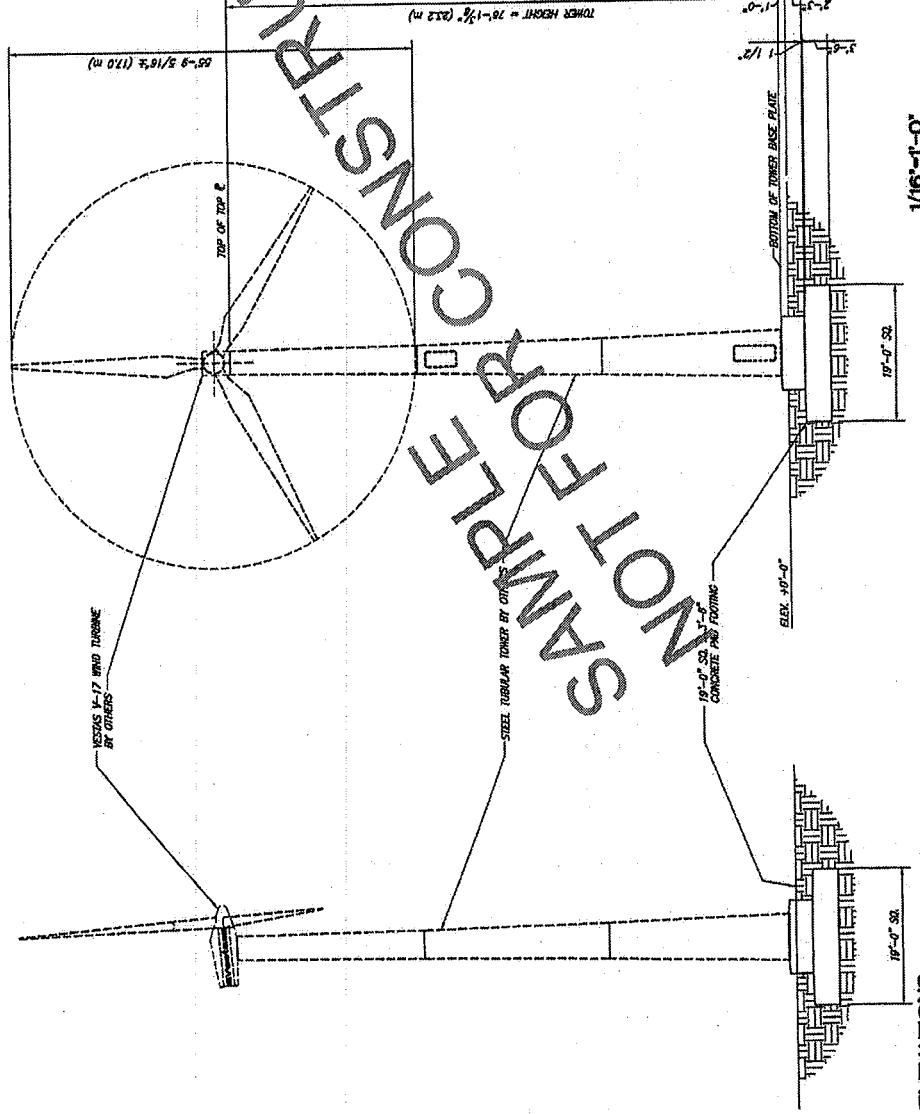


# VESTAS V-17 WIND TURBINE FOUNDATION 23 METER TOWER • 3 SECTION

## SHEET INDEX

No.	SO.0	TITLE
1	SO.0	TITLE SHEET
GENERAL NOTES		
2	SI.0	GENERAL NOTES
3	SI.1	GENERAL NOTES
4	SI.2	GENERAL NOTES
FOUNDATION DETAILS		
5	SI.0	FOUNDATION PLAN, SECTIONS AND DETAILS
6	SI.1	FOUNDATION DETAILS



ELEVATIONS  
1/16"=1'-0"

EDGEWOOD WIND ENERGY PROJECT  
EDGEWOOD, NEW MEXICO, USA  
FOUNDATION

HALLS POWER SYSTEMS  
1000 W. 10TH ST. SUITE 100  
DENVER, CO 80202

Nestor A. Agbayani  
Professional Engineer



*Nestor A. Agbayani*  
SIGNATURE (OR DIGITAL SIGNATURE ON ELECTRONIC FILE)  
DATE 01.21.2011

TITLE SHEET

MINNER, STINNETT, KOO & AGRAYANI  
STRUCTURAL & CIVIL ENGINEERS  
1214 W. STREET, SACRAMENTO, CALIFORNIA 95811  
PHONE (916) 524-0294 FAX (916) 524-3118

VESTAS V-17  
WIND TURBINE FOUNDATION  
23 METER • 3 SECTION

JOB NO. 11-0008  
DATE 2011-01-27  
SHEET 50.0

DESIGN: *Thyagaraj*  
CHECKED: *Thyagaraj*  
APPROVED: *Thyagaraj*

PLN2012-00006  
Exhibit C- Elevations  
February 7, 2013

NOTES: 02-084/03-037 SMLAR

EXCEWOOD WIND ENERGY PROJECT  
EXCEWOOD, NEW MEXICO, USA  
FOUNDATION

HULLIS POWER SYSTEMS  
2500 GREAT AVENUE  
SUN VALLEY, CA 94134  
PHONE (916) 796-2024 FAX (916) 796-2024



*Nestor A. Agbavani*  
ENGINEER (OR INITIAL SIGNATURE ON ELECTRONIC FILE)  
DATE 01-27-2011

**GENERAL NOTES**

MINNER, STINNETT, KOO & AGRAYANI  
STRUCTURAL & CIVIL ENGINEERS  
2125 14TH STREET, SACRAMENTO, CALIFORNIA 95811  
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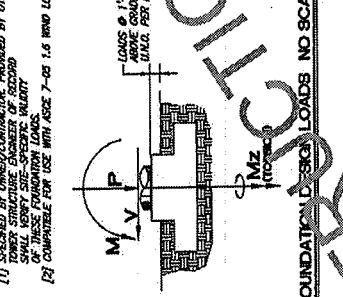
WIND TURBINE FOUNDATION  
VESTAS V-17  
23 METER • 3 SECTION

JOB NO.	11-008	DATE	2011-01-27	SHEET
DESIGNED BY	TJH	CHECKED BY	TJH	S1.0
DRAWN BY	TJH	APPROVED BY	TJH	

**GENERAL NOTES**  
**CODE DESIGN DATA (FOR FOUNDATION ONLY)**  
STATEMENT OF DESIGN CODE COMPARISONS:  
THE STATE BUILDING CODE BASED ON THE IBC.  
LOAD CALCULATIONS ARE IN ACCORDANCE WITH ASCE 7-05 FOR COMPARABILITY WITH THE IBC. THE IBC DOES NOT HAVE A PROVISION FOR WIND LOADS ON WIND TURBINE FOUNDATIONS. THE DESIGN OF THIS WIND TURBINE FOUNDATION IS BASED ON THE IBC WIND LOADS AND THE FOLLOWING ASSUMPTIONS:  
1. THE WIND TURBINE FOUNDATION IS CONSIDERED AS A SIGNIFICANTLY CHANGING THE RESULTING EXTERNAL WIND OR SEISMIC DESIGN FORCES.  
2. THE STATE BUILDING CODE BASED ON THE IBC.  
LOAD CALCULATIONS ARE IN ACCORDANCE WITH ASCE 7-05 FOR COMPARABILITY WITH THE IBC. THE IBC DOES NOT HAVE A PROVISION FOR WIND LOADS ON WIND TURBINE FOUNDATIONS. THE DESIGN OF THIS WIND TURBINE FOUNDATION IS BASED ON THE IBC WIND LOADS AND THE FOLLOWING ASSUMPTIONS:  
1. THE WIND TURBINE FOUNDATION IS CONSIDERED AS A SIGNIFICANTLY CHANGING THE RESULTING EXTERNAL WIND OR SEISMIC DESIGN FORCES.

NO.	ITEM	DESIGN VALUE	SITE VALUE	COMMENT
1	BASIC WIND SPEED	V (mph)	30	SAME
2	WIND IMPORTANCE FACTOR	I	1.15	SAME
3	EXPOSURE	C	C	SAME
4	EXPOSURE COEFFICIENT (MAX.)	Kz	1.193	SAME
5	DESIGN WIND PRESSURE FOR TOWER COMPONENTS AND CLADDING	Cf	0.678	SAME
6	OTHER WIND DESIGN DATA		N/A	N/A
7	TOPOGRAPHIC FACTOR (MAX.)	Kt	1.0	SAME
8	VELOCITY PRESSURE (MAX.)	qz (psf)	27	SAME
9	EAST EFFECT FACTOR	CE	0.887	SAME
10	AIR DENSITY	ρ (lb/ft³)	1.225	SAME

**NOTES**  
1. [NOT USED]  
2. WIND DESIGN LOAD COMBINATIONS (PER STRENGTH DESIGN):  
U = 1.4D OR 1.2D + (1.1D OR 1.3D OR 1.8W)  
3. [NOT USED]  
4. ESTIMATED BY AREA PER FOUNDATION ONLY - TOWER DESIGN IS BY OTHERS.



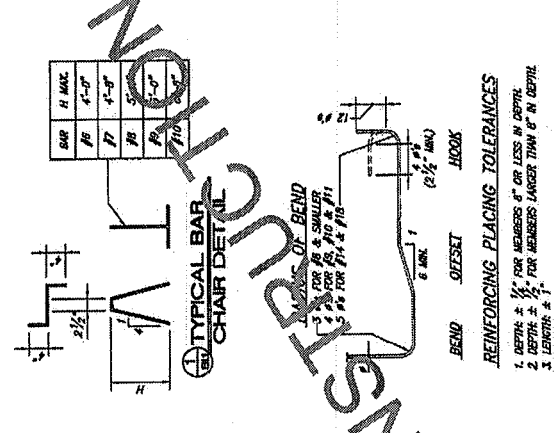
FOUNDATION DESIGN LOADS NO SCALE

NO.	ITEM	DESIGN VALUE	SITE VALUE	COMMENT
1	SEISMIC IMPORTANCE FACTOR	I	1.0	SAME
2	SEISMIC COEFFICIENT	C	0.5	SAME
3	SEISMIC CATEGORY	SC	C	SAME
4	SEISMIC FORCE-RESISTING SYSTEM	RS	FORCED MOMENT RESISTING	SAME
5	DESIGN BASE SHEAR	V	7.1	SAME
6	SEISMIC RESPONSE COEFFICIENT	Ca	0.233	SAME
7	RESPONSE MODIFICATION FACTOR	R	1.0	SAME
8	ANALYSIS PROCEDURE		RESPONSE SPECTRUM ANALYSIS	
9	TOWER FUNDAMENTAL PERIOD (AREA STIFF ESTIMATE)	T	1.26	SAME
10	FOUNDATION ROTATIONAL STIFFNESS (MINIMUM)	ks	ASCD	SAME
11	OTHER:			

**NOTES**  
1. SEISMIC DESIGN LOAD COMBINATIONS (PER STRENGTH DESIGN):  
U = 1.4D OR 1.2D + 1.4E + 1.6W OR 1.2D + 1.6W  
PER E.C. 6 - 1.4W

**WORK BY OTHERS**  
Lower design, site grading, and investigations, and all reports are by others. They are not provided by Minner, Stinnitt, Koo & Agrayani, Structural and Civil Engineers.

**GENERAL NOTES**  
1. Detailability and proposed details apply in all cases unless specifically shown otherwise on the drawings.  
2. All details shall be in accordance with the American Institute of Steel Construction, Inc. (AISC) Specification for Structural Steel Buildings, 13th Edition, 2005, unless otherwise noted.  
3. All dimensions from the Design Drawings are permitted without the permission of the Engineer.



**CONCRETE BAR LAP SPICE LENGTHS (CLASS 'B')**

BAR NO.	#4	#5	#6	#7	#8	#9	#10	#11
TOP BARS	1'-4"	1'-6"	1'-10"	2'-2"	2'-5"	2'-9"	2'-9"	3'-0"
OTHER BARS	1'-4"	1'-4"	1'-5"	1'-5"	2'-5"	2'-10"	2'-9"	3'-1"

VERIFICATION: BARS MUST BE MORE THAN 12" OF CONCRETE CAST IN MEMBER BELOW BAR.

**GENERAL NOTES**

**TESTING**  
1. Provide test results of all reinforcing bars of larger bars. All tests are to be completed 7 days prior to the placement of concrete.  
2. Provide certified independent certificate for each truckload of concrete for each concrete pour.  
3. Test 3 concrete test cylinders for each complete lower foundation to verify concrete strength. Test the cylinders at ages of 7, 14, and 28 days.

**WELDING INSPECTION**  
1. All welding inspection shall be in accordance with AWS D1.1 Section 6.4.  
2. Welding inspection reports shall be provided to the Owner and Engineer.  
3. All welds shall be inspected (using acceptance criteria for gullyhead connections) in accordance with AWS D1.1 Section 6.4.2.  
4. All welds shall be inspected (using acceptance criteria for gullyhead connections) in accordance with AWS D1.1 Section 6.4.2.  
5. All welds shall be inspected (using acceptance criteria for gullyhead connections) in accordance with AWS D1.1 Section 6.4.2.

**FOUNDATION NOTES**

1. See Note 1 on sheet with same end and grade, medium stiff to hard.  
2. Foundation Design Basis Pressure: DL only = 300 psf.  
3. Foundation Design Basis Wind Speed: 130 mph on 30 min. return period.  
4. Foundation Design Basis Seismicity: Not on base and unaccompanied RE.  
5. Foundation Design Basis Soil Conditions: See Geotechnical Report 0810000 (dated 1/1/2010).  
6. Foundation Design Basis Foundation Settlement: See Geotechnical Report 0810000 (dated 1/1/2010).

**SOILS REPORT**  
The soils report was prepared by a geotechnical engineer who is a duly licensed professional engineer in the State of New Mexico. The report was prepared by the geotechnical engineer who is a duly licensed professional engineer in the State of New Mexico. The report was prepared by the geotechnical engineer who is a duly licensed professional engineer in the State of New Mexico.

**STATEMENT OF SPECIAL INSPECTIONS**

Special Inspection by: [Name]  
Test/Drawings: [Name]  
Contract No.: [Name]  
Project: [Name]  
Site: [Name]

1. Verify foundation dimensions and reinforcement.  
2. Verify foundation depth and grade.  
3. Verify foundation concrete strength.  
4. Verify foundation reinforcement.  
5. Verify foundation reinforcement.  
6. Verify foundation reinforcement.  
7. Verify foundation reinforcement.

**CONCRETE**

- Minimum 28 Day Compressive Strength @ 28 days: 4000 psi
- Use Type I or Type II Low-Alkali Cement
- Maximum Chloride: 0.05% by weight of cement
- Maximum Sulfate: 3.0% by weight of cement
- Minimum Slump: 10" at 15" height
- Water Reducing Admixtures: No Chloride Chloride
- Prohibited Retarders: None
- Maximum Temperature of Concrete at Placement: 90°F
- Minimum Temperature of Concrete at Placement: 40°F
- Maximum Rate of Temperature Change: 5°F per hour
- Required Curing Compound for all concrete: High strength, non-soluble, non-chloride, non-sulfate, non-sulfate, non-sulfate.

**REINFORCING STEEL**

**Deformed Bars**  
ASTM A63  
ASTM A722  
ASTM A723  
ASTM A724  
ASTM A725  
ASTM A726  
ASTM A727  
ASTM A728  
ASTM A729  
ASTM A730  
ASTM A731  
ASTM A732  
ASTM A733  
ASTM A734  
ASTM A735  
ASTM A736  
ASTM A737  
ASTM A738  
ASTM A739  
ASTM A740  
ASTM A741  
ASTM A742  
ASTM A743  
ASTM A744  
ASTM A745  
ASTM A746  
ASTM A747  
ASTM A748  
ASTM A749  
ASTM A750

**STRUCTURAL STEEL**

**Minimum Yield Strength**  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50  
ASTM A572 Gr. 50

**GENERAL NOTES**

1. Verify foundation dimensions and reinforcement.  
2. Verify foundation depth and grade.  
3. Verify foundation concrete strength.  
4. Verify foundation reinforcement.  
5. Verify foundation reinforcement.  
6. Verify foundation reinforcement.  
7. Verify foundation reinforcement.

**GENERAL NOTES**

1. Verify foundation dimensions and reinforcement.  
2. Verify foundation depth and grade.  
3. Verify foundation concrete strength.  
4. Verify foundation reinforcement.  
5. Verify foundation reinforcement.  
6. Verify foundation reinforcement.  
7. Verify foundation reinforcement.

HALLUS POWER SYSTEMS  
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FAX: (801) 796-0004



*Nestor A. Agbayani*  
SIGNATURE (FOR DIGITAL SIGNATURE BY ELECTRONIC FILE)  
DATE: 01-27-2011

GENERAL NOTES

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DENVER, CO 80231  
TEL: (303) 551-4000  
FAX: (303) 551-4004

VESTAS V-17  
WIND TURBINE FOUNDATION  
23 METER • 3 BECTORN

DATE	11-008	DATE	2011-01-27
ISSUE	11-008	ISSUE	11-008
REVISION	11-008	REVISION	11-008
SHEET		S12	

STRUCTURAL OBSERVATIONS

When the 2008 IBC is the applicable code for the local building code, refer to Section 1702 for structural observation requirements or to the equivalent section in the local building code.  
When the 1999 IBC is the applicable code for the local building code, refer to Section 1710 for structural observation requirements or to the equivalent section in the local building code.

GENERAL NOTES

STEEL PER IBC TABLE 1704.3	Continuous	Periodic
1. Verification and inspection task and schedule: a. Identification markings to conform to ASTM specifications as specified in the approved construction documents. b. Manufacturer's certificate of compliance req'd.		X
2. Inspection of high-strength bolting: a. Pre-tensioned joints. b. Pre-tensioned and slip-critical joints using turn-of-nut with monitoring, turn-of-bolt or direct tension indicator methods of installation. c. Pre-tensioned and slip-critical joints using turn-of-nut with monitoring of calibrated wrench methods of installation.	X	X
3. Material verification of structural steel and cold-formed steel deck: a. For structural steel, identification markings to conform to AISC 360. b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents. c. Manufacturer's certified test reports.		X
4. Material verification of weld filler materials: a. Identification markings to conform to AWS specifications in the approved construction documents. b. Manufacturer's certificate of compliance req'd.		X
5. Inspection of welding: 1) Structural steel and cold-formed steel deck 2) Complete penetration groove welds 3) Non-penetrating groove welds 4) Single pass fillet welds 5) Single pass fillet welds > 1/2" high 6) Fillet welds 7) Single pass fillet welds 8) Fillet welds 9) Verification of reliability of relationship steel-to-concrete connections, ASTM A708. 10) Verification of steel-reinforcing framework and cold-formed steel reinforcement. 11) Verification of steel-reinforcing framework and cold-formed steel reinforcement. 12) Verification of steel-reinforcing framework and cold-formed steel reinforcement. 13) Verification of steel-reinforcing framework and cold-formed steel reinforcement. 14) Verification of steel-reinforcing framework and cold-formed steel reinforcement. 15) Verification of steel-reinforcing framework and cold-formed steel reinforcement. 16) Verification of steel-reinforcing framework and cold-formed steel reinforcement. 17) Verification of steel-reinforcing framework 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and cold-formed steel reinforcement. 100) Verification of steel-reinforcing framework and cold-formed steel reinforcement.	X	X
6. Inspection of steel frame joint details for compliance with approved construction documents: a. Details such as bracing and stiffening. b. Member locations. c. Application of joint details at each connection.		X

STATEMENT OF SPECIAL INSPECTION (SOSI)

The SOI is prepared and matches the content of the Code Tables. All items are not necessarily applicable to the project. Refer to the equivalent sections about 1704.3 based on the current edition of the IBC. The equivalent sections about 1704.3:

Verification and Inspection Task	Continuous	Periodic
1. Verify materials below footings are adequate to achieve the design bearing capacity.		X
2. Verify excavations are adequate to proper depth and have reached proper material.		X
3. Perform classification and testing of controlled fill materials (where occurs per soils report).		X
4. Verify use of proper materials, methods and fill placement and compaction and composition of controlled fill (where occurs per soils report).	X	
5. Prior to placement of controlled fill, observe and verify that site has been prepared properly.		X

**TOWER FOUNDATION**  
TOWER FOUNDATION DESIGN IS BY OTHERS.  
CONCRETE FOUNDATION-RELATED ITEMS LISTED HERE ARE ONLY FOR INFORMATION.  
DESIGN DRAWINGS BY OTHERS SHALL CONTROL.

Verification and Inspection Task	Continuous	Periodic
1. Inspection of reinforcing steel, including prestressing tendons and placement.		X
2. Inspection of reinforcement steel welding in accordance with IBC Table 1704.3, Item 53.		
3. Inspect joints to be included in concrete prior to their casting placement of concrete.	X	
4. Inspection of anchors installed in hardened concrete.		X
5. Verify use of required design mix.		X
6. At the time fresh concrete is prepared to fabricate formwork, perform slump and air content tests, and determine the temperature of the concrete.	X	
7. Inspection of concrete and substrate placement for proper application techniques.	X	
8. Inspection for maintenance of specified curing temperature and techniques.		X
9. Inspection of prestressed concrete: a. Application of prestressing forces. b. Grouting of bonded prestressing tendons in the eddy-former-casting system.	X	
10. Erection of precast concrete members.		X
11. Verification of in-situ concrete strength prior to structural slab.		X
12. Inspect formwork for shear, flexure and dimensions of the concrete member being formed.		X

EDGEMOND WIND ENERGY PROJECT  
EDGEMOND, NEW MEXICO, USA  
FOUNDATION

HALLUS POWER BREIERS  
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FAX: (801) 700-0524



*Nestor A. Agbayani*  
SIGNATURE (OR LEGAL SIGNATURE AND ELECTRONIC FILE)  
DATE 01.27.2011

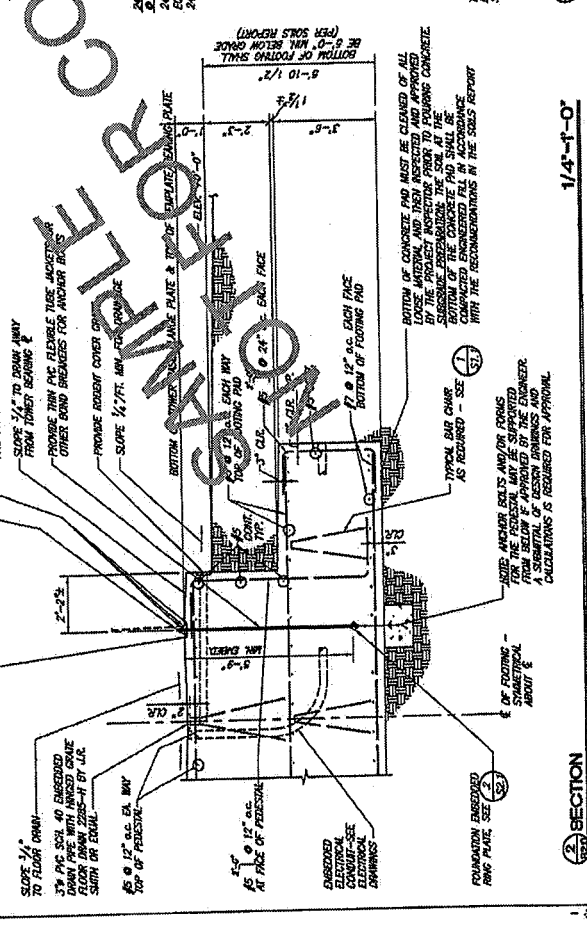
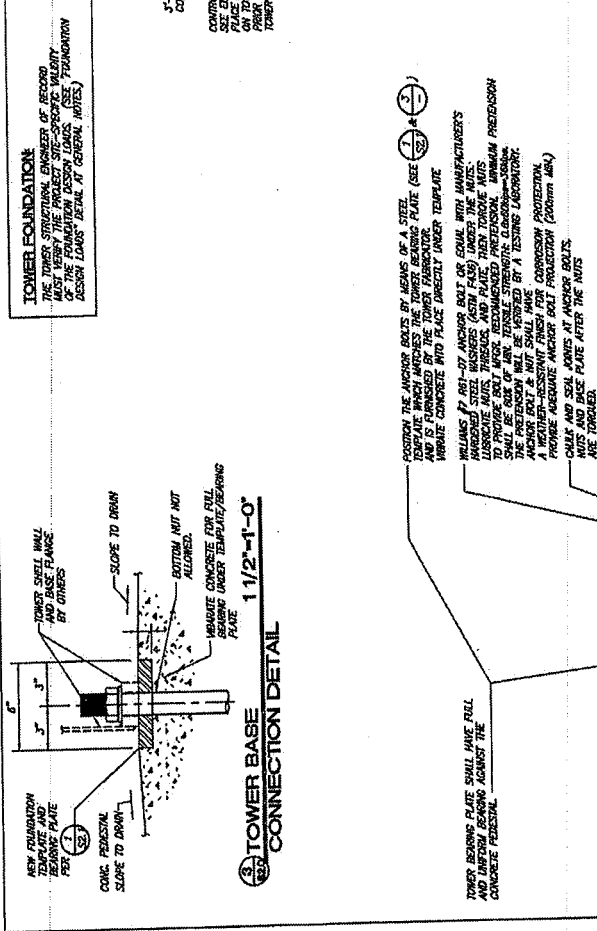
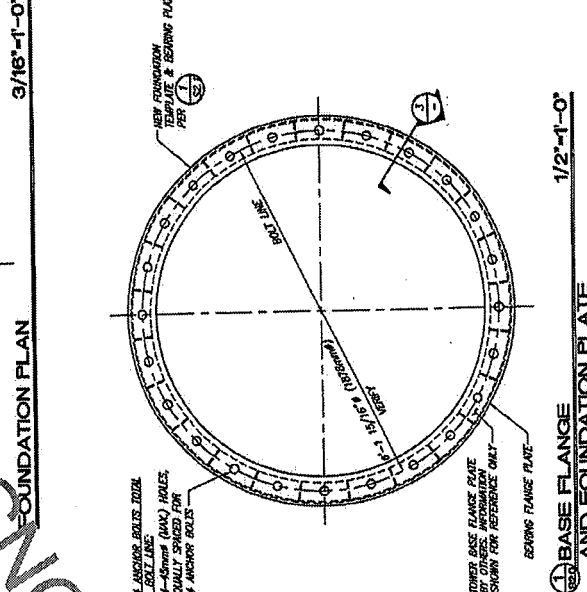
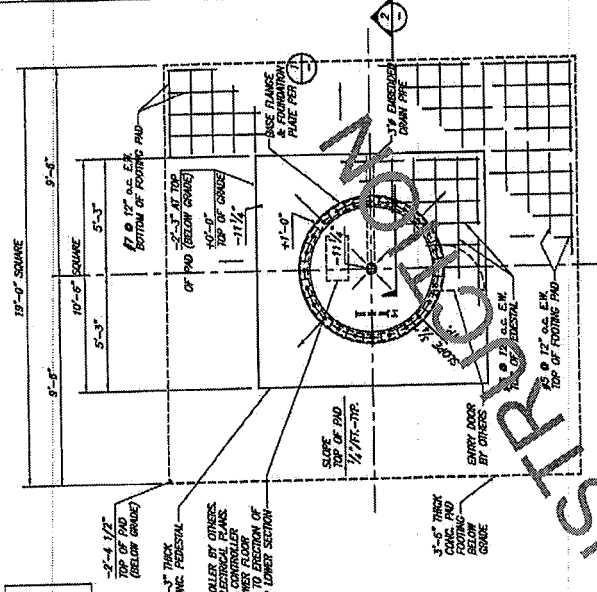
FOUNDATION PLAN,  
SECTIONS AND DETAILS

MINNER, STINNETT, KOO & AGBAYANI  
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VESTAS V-17  
WIND TURBINE FOUNDATION  
23 METER • 3 SECTION

DATE 2011-01-27  
DRAWN: Nestor Agbayani  
CHECKED: Nestor Agbayani  
PROJECT: Edgemoent

SHEET \$2.0



**1** TOWER FOUNDATION CONNECTION DETAIL 1 1/2'-1'-0"

**2** SECTION 1-1 1/4'-1'-0"

**3** FOUNDATION PLAN AND FOUNDATION FLATE 1/2'-1'-0"

**4** FOUNDATION PLAN 9/16'-1'-0"

PLN2012-00006  
Exhibit C- Elevations  
February 7, 2013

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 HALLIBURTON SERVICES  
 2329 BRADY AVENUE  
 SAN LEONARD, CA 94577  
 TEL: (916) 790-0091  
 FAX: (916) 790-0054



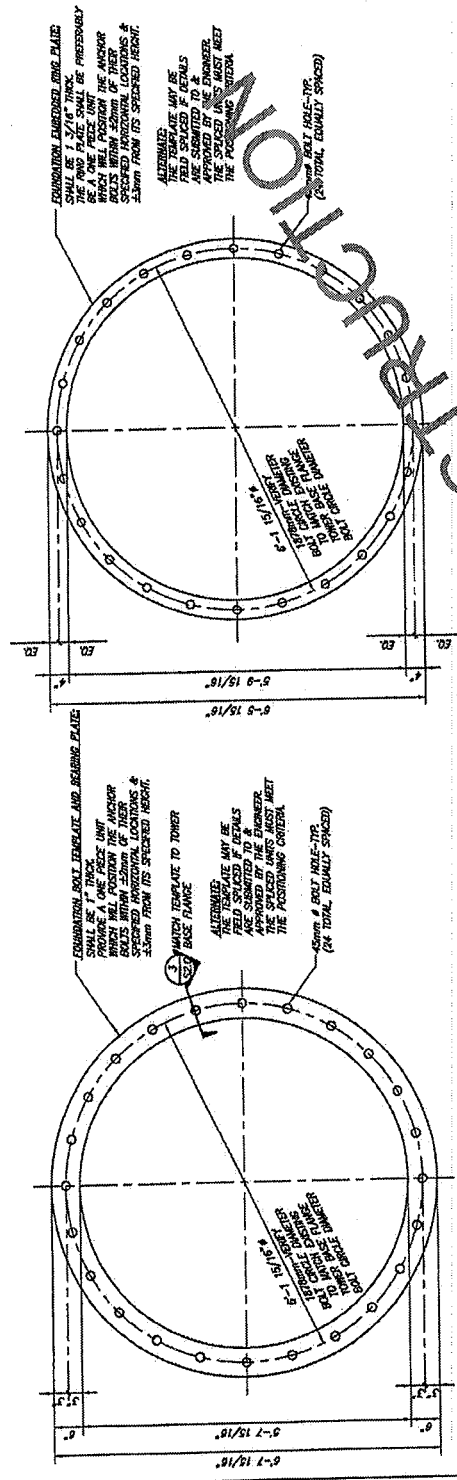
*Nestor A. Agbayani*  
 SIGNATURE FOR OFFICIAL SEALING OF ELECTRICAL P&ID  
 DATE 01.27.2011

FOUNDATION DETAILS

MINNER, STINNETT, KOO & AGRAYANI  
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 1718 9th STREET, ALBUQUERQUE, NEW MEXICO 87102  
 PHONE: (505) 252-4224 FAX: (505) 252-5245

VESTAB V-17  
 WIND TURBINE FOUNDATION  
 23 METER • 3 SECTION

SWT	DATE	BY	CHKD
S2.1	2011-01-27	T. Agbayani	T. Agbayani
ISSUED	DESIGNED	CHECKED	APPROVED
T. Agbayani	T. Agbayani	T. Agbayani	T. Agbayani



FOUNDATION BOLT TEMPLATE AND BEARING PLATE N.T.S.

FOUNDATION ENBEDDED RING PLATE N.T.S.

SAMPLE FOR COMMENTS  
 NOT FOR CONSTRUCTION

PLN2012-00006  
 Exhibit C- Elevations  
 February 7, 2013