



6718 W. Plank Road  
Peoria, IL 61604 USA  
Phone 309-697-4400  
FAX 309-897-5612  
Toll Free 800-727-ROHN

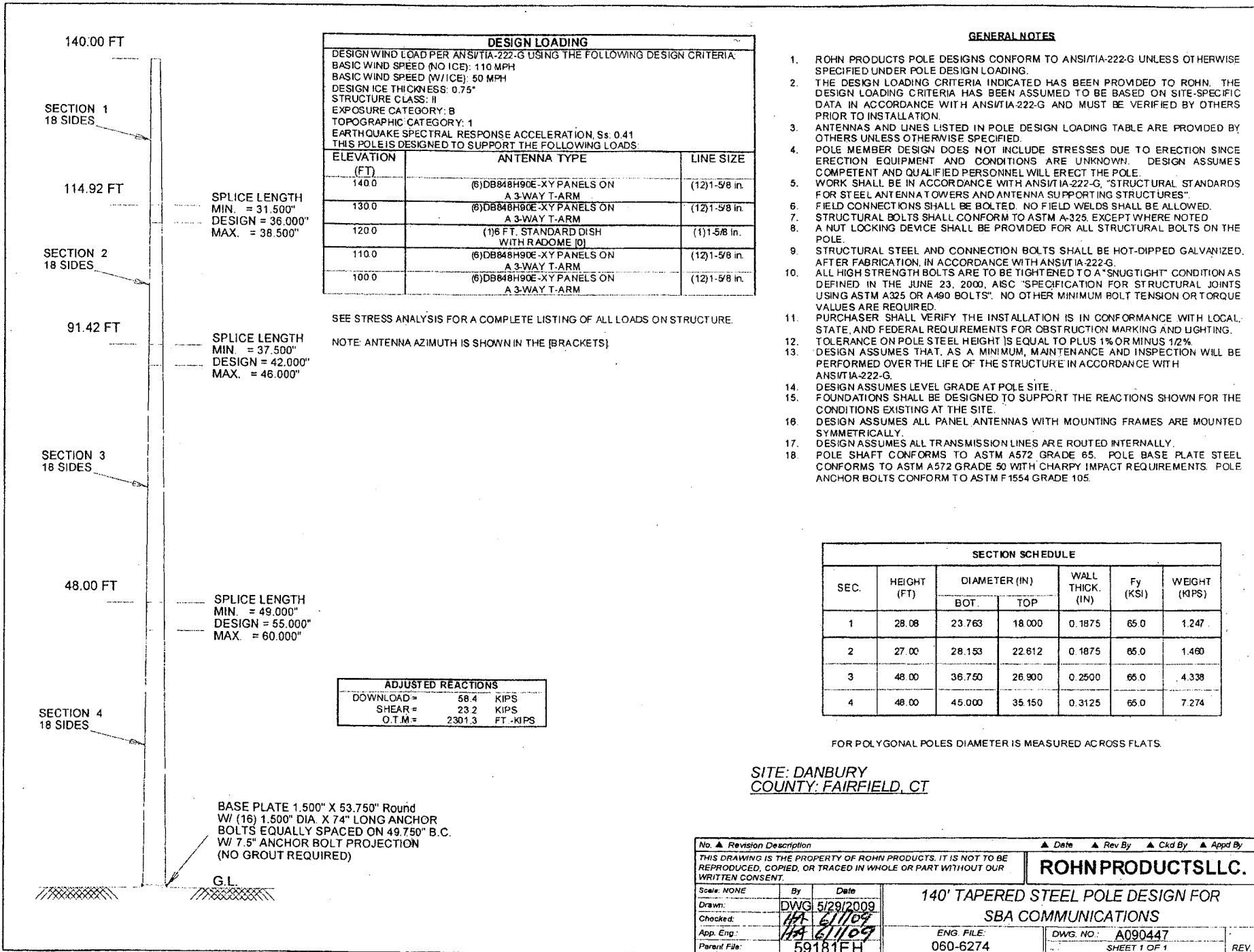
PURCHASER: SBA COMMUNICATIONS  
NAME OF PRODUCT: DUNBURY, FAIRFIELD COUNTY, CONNECTICUT  
140 FT. TAPERED STEEL POLE  
FILE NUMBER: 0606274  
DRAWING NUMBER: A090447 AND A090448 1-3

I CERTIFY THAT THE ATTACHED DRAWINGS AND CALCULATIONS WERE  
PREPARED UNDER MY SUPERVISION IN ACCORDANCE WITH THE  
LOADING AND SOIL CRITERIA SPECIFIED BY THE PURCHASER AND THAT  
I AM A REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF  
THE STATE OF CONNECTICUT.

CERTIFIED BY: HABIB JIRJI

DATE: 6/1/09





DESIGN LOADING		
DESIGN WIND LOAD PER ANSITIA-222-G USING THE FOLLOWING DESIGN CRITERIA: BASIC WIND SPEED (NO ICE): 110 MPH BASIC WIND SPEED (W/ICE): 50 MPH DESIGN ICE THICKNESS: 0.75" STRUCTURE CLASS: II EXPOSURE CATEGORY: B TOPOGRAPHIC CATEGORY: 1 EARTHQUAKE SPECTRAL RESPONSE ACCELERATION, Ss: 0.41 THIS POLE IS DESIGNED TO SUPPORT THE FOLLOWING LOADS:		
ELEVATION (FT)	ANTENNA TYPE	LINE SIZE
140.0	(6) DB848H90E-XY PANELS ON A 3-WAY T-ARM	(12) 1-5/8 in.
130.0	(6) DB848H90E-XY PANELS ON A 3-WAY T-ARM	(12) 1-5/8 in.
120.0	(1) 6 FT. STANDARD DISH WITH RADOME (0)	(1) 1-5/8 in.
110.0	(6) DB848H90E-XY PANELS ON A 3-WAY T-ARM	(12) 1-5/8 in.
100.0	(6) DB848H90E-XY PANELS ON A 3-WAY T-ARM	(12) 1-5/8 in.

SEE STRESS ANALYSIS FOR A COMPLETE LISTING OF ALL LOADS ON STRUCTURE.

NOTE: ANTENNA AZIMUTH IS SHOWN IN THE [BRACKETS]

ADJUSTED REACTIONS	
DOWNLOAD =	58.4 KIPS
SHEAR =	23.2 KIPS
O.T.M =	2301.3 FT.-KIPS

**GENERAL NOTES**

- ROHN PRODUCTS POLE DESIGNS CONFORM TO ANSITIA-222-G UNLESS OTHERWISE SPECIFIED UNDER POLE DESIGN LOADING.
- THE DESIGN LOADING CRITERIA INDICATED HAS BEEN PROVIDED TO ROHN. THE DESIGN LOADING CRITERIA HAS BEEN ASSUMED TO BE BASED ON SITE-SPECIFIC DATA IN ACCORDANCE WITH ANSITIA-222-G AND MUST BE VERIFIED BY OTHERS PRIOR TO INSTALLATION.
- ANTENNAS AND LINES LISTED IN POLE DESIGN LOADING TABLE ARE PROVIDED BY OTHERS UNLESS OTHERWISE SPECIFIED.
- POLE MEMBER DESIGN DOES NOT INCLUDE STRESSES DUE TO ERECTION SINCE ERECTION EQUIPMENT AND CONDITIONS ARE UNKNOWN. DESIGN ASSUMES COMPETENT AND QUALIFIED PERSONNEL WILL ERECT THE POLE.
- WORK SHALL BE IN ACCORDANCE WITH ANSITIA-222-G, "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".
- FIELD CONNECTIONS SHALL BE BOLTED. NO FIELD WELDS SHALL BE ALLOWED.
- STRUCTURAL BOLTS SHALL CONFORM TO ASTM A-325, EXCEPT WHERE NOTED
- A NUT LOCKING DEVICE SHALL BE PROVIDED FOR ALL STRUCTURAL BOLTS ON THE POLE.
- STRUCTURAL STEEL AND CONNECTION BOLTS SHALL BE HOT-DIPPED GALVANIZED, AFTER FABRICATION, IN ACCORDANCE WITH ANSITIA-222-G.
- ALL HIGH STRENGTH BOLTS ARE TO BE TIGHTENED TO A "SNUGTIGHT" CONDITION AS DEFINED IN THE JUNE 23, 2000, AISC "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS". NO OTHER MINIMUM BOLT TENSION OR TORQUE VALUES ARE REQUIRED.
- PURCHASER SHALL VERIFY THE INSTALLATION IS IN CONFORMANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS FOR OBSTRUCTION MARKING AND LIGHTING.
- TOLERANCE ON POLE STEEL HEIGHT IS EQUAL TO PLUS 1% OR MINUS 1/2%.
- DESIGN ASSUMES THAT, AS A MINIMUM, MAINTENANCE AND INSPECTION WILL BE PERFORMED OVER THE LIFE OF THE STRUCTURE IN ACCORDANCE WITH ANSITIA-222-G.
- DESIGN ASSUMES LEVEL GRADE AT POLE SITE.
- FOUNDATIONS SHALL BE DESIGNED TO SUPPORT THE REACTIONS SHOWN FOR THE CONDITIONS EXISTING AT THE SITE.
- DESIGN ASSUMES ALL PANEL ANTENNAS WITH MOUNTING FRAMES ARE MOUNTED SYMMETRICALLY.
- DESIGN ASSUMES ALL TRANSMISSION LINES ARE ROUTED INTERNALLY.
- POLE SHAFT CONFORMS TO ASTM A572 GRADE 65. POLE BASE PLATE STEEL CONFORMS TO ASTM A572 GRADE 50 WITH CHARPY IMPACT REQUIREMENTS. POLE ANCHOR BOLTS CONFORM TO ASTM F1554 GRADE 105.

SECTION SCHEDULE						
SEC.	HEIGHT (FT)	DIAMETER (IN)		WALL THICK. (IN)	Fy (KSI)	WEIGHT (KIPS)
		BOT.	TOP			
1	28.08	23.763	18.000	0.1875	65.0	1.247
2	27.00	28.153	22.612	0.1875	65.0	1.460
3	48.00	36.750	26.900	0.2500	65.0	4.338
4	48.00	45.000	35.150	0.3125	65.0	7.274

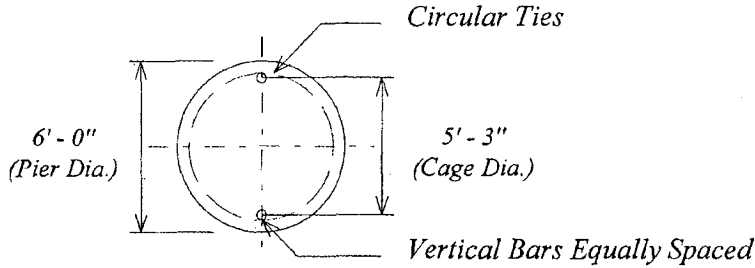
FOR POLYGONAL POLES DIAMETER IS MEASURED ACROSS FLATS.

SITE: DANBURY  
COUNTY: FAIRFIELD, CT

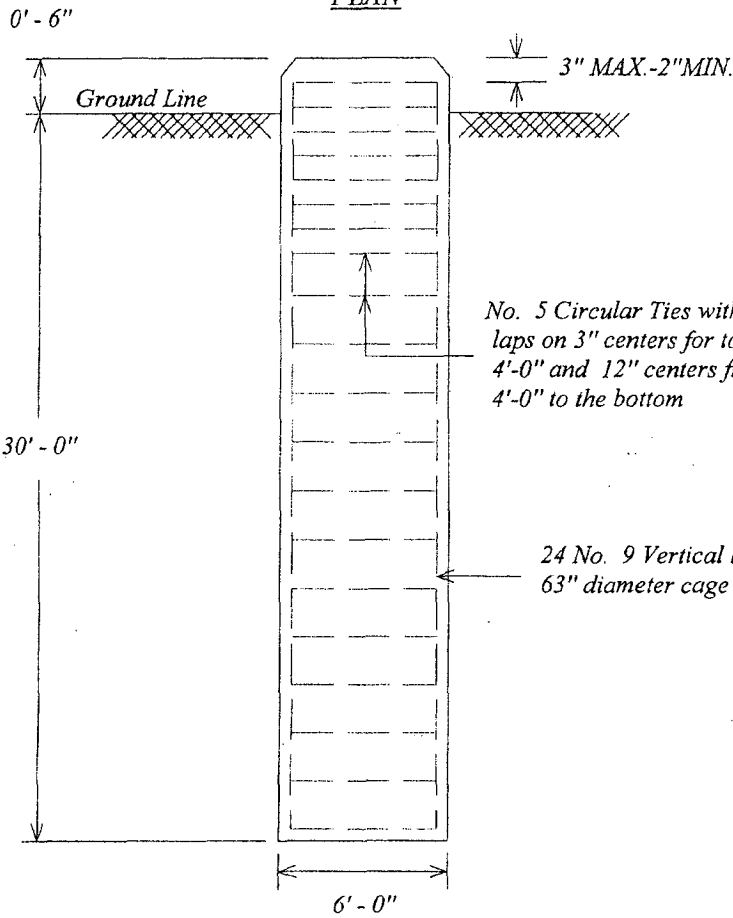
BASE PLATE 1,500" X 53.750" Round  
W/ (16) 1,500" DIA. X 74" LONG ANCHOR  
BOLTS EQUALLY SPACED ON 49.750" B.C.  
W/ 7.5" ANCHOR BOLT PROJECTION  
(NO GROUT REQUIRED)

No. ▲ Revision Description		▲ Date	▲ Rev By	▲ Ckd By	▲ Appd By
THIS DRAWING IS THE PROPERTY OF ROHN PRODUCTS. IT IS NOT TO BE REPRODUCED, COPIED, OR TRACED IN WHOLE OR PART WITHOUT OUR WRITTEN CONSENT.					
<b>ROHN PRODUCTS LLC.</b>					
Scale: NONE	By	Date	140' TAPERED STEEL POLE DESIGN FOR SBA COMMUNICATIONS		
Drawn:	DWG	5/29/2009			
Checked:	HA	6/11/09			
App. Eng:	HA	6/11/09			
Parent File:	59181EH	ENG. FILE:	060-6274	DWG. NO.:	A090447
				SHEET 1 OF 1	
					REV.

NOTE: SEE POLE ASSEMBLY DRAWING FOR FOUNDATION LAYOUT AND ANCHORAGE EMBEDMENT DRAWING NUMBER.



PLAN



ELEVATION

VOLUME OF CONCRETE

31.9 Cu. Yds.

REACTIONS

Download = 58.4 KIPS

Shear = 23.2 KIPS

O.T.M. = 2301.3 FT.-KIPS

POLE SITE

DANBURY, CT

No.	Revision Description	Date	Rev By	CkdBy	App By
THIS DRAWING IS THE PROPERTY OF ROHN PRODUCTS. IT IS NOT TO BE REPRODUCED, COPIED OR TRACED IN WHOLE OR IN PART WITHOUT OUR WRITTEN CONSENT.					
Scale: NONE			<p style="text-align: center;"><b>ROHN</b></p> <p style="text-align: center;">DRILLED PIER FOUNDATION DETAILS FOR SBA COMMUNICATIONS</p>		
Drawn:	DWG	05/29/09	DWG. NO.: A090448		
Checked:	HA	6/1/09	SHEET 1 OF 3		
App. Eng.:	HA	6/1/09	REV.		
Parent File:					

# FOUNDATION GENERAL NOTES

1. Foundation design has been developed in accordance with generally accepted professional engineering principles and practices within the limits of the subsurface data provided. Foundation design modifications may be required in the event the following design parameters are not applicable for the subsurface conditions encountered.

Depth(ft)	Soil Type	K(pci)	$\gamma$ (pcf)	$\phi$ (deg)	C(ksf)	$\epsilon_{50}$ (in/in)
0.0-2.0	Soft Clay	5.0	80.0	0.0	0.100	0.035
2.0-15.0	Sand	62.0	115.0	32.0	0.000	0.000
15.0-35.0	Sand	99.0	56.0	36.0	0.000	0.000

2. Work shall be in accordance with local codes, safety regulations and unless otherwise noted, the latest revision of ACI 318, "Building Code Requirements for Reinforced Concrete". Procedures for the protection of excavations, existing construction and utilities shall be established prior to foundation installation.
3. Concrete materials shall conform to the appropriate state requirements for exposed structural concrete.
4. Proportions of concrete materials shall be suitable for the installation method utilized and shall result in durable concrete for resistance to local anticipated aggressive actions. The durability requirements of ACI 318 Chapter 4 shall be satisfied based on the conditions expected at the site. As a minimum, concrete shall develop a minimum compressive strength of 4000 psi ( 27.6 MPa) in 28 days.
5. Maximum size of aggregate shall not exceed size suitable for installation method utilized or 1/3 clear distance behind or between reinforcing. Maximum size may be increased to 2/3 clear distance provided workability and methods of consolidation such as vibrating will prevent honeycombs or voids.
6. Reinforcement shall be deformed and conform to the requirements of ASTM A615 grade 60 unless otherwise noted. Splices in reinforcement shall not be allowed unless otherwise indicated.
7. Reinforcing cages shall be braced to retain proper dimensions during handling and throughout placement of concrete. When temporary casing is utilized, bracing shall be adequate to resist forces occurring from flowing concrete during casing extraction.
8. Welding is prohibited on reinforcing steel and embedments.
9. Minimum concrete cover for reinforcement shall be 3 inches (76 mm) unless otherwise noted. Approved spacers shall be used to insure a 3 inch (76 mm) minimum cover on reinforcement.
10. Concrete cover from top of foundation to ends of vertical reinforcement shall not exceed 3 inches (76mm) nor be less than 2 inches (51mm).
11. Spacers shall be attached intermittently throughout the entire length of vertical reinforcing cages to insure concentric placement of cages in excavations.
12. Foundation design has been based on geotechnical report no. 091184.01 by Tower Engineering Professionals, Inc. dated 05/13/09
13. Foundation depth indicated is based on the grade line described in the referenced geotechnical report. Foundation modification may be required in the event cut or fill operations have taken place subsequent to the geotechnical investigation.
14. Foundation design assumes level grade at pole site.

## FOUNDATION GENERAL NOTES

15. Foundation design assumes the recommendations in the referenced geotechnical report concerning verification of subsurface conditions are implemented prior to placement of concrete.
16. Foundation installation shall be supervised by personnel knowledgeable and experienced with the proposed foundation type. Construction shall be in accordance with generally accepted installation practices.
17. Foundation design assumes field inspections will be performed to verify that construction materials, installation methods and assumed design parameters are acceptable based on conditions existing at the site.
18. For foundation and anchor tolerances see Pole Assembly drawing.
19. Loose material shall be removed from bottom of excavation prior to concrete placement. Sides of excavation shall be rough and free of loose cuttings.
20. Concrete shall be placed in a manner that will prevent segregation of concrete materials, infiltration of water or soil and other occurrences which may decrease the strength or durability of the foundation.
21. Free fall concrete may be used provided fall is vertical down without hitting sides of excavation, formwork, reinforcing bars, form ties, cage bracing or other obstructions. Under no circumstances shall concrete fall through water.
22. Construction joints, if required in piers, must be at least 12 inches (305 mm) below bottom of embedments and must be intentionally roughened to a full amplitude of 1/4 inch (6 mm). Foundation design assumes no other construction joints.
23. Top of foundation outside limits of anchor bolts shall be sloped to drain with a floated finish. Area inside limits of anchor bolts shall be level with a scratched finish.
24. Exposed edges of concrete shall be chamfered 3/4" x 3 / 4 " (19mm x 19mm) minimum.
25. Foundation design assumes casing, if used, will not be left in place. Equipment, procedures and proportions of concrete materials shall insure concrete will not be adversely disturbed upon casing removal.
26. Drilling fluid, if used, shall be fully displaced by concrete and shall not be detrimental to concrete or surrounding soil. Contaminated concrete shall be removed from top of foundation and replaced with fresh concrete.



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June 1, 2009

SBA Communications  
Attn: Shawn McCoy  
5900 Broken Sound Parkway  
Boca Raton, FL 33487

Reference: 140 Ft. Tapered Pole for SBA Communications  
Fairfield County, Connecticut – Rohn File #: 0606274

Dear Mr. McCoy:

The referenced pole is designed to meet the specified loading requirements in accordance with the ANSI/TIA/EIA-222-G-2005 for a 110 MPH 3-second wind speed with no ice and 50 MPH 3-second wind speed with 0.75 inches radial ice load; Structure Class II, Exposure Category B; Topographic Category 1.

Load and importance factors will be utilized in accordance with the referenced standards to result in approximately a 200-year return wind loading (equivalent to a 121 MPH gust wind speed).

It is our understanding that the design of the referenced pole may require consideration of a contained fall radius in the event a catastrophic wind speed were to result in a failure. Although the pole would not be designed to fail, stronger sections than required by analysis are provided in the lower portion of the pole. This results in an increased safety factor in the lower sections. This design enables the pole to fail through a combination of bending and buckling in the upper portion of the pole should a catastrophic wind loading occur. Failure in this manner results in the upper portion of the pole folding over the lower portion, resulting in a fall zone **less than 100 ft. from pole base.**

Please contact us at your convenience should you have further questions concerning the safety of pole structures or other aspects of pole design.

Sincerely,

Habib Azouri, P.E.  
Engineering Manager



ROHN Products LLC.

File: 606274 Site: 1 Cycle: 1 Design: 1 Engineer: don\_g  
 Customer: SBA NETWORK SERVICES  
 Site: DANBURY  
 Type: POLE-TPR  
 Pole: Tapered Steel

Page: 1  
 05/29/2009  
 1:49 PM

SUMMARY OF ANALYSIS RESULTS

Conditions : 110 mph Basic Wind Speed (no ice) 60 mph Operational  
 : 50 mph Basic Wind Speed (0.75" radial ice)  
 Building Code : EIA Revision G  
 Exposure : B  
 Gust response factor: 1.10  
 Structural Category : II  
 Topographic Category : 1  
 Natural Frequency : 0.35 cps  
 Resonant Velocity : 4.22 mph  
 Pole Height : 140.00 ft  
 Top Diameter : 18.000 in  
 Bottom Diameter : 45.000 in  
 Embedment Depth : 0.00 ft  
 Pole Shape : 18-sided Polygon  
 Joint Type : Slip  
 Shaft Steel Weight : 13.873 kips

POLE SHAFT PROPERTIES:

Seq	Sect. Length (ft)	Wall Thickness [t] (in)	Mat'l Yield [Fy] (ksi)	Top Diameter [Dt] (in)	Bottom Diameter [Db] (in)	Slip Joint Overlap (in)	Taper (in/ft)	Steel Weight (kips)
1	28.080	0.18750	65	18.000	23.760	36.00	0.2051	1.247
2	27.000	0.18750	65	22.610	28.150	42.00	0.2052	1.460
3	48.000	0.25000	65	26.900	36.750	55.00	0.2052	4.338
4	48.000	0.31250	65	35.150	45.000		0.2052	6.828

Design Bend Radius = 4.0 \* t inches

POLE SHAFT SECTION MAXIMUM FORCES AND MOMENTS:

Seq	Load Case	At Base of Section					Max. Ratio Actual Allowable [Ftot/Fb]
		Sect. Elev. (ft.)	Axial Load (kips)	Bending Moment (ft-kips)	Horiz. Shear (kips)	Torsion (ft-Kips)	
1	Combo005	111.92	6.4640	142.1734	7.7543	0.0000	0.3826
2	Combo005	87.92	13.2998	435.4260	14.1522	0.0000	0.8283
3	Combo011	43.42	22.1641	1176.6633	17.9275	0.0000	0.9814
4	Combo011	0.00	32.8810	2150.9425	21.4980	0.0000	0.9089
DESIGN REACTIONS →			54.6272	2150.9425	21.6909	10.7342 ←	
OPERATIONAL REACTIONS →			27.8688	339.3112	3.5998	1.7859 ←	
ADJUSTED REACTIONS →			58.4456	2301.2937	23.2071	11.4845 ←	

SECTION PROPERTIES:

Seq	Weight (kips)	Location	Elev (ft)	Diam Across Flats (in)	Wall Thick [t] (in)	[W/t] Ratio	Diam/Thick [D/t] Ratio	Area (in^2)	J (in^4)	I (in^4)
1	1.247	@Top	140.00	18.000	0.1875	15.16	96.00	10.60	852.0	424.9
		@Splice	114.92	22.630		19.52	120.69	13.36	1704.0	849.9
		@Bot	111.92	23.760		20.58	126.72	14.03	1974.6	984.8
2	1.460	@Top	114.92	22.610	0.1875	19.50	120.59	13.34	1699.5	847.6
		@Splice	91.42	27.010		23.64	144.05	15.96	2909.1	1450.9
		@Bot	87.92	28.150		24.71	150.13	16.64	3296.0	1643.9
3	4.338	@Top	91.42	26.900	0.2500	17.21	107.60	21.15	3804.4	1897.5
		@Splice	48.00	35.810		23.49	143.24	28.22	9038.2	4507.9
		@Bot	43.42	36.750		24.16	147.00	28.96	9774.1	4874.9
4	6.828	@Top	48.00	35.150	0.3125	18.07	112.48	34.55	10623.0	5298.3
		@Bot	0.00	45.000		23.63	144.00	44.32	22421.5	11182.9

Total Shaft Steel Weight = 13.873 kips



ROHN Products LLC.

File: 606274 Site: 1 Cycle: 1 Design: 1 Engineer: don\_g  
 Customer: SBA NETWORK SERVICES  
 Site: DANBURY  
 Type: POLE-TPR  
 Pole: Tapered Steel

Page: 2  
 05/29/2009  
 1:49 PM

PROPERTIES:

( @ Max Segment = 5.0 ft)

Node No.	Node Elev. (ft)	Diam. Across Flats (in)	Wall Thick [t] (in)	[W/t] Ratio	Diam/ Thick [D/t] Ratio	Area (in <sup>2</sup> )	J (in <sup>4</sup> )	I (in <sup>4</sup> )
44	140.000	18.00	0.1875	15.16	96.00	10.60	852.0	424.9
43	137.492	18.51	0.1875	15.65	98.74	10.91	928.0	462.8
42	134.983	19.03	0.1875	16.13	101.49	11.21	1008.3	502.9
41	132.475	19.54	0.1875	16.62	104.23	11.52	1093.2	545.2
40	129.967	20.06	0.1875	17.10	106.98	11.82	1182.7	589.9
39	127.458	20.57	0.1875	17.58	109.72	12.13	1277.0	636.9
38	124.950	21.09	0.1875	18.07	112.46	12.44	1376.1	686.3
37	122.442	21.60	0.1875	18.55	115.21	12.74	1480.3	738.3
36	119.933	22.12	0.1875	19.03	117.95	13.05	1589.5	792.8
35	117.425	22.63	0.1875	19.52	120.69	13.36	1704.1	849.9
34O	114.917	23.14	0.1875	20.00	123.44	13.66	1824.0	909.7
34I	114.917	22.61	0.1875	19.50	120.59	13.34	1699.5	847.6
33	111.917	23.23	0.1875	20.08	123.87	13.71	1843.3	919.4
32	109.867	23.65	0.1875	20.47	126.11	13.96	1946.1	970.6
31	107.817	24.07	0.1875	20.87	128.36	14.21	2052.7	1023.8
30	105.767	24.49	0.1875	21.26	130.60	14.46	2163.1	1078.8
29	103.717	24.91	0.1875	21.66	132.84	14.71	2277.4	1135.9
28	101.667	25.33	0.1875	22.06	135.09	14.96	2395.6	1194.8
27	99.617	25.75	0.1875	22.45	137.33	15.21	2517.9	1255.8
26	97.567	26.17	0.1875	22.85	139.57	15.46	2644.2	1318.8
25	95.517	26.59	0.1875	23.24	141.82	15.71	2774.7	1383.9
24	93.467	27.01	0.1875	23.64	144.06	15.96	2909.5	1451.1
23O	91.417	27.43	0.1875	24.03	146.30	16.21	3048.5	1520.5
23I	91.417	26.90	0.2500	17.21	107.60	21.15	3804.5	1897.5
22	87.917	27.62	0.2500	17.72	110.47	21.72	4120.4	2055.1
21	83.925	28.44	0.2500	18.29	113.75	22.37	4501.5	2245.2
20	79.933	29.26	0.2500	18.87	117.03	23.02	4905.5	2446.6
19	75.942	30.08	0.2500	19.45	120.30	23.67	5332.9	2659.8
18	71.950	30.89	0.2500	20.03	123.58	24.32	5784.5	2885.0
17	67.958	31.71	0.2500	20.60	126.86	24.97	6260.8	3122.6
16	63.967	32.53	0.2500	21.18	130.13	25.62	6762.7	3372.9
15	59.975	33.35	0.2500	21.76	133.41	26.27	7290.6	3636.2
14	55.983	34.17	0.2500	22.34	136.68	26.92	7845.3	3912.9
13	51.992	34.99	0.2500	22.92	139.96	27.57	8427.5	4203.2
12O	48.000	35.81	0.2500	23.49	143.24	28.22	9037.8	4507.7
12I	48.000	35.15	0.3125	18.07	112.48	34.55	10623.0	5298.3
11	43.417	36.09	0.3125	18.60	115.49	35.49	11506.8	5739.1
10	39.075	36.98	0.3125	19.10	118.34	36.37	12388.1	6178.6
9	34.733	37.87	0.3125	19.61	121.19	37.25	13313.1	6640.0
8	30.392	38.76	0.3125	20.11	124.04	38.14	14283.2	7123.8
7	26.050	39.65	0.3125	20.61	126.89	39.02	15299.2	7630.6
6	21.708	40.55	0.3125	21.11	129.74	39.90	16362.4	8160.8
5	17.367	41.44	0.3125	21.62	132.60	40.79	17473.6	8715.1
4	13.025	42.33	0.3125	22.12	135.45	41.67	18634.2	9293.9
3	8.683	43.22	0.3125	22.62	138.30	42.56	19844.9	9897.7
2	4.342	44.11	0.3125	23.13	141.15	43.44	21107.0	10527.3
1	0.000	45.00	0.3125	23.63	144.00	44.32	22421.5	11182.9





ROHN Products LLC.

File: 606274 Site: 1 Cycle: 1 Design: 1 Engineer: don\_g
Customer: SBA NETWORK SERVICES
Site: DANBURY
Type: POLE-TPR
Pole: Tapered Steel

Page: 3
05/29/2009
1:49 PM

DISCRETE APPURTENANCE PROPERTIES

Table with columns: Elev. (ft), Description, Weight (w/o Ice, w/ Ice), Az., EPA (w/o Ice, w/ Ice), Lines. Rows include DB848H90E PANELS ON A 3-WAY T-MOUNT and 6 Ft Diameter Dish w/ Radome.



ROHN Products LLC.

File: 606274 Site: 1 Cycle: 1 Design: 1 Engineer: don\_g  
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 Site: DANBURY  
 Type: POLE-TPR  
 Pole: Tapered Steel

Page: 4  
 05/29/2009  
 1:49 PM

PRESSURES

Seg.	Elev. (ft)	Kz	W/o Ice		With Ice		Operational	
			G <sub>h</sub> qz	Cf	G <sub>h</sub> qz	Cf	G <sub>h</sub> qz	Cf
1-11	138.746	1.085	35.126	0.650	7.258	1.200	9.351	0.650
1-10	136.238	1.080	34.944	0.650	7.220	1.200	9.302	0.650
1-9	133.729	1.074	34.759	0.650	7.182	1.200	9.253	0.650
1-8	131.221	1.068	34.571	0.650	7.143	1.200	9.203	0.650
1-7	128.713	1.062	34.381	0.650	7.104	1.200	9.152	0.650
1-6	126.204	1.056	34.188	0.650	7.064	1.200	9.101	0.650
1-5	123.696	1.050	33.993	0.650	7.023	1.200	9.049	0.650
1-4	121.188	1.044	33.794	0.650	6.982	1.200	8.996	0.650
1-3	118.679	1.038	33.593	0.650	6.941	1.200	8.943	0.650
1-2	116.171	1.031	33.389	0.650	6.898	1.200	8.888	0.650
1-1	113.417	1.024	33.161	0.650	6.851	1.200	8.827	0.650
2-12	113.417	1.024	33.161	0.650	6.851	1.200	8.827	0.650
2-11	110.892	1.018	32.948	0.650	6.807	1.200	8.771	0.650
2-10	108.842	1.012	32.773	0.650	6.771	1.200	8.724	0.650
2-9	106.792	1.007	32.595	0.650	6.735	1.200	8.677	0.650
2-8	104.742	1.001	32.415	0.650	6.697	1.200	8.629	0.650
2-7	102.692	0.996	32.233	0.650	6.660	1.200	8.580	0.650
2-6	100.642	0.990	32.047	0.650	6.621	1.200	8.531	0.650
2-5	98.592	0.984	31.860	0.650	6.583	1.200	8.481	0.650
2-4	96.542	0.978	31.669	0.650	6.543	1.200	8.430	0.650
2-3	94.492	0.972	31.475	0.650	6.503	1.200	8.379	0.650
2-2	92.442	0.966	31.279	0.650	6.463	1.200	8.326	0.650
2-1	89.667	0.958	31.007	0.650	6.406	1.200	8.254	0.650
3-12	89.667	0.958	31.007	0.650	6.406	1.200	8.254	0.650
3-11	85.921	0.946	30.632	0.650	6.329	1.200	8.154	0.650
3-10	81.929	0.934	30.218	0.650	6.243	1.200	8.044	0.650
3-9	77.938	0.920	29.790	0.650	6.155	1.200	7.930	0.650
3-8	73.946	0.907	29.346	0.650	6.063	1.200	7.812	0.650
3-7	69.954	0.892	28.884	0.650	5.968	1.200	7.689	0.650
3-6	65.963	0.877	28.403	0.650	5.868	1.200	7.561	0.650
3-5	61.971	0.862	27.901	0.650	5.765	1.200	7.427	0.650
3-4	57.979	0.846	27.376	0.650	5.656	1.200	7.287	0.650
3-3	53.988	0.829	26.823	0.650	5.542	1.200	7.140	0.650
3-2	49.996	0.811	26.241	0.650	5.422	1.200	6.985	0.650
3-1	45.708	0.790	25.577	0.650	5.285	1.200	6.809	0.650
4-11	45.708	0.790	25.577	0.650	5.285	1.200	6.809	0.650
4-10	41.246	0.767	24.838	0.650	5.132	1.200	6.612	0.650
4-9	36.904	0.743	24.061	0.650	4.971	1.200	6.405	0.650
4-8	32.563	0.717	23.215	0.650	4.797	1.200	6.180	0.650
4-7	28.221	0.700	22.659	0.650	4.682	1.200	6.032	0.650
4-6	23.879	0.700	22.659	0.650	4.682	1.200	6.032	0.650
4-5	19.538	0.700	22.659	0.650	4.682	1.200	6.032	0.650
4-4	15.196	0.700	22.659	0.650	4.682	1.200	6.032	0.650
4-3	10.854	0.700	22.659	0.650	4.682	1.200	6.032	0.650
4-2	6.513	0.700	22.659	0.650	4.682	1.200	6.032	0.650
4-1	2.171	0.700	22.659	0.650	4.682	1.200	6.032	0.650



ROHN Products LLC.

File: 606274 Site: 1 Cycle: 1 Design: 1 Engineer: don\_g  
 Customer: SBA NETWORK SERVICES  
 Site: DANBURY  
 Type: POLE-TPR  
 Pole: Tapered Steel

Page: 5  
 05/29/2009  
 1:49 PM

MOMENTS, FORCES AND DEFLECTIONS

Node	Elev.	Moment			Shear		Torsion (ft-k)	Operational		
		Axial (kips)	My (ft-k)	Mz (ft-k)	Vy (kips)	Vz (kips)		Deflection (in)	Twist (deg)	Sway (deg)
44	140.000	4.736	0.00	3.45	0.00	0.68	0.491	20.138	0.033	1.270
43	137.492	2.034	0.00	8.54	2.75	0.00	0.000	19.471	0.033	1.267
42	134.983	2.194	0.00	16.15	2.90	0.00	0.000	18.806	0.032	1.263
41	132.475	2.381	0.00	24.20	3.09	0.00	0.000	18.144	0.032	1.258
40	129.967	4.335	0.00	34.24	5.69	0.00	0.000	17.484	0.031	1.251
39	127.458	4.534	0.00	50.00	5.85	0.00	0.000	16.829	0.030	1.242
38	124.950	4.745	0.00	66.20	6.01	0.00	0.000	16.180	0.029	1.230
37	122.442	4.979	0.00	82.89	6.20	0.00	0.000	15.537	0.028	1.217
36	119.933	5.898	0.00	100.74	7.40	0.00	0.000	14.901	0.027	1.202
35	117.425	6.122	0.00	121.22	7.56	0.00	0.000	14.273	0.026	1.186
34	114.917	6.464	0.00	142.17	7.75	0.00	0.000	13.655	0.025	1.167
33	111.917	6.911	0.00	168.01	8.08	0.00	0.000	12.926	0.024	1.151
32	109.867	8.801	0.00	188.01	10.44	0.00	0.000	12.435	0.023	1.133
31	107.817	9.030	0.00	211.64	10.58	0.00	0.000	11.953	0.022	1.114
30	105.767	9.277	0.00	235.57	10.73	0.00	0.000	11.479	0.021	1.093
29	103.717	9.527	0.00	259.83	10.88	0.00	0.000	11.014	0.020	1.071
28	101.667	10.118	0.00	284.76	11.46	0.00	0.000	10.558	0.019	1.049
27	99.617	11.852	0.00	312.18	13.48	0.00	0.000	10.113	0.018	1.026
26	97.567	12.141	0.00	342.52	13.63	0.00	0.000	9.677	0.017	1.001
25	95.517	12.438	0.00	373.18	13.79	0.00	0.000	9.252	0.016	0.976
24	93.467	12.741	0.00	404.15	13.94	0.00	0.000	8.839	0.015	0.950
23	91.417	13.300	0.00	435.43	14.15	0.00	0.000	8.436	0.014	0.923
22	87.917	14.035	0.00	489.64	14.44	0.00	0.000	7.769	0.013	0.896
21	83.925	14.697	0.00	552.68	14.75	0.00	0.000	7.038	0.012	0.852
20	79.933	15.370	0.00	616.92	15.06	0.00	0.000	6.344	0.011	0.806
19	75.942	16.055	0.00	682.35	15.37	0.00	0.000	5.688	0.010	0.760
18	71.950	16.751	0.00	748.94	15.69	0.00	0.000	5.071	0.009	0.714
17	67.958	17.455	0.00	816.68	16.01	0.00	0.000	4.493	0.008	0.667
16	63.967	18.170	0.00	885.83	16.60	0.00	0.000	3.955	0.007	0.620
15	59.975	18.899	0.00	956.89	16.92	0.00	0.000	3.455	0.006	0.573
14	55.983	19.640	0.00	1029.06	17.25	0.00	0.000	2.995	0.006	0.526
13	51.992	20.694	0.00	1102.31	17.58	0.00	0.000	2.574	0.005	0.479
12	48.000	22.164	0.00	1176.66	17.93	0.00	0.000	2.192	0.004	0.433
11	43.417	23.440	0.00	1263.55	18.29	0.00	0.000	1.791	0.004	0.401
10	39.075	24.422	0.00	1347.27	18.64	0.00	0.000	1.445	0.003	0.359
9	34.733	25.420	0.00	1432.18	18.98	0.00	0.000	1.137	0.003	0.317
8	30.392	26.435	0.00	1518.22	19.32	0.00	0.000	0.867	0.002	0.276
7	26.050	27.470	0.00	1605.36	19.66	0.00	0.000	0.635	0.002	0.235
6	21.708	28.521	0.00	1693.58	20.02	0.00	0.000	0.439	0.002	0.194
5	17.367	29.586	0.00	1782.89	20.37	0.00	0.000	0.280	0.001	0.154
4	13.025	30.668	0.00	1873.27	20.74	0.00	0.000	0.157	0.001	0.115
3	8.683	31.766	0.00	1964.74	21.12	0.00	0.000	0.070	0.001	0.076
2	4.342	32.881	0.00	2057.30	21.50	0.00	0.000	0.018	0.000	0.038
1	0.000	32.881	0.00	2150.94	21.50	0.00	0.000	0.000	0.000	0.000



ROHN Products LLC.

File: 606274 Site: 1 Cycle: 1 Design: 1 Engineer: don\_g  
 Customer: SBA NETWORK SERVICES  
 Site: DANBURY  
 Type: POLE-TPR  
 Pole: Tapered Steel

Page: 6  
 05/29/2009  
 1:49 PM

ACTUAL AND ALLOWABLE STRESSES

Node	Elevation (ft)	Actual Stresses					Allowable Stress [Fb] (ksi)	Actual / Allowable [Ftot/Fb] Ratio
		Axial [fa] (ksi)	Bending [fb] (ksi)	Shear [fv] (ksi)	Torsion [ft] (ksi)	Combined [Ftot] (ksi)		
44	140.000	0.447	0.881	0.128	0.063	1.364	65.000	0.0232
43	137.492	0.187	2.060	0.505	0.000	2.501	65.000	0.0387
42	134.983	0.196	3.686	0.518	0.000	4.149	65.000	0.0666
41	132.475	0.207	5.234	0.536	0.000	5.728	65.000	0.0933
40	129.967	0.367	7.028	0.963	0.000	8.321	65.000	0.1270
39	127.458	0.374	9.749	0.964	0.000	11.053	65.000	0.1737
38	124.950	0.382	12.282	0.967	0.000	13.598	65.000	0.2171
37	122.442	0.391	14.647	0.973	0.000	15.985	65.000	0.2577
36	119.933	0.452	16.976	1.133	0.000	18.713	65.000	0.2988
35	117.425	0.458	19.502	1.133	0.000	21.244	65.000	0.3420
34O	114.917	0.473	21.859	1.135	0.000	23.621	65.000	0.3826
34I	114.917	0.484	22.914	1.162	0.000	24.749	65.000	0.4009
33	111.917	0.504	25.651	1.179	0.000	27.546	65.000	0.4480
32	109.867	0.630	27.684	1.495	0.000	30.551	65.000	0.4853
31	107.817	0.635	30.075	1.489	0.000	32.928	65.000	0.5262
30	105.767	0.642	32.327	1.484	0.000	35.171	65.000	0.5649
29	103.717	0.648	34.452	1.479	0.000	37.286	65.000	0.6013
28	101.667	0.676	36.506	1.531	0.000	39.527	65.000	0.6370
27	99.617	0.779	38.715	1.772	0.000	42.635	65.000	0.6768
26	97.567	0.785	41.113	1.763	0.000	45.007	65.000	0.7179
25	95.517	0.792	43.377	1.755	0.000	47.248	65.000	0.7567
24	93.467	0.798	45.515	1.747	0.000	49.364	65.000	0.7934
23O	91.417	0.820	47.535	1.746	0.000	51.403	65.000	0.8283
23I	91.417	0.629	37.259	1.339	0.000	39.680	65.000	0.6488
22	87.917	0.646	39.728	1.330	0.000	42.143	65.000	0.6913
21	83.925	0.657	42.275	1.319	0.000	44.671	65.000	0.7350
20	79.933	0.668	44.561	1.308	0.000	46.941	65.000	0.7743
19	75.942	0.678	46.617	1.299	0.000	48.983	65.000	0.8096
18	71.950	0.689	48.467	1.290	0.000	50.821	65.000	0.8415
17	67.958	0.699	50.135	1.283	0.000	52.480	65.000	0.8701
16	63.967	0.709	51.655	1.296	0.000	54.044	65.000	0.8963
15	59.975	0.720	53.072	1.288	0.000	55.452	65.000	0.9207
14	55.983	0.730	54.352	1.282	0.000	56.724	65.000	0.9428
13	51.992	0.751	55.507	1.275	0.000	57.884	65.000	0.9629
12O	48.000	0.786	56.553	1.271	0.000	58.953	65.000	0.9814
12I	48.000	0.641	47.137	1.038	0.000	48.855	65.000	0.8177
11	43.417	0.661	47.992	1.031	0.000	49.715	65.000	0.8326
10	39.075	0.671	48.715	1.025	0.000	50.437	65.000	0.8452
9	34.733	0.682	49.358	1.019	0.000	51.078	65.000	0.8564
8	30.392	0.693	49.926	1.013	0.000	51.646	65.000	0.8663
7	26.050	0.704	50.428	1.008	0.000	52.148	65.000	0.8751
6	21.708	0.715	50.869	1.003	0.000	52.590	65.000	0.8828
5	17.367	0.725	51.256	0.999	0.000	52.979	65.000	0.8896
4	13.025	0.736	51.595	0.995	0.000	53.321	65.000	0.8956
3	8.683	0.746	51.890	0.992	0.000	53.621	65.000	0.9008
2	4.342	0.757	52.146	0.990	0.000	53.883	65.000	0.9054
1	0.000	0.742	52.368	0.970	0.000	54.050	65.000	0.9089



ROHN Products LLC.

File: 606274 Site: 1 Cycle: 1 Design: 1 Engineer: don\_g
Customer: SBA NETWORK SERVICES
Site: DANBURY
Type: POLE-TPR
Pole: Tapered Steel

Page: 7
05/29/2009
1:49 PM

SUMMARY OF BASE PLATE DESIGN

Table with 2 columns: PLATE and ANCHOR BOLTS. Rows include Pole Diameter at Base, Plate Diameter, Plate Thickness, Plate Weight (Black), Fy, Fu, Size, Grade, No. Of Bolts, Bolt Circle, and Fy.

MAXIMUM POLE REACTIONS:

Axial = 54.63 kips
Moment = 2,150.94 ft-kips
Shear = 21.69 kips
Torsion = 10.73 ft-kips

ANCHOR BOLTS:

Axial = 105.3 kips/bolt
Moment = 1.7 in-kips/bolt
Shear = 1.7 kips/bolt

Axial Capacity = 148.0 kips/bolt
Moment Capacity = 42.1 in-kips/bolt
Shear Capacity = 111.0 kips/bolt

ANCHOR BOLT STRESS RATIO = 0.835 < 1.0 OK

PLATE:

Bolt Group Tension Capacity = 2,131.9 kips
Plate Tension Capacity = 3,085.1 kips
Plate Shear Capacity = 6,254.4 kips

PLATE STRESS RATIO = 0.691 < 1.0 OK



ROHN Products LLC.

File: 606274 Site: 1 Cycle: 1 Design: 1 Engineer: don\_g  
Customer: SBA NETWORK SERVICES  
Site: DANBURY  
Type: POLE-TPR  
Pole: Tapered Steel

Page: 8  
05/29/2009  
1:49 PM

NOTES

LOAD COMBINATIONS

Load Combo   Description

---

Combo005   Dead Load + Wind Load no Ice @ 090 deg.  
Combo011   Dead Load + Wind Load no Ice @ 270 deg.

MISCELLANEOUS NOTES

Critical wind velocity is outside range where vortex shedding lock-in may occur. No further investigation required.

Designed By: DWG  
Checked By: HA  
Eng. File: 060-6274

Date: 5/29/2009 2:47:55 PM  
Date: 6/1/09

**Customer Name: SBA COMMUNICATIONS**

**Site Name: DANBURY, CT**

### REACTIONS

Download = 38.9 kips = 58.4 / 1.5  
OTM = 1534.2 ft-kips = 2301.3 / 1.5  
Shear = 15.5 kips = 23.2 / 1.5

### LPILE INPUT PARAMETERS

Depth(ft)	Soil Type	K(pci)	$\gamma$ (pcf)	$\phi$ (deg)	C(ksf)	$\epsilon_{50}$ (in/in)	N	RQD
0.0-2.0	Soft Clay	5.0	80.0	0.0	0.100	0.035	1	0
2.0-15.0	Sand	62.0	115.0	32.0	0.000	0.000		0
15.0-35.0	Sand	99.0	56.0	36.0	0.000	0.000		0

Load Factor = 2.0

Pier Diameter = 6' - 0", Shaft I.D. = 0' - 0", Pier Depth = 30' - 0" and Ground Slope = 0 Deg.

### SUMMARY OF LPILE RESULTS

(See Attached Graphs)

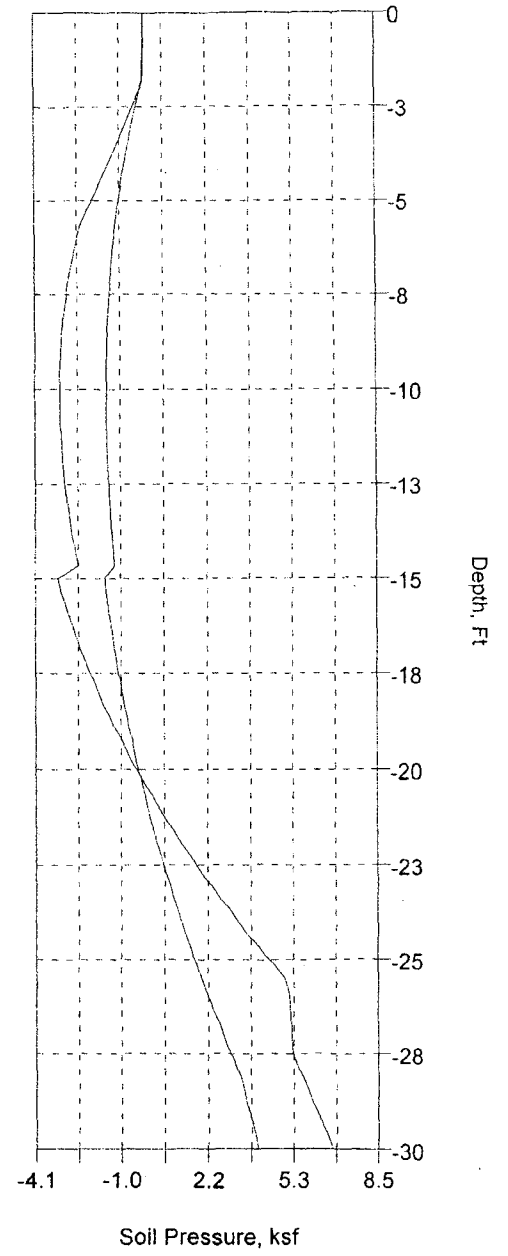
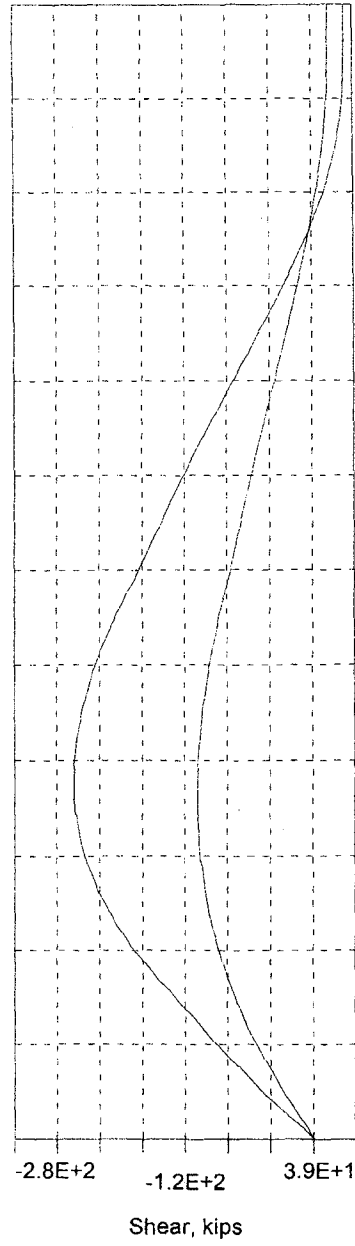
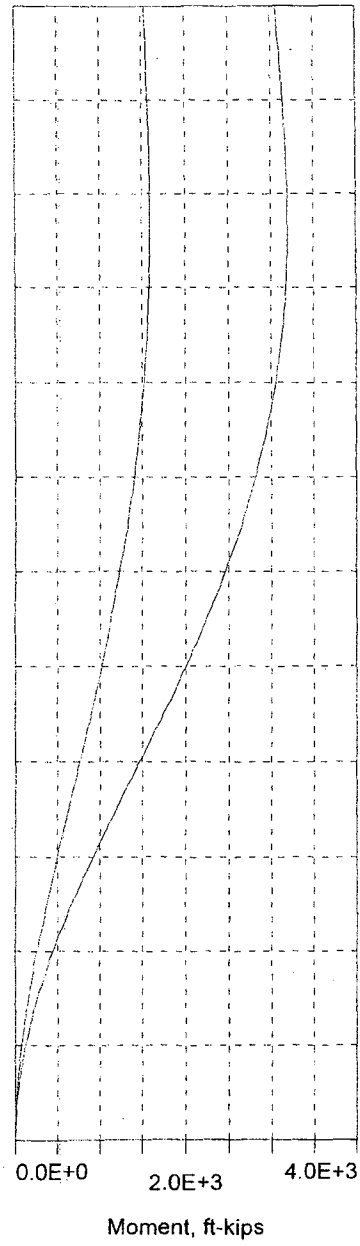
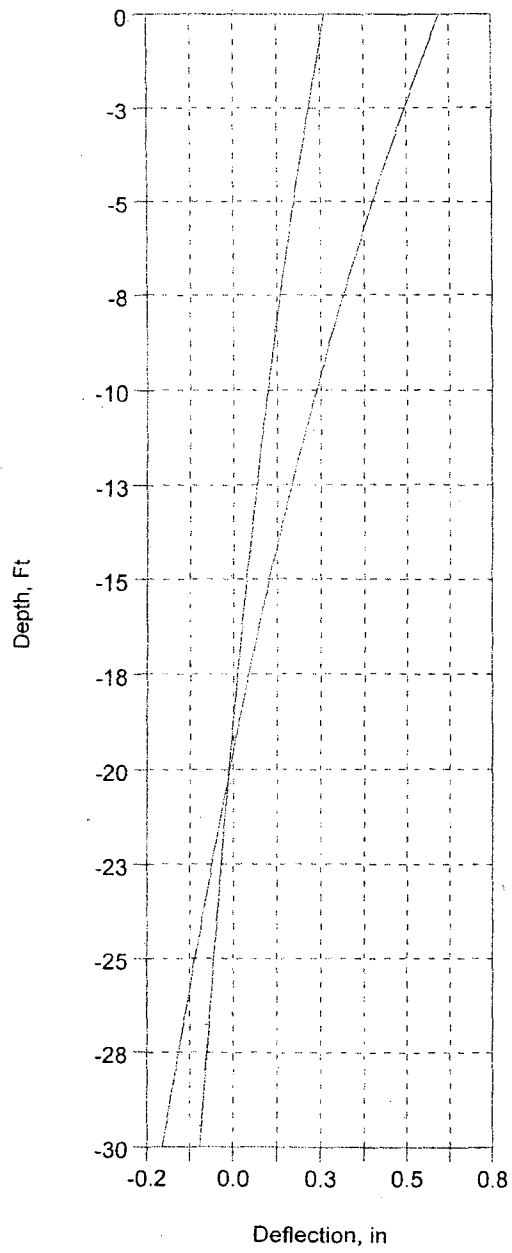
Deflection at Top = 0.28 in ✓  
Max. Moment = 1608.3 ft-kips  
Max. Shear = 111.5 kips  
Max. Lateral Soil Pressure = 4.020 ksf ✓

(See Attached Shaft Reinforcing Program For Reinforcement Calculations)

### SUMMARY

- 1) Use 6' - 0" diameter and 30' - 0" deep drilled pier with 0' - 6" projection.
- 2) Use 24 # 9 bars in 5' - 3" Dia. cage with # 5 ties at 3" centers in top 4 feet and at 12" centers in rest of pier.
- 3) Concrete Volume = 31.9 Cu. Yds. ✓

060-6274  
DWG





SHAFT REINFORCING PROGRAM VER. 91.4

=====

DESIGNED BY: DWG  
ENG. FILE NO.: 060-6274  
DATE: 05/29/09

CUSTOMER: SBA COMMUNICATIONS

INPUT DATA

=====

C = 38.93 Kips	Vc = 111.50 Kips	Mc = 1608.33 Ft-K
T = .00 Kips	Vt = .00 Kips	Mt = .00 Ft-K
Fy = 60.00 Ksi	Fyt = 60.00 Ksi	L.F. = 1.50
H = 72.00 In.	Ds = 63.00 In.	F'c = 4.00 Ksi
U = 1.00	Irs = 1	

\*\*\* SHAFT CROSS SECTION IS ROUND \*\*\*

SUMMARY OF ANALYSIS

=====

Minimum area of steel req'd. = 20.36 sq.in.	(Rhomn = .0050)
Maximum steel area limit = 325.72 sq.in.	(Rhomax = .0800)

CIRCULAR TIE DATA

=====

$V_u < .85 * V_c / 2$ , shear reinforcement is not required.

Use maximum tie spacing specified in A.C.I. 318-83,  
Section 7.10.5 for compression reinforcement.

DEVELOPMENT LENGTH MODIFIERS FOR TENSION AND COMPRESSION BAR DEVELOPMENT

=====

DLMT = MODIFIER FOR TENSION DEVELOPMENT = .900

DLMC = MODIFIER FOR COMPRESSION DEVELOPMENT = .468

REQUIRED Ld = MODIFIER \* BASIC Ld \* ACI 318 MODIFIERS (12 in. min.)