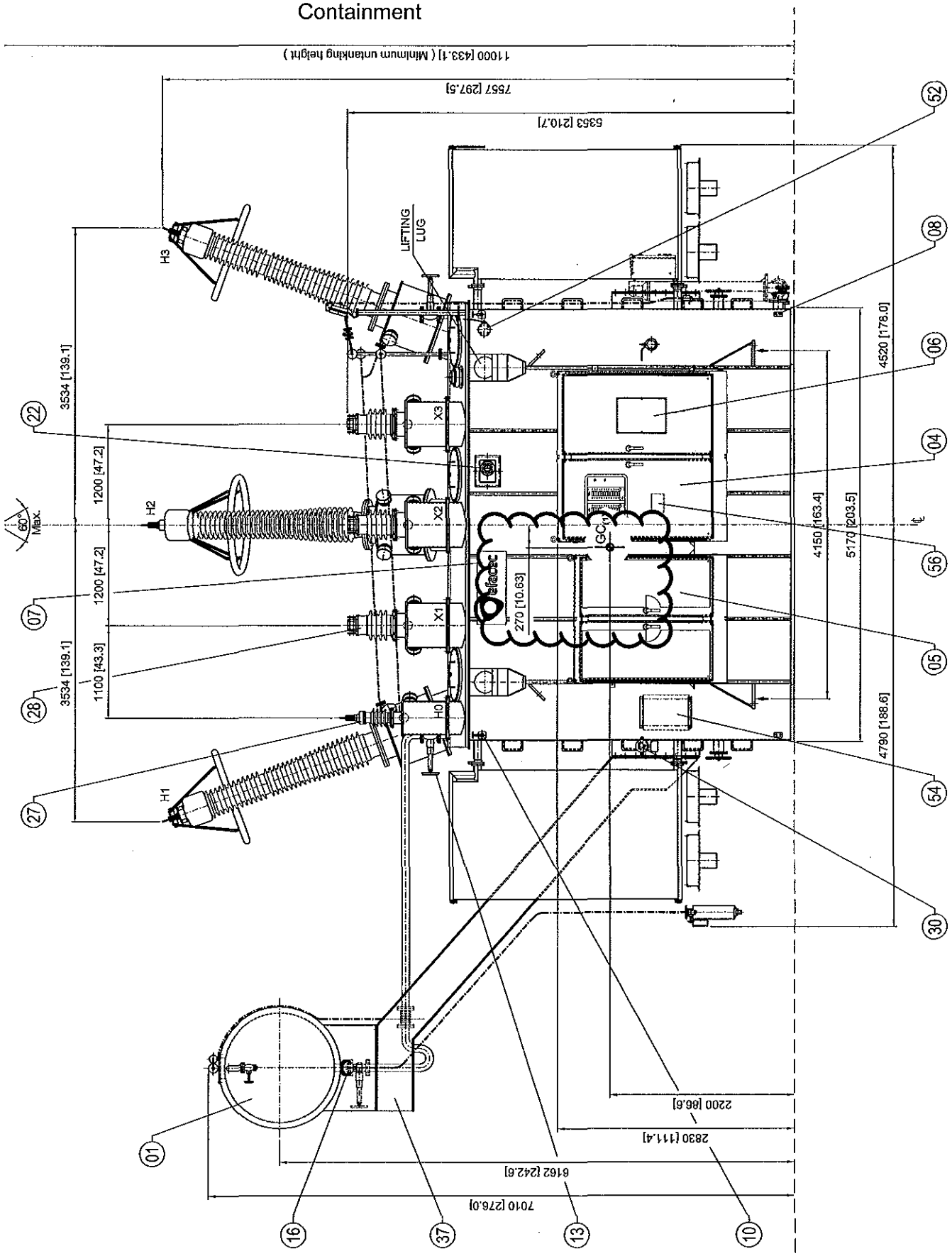
Genesis Solar Energy Center

Transformer-2 Foundation and Containment



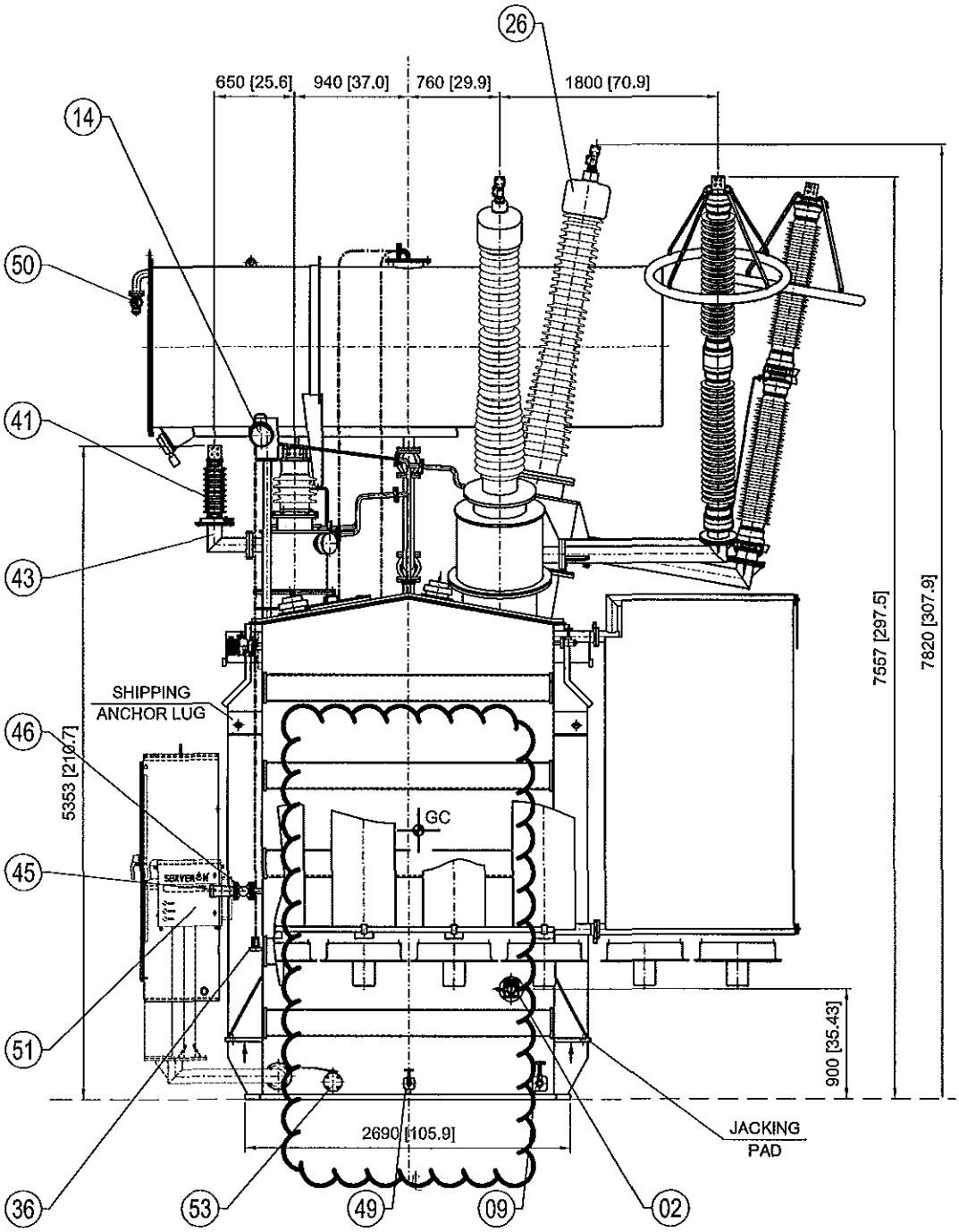
Genesis Solar Energy Center

Transformer-2 Foundation and Containment



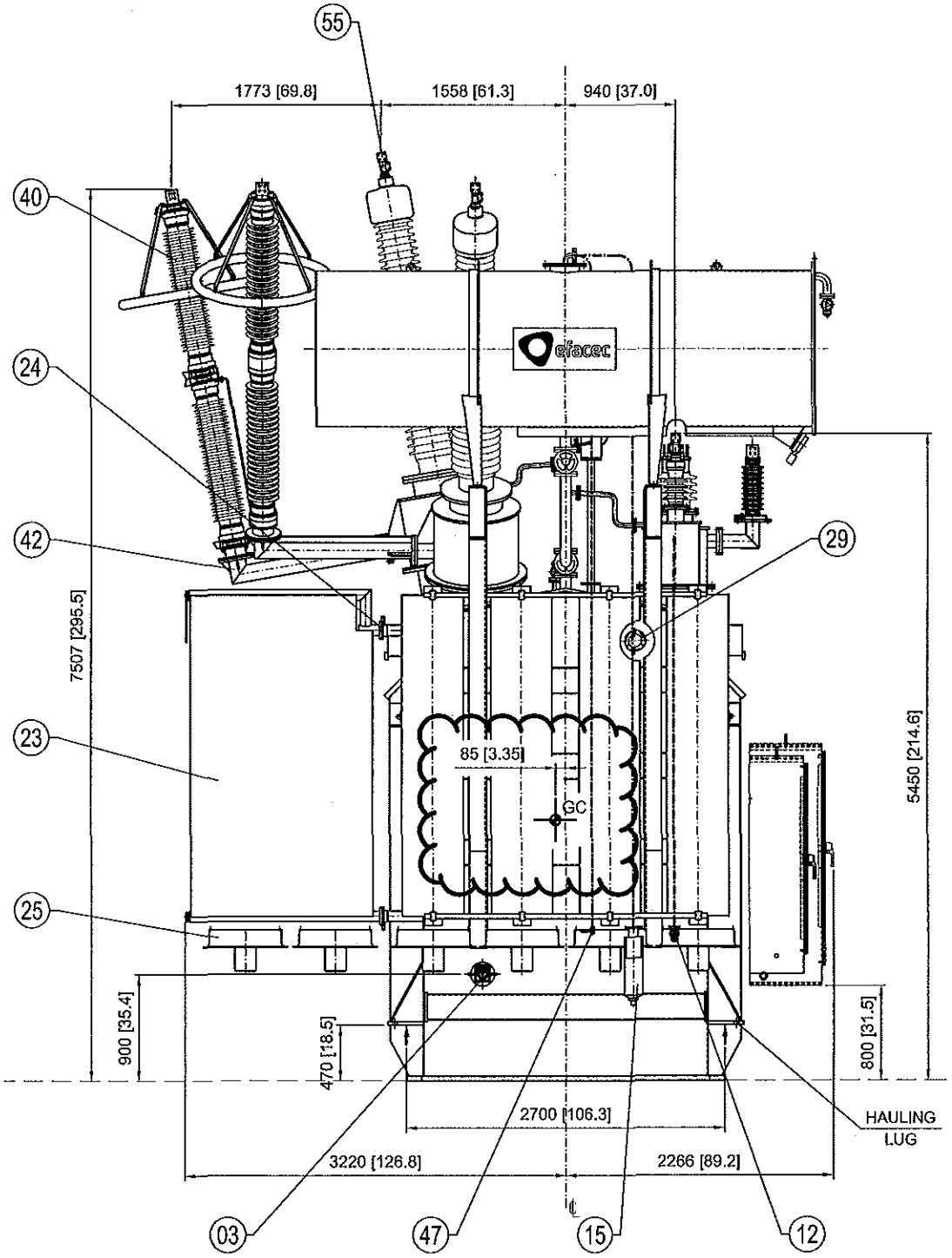
Genesis Solar Energy Center

Transformer-2 Foundation and Containment



Genesis Solar Energy Center

Transformer-2 Foundation and Containment



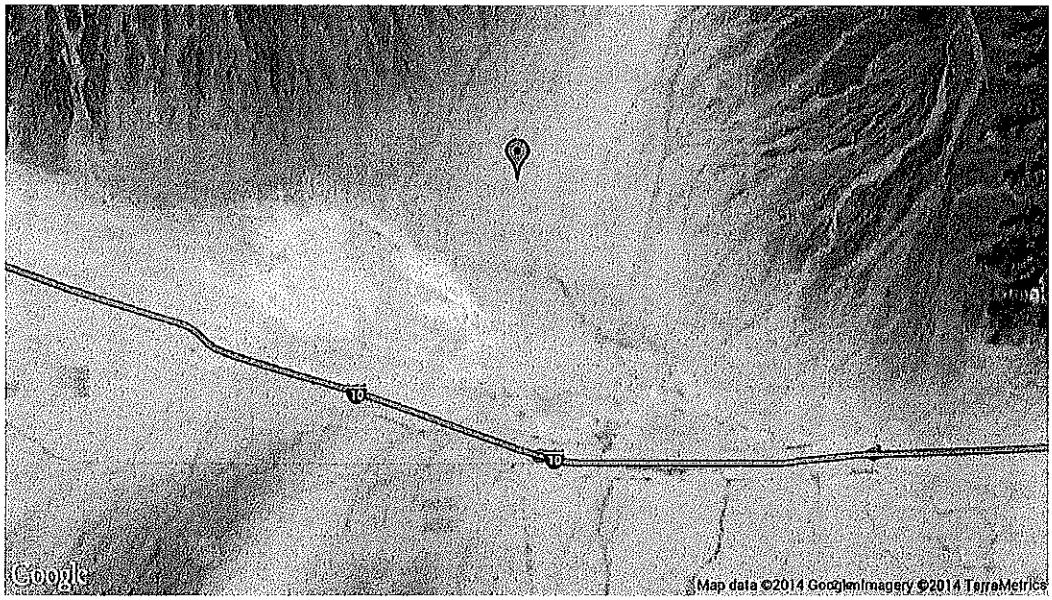
To find the latitude and longitude of a point **Click** on the map, **Drag** the marker, or enter the...

Address: 123 Street, City State/Country GO

Map Center: Get Address - Land Plat Size - Street View - Area Photographs

Try out 3D Google Earth. Google Earth gives you a 3D look of the area around the center of the map, which is usually your last click point, and includes latitude, longitude and elevation information.

Latitude and Longitude of a Point



Clear / Reset | Remove Last Blue Marker | Center Red Marker

Get the Latitude and Longitude of a Point

When you click on the map, move the marker or enter an address the latitude and longitude coordinates of the point are inserted in the boxes below.

Latitude:	33.666272
Longitude:	-114.996334

	Degrees	Minutes	Seconds
Latitude:	33	39	58.5786
Longitude:	-114	59	46.8024

Show Point from Latitude and Longitude

Use this if you know the latitude and longitude coordinates of a point and want to see where on the map the point is.
Use: + for *N* Lat or *E* Long - for *S* Lat or *W* Long.
Example: +40.689060 -74.044636
Note: Your entry should not have any embedded spaces.

Decimal Deg. Latitude:	
Decimal Deg. Longitude:	

Show Point

Example: **+34 40 50.12** for *34N 40' 50.12"*

	Degrees	Minutes	Seconds
Latitude:			
Longitude:			

Show Point

USGS Design Maps Summary Report

User-Specified Input

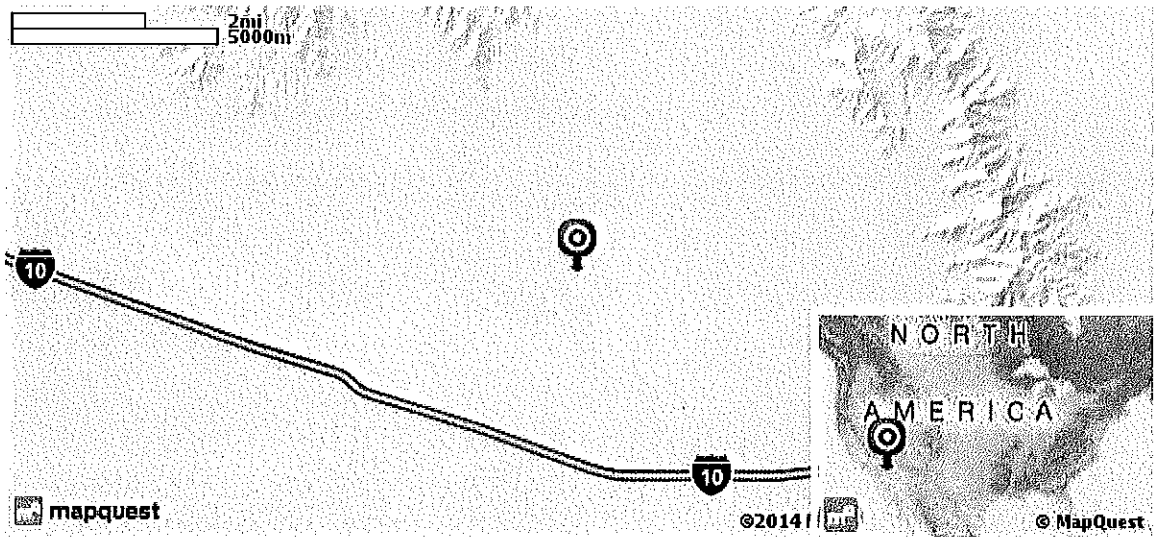
Report Title Genesis Solar Project

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 33.66627°N, 114.99633°W

Site Soil Classification Site Class C – "Very Dense Soil and Soft Rock"

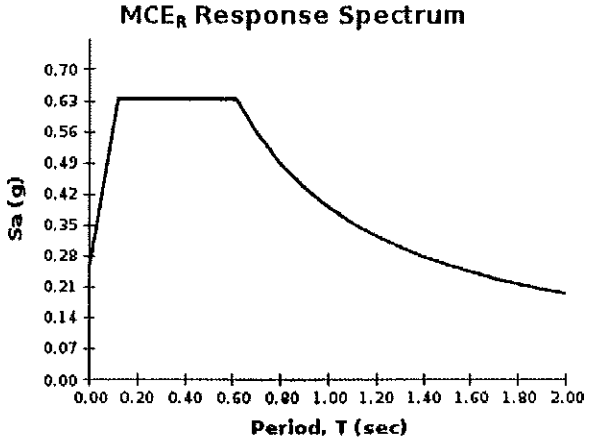
Risk Category IV (e.g. essential facilities)

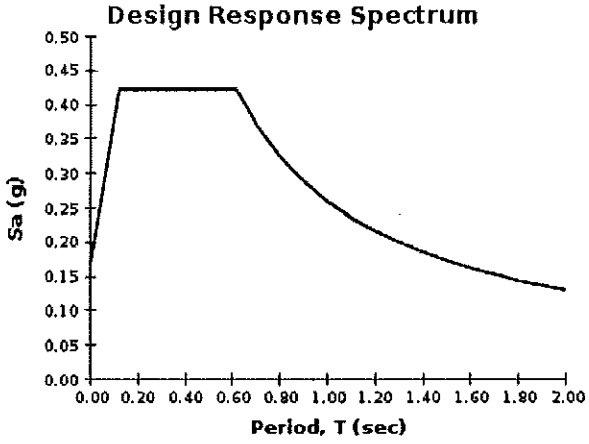


USGS-Provided Output

S_S =	0.534 g	S_{MS} =	0.634 g	S_{DS} =	0.423 g
S_1 =	0.252 g	S_{M1} =	0.390 g	S_{D1} =	0.260 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Equipment Forces

2013 CBC

Seismic Forces:

$F_p=((0.4ap\ S_{DS}\ Ip)/R_p)*(1+2z/h)*W_p$ Per ASCE7-10 Eq. 13.3-1

$F_{pmin}=0.3S_{DS}I_pW_p$ Per ASCE7-10 Eq. 13.3-3

$F_{pmax}=1.6S_{DS}I_pW_p$ Per ASCE7-10 Eq. 13.3-2

S_{DS}=	**0.423**	Fp min=	0.190 Wp
I_P=	1.50	Fp max=	1.015 Wp

Unit =	**Transformer**	
W_p=	326,284 lbs.	
z=	3 ft.	
h=	3 ft.	
a_p=	1.0	
R_p=	2.5	
F_p=	0.305 Wp	
F_p WSD=	0.218 Wp	
F_p WSD=	70,981 lbs.	
h=	7.217 ft.	
d=	8.858 ft.	
Seismic OTM=	512,244 'lbs.	
RM=	1,445,166 'lbs.	
Seismic F.S.=	**2.82**	
Net uplift=	-105,316 lbs.	**No net uplift**
Net Shear=	70,981 lbs.	
# of anchors per side=	2	
Shear per Anchor group=	**35,490 lbs.**	49,687 'lbs. (Strength level force)

USE: (2)-1-1/2" Ø F1554 (105 ksi) threaded rod anchors at each corner
(with 24" min. embedment, typical)

Genesis Solar Energy Center
Transformer-2 Foundation and
Containment

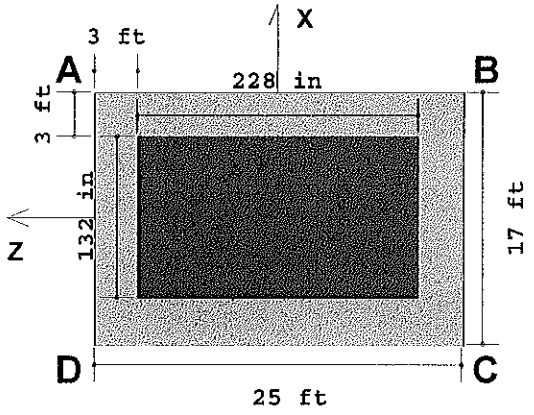
Transformer Footing Design

Transformer design wgt. =	326,284 lbs.
Seismic coeff.=	0.218
Transformer Seismic Shear =	70.98 K
H (C.G.) =	10.217 ft
Pedestal Height =	3 ft.
Pedestal width =	11 ft.
Pedestal length =	19 ft.
Pedestal volume =	627.00 cf
Pedestal wgt. =	94,050 lbs.
Seismic coeff.=	0.218
Pedestal Seismic Shear =	20.46 K
H (C.G.) =	1.500 ft
Total weight =	420,334 lbs.
Total Seismic Shear =	91.44 K
Moment about pedestal base=	755.9 K-ft.

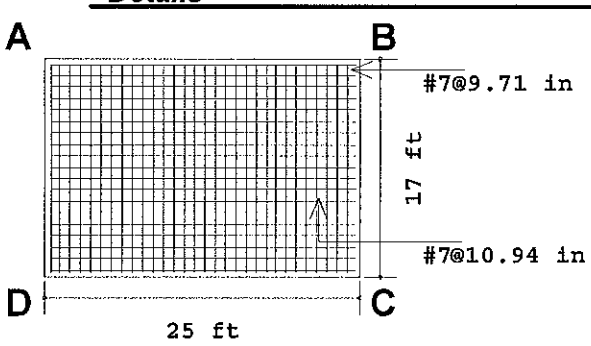
(See attached footing analysis and Design calculations)

Company : **BG Structural Engineering** July 29, 2015
Designer : **KDC**
Job Number : **800.1915** **Pedestal Footing -Biaxial** Checked By:_____

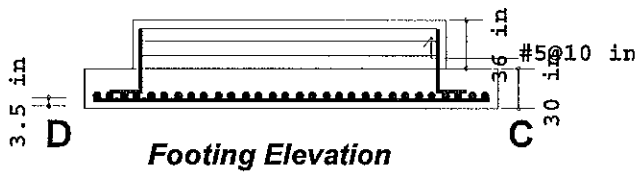
Sketch



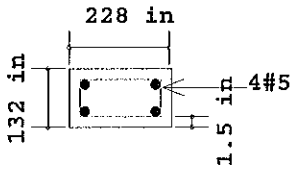
Details



Bottom Rebar Plan



Footing Elevation



Pedestal Rebar Plan

Geometry, Materials and Criteria

Length	:25 ft	eX	:0 in	Gross Allow. Bearing	:3000 psf (gross)	Steel fy	:60 ksi
Width	:17 ft	eZ	:0 in	Concrete Weight	:145 pcf	Minimum Steel	:.0018
Thickness	:30 in	pX	:132 in	Concrete f'c	:4.5 ksi	Maximum Steel	:.0075
Height	:36 in	pZ	:228 in	Design Code	:ACI 318-05		

Footing Top Bar Cover	:3.5 in	Overturning Safety Factor	:1.5	Phi for Flexure	:0.9
Footing Bottom Bar Cover	:3.5 in	Coefficient of Friction	:0.35	Phi for Shear	:0.75
Pedestal Longitudinal Bar Cover	:1.5 in	Passive Resistance of Soil	:.25 k	Phi for Bearing	:0.65

Company : **BG Structural Engineering** July 29, 2015
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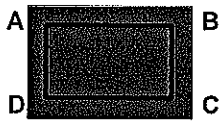
Loads

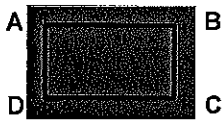
	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL	420.334					0
EL		91.44	91.44	-755.9	755.9	

Soil Bearing

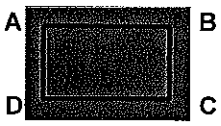
Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
ASCE 2.4.1-1	1DL	3000	1565.44 (A)	.522
ASCE 2.4.1-2	1DL+1LL	3000	1565.44 (A)	.522
ASCE 2.4.1-3a	1DL+1WL	3000	1565.44 (A)	.522
ASCE 2.4.1-3b	1DL+.7EL	3000	2794.81 (A)	.932
ASCE 2.4.1-3c	1DL+.75LL+.75WL	3000	1565.44 (A)	.522
ASCE 2.4.1-3d	1DL+.75LL+.7EL	3000	2794.81 (A)	.932
ASCE 2.4.1-4	.6DL+1WL	3000	939.263 (A)	.313
ASCE 2.4.1-5	.6DL+.7EL	3000	2182.75 (A)	.728



1DL
QA: 1565.44 psf
QB: 1565.44 psf
QC: 1565.44 psf
QD: 1565.44 psf
NAZ: -1 in
NAX: -1 in

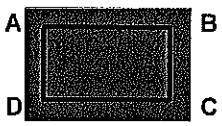


1DL+1LL
QA: 1565.44 psf
QB: 1565.44 psf
QC: 1565.44 psf
QD: 1565.44 psf
NAZ: -1 in
NAX: -1 in

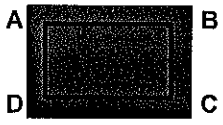


1DL+1WL
QA: 1565.44 psf
QB: 1565.44 psf
QC: 1565.44 psf
QD: 1565.44 psf
NAZ: -1 in
NAX: -1 in

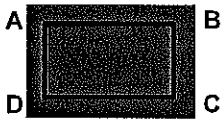
1DL+.7EL
QA: 2794.81 psf
QB: 1799.61 psf
QC: 336.064 psf
QD: 1331.27 psf
NAZ: 842.481 in
NAX: 389.563 in



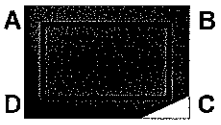
1DL+.75LL+.75WL
QA: 1565.44 psf
QB: 1565.44 psf
QC: 1565.44 psf
QD: 1565.44 psf
NAZ: -1 in
NAX: -1 in



1DL+.75LL+.7EL
QA: 2794.81 psf
QB: 1799.61 psf
QC: 336.064 psf
QD: 1331.27 psf
NAZ: 842.481 in
NAX: 389.563 in



.6DL+1WL
QA: 939.263 psf
QB: 939.263 psf
QC: 939.263 psf
QD: 939.263 psf
NAZ: -1 in
NAX: -1 in



.6DL+.7EL
QA: 2182.75 psf
QB: 1170.58 psf
QC: 0 psf
QD: 701.269 psf
NAZ: 646.95 in
NAX: 300.565 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
ACI-99 9-1	1.4DL+1.7LL	128.835	1.1	189.463	1.618
ACI-99 9-2	1.05DL+1.275LL+1.275WL	96.626	.825	142.097	1.213
ACI-99 9-3	.9DL+1.3WL	82.822	.707	121.798	1.04
IBC 16-5	1.2DL+1LL+1EL	160.46	1.371	266.167	2.275
IBC 16-6	.9DL+1EL	133.14	1.137	225.993	1.931

Company : **BG Structural Engineering** July 29, 2015
Designer : **KDC**
Job Number : **800.1915** **Pedestal Footing -Biaxial** Checked By:_____

Footing Shear Check

Two Way (Punching) Vc: 4704.74 k One Way (X Dir. Cut) Vc 713.317 k One Way (Z Dir. Cut) Vc: 1049 k

Description	Categories and Factors	Punching Vu(k)	Punching Vu/ØVc	X Dir. Cut Vu(k)	X Dir. Cut Vu/ØVc	Z Dir. Cut Vu(k)	Z Dir. Cut Vu/ØVc
ACI-99 9-1	1.4DL+1.7LL	246.094	.07	23.709	.044	34.866	.044
ACI-99 9-2	1.05DL+1.275LL+1.275WL	184.571	.052	17.782	.033	26.15	.033
ACI-99 9-3	.9DL+1.3WL	158.203	.045	15.242	.028	22.414	.028
IBC 16-5	1.2DL+1LL+1EL	210.938	.06	29.998	.056	50.474	.064
IBC 16-6	.9DL+1EL	158.947	.045	24.975	.047	43.091	.055

Pedestal Design

Shear Check Results (Envelope):
Shear Along X Direction Vc: 3963.24 k Vs: 476.991 k Vu: 91.44 k Vu/ØVn:.027 Ø: .75
Shear Along Z Direction Vc: 3994.63 k Vs: 830.42 k Vu: 91.44 k Vu/ØVn:.025
Pedestal Ties: #5 @ 10 in

Bending Check Results (Envelope):

		Phi	:.9	Parme Beta	:.65
Pu	:0 k	Mux	:-1030.22 k-ft	Muz:	:1030.22 k-ft
Pn	:0 k	Mnx	:1144.69 k-ft	Mnz:	:1144.69 k-ft
		Mnox	:699.048 k-ft	Mnoz	:404.712 k-ft
Pedestal Bars:	#5	% Steel: .004			

Compression Development Length Pedestal Bars (Envelope):
Lreq.: 11.25 in Lpro.: 24.125 in Lreq./Lpro.: .466

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 164158 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/ØBc
ACI-99 9-1	1.4DL+1.7LL	931.436	.009
ACI-99 9-2	1.05DL+1.275LL+1.275WL	698.577	.007
ACI-99 9-3	.9DL+1.3WL	598.78	.006
IBC 16-5	1.2DL+1LL+1EL	798.374	.007
IBC 16-6	.9DL+1EL	598.78	.006

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
ASCE 2.4.1-1	1DL	0	8316.39	0	5655.15	NA	NA
ASCE 2.4.1-2	1DL+1LL	0	8316.39	0	5655.15	NA	NA
ASCE 2.4.1-3a	1DL+1WL	0	8316.39	0	5655.15	NA	NA
ASCE 2.4.1-3b	1DL+.7EL	881.174	8316.39	881.174	5655.15	9.438	6.418
ASCE 2.4.1-3c	1DL+.75LL+.75WL	0	8316.39	0	5655.15	NA	NA
ASCE 2.4.1-3d	1DL+.75LL+.7EL	881.174	8316.39	881.174	5655.15	9.438	6.418
ASCE 2.4.1-4	.6DL+1WL	0	4989.84	0	3393.09	NA	NA
ASCE 2.4.1-5	.6DL+.7EL	881.174	4989.84	881.174	3393.09	5.663	3.851

Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

Sliding Check (Service)

Description	Categories and Factors	Va-XX (k)	Vr-XX (k)	Va-ZZ (k)	Vr-ZZ (k)	SR-XX	SR-ZZ
ASCE 2.4.1-1	1DL	0	233.109	0	233.109	NA	NA
ASCE 2.4.1-2	1DL+1LL	0	233.109	0	233.109	NA	NA
ASCE 2.4.1-3a	1DL+1WL	0	233.109	0	233.109	NA	NA
ASCE 2.4.1-3b	1DL+.7EL	64.008	233.109	64.008	233.109	3.642	3.642
ASCE 2.4.1-3c	1DL+.75LL+.75WL	0	233.109	0	233.109	NA	NA
ASCE 2.4.1-3d	1DL+.75LL+.7EL	64.008	233.109	64.008	233.109	3.642	3.642
ASCE 2.4.1-4	.6DL+1WL	0	139.965	0	139.965	NA	NA
ASCE 2.4.1-5	.6DL+.7EL	64.008	139.965	64.008	139.965	2.187	2.187

Va-XX: Applied Lateral Force to Cause Sliding Along XX Axis
Vr-XX: Resisting Lateral Force Against Sliding Along XX Axis
SR-XX: Ratio of Vr-XX to Va-XX

Untitled Calculation - Click to Edit | **ACI Appendix D - Anchorage to Concrete**

Model

Anchor Bolt
1-1/2" Threaded Rod
Square
futa = 105.00 ksi
Embed Depth 24"
Anchors Welded to Base Plate

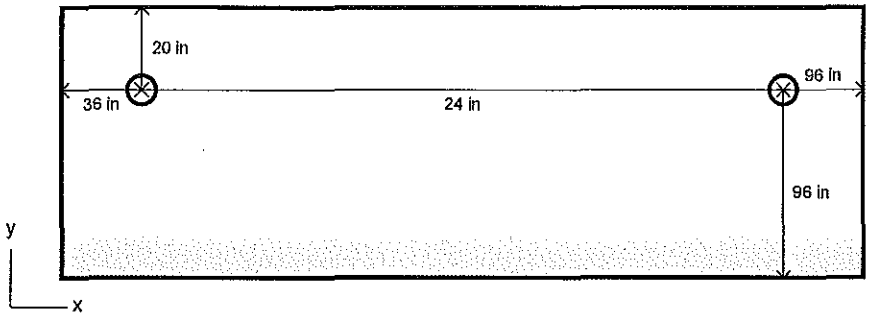
Concrete
ACI Chapter 9
f'c = 4.50 ksi
thickness = 36"
Seismic Provisions Apply

Loads
Tension = 0.00 kips
Shear X = 49.70 kips
Shear Y = 49.70 kips

Tension Steel
Bars Cross Failure Plane (D.5.2.9)

Shear X Steel
No. 4 or greater between anchor and edge (D.6.2.7)

Shear Y Steel
No. 4 or greater between anchor and edge (D.6.2.7)



Drawing Not to Scale

✓ **Design OK** **X Interaction = 0.25** **Y Interaction = 0.40**

✓ Tensile Capacity
φNn = 101 kips
Breakout Controls

✓ Shear X Capacity
φVnx = 115 kips
Bolt Shear Controls

✓ Shear Y Capacity
φVny = 86.1 kips
Breakout Controls

Tension Calcs

Bolt Tension (D.5.1) = 222 kips
$\varphi N_{sa} = \varphi n A_{se} f_{uta}$
$\varphi = 0.75$, $n = 2$, $A_{se} = 1.41$ in^2
$f_{uta} = 105$ ksi

Concrete Breakout (D.5.2) = 101 kips
$\varphi N_{cb} = \varphi A_{nc}/A_{nco} \psi_{ec} \psi_{ed} \psi_c \psi_{cp} N_b$
$\varphi = 0.7$, $A_{nc} = 5.38e+3$ in^2, $A_{nco} = 5.18e+3$ in^2
$\psi_{ec} = 1.0$, $\psi_{ed} = 0.867$, $\psi_c = 1.0$
$\psi_{cp} = 1.0$, $N_b = 214$ kips, $h_{ef} = 24.0$ in, $k_c = 24$

Pullout (D.5.3) = 125 kips
$\varphi N_{pn} = \varphi \psi_c N_p$
$\varphi = 0.7$, $\psi_c = 1.0$, $N_p = 119$ kips
$A_{brg} = 3.295$ in^2

Side-Face Blowout (D.5.4) = N/A
$\varphi N_{sb} = \varphi (1+s/(6\, c_{a1}))\, 160\, c_{a1} \sqrt{A_{brg} f'_c}$
$\varphi = 0.7$, $c_{a1} = 20.0$

Shear Calcs

X-Direction

Bolt Shear (D.6.1) = 115 kips
$\varphi V_{sa} = \varphi n A_{se} f_{uta}$
$\varphi = 0.65$, $n = 2$, $A_{se} = 1.41$ in^2
$f_{uta} = 105$ ksi

Concrete Breakout (D.6.2) = 153 kips
$\varphi V_{cb} = \varphi A_{vc}/A_{vco} \psi_{ec} \psi_{ed} \psi_c V_b$
$\varphi = 0.7$, $A_{vc} = 4.18e+3$ in^2, $A_{vco} = 6.48e+4$ in^2
$\psi_{ec} = 1.0$, $\psi_{ed} = 0.733$, $\psi_c = 1.0$
$\psi_h = 1.0$, $V_b = 1.15e+3$ kips, $c_{a1} = 120$ in

Concrete Pryout (D.6.3) = 202 kips
$\varphi V_{cp} = \varphi k_{cp} N_{cb}$
$\varphi = 0.7$, $k_{cp} = 2.00$

Y-Direction

Bolt Shear (D.6.1) = 115 kips
$\varphi V_{sa} = \varphi n A_{se} f_{uta}$
$\varphi = 0.65$, $n = 2$, $A_{se} = 1.41$ in^2
$f_{uta} = 105$ ksi

Concrete Breakout (D.6.2) = 86.1 kips
$\varphi V_{cb} = \varphi A_{vc}/A_{vco} \psi_{ec} \psi_{ed} \psi_c V_b$
$\varphi = 0.7$, $A_{vc} = 3.46e+3$ in^2, $A_{vco} = 2.59e+3$ in^2
$\psi_{ec} = 1.0$, $\psi_{ed} = 1.00$, $\psi_c = 1.0$
&psih = 1.0, $V_b = 102$ kips, $c_{a1} = 24.0$ in

Concrete Pryout (D.6.3) = 202 kips
$\varphi V_{cp} = \varphi k_{cp} N_{cb}$
$\varphi = 0.7$, $k_{cp} = 2.00$

PROJECT	B.G. STRUCTURAL ENGINEERING	SHEET NO. 20
Genesis Solar Energy Ctr Transformer #2 Foundation		JOB NO. 800.1915
ITEM Column For Electrical Boxes		DATE Aug. 2015
		ENGINEER BG

COLUMN / FOUNDATION DESIGN

WIND SPEED = 16 PSF (EXPOSURE C @ 127 MPH)

ELECTRICAL CIRCUIT BOXES (DEAD LOAD)

LARGE CIRCUIT BOX : 60# +/- ← GOVERNS P_{DEAD}
SMALL CIRCUIT BOX : 21# +/-

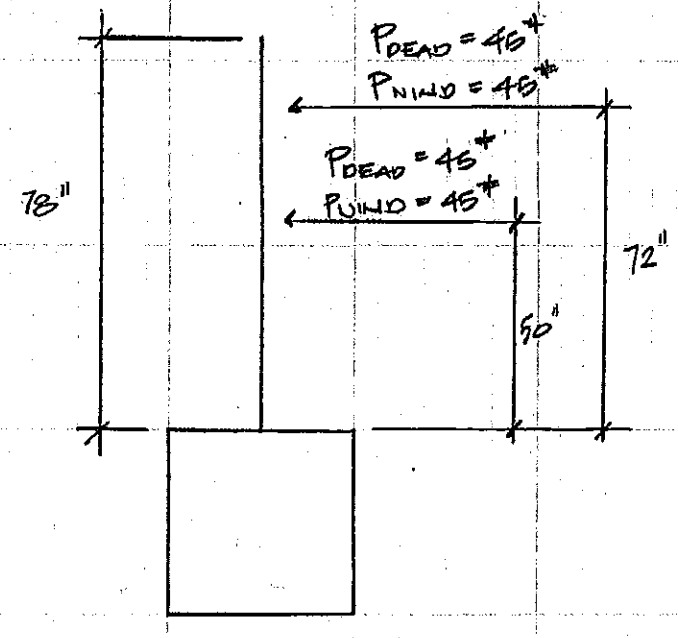
WIND LOAD

GOVERNING AREA : 2'-0" x 2'-0" (LARGE CIRCUIT BOX)

$P_{WIND} = (16\ PSF)(2')(2') = 64\#$ ← GOVERNS P_{WIND}

→ $P_{DEAD} = 60\#$ @ 4 ANCHOR POINTS

→ $P_{WIND} = 64\#$ @ 4 ANCHOR POINTS



→ USE HSS 2.875 x 0.250 PIPE COLUMN

→ USE 18"ϕ x 3'-0" DEEP CONC FTG W/ (4)-#4 VERT & #3 TIES @ 8" OC

B.G Structural Engineering, Inc.
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Project Title: Genesis Solar Energy Center - Transformer #2
Engineer: BG
Project ID: 800.1915
Project Descr:

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Steel Column

Lic. # : KW-06008402

Description : Column C1

Code References

Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2012

General Information

Steel Section Name :	**HSS 2.875x0.250**
Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	42.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi
Load Combination :	IBC 2012

Overall Column Height 6.50 ft
Top & Bottom Fixity Top Free, Bottom Fixed
Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for X-X Axis buckling = 6.5 ft, K = 2.1
Y-Y (depth) axis :
Unbraced Length for Y-Y Axis buckling = 6.5 ft, K = 2.1

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 45.60 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 6.50 ft, D = 0.0250 k
BENDING LOADS . . .
Lat. Point Load at 6.0 ft creating Mx-x, D = 0.0450, W = 0.0450 k
Lat. Point Load at 4.330 ft creating Mx-x, D = 0.0450, W = 0.0450 k

DEFLECTION CHECK:

$\Delta_{ALL} = 0.025(6.5)(12) = 1.95"$

$\Delta_{ALL} = 1.95" >> \Delta_{ACT} = 0.323"$ ✓ OK

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2214** : 1
Load Combination +D+0.60W+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Pa : Axial 0.07060 k
Pn / Omega : Allowable 9.513 k
Ma-x : Applied -0.7438 k-ft
Mn-x / Omega : Allowable 3.416 k-ft
Ma-y : Applied 0.0 k-ft
Mn-y / Omega : Allowable 3.416 k-ft

PASS Maximum Shear Stress Ratio = **0.009889** : 1
Load Combination +D+0.60W+H
Location of max.above base 0.0 ft
At maximum location values are . . .
Va : Applied 0.1440 k
Vn / Omega : Allowable 14.562 k

Maximum SERVICE Load Reactions . .

Top along X-X	0.0 k
Bottom along X-X	0.0 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.1440 k

Maximum SERVICE Load Deflections . . .

Along Y-Y 0.3225 in at 6.50 ft above base
for load combination :+D+0.60W+H

Along X-X 0.0 in at 0.0 ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.140	PASS	0.00 ft	0.006	PASS	0.00 ft
+D+L+H	0.140	PASS	0.00 ft	0.006	PASS	0.00 ft
+D+Lr+H	0.140	PASS	0.00 ft	0.006	PASS	0.00 ft
+D+S+H	0.140	PASS	0.00 ft	0.006	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.140	PASS	0.00 ft	0.006	PASS	0.00 ft
+D+0.750L+0.750S+H	0.140	PASS	0.00 ft	0.006	PASS	0.00 ft
+D+0.60W+H	0.221	PASS	0.00 ft	0.010	PASS	0.00 ft
+D+0.70E+H	0.140	PASS	0.00 ft	0.006	PASS	0.00 ft
+D+0.750Lr+0.750L+0.450W+H	0.201	PASS	0.00 ft	0.009	PASS	0.00 ft
+D+0.750L+0.750S+0.450W+H	0.201	PASS	0.00 ft	0.009	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.140	PASS	0.00 ft	0.006	PASS	0.00 ft
+0.60D+0.60W+0.60H	0.166	PASS	0.00 ft	0.007	PASS	0.00 ft
+0.60D+0.70E+0.60H	0.084	PASS	0.00 ft	0.004	PASS	0.00 ft

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Engineer: BG
Project Descr:
Project ID: 800.1915

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Steel Column

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Description : Column C1

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base
+D+H		k	-0.090	k	0.071 k
+D+L+H		k	-0.090	k	0.071 k
+D+Lr+H		k	-0.090	k	0.071 k
+D+S+H		k	-0.090	k	0.071 k
+D+0.750Lr+0.750L+H		k	-0.090	k	0.071 k
+D+0.750L+0.750S+H		k	-0.090	k	0.071 k
+D+0.60W+H		k	-0.144	k	0.071 k
+D+0.70E+H		k	-0.090	k	0.071 k
+D+0.750Lr+0.750L+0.450W+H		k	-0.131	k	0.071 k
+D+0.750L+0.750S+0.450W+H		k	-0.131	k	0.071 k
+D+0.750L+0.750S+0.5250E+H		k	-0.090	k	0.071 k
+0.60D+0.60W+0.60H		k	-0.108	k	0.042 k
+0.60D+0.70E+0.60H		k	-0.054	k	0.042 k
D Only		k	-0.090	k	0.071 k
Lr Only		k		k	k
L Only		k		k	k
S Only		k		k	k
W Only		k	-0.090	k	k
E Only		k		k	k
H Only		k		k	k

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
+D+H	0.0000	in	0.000	ft	0.202	in	6.500	ft
+D+L+H	0.0000	in	0.000	ft	0.202	in	6.500	ft
+D+Lr+H	0.0000	in	0.000	ft	0.202	in	6.500	ft
+D+S+H	0.0000	in	0.000	ft	0.202	in	6.500	ft
+D+0.750Lr+0.750L+H	0.0000	in	0.000	ft	0.202	in	6.500	ft
+D+0.750L+0.750S+H	0.0000	in	0.000	ft	0.202	in	6.500	ft
+D+0.60W+H	0.0000	in	0.000	ft	0.323	in	6.500	ft
+D+0.70E+H	0.0000	in	0.000	ft	0.202	in	6.500	ft
+D+0.750Lr+0.750L+0.450W+H	0.0000	in	0.000	ft	0.292	in	6.500	ft
+D+0.750L+0.750S+0.450W+H	0.0000	in	0.000	ft	0.292	in	6.500	ft
+D+0.750L+0.750S+0.5250E+H	0.0000	in	0.000	ft	0.202	in	6.500	ft
+0.60D+0.60W+0.60H	0.0000	in	0.000	ft	0.242	in	6.500	ft
+0.60D+0.70E+0.60H	0.0000	in	0.000	ft	0.121	in	6.500	ft
D Only	0.0000	in	0.000	ft	0.202	in	6.500	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.202	in	6.500	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Steel Section Properties : HSS 2.875x0.250

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Project Descr:
Project ID: 800.1915

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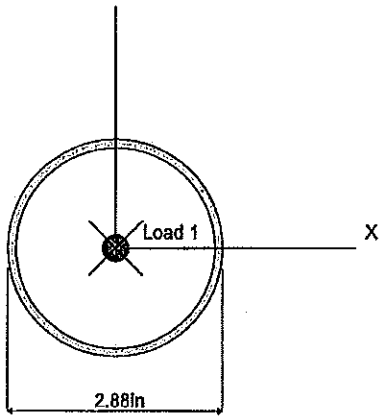
Steel Column

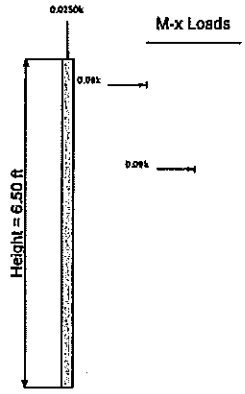
Lic. # : KW-06008402
Licensee : BG STRUCTURAL ENGINEERING INC.

Description : Column C1

Steel Section Properties : HSS 2.875x0.250

Depth	=	2.875 in	I xx	=	1.70 in^4	J	=	3.400 in^4
			S xx	=	1.18 in^3			
Diameter	=	2.875 in	R xx	=	0.938 in			
Wall Thick	=	0.250 in	Zx	=	1.630 in^3			
Area	=	1.930 in^2	I yy	=	1.700 in^4	C	=	2.370 in^3
Weight	=	7.015 plf	S yy	=	1.180 in^3			
			R yy	=	0.938 in			
Ycg	=	0.000 in						





Loads are total entered value. Arrows do not reflect absolute direction.

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Pole Footing Embedded in Soil

Lic. # : KW-06008402 — Licensee : BG STRUCTURAL ENGINEERING INC.

Description : Foundation @ Column C1

Code References

Calculations per IBC 2012 1807.3, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2012

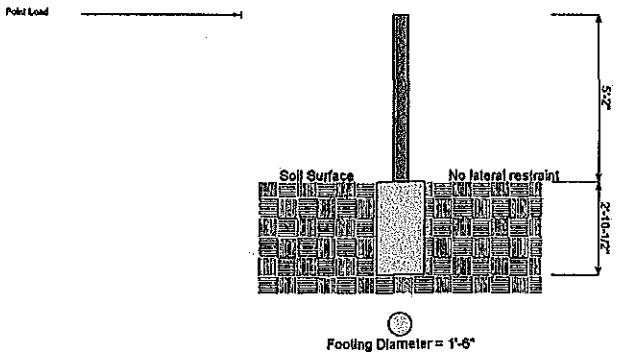
General Information

Pole Footing Shape	Circular
Footing Diameter	18.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	250.0 pcf
Max Passive	3,000.0 psf

Controlling Values

Governing Load Combination : +D+0.60W+H

Lateral Load	0.1440 k
Moment	0.7439 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	235.502 psf
Allowable	236.925 psf
Minimum Required Depth	**2.875 ft**
Footing Base Area	1.767 ft^2
Maximum Soil Pressure	0.01415 ksf



Applied Loads

	Lateral Concentrated Load	Lateral Distributed Load	Vertical Load
D : Dead Load	0.090 k	k/ft	0.0250 k
Lr : Roof Live	k	k/ft	k
L : Live	k	k/ft	k
S : Snow	k	k/ft	k
W : Wind	0.090 k	k/ft	k
E : Earthquake	k	k/ft	k
H : Lateral Earth	k	k/ft	k
Load distance above ground surface	5.166 ft	TOP of Load above ground surface ft	
		BOTTOM of Load above ground surface ft	

Load Combination Results

Load Combination	Forces @ Ground Surface Loads - (k)	Moments - (ft-k)	Required Depth - (ft)	Pressure at 1/3 Depth Actual - (psf)	Allow. - (psf)	Soil Increase Factor
+D+H	0.090	0.465	2.50	198.0	198.7	1.000
+D+L+H	0.090	0.465	2.50	198.0	198.7	1.000
+D+Lr+H	0.090	0.465	2.50	198.0	198.7	1.000
+D+S+H	0.090	0.465	2.50	198.0	198.7	1.000
+D+0.750Lr+0.750L+H	0.090	0.465	2.50	198.0	198.7	1.000
+D+0.750L+0.750S+H	0.090	0.465	2.50	198.0	198.7	1.000
+D+0.60W+H	0.144	0.744	2.88	235.5	236.9	1.000
+D+0.70E+H	0.090	0.465	2.50	198.0	198.7	1.000
+D+0.750Lr+0.750L+0.450W+H	0.131	0.674	2.75	227.8	227.9	1.000

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Pole Footing Embedded in Soil

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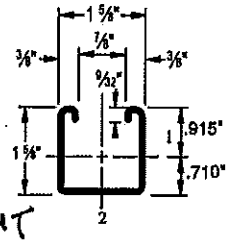
Lic. # : KW-06008402 Licensee : BG STRUCTURAL ENGINEERING INC.

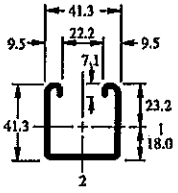
Description : Foundation @ Column C1

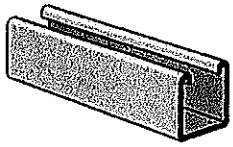
+D+0.750L+0.750S+0.450W+H	0.131	0.674	2.75	227.8	227.9	1.000
+D+0.750L+0.750S+0.5250E+H	0.090	0.465	2.50	198.0	198.7	1.000
+0.60D+0.60W+0.60H	0.108	0.558	2.63	211.2	212.9	1.000
+0.60D+0.70E+0.60H	0.054	0.279	2.00	163.7	164.9	1.000

P1000®

GR HG PG PL



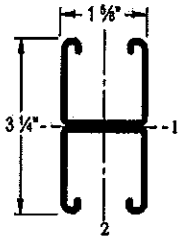


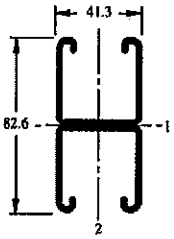


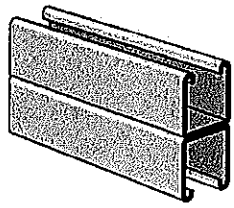
Wt/100 Ft:189 Lbs (281 kg/100 m)
Allowable Moment 5,070 In-Lbs (570 N•m)
12 Gauge Nominal Thickness .105" (2.7mm)

P1001

GR HG PG PL

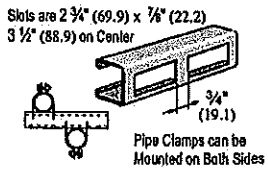






Wt/100 Ft: 378 Lbs (562 kg/100 m)
Allowable Moment 14,360 In-Lbs (1,620 N•m)
12 Gauge Nominal Thickness .105" (2.7mm)

P1000 DS



Wt/100 Ft: 173 Lbs (257 kg/100 m)

P1000 H3

GR HG PG PL

Wt/100 Ft: 175 Lbs (260 kg/100 m)

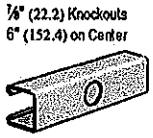
P1000 HS

GR HG PG PL

Wt/100 Ft:185 Lbs (275 kg/100 m)

P1000 KO

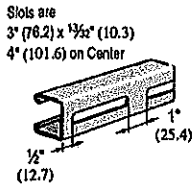
GR PG



Wt/100 Ft: 190 Lbs (283 kg/100 m)

P1000 SL

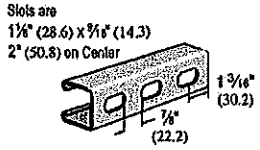
GR HG PG PL



Wt/100 Ft: 185 Lbs (275 kg/100 m)

P1000 T

GR HG PG PL



Wt/100 Ft: 185 Lbs (275 kg/100 m)

Channel Nuts (Refer to Pages 73,74 for Details)

See Page 73, 74

P1006-0832
P1006-1024
P1006-1420
P1007
P1008
P1009
P1010

P1008T
P1006T1420
P1010T

P1024
P1012S
P1023S

P1012
P1023
P1024S

P3006-0832
P3006-1024
P3006-1420
P3007
P3008
P3009
P3010

P3016-0632
P3016-0832
P3016-1024
P3016-1420

Channel Finishes: PL, GR, HG, PG, ZD; Standard Lengths: 10' & 20'

P1000 - Beam Loading

Span In	Max. Allowable Uniform Load Lbs	Defl. at Uniform Load In	Uniform Loading at Deflection Span/180 Lbs	Span/240 Lbs	Span/360 Lbs
24	1,690	0.06	1,690	1,690	1,690
36	1,130	0.13	1,130	1,130	900
48	850	0.22	850	760	500
60	680	0.35	650	480	320
72	560	0.50	450	340	220
84	480	0.68	330	250	160
96	420	0.89	250	190	130
108	380	1.14	200	150	100
120	340	1.40	160	120	80
144	280	2.00	110	80	60
168	240	2.72	80	60	40
192	210	3.55	60	50	NR
216	190	4.58	50	40	NR
240	170	5.62	40	NR	NR

P1000 5'-0" SPAN

P1001 - Beam Loading

Span In	Max. Allowable Uniform Load Lbs	Defl. at Uniform Load In	Uniform Loading at Deflection Span/180 Lbs	Span/240 Lbs	Span/360 Lbs
24	3,500*	0.02	3,500*	3,500*	3,500*
36	3,190	0.07	3,190	3,190	3,190
48	2,390	0.13	2,390	2,390	2,390
60	1,910	0.20	1,910	1,910	1,620
72	1,600	0.28	1,600	1,600	1,130
84	1,370	0.39	1,370	1,240	830
96	1,200	0.51	1,200	950	630
108	1,060	0.64	1,000	750	500
120	960	0.79	810	610	410
144	800	1.14	560	420	280
168	680	1.53	410	310	210
192	600	2.02	320	240	160
216	530	2.54	250	190	130
240	480	3.16	200	150	100

P1000 - Column Loading

Unbraced Height In	Max. Allowable Load at Slot Face Lbs	Maximum Column Load Applied at C.G. K = 0.65 Lbs	K = 0.80 Lbs	K =1.0 Lbs	K = 1.2 Lbs
24	3,550	10,740	9,890	8,770	7,740
36	3,190	8,910	7,740	6,390	5,310
48	2,770	7,260	6,010	4,690	3,800
60	2,380	5,910	4,690	3,630	2,960
72	2,080	4,840	3,800	2,960	2,400
84	1,860	4,040	3,200	2,480	1,980
96	1,670	3,480	2,750	2,110	1,660
108	1,510	3,050	2,400	1,810	**
120	1,380	2,700	2,110	**	**
144	1,150	2,180	1,660	**	**

P1001 - Column Loading

Unbraced Height In	Max. Allowable Load at Slot Face Lbs	Maximum Column Load Applied at C.G. K = 0.65 Lbs	K = 0.80 Lbs	K =1.0 Lbs	K = 1.2 Lbs
24	6,430	24,280	23,610	22,700	21,820
36	6,290	22,810	21,820	20,650	19,670
48	6,160	21,410	20,300	18,670	16,160
60	6,000	20,210	18,670	15,520	12,390
72	5,620	18,970	16,160	12,390	8,950
84	5,170	16,950	13,630	9,470	6,580
96	4,690	14,890	11,190	7,250	5,040
108	4,170	12,850	8,950	5,730	3,980
120	3,690	10,900	7,250	4,640	**
144	2,930	7,630	5,040	**	**

P1000/P1001 - Elements of Section

Parameter	P1000		P1001	
Area of Section	0.555	in^2	1.111	in^2
Axis 1-1				
Moment of Inertia (I)	0.185	in^4	0.928	in^4
Section Modulus (S)	0.202	in^3	0.571	in^3
Radius of Gyration (r)	0.577	In	0.914	In
Axis 2-2				
Moment of Inertia (I)	0.236	in^4	0.471	in^4
Section Modulus (S)	0.290	in^3	0.580	in^3
Radius of Gyration (r)	0.651	In	0.651	In

Notes:

* Load limited by spot weld shear.

** KL/r > 200

NR = Not Recommended.

1. Beam loads are given in *total* uniform load (W Lbs) not uniform load (w lbs/ft or w lbs/in).
2. Beam loads are based on a simple span and assumed to be adequately laterally braced. Unbraced spans can reduce beam load carrying capacity. Refer to Page 62 for reduction factors for unbraced lengths.
3. For pierced channel, multiply beam loads by the following factor:

"KO" Series.....95%	"T" Series 85%
"HS" Series 90%	"SL" Series.....85%
"H3" Series.....90%	"DS" Series.....70%

4. Deduct channel weight from the beam loads.
5. For concentrated midspan point loads, multiply beam loads by 50% and the corresponding deflection by 80%. For other load conditions refer to page 18.
6. All beam loads are for bending about Axis 1-1.

PROJECT	B.G. STRUCTURAL ENGINEERING	SHEET NO.
Genesis Solar Energy Ctr Transformer #2 Foundation		JOB NO. 800.1915
ITEM Footing @ Lighting Protection Pole		DATE Aug. 2015
		ENGINEER BG

BASIC WIND SPEED = 127 MPH (EXPOSURE C)

USE P_{WIND} = 18.0 PSF @ LIGHTING PROTECTION POLE

WIND LOADS & RESULTANTS

Ⓐ $(39' \times 7/12) = 22.75 FT^2 \times 19.5' = 444 FT^3$

Ⓑ $\pi R^2 = 12.5 FT^2 \times 1.5' = 19 FT^3$

TOTALS: $39.25 FT^2$ $463 FT^3$

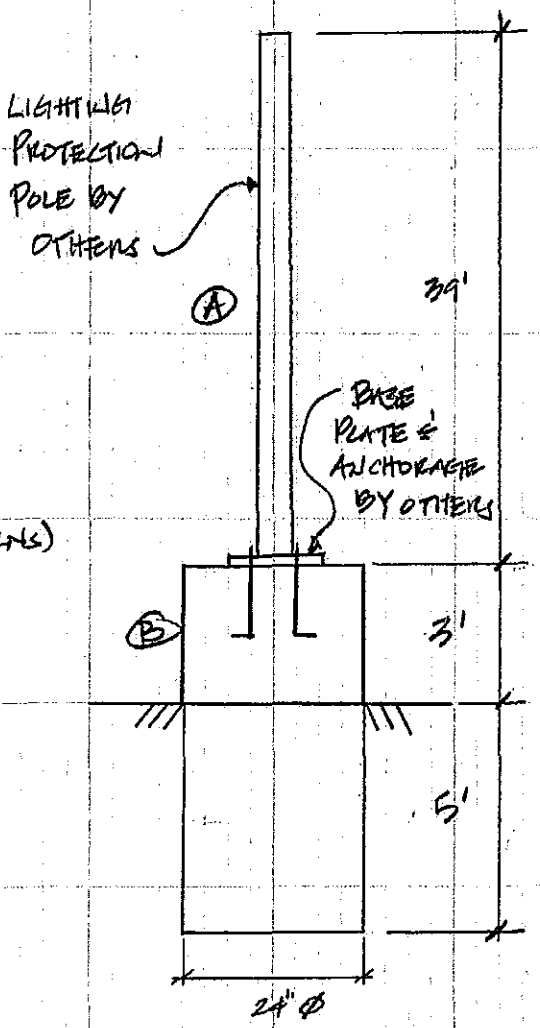
$$h' = \frac{463 FT^3}{39.25 FT^2} = 11.25'$$

$F_{WIND} = (18.0 \#/FT^2)(39.25 FT^2) = \underline{\underline{635\#}}$ (GOVERNS)

$P_{POLE} = 500\#$

$F_{EQ} = (.342)(500\#) = 172\#$

$H = 11.25' + 3' = \underline{\underline{14.25'}}$



USE 24" Ø × 5'-0" DEEP CONC FTG

W/(5)-#5 VERT & #3 TIES @ 8" OC

B.G Structural Engineering, Inc.
75-175 Merle Drive, Suite 200
Palm Desert, CA 92211
760-568-3553 Voice
760-568-5681 Fax

Project Title: Genesis Solar Energy Center - Transformer #2
Engineer: BG
Project Descr:
Project ID: 800.1915

Printed: 12 AUG 2015, 3:06PM
File = s:\EC6-DA~1\805ADF~1.EC6
ENERCALC, INC. 1983-2015, Build:6.15.7.30, Ver:6.15.7.30
Licensee : BG STRUCTURAL ENGINEERING INC.

Pole Footing Embedded in Soil

Lic. # : KW-06008402

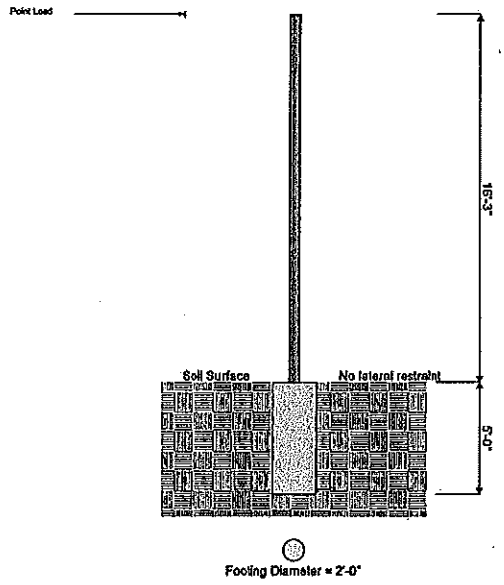
Description : Footing @ Lighting Protection Pole

Code References

Calculations per IBC 2012 1807.3, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2012

General Information

Pole Footing Shape	Circular
Footing Diameter	24.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	250.0 pcf
Max Passive	1,500.0 psf



Controlling Values

Governing Load Combination : +D+0.60W+H

Lateral Load	0.3810 k
Moment	6.191 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	412.178 psf
Allowable	412.566 psf
Minimum Required Depth	**5.0 ft**
Footing Base Area	3.142 ft^2
Maximum Soil Pressure	0.1592 ksf

Applied Loads

	Lateral Concentrated Load	Lateral Distributed Load	Vertical Load
D : Dead Load	0.0 k	0.0 k/ft	0.50 k
Lr : Roof Live	0.0 k	0.0 k/ft	0.0 k
L : Live	0.0 k	0.0 k/ft	0.0 k
S : Snow	0.0 k	0.0 k/ft	0.0 k
W : Wind	0.6350 k	0.0 k/ft	0.0 k
E : Earthquake	0.0 k	0.0 k/ft	0.0 k
H : Lateral Earth	0.0 k	0.0 k/ft	0.0 k
Load distance above ground surface	16.250 ft	TOP of Load above ground surface 0.0 ft	
		BOTTOM of Load above ground surface 0.0 ft	

Load Combination Results

Load Combination	Forces @ Ground Surface: Loads - (k)	Forces @ Ground Surface: Moments - (ft-k)	Required Depth - (ft)	Pressure at 1/3 Depth: Actual - (psf)	Pressure at 1/3 Depth: Allow - (psf)	Soil Increase Factor
+D+H	0.000	0.000	0.13	0.0	0.0	1.000
+D+L+H	0.000	0.000	0.13	0.0	0.0	1.000
+D+Lr+H	0.000	0.000	0.13	0.0	0.0	1.000
+D+S+H	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750Lr+0.750L+H	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750L+0.750S+H	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.60W+H	0.381	6.191	5.00	412.2	412.6	1.000
+D+0.70E+H	0.000	0.000	0.13	0.0	0.0	1.000
+D+0.750Lr+0.750L+0.450W+H	0.286	4.643	4.50	372.0	372.0	1.000

B.G Structural Engineering, Inc.
75-175 Merle Drive, Suite 200
Palm Desert, CA 92211
760-568-3553 Voice
760-568-5681 Fax

Project Title: Genesis Solar Energy Center - Transformer #2
Engineer: BG
Project Descr:
Project ID: 800.1915

Printed: 12 AUG 2015, 3:06PM

Pole Footing Embedded in Soil

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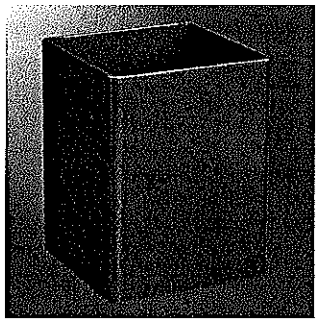
ENERCALC, INC. 1983-2015, Build:6.15.7.30, Ver:6.15.7.30

Lic. # : KW-06008402 Licensee : BG STRUCTURAL ENGINEERING INC.

Description : Footing @ Lighting Protection Pole

+D+0.750L+0.750S+0.450W+H	0.286	4.643	4.50	372.0	372.0	1.000
+D+0.750L+0.750S+0.5250E+H	0.000	0.000	0.13	0.0	0.0	1.000
+0.60D+0.60W+0.60H	0.381	6.191	5.00	412.2	412.6	1.000
+0.60D+0.70E+0.60H	0.000	0.000	0.13	0.0	0.0	1.000

COOPER LIGHTING



STS SQUARE TAPERED STEEL

Catalog #		Type
Project		
Comments		Date
Prepared by		

FEATURES
- ASTM Grade steel base plate with ASTM A366 base cover
- Hand hole assembly 3" x 5" on STS poles
- 20'-50' mounting heights
- Drilled or tenon (specify)

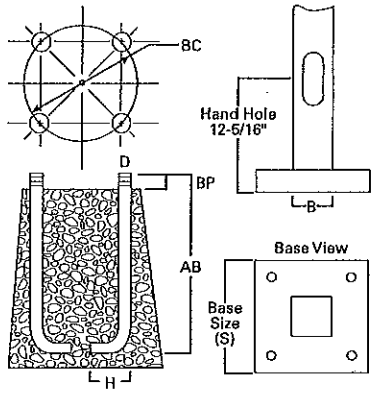
ORDERING INFORMATION

SAMPLE NUMBER: STS5A20SF21XE

Product Family	Shaft Size (Inches)[1]	Wall Thickness (Inches)	Mounting Height (Feet)	Base Type	Finish	Mounting Type	Number and Location of Arms	Arm Lengths (Feet)	Options (Add as Suffix)
STS=Square Tapered Steel	5=5" 6=6" 7=7" 8=8" 9=9" Steel; 6-3/4" Aluminum	A=0.120" D=0.180"	20=20' 25=25' 30=30' 35=35' 39=39' 45=45' 50=50'	S=Square Steel Base	F=Dark Bronze G=Galvanized Steel J=Summit White K=Carbon Bronze L=Dark Platinum P=Primer Powder Coat R=Hartford Green S=Silver T=Graphite Metallic V=Grey W=White X=Custom Color Y=Black	2=2-3/8" O.D. Tenon (4" Long) 3=3-1/2" O.D. Tenon (5" Long) 4=4" O.D. Tenon (6" Long) 5=3" O.D. Tenon (4" Long) 6=2-3/8" O.D. Tenon (6" Long) 7=4" O.D. Tenon (10" Long) A=Type A Drilling C=Type C Drilling E=Type E Drilling F=Type F Drilling G=Type G Drilling J=Type J Drilling K=Type K Drilling M=Type M Drilling R=Type R Drilling Z=Type Z Drilling	1=Single 2=2 at 180° 3=Triple[2] 4=4 at 90° 5=2 at 90° X=None	X=None	A=1/2" Tapped Hub (Specify location desired) B=3/4" Tapped Hub (Specify location desired) C=Convenience Outlet[3] E=GFCI Convenience Outlet[3] G=Ground Lug H=Additional Hand Hole[4] L=Drilled for Bumper Glitter V=Vibration Dampener

NOTES: 1. All shaft sizes nominal. **2.** Square poles are 3 at 90°, round poles are 3 at 120°. **3.** Outlet is located 4' above base and on same side of pole as hand hole, unless specified otherwise. Receptacle not included, provision only. **4.** Additional hand hole is located 12" below pole top and 90° from standard hand hole location, unless otherwise specified.

DIMENSIONS



Effective Projected Area (At Pole Top)

Mounting Height (Feet)	Catalog Number [1,2]	Wall Thickness (Inches)	Base Square [3] (Inches)	Bolt Circle Diameter (Inches)	Anchor Bolt Projection [3] (Inches)	Shaft Diameter at Base [3] (Inches)	Shaft Taper (Inches/ Feet)	Anchor Bolt Diameter x Length x Hook (Inches)	Net Weight (Pounds)	Maximum Effective Projected Area (Square Feet) [4]				Max Fixture Load - Includes Bracket (Pounds)
MH			S	BC	BP	B		D x AB x H		70 mph	80 mph	90 mph	100 mph	
20	STS5A20S	0.120	10-3/4	10-3/4	4	5.25	0.11	1 x 36 x4	155	--	--	--	--	--
25	STS6A25S	0.120	11-1/2	12	4-1/8	6.00	0.11	1 x 36 x4	205	--	--	--	--	--
30	STS6A30S	0.120	11-7/8	12-1/2	4-1/8	6.41	0.11	1 x 36 x4	260	--	--	--	--	--
30	STS7D30S	0.180	12-5/8	13-1/2	4-1/2	7.13	0.11	1 x 36 x4	431	--	--	--	--	--
35	STS7A35S	0.120	12-1/4	13	4-1/8	6.81	0.11	1 x 36 x4	305	--	--	--	--	--
35	STS7D35S	0.180	12-5/8	13-1/2	4-1/2	7.13	0.11	1 x 36 x4	475	--	--	--	--	--
39	STS7A39S	0.120	12-5/8	13-1/2	4-1/8	7.18	0.11	1 x 36 x4	345	--	--	--	--	--
39	STS7D39S	0.180	12-5/8	13-1/2	4-1/2	7.13	0.11	1 x 36 x4	500	--	--	--	--	--
45	STS8D45S	0.180	13-3/8	14-1/2	4-1/2	7.88	0.11	1 x 36 x4	620	--	--	--	--	--
50	STS9D50S	0.180	15-1/2	16	5	8.81	0.11	1-1/4 x 42 x 6	780	--	--	--	--	--

Effective Projected Area (Two Feet Above Pole Top)

Mounting Height (Feet)	Catalog Number [1,2]	Wall Thickness (Inches)	Base Square [3] (Inches)	Bolt Circle Diameter (Inches)	Anchor Bolt Projection [3] (Inches)	Shaft Diameter at Base [3] (Inches)	Shaft Taper (Inches/ Feet)	Anchor Bolt Diameter x Length x Hook (Inches)	Net Weight (Pounds)	Maximum Effective Projected Area (Square Feet) [4]				Max Fixture Load - Includes Bracket (Pounds)
MH			S	BC	BP	B		D x AB x H		70 mph	80 mph	90 mph	100 mph	
20	STS5A20S	0.120	10-3/4	10-3/4	4	5.25	0.11	1 x 36 x4	155	--	--	--	--	--
25	STS6A25S	0.120	11-1/2	12	4-1/8	6.00	0.11	1 x 36 x4	205	--	--	--	--	--
30	STS6A30S	0.120	11-7/8	12-1/2	4-1/8	6.41	0.11	1 x 36 x4	260	--	--	--	--	--
30	STS7D30S	0.180	12-5/8	13-1/2	4-1/2	7.13	0.11	1 x 36 x4	431	--	--	--	--	--
35	STS7A35S	0.120	12-1/4	13	4-1/8	6.81	0.11	1 x 36 x4	305	--	--	--	--	--
35	STS7D35S	0.180	12-5/8	13-1/2	4-1/2	7.13	0.11	1 x 36 x4	475	--	--	--	--	--
39	STS7A39S	0.120	12-5/8	13-1/2	4-1/8	7.18	0.11	1 x 36 x4	345	--	--	--	--	--
39	STS7D39S	0.180	12-5/8	13-1/2	4-1/2	7.13	0.11	1 x 36 x4	500	--	--	--	--	--
45	STS8D45S	0.180	13-3/8	14-1/2	4-1/2	7.88	0.11	1 x 36 x4	620	--	--	--	--	--
50	STS9D50S	0.180	15-1/2	16	5	8.81	0.11	1-1/4 x 42 x 6	780	--	--	--	--	--

NOTES:

1. Catalog number includes pole with hardware kit. Anchor bolts not included. Before installing, make sure proper anchor bolts and templates are obtained from Eaton's Cooper Lighting business.
2. Tenon size or machining for rectangular arms must be specified. Hand hole position relative to drill location.
3. Shaft size, base square, anchor bolts and projections may vary slightly. All dimensions nominal.
4. EPAs based on shaft properties with wind normal to flat. EPAs calculated using base wind velocity as indicated plus 30% gust factor.

Equipment Forces - 800.1915 Genesis Solar - Transformer 2

2013 CBC (Small Transformer)

$F_p=((0.4ap\ S_{DS}\ Ip)/R_p)*(1+2z/h)*W_p$ Per ASCE7-10 Eq. 13.3-1

$F_{pmin}=0.3S_{DS}I_pW_p$ Per ASCE7-10 Eq. 13.3-3

$F_{pmax}=1.6S_{DS}I_pW_p$ Per ASCE7-10 Eq. 13.3-2

S_{DS}=	0.423	Fp min=	0.190 Wp
I_p=	1.5	Fp max=	1.015 Wp

Unit = Transformer

W_p=	250 lbs.
z=	0.25 ft.
h=	0.25 ft.
a_p=	1
R_p=	2.5
F_p=	0.305 Wp
F_p WSD=	0.218 Wp
F_p WSD=	54 lbs.
h=	2.67
d=	1 ft.
M=	145 'lbs.
T=C=	145 lbs.

⟹ USE SIMPSON STRONG-BOLT:
½" ϕ STRONG BOLT [h_{nom} = 3"]
(SEE SIMPSON ANCHOR DESIGN ATTACHED)

SIMPSON Strong-Tie® Anchor Designer™ Software
Version 2.4.5673.4

Company:	BG Structural Engineering	Date:	8/12/2015
Engineer:	SC	Page:	1/5
Project:	800.1915 Genesis Solar - Transformer 2		
Address:	75-175 Merle Drive, Suite 200		
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-11
Units: Imperial units

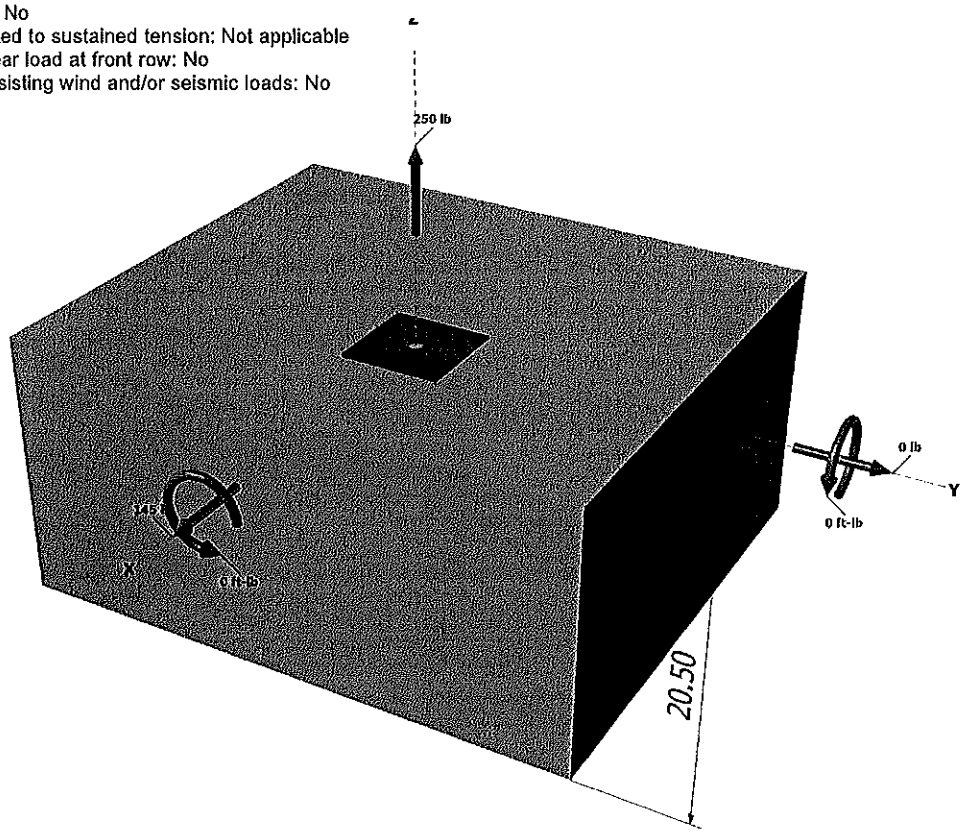
Anchor Information:
Anchor type: Torque controlled expansion anchor
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 3.000
Effective Embedment depth, h_{ef} (inch): 2.500
Code report: ICC-ES ESR-1771
Anchor category: 1
Anchor ductility: Yes
h_{min} (inch): 4.83
c_{ac} (inch): 8.75
C_{min} (inch): 4.00
S_{min} (inch): 4.00

Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: Not applicable
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 20.50
State: Cracked
Compressive strength, f'_c (psi): 4500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout in tension: No
Do not evaluate concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 3.50 x 3.50 x 0.00

<Figure 1>

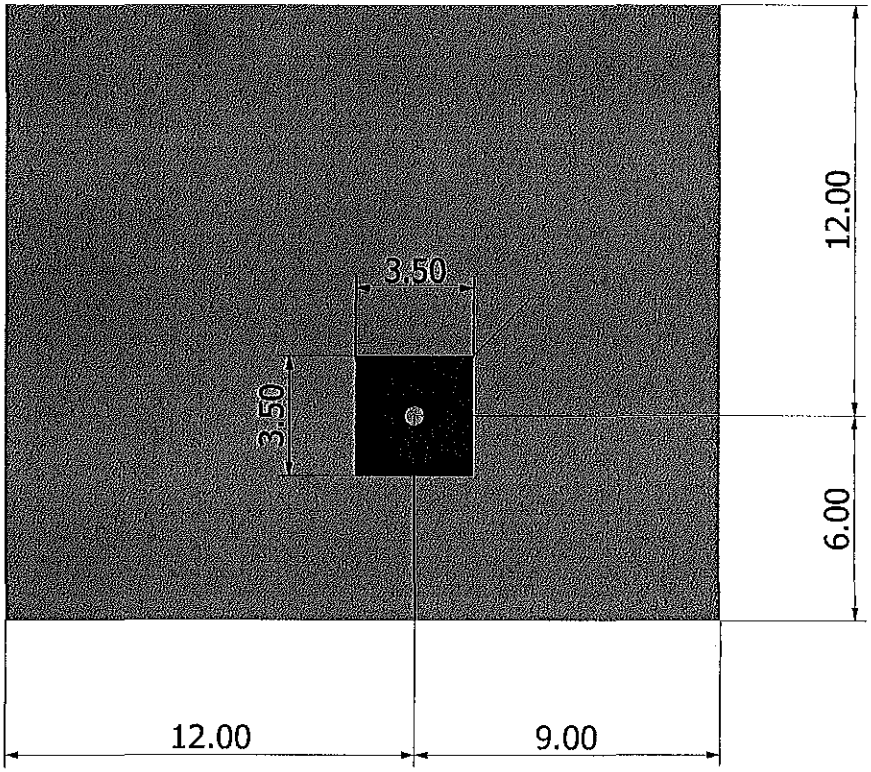


SIMPSON Strong-Tie®

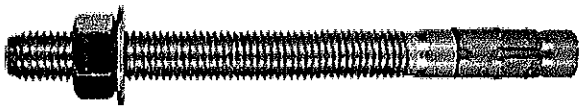
Anchor Designer™ Software
Version 2.4.5673.4

Company:	BG Structural Engineering	Date:	8/12/2015
Engineer:	SC	Page:	2/5
Project:	800.1915 Genesis Solar - Transformer 2		
Address:	75-175 Merle Drive, Suite 200		
Phone:			
E-mail:			

<Figure 2>



Recommended Anchor
Anchor Name: Strong-Bolt® (Discontinued) - 1/2"Ø Strong-Bolt, hnom:3" (76mm)
Code Report: ICC-ES ESR-1771



SIMPSON Strong-Tie® Anchor Designer™ Software Version 2.4.5673.4

Company:	BG Structural Engineering	Date:	8/12/2015
Engineer:	SC	Page:	3/5
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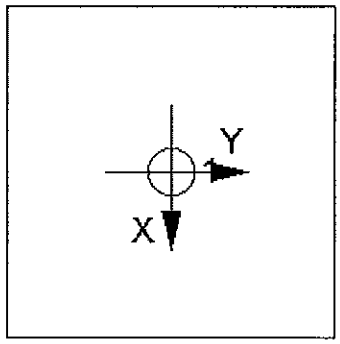
Address:	75-175 Merle Drive, Suite 200		
Phone:			
E-mail:			

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	250.0	145.0	0.0	145.0
Sum	250.0	145.0	0.0	145.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 250
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension(Sec. D.5.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
13500	0.75	10125

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. D-6)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	4500	2.500	4508

$\phi N_{cb} = \phi \, (A_{Nc} / A_{Nco}) \, \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-3)

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
56.25	56.25	1.000	1.00	1.000	4508	0.65	2930

6. Pullout Strength of Anchor in Tension (Sec. D.5.3)

$\phi N_{pn} = \phi \Psi_{c,P} \lambda_a N_p (f'_c / 2{,}500)^n$ (Sec. D.4.1, Eq. D-13 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	ϕN_{pn} (lb)
1.0	1.00	2895	4500	0.50	0.65	2525

SIMPSON Strong-Tie Anchor Designer™ Software Version 2.4.5673.4

Company:	BG Structural Engineering	Date:	8/12/2015
Engineer:	SC	Page:	4/5
Project:	800.1915 Genesis Solar - Transformer 2		
Address:	75-175 Merle Drive, Suite 200		
Phone:			
E-mail:			

8. Steel Strength of Anchor in Shear (Sec. D.6.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
5280	1.0	0.65	3432

9. Concrete Breakout Strength of Anchor in Shear (Sec. D.6.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. D-33 & Eq. D-34)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
2.50	0.50	1.00	4500	6.00	6733

$\phi V_{cbx} = \phi\ (A_{Vc} / A_{Vco})\ \Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1 & Eq. D-30)

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
162.00	162.00	1.000	1.000	1.000	6733	0.70	4713

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. D-33 & Eq. D-34)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
2.50	0.50	1.00	4500	9.00	12369

$\phi V_{cbx} = \phi\ (2)(A_{Vc} / A_{Vco})\ \Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1 & Eq. D-30)

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
243.00	364.50	1.000	1.000	1.000	12369	0.70	11545

10. Concrete Pryout Strength of Anchor in Shear (Sec. D.6.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp}(A_{Nc} / A_{Nco})\ \Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Eq. D-40)

k_{cp}	A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	56.25	56.25	1.000	1.000	1.000	4508	0.70	6311

11. Results

Interaction of Tensile and Shear Forces (Sec. D.7)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	250	10125	0.02	Pass
Concrete breakout	250	2930	0.09	Pass
Pullout	**250**	**2525**	**0.10**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**145**	**3432**	**0.04**	**Pass (Governs)**
T Concrete breakout x+	145	4713	0.03	Pass
|| Concrete breakout y+	145	11545	0.01	Pass
Pryout	145	6311	0.02	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.10	0.00	9.9 %	1.0	Pass

1/2"Ø Strong-Bolt, hnom:3" (76mm) meets the selected design criteria.

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

B.G Structural Engineering, Inc.
75-175 Merle Drive, Suite 200
Palm Desert, CA 92211
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760-568-5681 Fax

Project Title: Genesis Solar Energy Center - Transformer #2
Engineer: BG
Project Descr:
Project ID: 800.1915

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ENERCALC, INC. 1983-2015, Build:6.15.7.30, Ver:6.15.7.30

Steel Column

Lic. # : KW-06008402 Licensee : BG STRUCTURAL ENGINEERING INC.

Description : Column C2 (Bollard Column)

Code References

Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10
Load Combinations Used : 2006IBC&ASCE7-05

General Information

Steel Section Name :	HSS 6x0.375	Overall Column Height	4.0 ft
Analysis Method :	Allowable Strength	Top & Bottom Fixity	Top Free, Bottom Fixed
Steel Stress Grade		Brace condition for deflection (buckling) along columns :	
Fy : Steel Yield	42.0 ksi	X-X (width) axis :	
E : Elastic Bending Modulus	29,000.0 ksi	Unbraced Length for X-X Axis buckling = 4 ft, K = 2.1	
Load Combination :	2006IBC&ASCE7-05	Y-Y (depth) axis :	
		Unbraced Length for Y-Y Axis buckling = 4 ft, K = 2.1	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 90.198 lbs * Dead Load Factor
BENDING LOADS . . .
Lat. Point Load at 2.670 ft creating Mx-x, D = 6.0 k

DEFLECTION CHECK:
$\Delta_{ALL} = 0.025(4)(12) = 1.20"$
$\Delta_{ALL} = 1.20" >> \Delta_{ACT} = .159"$ ✓OK

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6828** : 1

Load Combination	D Only
Location of max.above base	0.0 ft
At maximum location values are . . .	
Pa : Axial	0.09020 k
Pn / Omega : Allowable	133.404 k
Ma-x : Applied	-16.020 k-ft
Mn-x / Omega : Allowable	23.473 k-ft
Ma-y : Applied	0.0 k-ft
Mn-y / Omega : Allowable	23.473 k-ft

PASS Maximum Shear Stress Ratio = **0.1283** : 1

Load Combination	D Only
Location of max.above base	0.0 ft
At maximum location values are . . .	
Va : Applied	6.0 k
Vn / Omega : Allowable	46.778 k

Maximum SERVICE Load Reactions . .

Top along X-X	0.0 k
Bottom along X-X	0.0 k
Top along Y-Y	0.0 k
Bottom along Y-Y	6.0 k

Maximum SERVICE Load Deflections . . .

Along Y-Y 0.1591 in at 4.0ft above base
for load combination : D Only

Along X-X 0.0 in at 0.0ft above base
for load combination :

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+L+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+Lr+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+S+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+0.750Lr+0.750L+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+0.750L+0.750S+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+W+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+0.70E+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+0.750Lr+0.750L+0.750W+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+0.750L+0.750S+0.750W+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+0.750Lr+0.750L+0.5250E+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+D+0.750L+0.750S+0.5250E+H	0.683	PASS	0.00 ft	0.128	PASS	0.00 ft
+0.60D+W+H	0.410	PASS	0.00 ft	0.077	PASS	0.00 ft
+0.60D+0.70E+H	0.410	PASS	0.00 ft	0.077	PASS	0.00 ft

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Steel Column

Lic. # : KW-06008402
Licensee : BG STRUCTURAL ENGINEERING INC.

Description : Column C2 (Bollard Column)

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base
D Only		k	-6.000	k	0.090 k
+D+L+H		k	-6.000	k	0.090 k
+D+Lr+H		k	-6.000	k	0.090 k
+D+S+H		k	-6.000	k	0.090 k
+D+0.750Lr+0.750L+H		k	-6.000	k	0.090 k
+D+0.750L+0.750S+H		k	-6.000	k	0.090 k
+D+W+H		k	-6.000	k	0.090 k
+D+0.70E+H		k	-6.000	k	0.090 k
+D+0.750Lr+0.750L+0.750W+H		k	-6.000	k	0.090 k
+D+0.750L+0.750S+0.750W+H		k	-6.000	k	0.090 k
+D+0.750Lr+0.750L+0.5250E+H		k	-6.000	k	0.090 k
+D+0.750L+0.750S+0.5250E+H		k	-6.000	k	0.090 k
+0.60D+W+H		k	-3.600	k	0.054 k
+0.60D+0.70E+H		k	-3.600	k	0.054 k
D Only		k	-6.000	k	0.090 k
Lr Only		k		k	k
L Only		k		k	k
S Only		k		k	k
W Only		k		k	k
E Only		k		k	k
H Only		k		k	k

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection		Distance		Max. Y-Y Deflection		Distance	
D Only	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+L+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+Lr+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+S+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+0.750Lr+0.750L+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+0.750L+0.750S+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+W+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+0.70E+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+0.750Lr+0.750L+0.750W+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+0.750L+0.750S+0.750W+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+0.750Lr+0.750L+0.5250E+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+D+0.750L+0.750S+0.5250E+H	0.0000	in	0.000	ft	0.159	in	4.000	ft
+0.60D+W+H	0.0000	in	0.000	ft	0.095	in	4.000	ft
+0.60D+0.70E+H	0.0000	in	0.000	ft	0.095	in	4.000	ft
D Only	0.0000	in	0.000	ft	0.159	in	4.000	ft
Lr Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
L Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
S Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
W Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
E Only	0.0000	in	0.000	ft	0.000	in	0.000	ft
H Only	0.0000	in	0.000	ft	0.000	in	0.000	ft

Steel Section Properties : HSS 6x0.375

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Steel Column

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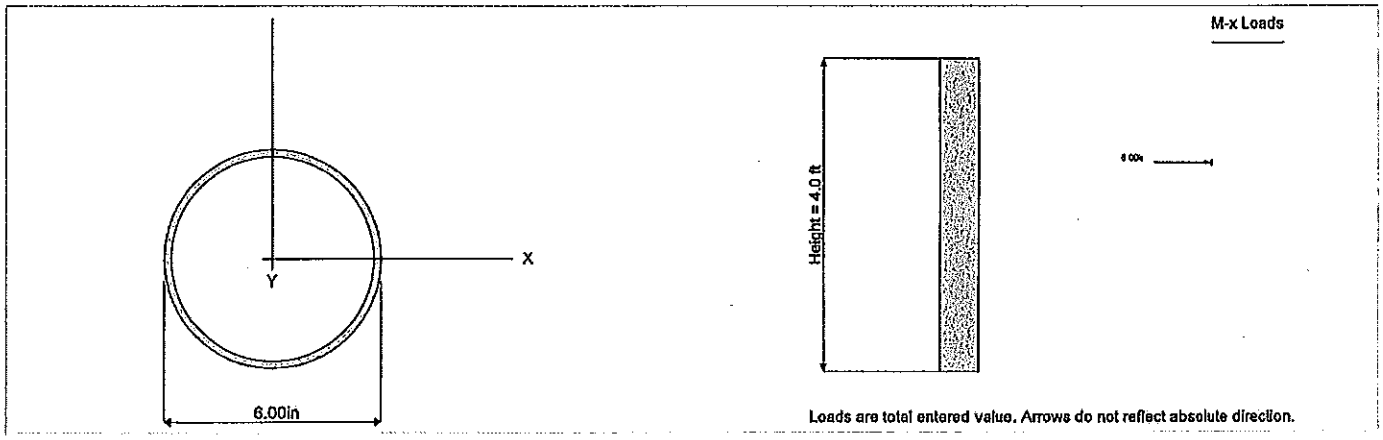
Description : Column C2 (Bollard Column)

Steel Section Properties : HSS 6x0.375

Depth	=	6.000 in	I xx	=	24.80 in^4	J	=	49.700 in^4
			S xx	=	8.28 in^3			
Diameter	=	6.000 in	R xx	=	2.000 in			
Wall Thick	=	0.375 in	Zx	=	11.200 in^3			
Area	=	6.200 in^2	I yy	=	24.800 in^4	C	=	16.600 in^3
Weight	=	22.550 plf	S yy	=	8.280 in^3			
			R yy	=	2.000 in			
Ycg	=	0.000 in						



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Pole Footing Embedded in Soil

Lic. # : KW-06008402
Licensee : BG STRUCTURAL ENGINEERING INC.

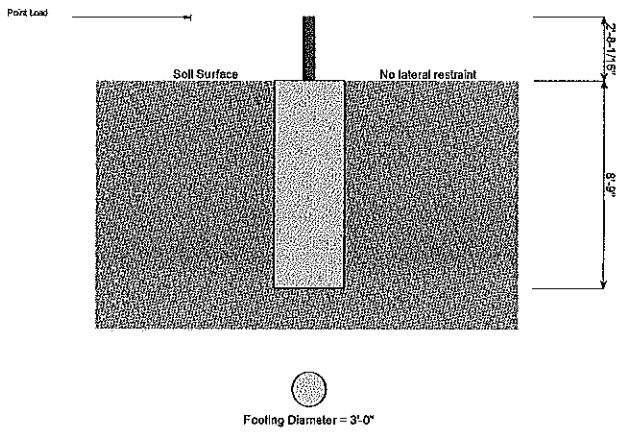
Description : Foundation @ Column C2 (Bollard Column)

Code References

Calculations per IBC 2012 1807.3, CBC 2013, ASCE 7-10
Load Combinations Used : IBC 2012

General Information

Pole Footing Shape	Circular
Footing Diameter	36.0 in
Calculate Min. Depth for Allowable Pressures	
No Lateral Restraint at Ground Surface	
Allow Passive	250.0 pcf
Max Passive	3,000.0 psf



Controlling Values

Governing Load Combination : +D+H

Lateral Load	6.0 k
Moment	16.020 k-ft
NO Ground Surface Restraint	
Pressures at 1/3 Depth	
Actual	721.80 psf
Allowable	721.85 psf
Minimum Required Depth	**8.750 ft**
Footing Base Area	7.069 ft^2
Maximum Soil Pressure	0.01698 ksf

Applied Loads

	Lateral Concentrated Load	Lateral Distributed Load	Vertical Load
D : Dead Load	6.0 k	k/ft	0.120 k
Lr : Roof Live	k	k/ft	k
L : Live	k	k/ft	k
S : Snow	k	k/ft	k
W : Wind	k	k/ft	k
E : Earthquake	k	k/ft	k
H : Lateral Earth	k	k/ft	k
Load distance above ground surface	2.670 ft	TOP of Load above ground surface ft	
		BOTTOM of Load above ground surface ft	

Load Combination Results

Load Combination	Forces @ Ground Surface Loads - (k)	Moments - (ft-k)	Required Depth - (ft)	Pressure at 1/3 Depth Actual - (psf)	Allow - (psf)	Soil Increase Factor
+D+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+L+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+Lr+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+S+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+0.750Lr+0.750L+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+0.750L+0.750S+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+0.60W+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+0.70E+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+0.750Lr+0.750L+0.450W+H	6.000	16.020	8.75	721.8	721.9	1.000

B.G Structural Engineering, Inc.
75-175 Merle Drive, Suite 200
Palm Desert, CA 92211
760-568-3553 Voice
760-568-5681 Fax

Project Title: Genesis Solar Energy Center - Transformer #2
Engineer: BG
Project Descr:
Project ID: 800.1915

Printed: 12 AUG 2015, 4:45PM

Pole Footing Embedded in Soil

File = s:\EC6-DA~1\805ADF~1.EC6
ENERCALC, INC. 1983-2015, Build:6.15.7.30, Ver:6.15.7.30

Lic. # : KW-06008402
Licensee : BG STRUCTURAL ENGINEERING INC.

Description : Foundation @ Column C2 (Bollard Column)

+D+0.750L+0.750S+0.450W+H	6.000	16.020	8.75	721.8	721.9	1.000
+D+0.750L+0.750S+0.5250E+H	6.000	16.020	8.75	721.8	721.9	1.000
+0.60D+0.60W+0.60H	3.600	9.612	7.00	575.7	577.2	1.000
+0.60D+0.70E+0.60H	3.600	9.612	7.00	575.7	577.2	1.000

GENERAL NOTES FOR UNDERGROUND CONDUITS:

1. DIG TRENCHES TO THE REQUIRED DEPTH WITHOUT POCKETS OR DIPS. REMOVE LARGE STONES FROM THE BOTTOM OF THE TRENCH AND FIRMLY TAMP LOOSE FILL IN THE TRENCH BOTTOM BEFORE CABLE AND CONDUIT IS LAID.
2. BACKFILL SHALL BE SOFT DIRT OR SAND TAMPED INTO PLACE. FILL TRENCH TO THE TOP AND RESTORE SURFACE TO ITS ORIGINAL CONDITION. REMOVE EXCESS EARTH. CONDUIT DUCT BANKS SHALL HAVE A MINIMUM EARTH COVER OF 24 INCHES AS SHOWN ON DRAWINGS, DEPENDING ON CONDITIONS OF SPECIFIC LOCATIONS.
3. RIGID GALVANIZED STEEL CONDUIT SHALL BE INSTALLED WHERE UNDERGROUND CONDUIT TURNS UP TO EXIT THE DUCT BANK, UNLESS OTHERWISE SPECIFIED. REFER TO THE ELECTRICAL INSTALLATION DETAIL FOR THIS REQUIREMENT.
4. UNLESS SHOWN OTHERWISE ON THE DRAWINGS, TERMINATE ALL STUB-UPS 3 INCHES ABOVE THE CONCRETE PAD.
5. ENCASE ALL CONDUITS IN RED COLORED 2000 PSI CONCRETE WITH A MINIMUM COVER OF 3 INCHES ON TOP, BOTTOM, AND SIDES OF CONDUIT. THE TOP SURFACE OF CONCRETE SHALL BE SPRAYED WITH RED OXIDE, WHEN CONCRETE IS WET OR BEFORE INITIAL SET.
6. MARK UNDERGROUND CABLE TRENCHES WITH AN 18 INCH WIDE YELLOW, DETECTABLE, WARNING TAPE PLACED A MINIMUM OF 4 INCHES ABOVE INSTALLED CABLES. MARK THE TAPE THUS: "CAUTION —BURIED ELECTRICAL LINE BELOW".
7. WHEN CONDUIT STUB-UPS ARE WITHIN THE EQUIPMENT ENCLOSURE, THE CONTRACTOR SHALL VERIFY THE EQUIPMENT OPENINGS AND OBSTRUCTIONS TO AVOID MISALIGNMENT OF STUB-UPS AND OPENINGS.
8. ALL UNDERGROUND CONDUIT SHALL BE RIGID PVC SCHEDULE 40 OR AN APPROVED SUBSTITUTE, EXCEPT AS SPECIFIED HEREIN OR IN THE DRAWINGS. ELBOWS ARE GENERALLY TO BE RGS.

SPECIFIC NOTES:

[1] BOND FOOTING REBAR TO EXTERIOR GROUND RING (EGR) WITH #2/0 BARE SOLID COPPER TINNED WIRE

[2] 3/4"x10' COPPER CLAD GROUND ROD. SEE DETAIL 'B' ON SHEET E1.0

[3] EXTERIOR GROUND RING (EGR) SHALL BE BARE TINNED 19-WIRE STRANDED COPPER CONDUCTOR, #4/0 AWG, BURIED IN EARTH MIN 30" BELOW FINISHED GRADE. THE EGR SHALL BE INSTALLED MINIMUM 5 FEET AWAY FROM FOUNDATION. BOND TO THE SITE EXISTING EGR. COORDINATE IN FIELD.

[4] BOND NEW EGR TO THE EXISTING SITE EGR WITH #4/0 AWG BARE TINNED SOLID COPPER CONDUCTOR. SUBJECT TO FIELD COORDINATION.

[5] BOND NEW SUPPORT STRUCTURE POWER PANEL AND CIRCUIT BREAKER TO THE EGR WITH #2/0 BARE SOLID COPPER TINNED WIRE.

[6] PROVIDE 5/8"x24" SOLID COPPER AIR TERMINAL FOR LIGHTING PROTECTION. PROVIDE ALL REQUIRED BASES, ADAPTERS AND MOUNTING HARDWARE. MOUNT ON THE TOP OF THE POLE. PROVIDE DOWNLEAD STRANDED COPPER CONDUCTOR, #2/0AWG, CLASS 1, TO THE EGR. LIGHTING PROTECTION EQUIPMENT SHALL BE BY THOMPSON COMPANY OR APPROVED EQUAL.

[7] BOND TRANSFORMER FRAME TO THE EGR WITH #2/0 BARE SOLID COPPER TINNED WIRE.

[8] PROVIDE 37' HIGH POLE, SQUARE TAPERED STEEL. COOPER INDUSTRIES STS-70-395-G, OR EQUAL. SEE DETAIL F/E1.0

[9] LOCATE EXISTING 2"C STUB-OUT, INTERCEPT, AND EXTEND TO THE NEW TRANSFORMER LOCATION. PULL IN ALL NEW WIRES IN THE NEW AND EXISTING CONDUITS. SUBJECT TO FIELD COORDINATION.

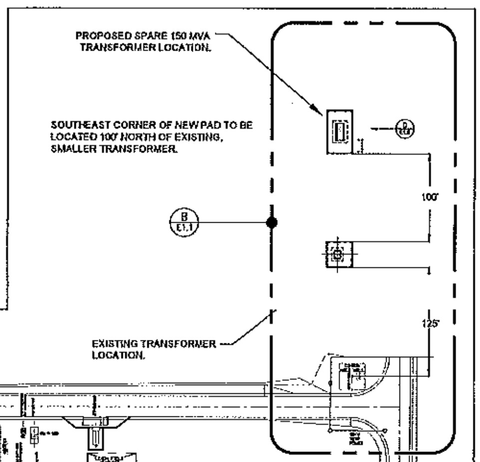
[10] STUB OUT 1" UNDERGROUND POWER CONDUIT AT THE LOCATION OF THE TRANSFORMER'S CONTROL CABINET. EXTEND CONDUIT TO THE CONTROL CABINET. PULL IN WIRES AS INDICATED ON THE ONE LINE DIAGRAM. COORDINATE IN FIELD EXACT LOCATIONS AND POWER REQUIREMENTS.

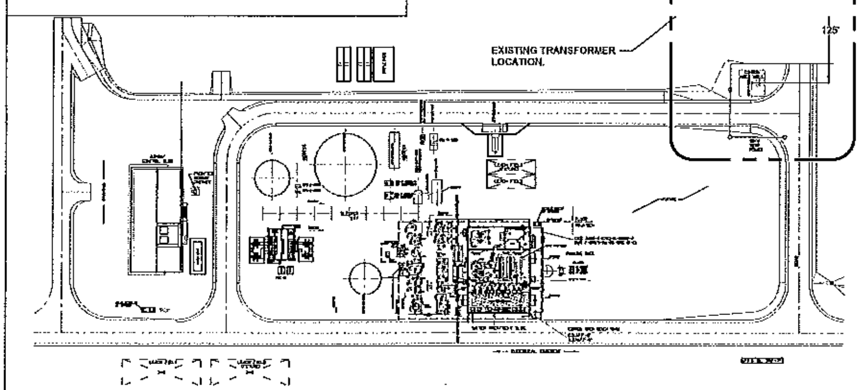
PANEL: 'TP1' (NEW)
DATE: 08/27/14 TIME: 15:31:53
JOB: SPARE TRANSFORMER
PANEL VOLTAGE: 120/240 1Ø 3W
BUS: 225A
MAINS: 125A-2P MCB
AC RATING: 10,000
(LEVEL 3P)
CIRCUIT CODE: blank or N : NON-CONTINUOUS
L : LONG-CONTINUOUS
R : DEMANDABLE RECEPTACLES
K : KITCHEN NO. OF EQUIPMENT: 0

CKT NO	CODE	TRIP	POLE	DESCRIPTION	M	R	L	ØA	ØB	ØA	ØB	L	R	M	DESCRIPTION	TRIP	POLE	CODE	CKT NO
1		50	/	MAIN CONTROL CAB.	1			4800		330				2	SERVICE RECEPT	20	1		2
3		/	2	–	–				4800		0				SPARE	20	1		4
5				SPACE				0		0					SPARE	20	1		6
7				SPACE					0		0				SPARE	20	1		8
9				SPACE				0		0					SPACE				10
11				SPACE					0		0				SPACE				12

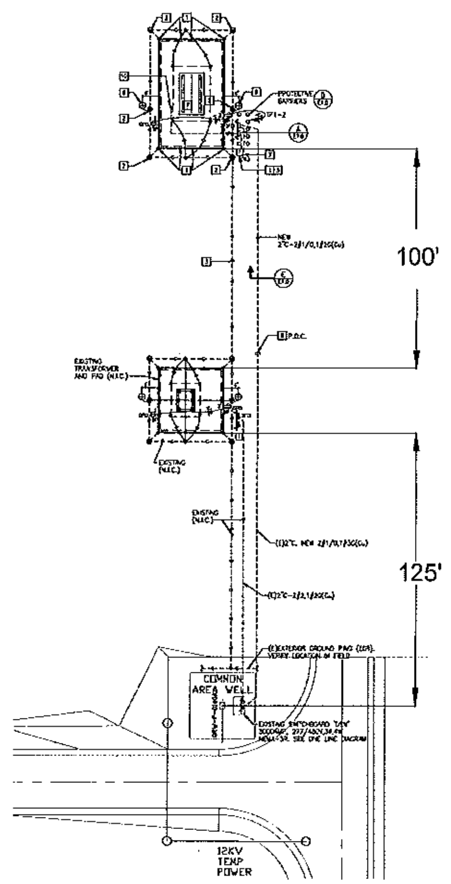
PANEL NOTES: PHASE TOTALS ØA: 5130 ØB: 4800

TOTAL CONNECTED VA	[illegible]
CONNECTED VA (CODE N)	[illegible]
CONNECTED VA (CODE L)	0
CONNECTED VA (CODE R)	0
CONNECTED VA (CODE K)	0
PANEL CONNECTED KVA	10.0
PANEL DEMAND KVA	10.0
PANEL DEMAND AMPS	41.5
HIGH Ø AMPS W/LCL	43.0





SITE PLAN
SCALE: 1" = 65'-0"



ENLARGED TRANSFORMER PLAN
SCALE: 1" = 20'-0"

Dennis Hurvitz

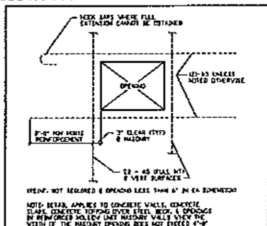
NO.	REMARKS	DATE

DESERT ENGINEERS
CONSULTING ENGINEERS

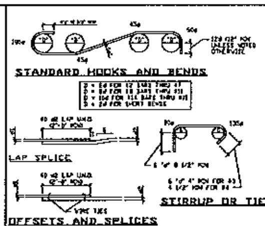
SITE PLAN

SPARE TRANSFORMER II, SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA. 92225

DRAWN BY:
DATE 07/29/2015
SCALE:
JOB NO.
SHEET
E1.1
OF SHEETS



1 S-1.1 GENERAL DETAIL



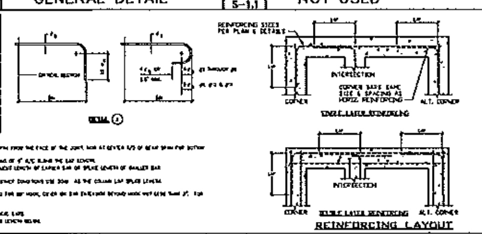
2 S-1.1 GENERAL DETAIL

3 S-1.1 NOT USED

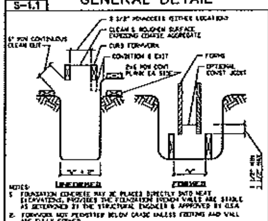
REBAR SPLICE AND EMBED LENGTH SCHEDULE

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

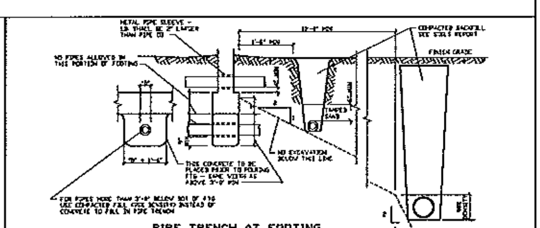
NOTES: [illegible]



6 S-1.1 GENERAL DETAIL



11 S-1.1 GENERAL DETAIL



12 S-1.1 GENERAL DETAIL

Dennis Hurvitz

NOTE: ALL NOTES ON THIS SHEET SHALL APPLY TO EACH SHEET OF THIS SET OF STRUCTURAL DRAWINGS

ICBC 2010 TABLE 1705.3 REQUIRED VERIFICATION AND INSPECTION OF CONCRETE CONSTRUCTION

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD*	IBC REFERENCE
1. INSPECTION OF REINFORCING STEEL, INCLUDING PRESTRESSING TENDONS, AND PLACEMENT	-	X	ACI 318: 3.5, 7.1-7.7	1913.4
2. INSPECT BOLTS TO BE INSTALLED IN CONCRETE PRIOR TO AND DURING PLACEMENT OF CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED	-	X	ACI 318 8.1.3, 21.2.8	1908.5, 1909.1
3. VERIFYING USE OF REQUIRED DESIGN MIX	-	X	ACI 318: CH. 4, 5.2-5.4	1904.2, 1910.2, 1910.3
4. AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE	X	-	ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	1910.10
5. INSPECTION OF CONCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES	X	-	ACI 318: 5.9, 5.10	1910.6, 1910.7, 1910.8
6. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES	-	X	ACI 318: 5.11-5.13	1910.9
7. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED	-	X	ACI 318: 6.1.1	-

FOR SI: 1 inch = 25.4 mm
a. WHERE APPLICABLE, SEE ALSO SECTION 1707.1, SPECIAL INSPECTION FOR SEISMIC RESISTANCE

9 S-1.1 SPECIAL INSPECTION TABLE (CONCRETE)

ICBC 2010 TABLE 1705.6 REQUIRED VERIFICATION AND INSPECTION OF SOILS

VERIFICATION AND INSPECTION TASK	CONTINUOUS DURING TASK LISTED	PERIODICALLY DURING TASK LISTED
1. VERIFY MATERIALS BELOW FOOTINGS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY	-	X
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL	-	X
3. PERFORM CLASSIFICATION AND TESTING OF CONTROLLED FILL MATERIALS	-	X
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF CONTROLLED FILL	X	-
5. PRIOR TO PLACEMENT OF CONTROLLED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	-	X

14 S-1.1 SPECIAL INSPECTION TABLE (SOILS)

16 S-1.1 NOT USED

18 S-1.1 NOT USED

19 S-1.1 NOT USED

20 S-1.1 BG DISCLAIMER

NO.#	REMARKS	DATE

B.G. STRUCTURAL ENGINEERING, INC.
BRIAN GOTTLIEB - CIVIL ENGINEER
PALM DESERT, CA 92211

DESERT ENGINEERS
CONSULTING ENGINEERS

GENERAL NOTES & DETAILS

TRANSFORMER #2 SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA 92225

DRAWN BY:	SC
DATE	08/12/15
SCALE	N.T.S.
JOB NO.	600.1915
SHEET	S-1.1
OF	SHEETS

GENERAL NOTES

PERFORM CONSTRUCTION AND WORKMANSHIP IN COMPLIANCE WITH THE DRAWINGS, SPECIFICATIONS AND THE [illegible] CALIFORNIA BUILDING CODE [illegible] INTERNATIONAL BUILDING CODE [illegible]

GOVERNING CODE AUTHORITY CITY OF BLYTHE, CALIFORNIA.

THE CONTRACTOR SHALL COORDINATE THE WORK OF ALL TRADES AND VERIFY ALL DIMENSIONS PRIOR TO THE START OF CONSTRUCTION. NOTIFY THE STRUCTURAL ENGINEER OF ANY DISCREPANCIES OR INCONSISTENCIES. DO NOT SCALE DRAWINGS.

ALL DETAILS, SECTIONS, AND NOTES SHOWN ON THE DRAWINGS ARE INTENDED TO BE TYPICAL AND SHALL APPLY TO SIMILAR SITUATIONS ELSEWHERE, UNLESS NOTED OTHERWISE. SPECIFIC NOTES AND DETAILS ON THE DRAWINGS TAKE PRECEDENCE OVER THESE GENERAL NOTES AND TYPICAL DETAILS.

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS AT THE SITE AND SHALL REPORT ANY DISCREPANCIES TO THE STRUCTURAL ENGINEER.

[illegible]

CAST IN PLACE CONCRETE

[illegible]

REINFORCING STEEL

[illegible]

ABBREVIATIONS

[illegible]

CONTRACTOR RESPONSIBILITY

[illegible]

STRUCTURAL STEEL

[illegible]

NOTE

ALL NOTES ON THIS SHEET SHALL APPLY TO EACH SHEET OF THIS SET OF STRUCTURAL DRAWINGS

STRUCTURAL OBSERVATION

STRUCTURAL OBSERVATION IS REQUIRED IN ACCORDANCE W/ SECTION [illegible] OF THE [illegible] CALIFORNIA [illegible] CODE. STRUCTURAL OBSERVATION SHALL BE REQUIRED ON FOUNDATIONS PRIOR TO POUR BY A CALIFORNIA LICENSED CIVIL AND/OR STRUCTURAL ENGINEER.

REQUIRED SPECIAL INSPECTIONS

IN ADDITION TO THE REGULAR INSPECTIONS, THE FOLLOWING CHECKED ITEMS WILL ALSO REQUIRE SPECIAL INSPECTION IN ACCORDANCE WITH SEC. [illegible] OF THE INTERNATIONAL BUILDING CODE & SEC [illegible] OF THE CBC

ITEM	REQUIRED?	REMARKS
SOILS COMPLIANCE PRIOR TO FOUNDATION INSPECTION	YES	SEE SOILS REPORT
STRUCTURAL CONCRETE OVER 2,500 PSI	YES	4500 PSI
FIELD WELDING	YES	
EXPANSION / EPOXY ANCHORS	YES	
SEE SHEET S-1.1 FOR ADDITIONAL INFORMATION		

TESTS AND INSPECTIONS

1. PROVIDE ALL STRUCTURAL MATERIAL FROM TESTED STOCK. FURNISH COPIES OF TEST REPORTS TO ARCHITECT & GOVERNING CODE AUTHORITY UPON REQUEST.
2. SEE TABLE(S) ON SHEET S-1.1 FOR TEST AND INSPECTION REQUIREMENTS.
3. [illegible]

DESIGN DATA

[illegible]

Dennis Hurvitz

NO.#	REMARKS	DATE

S.G. STRUCTURAL ENGINEERING, INC.
BRIAN GOTTLIEB - CIVIL ENGINEER
PALM DESERT, CA

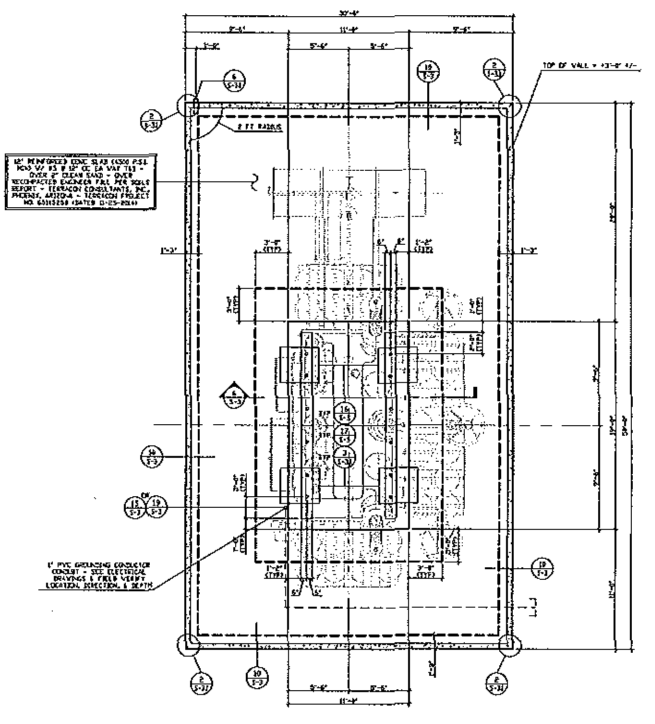
DESERT ENGINEERS

GENERAL NOTES

TRANSFORMER #2 SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA. 92225

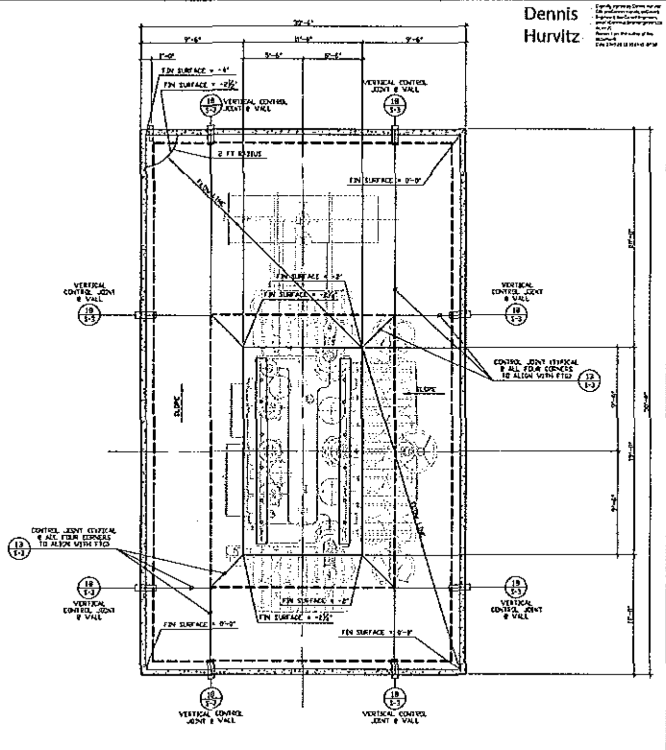
DRAWN BY:	SC
DATE	08/12/15
SCALE	N.T.S.
JOB NO.	800,1815
SHEET	S-1
OF	SHEETS

Dennis Hurvitz



TRANSFORMER 2 - DIMENSIONED FOUNDATION PLAN

SCALE: 1/4" = 1'-0"



TRANSFORMER 2 - CONTROL JOINT & FLOW LINE PLAN

SCALE: 1/4" = 1'-0"

FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS WITH PLANS

"SOILS COMPACTION TEST AND APPROVAL REQUIRED BY SOILS ENGINEER AFTER FOUNDATION EXCAVATION AND CERTIFICATE OF ACCEPTANCE SHALL BE READY AT TIME OF FOUNDATION INSPECTION. THIS IS TO BE PROVIDED FOR ANY FOUNDATION WORK AT THE REQUEST OF THE INSPECTOR."

FOUNDATION NOTES

[illegible]

NOTE: [illegible]

NOTE: [illegible]

CAUTION: [illegible]

INSTRUMENTS OF SERVICE

[illegible]

NO.#	REMARKS	DATE

B.G. STRUCTURAL ENGINEERING, INC.
LIC. NO. C59467
BRIAN GOTTLIEB - CIVIL ENGINEER
PALM DESERT, CA 92211

DESERT ENGINEERS

CONSULTING ENGINEERS

FOUNDATION PLAN

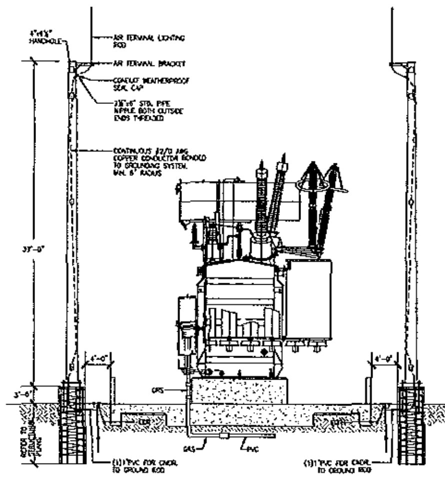
TRANSFORMER #2 SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA 92225

DRAWN BY:	BG
DATE	08/12/16
SCALE	AS NOTED
JOB NO.	800.1815

SHEET

S-2

OF SHEETS



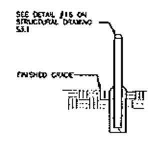
LIGHTING PROTECTION POLE DETAIL (F)
SCALE: NTS

GENERAL NOTES:

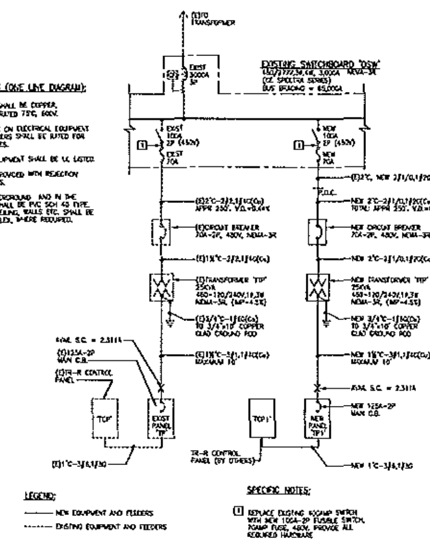
1. Provide lightning protection using air terminals on structures utilizing the rolling sphere method. Provide lightning protection system consisting of air terminals, down conductor, and grounding system installed in accordance with NFPA 780 and listed in accordance with IEEE 142. Meet the following requirements:
   A. Position – In center of least utilized field of view.
   B. Material – ... copper air terminal (Class I)
   C. Bonding – Attach air terminal to bracket by exothermic weld or with approved clamping.
   D. Structure wind rating in accordance with TxDOT ... (LIS2013).
2. Alternative orientation for air terminal due to project specific needs to be indicated on the plans and detailed in shop drawing submittal for approval.
3. Weld air terminal bracket to pole. Bracket may be welded by the fabricator in the shop prior to delivery. A bolted connection for the air terminal bracket is acceptable in lieu of a welded connection with approval by the Engineer and detailed in the shop drawings.

GENERAL NOTES (ONE LINE DIAGRAM):

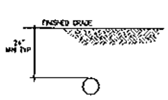
1. ALL CONDUCTORS SHALL BE COPPER, THHN/THWN TYPE, RATED 75°C, 600V.
2. ALL TERMINAL LUGS ON ELECTRICAL EQUIPMENT AND CIRCUIT BREAKERS SHALL BE RATED FOR USE WITH 75°C WIRES.
3. ALL ELECTRICAL EQUIPMENT SHALL BE UL LISTED.
4. FUSES SHALL BE PROVIDED WITH REJECTION TYPE FUSE HOLDERS.
5. ALL CONDUITS UNDERGROUND AND IN THE CONCRETE SLABS SHALL BE PVC SCH 40 TYPE. ALL CONDUITS IN CEILING, WALLS ETC. SHALL BE EMT OR METALLIC FLEX, WHERE REQUIRED.



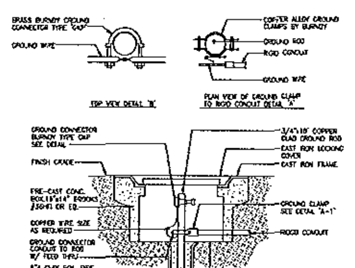
BARRIER POST DETAIL (D)
SCALE: NTS



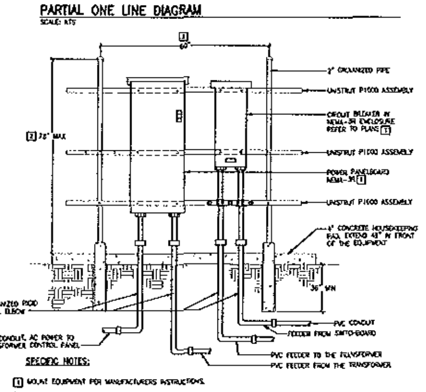
PARTIAL ONE LINE DIAGRAM
SCALE: NTS



CONDUIT DUCT BANK SECTION (E)
SCALE: NTS



PRE-CAST CONCRETE BOX AND GROUND ROD DETAIL (B)
SCALE: NTS



BOOST TRANSFORMER MOUNTING DETAIL (A)
SCALE: NTS

Dennis Hurvitz

NO#	REMARKS	DATE

DESERT ENGINEERS

DETAILS, SCHEDULES AND ONE LINE DIAGRAM

SPARE TRANSFORMER II, SITE PREPARATION
GENESIS SOLAR SGN-7209
11995 Wiley's Well Road
Blythe, CA. 92225

DRAWN BY:
DATE 07/29/2015
SCALE
JOB NO.
SHEET
E1.0
OF SHEETS