



Radian
Communication
Services

6718 West Plank Road
Peoria, IL 61604
Telephone + 1 309 697 4400
Facsimile + 1 309 697 5612
www.radiancorp.com

PURCHASER: OPTASITE, INC

NAME OF PROJECT: LEDYARD, NEW LONDON COUNTY,
CONNECTICUT
150 FT. TAPERED STEEL POLE

FILE NUMBER: 060-3664, 57975EH

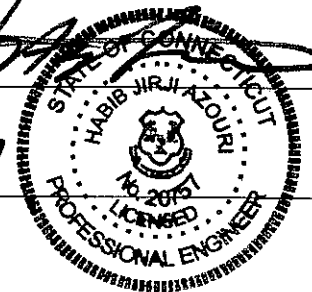
DRAWING NUMBERS: A070132 AND A070146 1-3

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

DATE:

3/27/07



150.00 FT

SECTION 1
18 SIDES

125.17 FT

SPLICE LENGTH
MIN. = 48.500"
DESIGN = 54.000"
MAX. = 59.500"

SECTION 2
18 SIDES

89.58 FT

SPLICE LENGTH
MIN. = 58.000"
DESIGN = 65.000"
MAX. = 71.000"

SECTION 3
18 SIDES

48.00 FT

SPLICE LENGTH
MIN. = 69.000"
DESIGN = 77.000"
MAX. = 84.500"

SECTION 4
18 SIDES

BASE PLATE 1.750" X 69.500" Round
W/ (34) 1.500" DIA. X 74" LONG ANCHOR
BOLTS EQUALLY SPACED ON 65.000" B.C.
W/ 7.5" ANCHOR BOLT PROJECTION
(NO GROUT REQUIRED)

G.L.

DESIGN LOADING

DESIGN WIND LOAD PER ANSI/EIA REVISION G USING THE FOLLOWING

DESIGN CRITERIA
BASIC WIND SPEED (NO ICE): 120 MPH
BASIC WIND SPEED (W/ ICE): 50 MPH
DESIGN ICE THICKNESS: 0.75"
STRUCTURE CLASS: II
EXPOSURE CATEGORY: C
TOPOGRAPHIC CATEGORY: 1
EARTHQUAKE SPECTRAL RESPONSE ACCELERATION, S_s : 0.27

THIS POLE IS DESIGNED TO SUPPORT THE FOLLOWING LOADS:

ELEVATION (FT)	ANTENNA TYPE	LINE SIZE
TOP	(12) APX16PV-16PVL ON 12" LP MOUNT W/ SUPPORT RAILS	(15) 1-5/8 in.
140.0	(12) 7752.00 ON 12" LP MOUNT W/ SUPPORT RAILS	(15) 1-5/8 in.
130.0	(12) 7752.00 ON 12" LP MOUNT W/ SUPPORT RAILS	(15) 1-5/8 in.
120.0	(12) DB844H65E-XY ON 12" LP MOUNT W/ SUPPORT RAILS	(15) 1-5/8 in.

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

SECTION SCHEDULE

SEC.	HEIGHT (FT)	DIAMETER (IN)		WALL THICK. (IN)	F _y (KSI)	WEIGHT (KIPS)
		BOT.	TOP			
1	29.33	36.327	30.000	0.1875	65.0	2.076
2	41.00	43.665	34.822	0.3125	65.0	5.711
3	48.00	52.065	41.712	0.4375	65.0	11.168
4	48.00	60.000	49.646	0.5000	65.0	15.654

FOR POLYGONAL POLES DIAMETER IS MEASURED ACROSS FLATS.

GENERAL NOTES

- RADIAN COMMUNICATION POLE DESIGNS CONFORM TO ANSI/EIA-222-G UNLESS OTHERWISE SPECIFIED UNDER POLE DESIGN LOADING.
- THE DESIGN LOADING CRITERIA INDICATED HAS BEEN PROVIDED TO RADIAN THE DESIGN LOADING CRITERIA HAS BEEN ASSUMED TO BE BASED ON SITE-SPECIFIC DATA IN ACCORDANCE WITH ANSI/EIA-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 ANSI/EIA-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 ANSI/EIA-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 ANSI/EIA-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 CHAMFY IMPACT REQUIREMENTS. POLE ANCHOR BOLTS CONFORM TO ASTM F1554 GRADE 105.

SITE: LEDYARD, CT
COUNTY: NEW LONDON, CT

No. ▲ Revision Description

THIS DRAWING IS THE PROPERTY OF RADIAN. IT IS NOT TO BE REPRODUCED, COPIED, OR TRACED IN WHOLE OR PART WITHOUT OUR WRITTEN CONSENT.

Scale:	None
Drawn:	BJD 3/15/2007
Checked:	HA 3/16/07
App. Eng.:	HA 3/16/07
Parent File:	

MAXIMUM REACTIONS	
DOWNLOAD =	94.7 KIPS
SHEAR =	55.4 KIPS
O.T.M =	6054.1 FT-KIPS

▲ Date ▲ Rev By ▲ Cld By ▲ Appd By

150' TAPERED STEEL POLE DESIGN FOR

RADIAN

OPTASITE

ENG. FILE:

A070132

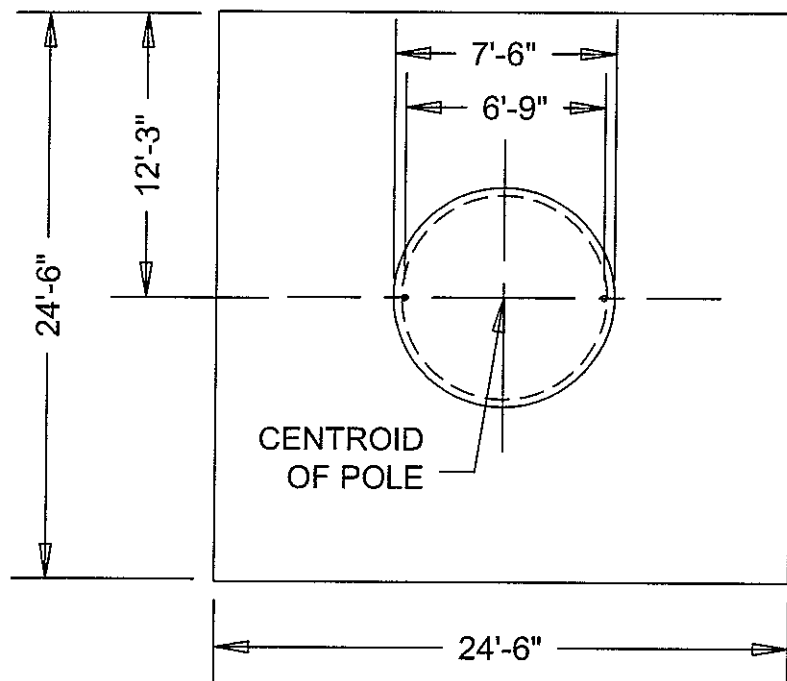
DWG. NO.:

060-3664

SHEET 1 OF 1

REV.

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



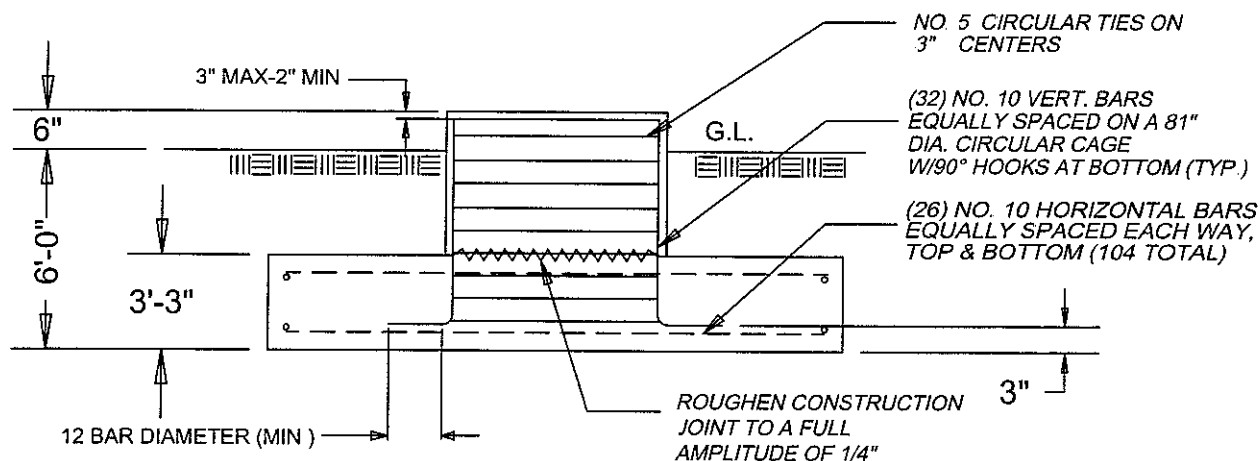
PLAN VIEW

CONCRETE VOLUME

77.6 CU. YDS.

REACTIONS

O.T.M. = 6054.1 FT.-KIPS
 DOWNLOAD = 94.7 KIPS
 SHEAR = 55.4 KIPS



ELEVATION VIEW

SITE: LEDYARD, CT
 NEW LONDON COUNTY, CT

No. ▲ Revision Description

▲ Date ▲ Rev By ▲ Ckd By ▲ Appd By

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ROHN PRODUCTS & ACCESSORIES
 PEORIA, IL, USA +1 800 727 ROHN

Scale: NONE	By	Date
Drawn:	BJD	3/26/07
Checked:	HA	3/27/07
App. Eng.:	HA	3/27/07
Parent File:		

**PIER AND PAD FOUNDATION DETAILS
 FOR
 OPTASITE**

ENG. FILE:
 060-3664

DWG. NO.: A070146
 SHEET 1 OF 3

REV.

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.
 - A) Ultimate soil bearing pressure at 6 Ft. Depth = 10,000 psf.
 - B) Ground water table below foundation depth.
 - C) Maximum frost penetration depth less than foundation depth.
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. Welding is prohibited on reinforcing steel and embedments.
8. 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.
9. Concrete cover from top of foundation to ends of vertical reinforcement shall not exceed 3 inches (76mm) nor be less than 2 inches (51mm).
10. Foundation design assumes structural backfill to be compacted in 8 inch (200 mm) maximum layers to 95% of maximum dry density at optimum moisture content in accordance with ASTM D698. Additionally, structural backfill must have a minimum compacted unit weight of 100 pounds per cubic foot (16 kN/m³).
11. Foundation design has been based on geotechnical report no. 07023CI dated 03/22/07 by Gemini Geotechnical Associates, Inc.

FOUNDATION GENERAL NOTES

12. 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.
13. Foundation design assumes level grade at pole site.
14. Foundation design assumes the recommendations in the referenced geotechnical report concerning verification of subsurface conditions are implemented prior to placement of concrete.
15. 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.
16. Foundation design assumes installation procedures will incorporate the procedures recommended in the referenced geotechnical report.
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. Concrete preferably shall be placed against undisturbed soil. When forms are necessary, they shall be removed prior to placing structural backfill.
22. Construction joint, if required at the base of the pier, 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.



ROHN Products

A Division of Radian Communication Services Inc

File: 060-3664 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
 Customer: OPTASIII
 Site: LEDYARD, CT
 Type: POLE-TPR
 Pole: Tapered Steel

Page: 1
 03/15/2007
 11:44 AM

SUMMARY OF ANALYSIS RESULTS

Conditions: 120 mph Basic Wind Speed (no ice) 60 mph Operational
 50 mph Basic Wind Speed (0.75" radial ice)
 Building Code: EIA Revision G
 Exposure: C
 Gust response factor: 1.10
 Structural Category: II
 Topographic Category: 1
 Natural Frequency: 0.49 cps
 Resonant Velocity: 8.37 mph
 Pole Height: 150.00 ft
 Top Diameter: 30.000 in
 Bottom Diameter: 60.000 in
 Embedment Depth: 0.00 ft
 Pole Shape: 18-sided Polygon
 Joint Type: Slip
 Shaft Steel Weight: 33.880 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	29.330	0.18750	65	30.000	36.330	54.00	0.2158	2.076
2	41.000	0.31250	65	34.820	43.670	65.00	0.2159	5.711
3	48.000	0.43750	65	41.710	52.070	77.00	0.2158	11.168
4	48.000	0.50000	65	49.650	60.000		0.2156	14.926

Design Bend Radius = 4.0 * t inches

POLE SHAFT SECTION MAXIMUM FORCES AND MOMENTS:

Seq	Load Case	Sect. Elev. (ft.)	At Base of Section				Max. Ratio Allowable [Ftot/Fb]
			Axial Load (kips)	Bending Moment (ft-kips)	Horiz. Shear (kips)	Torsion (ft-Kips)	
1	Combo005	120.67	12.4058	377.9940	26.0319	0.0000	0.4892
2	Combo005	81.46	25.5085	1799.1142	40.2030	0.0000	0.8292
3	Combo005	38.38	42.8602	3705.5192	47.9674	0.0000	0.8592
4	Combo005	0.00	62.2421	6054.0508	55.0857	0.0000	0.9006
DESIGN REACTIONS →			94.6864	6054.0508	55.4413	41.2304	
OPERATIONAL REACTIONS →			52.7176	833.4658	7.7401	5.7641	

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	2.076	@Top	150.00	30.000	0.1875	26.45	160.00	17.74	3994.4	1992.2
		@Splice	125.17	34.820		30.98	185.71	20.61	6261.9	3123.2
		@Bot	120.67	36.330		32.40	193.76	21.51	7117.2	3549.8
2	5.711	@Top	122.46	34.820	0.3125	17.88	111.42	34.23	10324.0	5149.1
		@Splice	86.88	43.090		22.55	137.89	42.43	19667.6	9809.4
		@Bot	81.46	43.670		22.88	139.74	43.00	20478.5	10213.8
3	11.168	@Top	86.38	41.710	0.4375	15.05	95.34	57.31	24729.6	12334.0
		@Splice	44.79	50.690		18.67	115.86	69.78	44638.2	22263.6
		@Bot	38.38	52.070		19.22	119.02	71.70	48417.6	24148.6
4	14.926	@Top	48.00	49.650	0.5000	15.75	99.30	78.00	47730.6	23805.9
		@Bot	0.00	60.000		19.40	120.00	94.42	84679.2	42234.3

Total Shaft Steel Weight = 33.880 kips



ROHN Products

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File: 060-3664 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASITE
Site: LEDYARD, CT
Type: POLE-TPR
Pole: tapered Steel

Page: 2
03/15/2007
11:44 AM

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 ²)	J (in ⁴)	I (in ⁴)
46	150.000	30.00	0.1875	26.45	160.00	17.74	3994.4	1992.2
45	147.517	30.54	0.1875	26.95	162.86	18.06	4213.7	2101.6
44	145.033	31.07	0.1875	27.46	165.72	18.38	4440.9	2214.9
43	142.550	31.61	0.1875	27.96	168.57	18.70	4676.1	2332.2
42	140.067	32.14	0.1875	28.46	171.43	19.02	4919.5	2453.6
41	137.583	32.68	0.1875	28.97	174.29	19.34	5171.1	2579.1
40	135.100	33.22	0.1875	29.47	177.15	19.66	5431.3	2708.9
39	132.617	33.75	0.1875	29.98	180.01	19.97	5699.9	2842.9
38	130.133	34.29	0.1875	30.48	182.86	20.29	5977.3	2981.2
37	127.650	34.82	0.1875	30.98	185.72	20.61	6263.6	3124.0
360	125.167	35.36	0.1875	31.49	188.58	20.93	6558.8	3271.3
36I	125.167	34.82	0.3125	17.88	111.42	34.23	10324.2	5149.3
35	120.667	35.79	0.3125	18.43	114.53	35.19	11220.5	5596.3
34	117.558	36.46	0.3125	18.81	116.68	35.85	11869.3	5919.9
33	114.450	37.13	0.3125	19.19	118.83	36.52	12542.4	6255.6
32	111.342	37.80	0.3125	19.57	120.97	37.19	13240.7	6603.9
31	108.233	38.48	0.3125	19.95	123.12	37.85	13964.3	6964.8
30	105.125	39.15	0.3125	20.32	125.27	38.52	14713.9	7338.7
29	102.017	39.82	0.3125	20.70	127.41	39.18	15489.8	7725.6
28	98.908	40.49	0.3125	21.08	129.56	39.85	16292.6	8126.0
27	95.800	41.16	0.3125	21.46	131.71	40.51	17122.5	8540.0
26	92.692	41.83	0.3125	21.84	133.86	41.18	17980.2	8967.7
25	89.583	42.50	0.3125	22.22	136.00	41.84	18866.1	9409.6
240	86.875	43.09	0.3125	22.55	137.87	42.42	19661.3	9806.2
25I	89.583	41.71	0.4375	15.05	95.34	57.31	24729.4	12333.9
24	86.875	42.29	0.4375	15.28	96.67	58.12	25795.2	12865.5
23	84.167	42.88	0.4375	15.52	98.01	58.93	26891.1	13412.1
22	80.550	43.66	0.4375	15.83	99.79	60.02	28402.4	14165.9
21	76.933	44.44	0.4375	16.15	101.58	61.10	29969.2	14947.3
20	73.317	45.22	0.4375	16.46	103.36	62.19	31592.6	15757.0
19	69.700	46.00	0.4375	16.78	105.15	63.27	33273.6	16595.4
18	66.083	46.78	0.4375	17.09	106.93	64.35	35013.2	17463.0
17	62.467	47.56	0.4375	17.41	108.71	65.44	36812.4	18360.4
16	58.850	48.34	0.4375	17.72	110.50	66.52	38672.2	19288.0
15	55.233	49.12	0.4375	18.04	112.28	67.60	40593.6	20246.3
14	51.617	49.90	0.4375	18.35	114.07	68.69	42577.6	21235.8
13	48.000	50.69	0.4375	18.66	115.85	69.77	44625.2	22257.1
120	44.792	51.38	0.4375	18.94	117.43	70.73	46495.5	23189.9
13I	48.000	49.65	0.5000	15.75	99.30	78.00	47726.8	23804.0
12	44.792	50.34	0.5000	15.99	100.68	79.09	49772.4	24824.3
11	41.583	51.03	0.5000	16.23	102.07	80.19	51876.0	25873.5
10	37.425	51.93	0.5000	16.55	103.86	81.62	54686.6	27275.3
9	33.267	52.83	0.5000	16.87	105.65	83.04	57597.2	28726.9
8	29.108	53.72	0.5000	17.18	107.45	84.46	60608.9	30229.1
7	24.950	54.62	0.5000	17.50	109.24	85.89	63724.2	31782.8
6	20.792	55.52	0.5000	17.81	111.03	87.31	66944.1	33388.8
5	16.633	56.41	0.5000	18.13	112.83	88.73	70270.6	35047.9
4	12.475	57.31	0.5000	18.45	114.62	90.15	73706.0	36761.3
3	8.317	58.21	0.5000	18.76	116.41	91.58	77251.1	38529.5
2	4.158	59.10	0.5000	19.08	118.21	93.00	80908.6	40353.6
1	0.000	60.00	0.5000	19.40	120.00	94.42	84679.2	42234.3



ROHN Products

A Division of Radian Communication Services, Inc.



File: 060-3664 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASITE
Site: LEDYARD, CT
Type: POLE-TPR
Pole: Tapered Steel

Page: 3
03/15/2007
11:44 AM

DISCRETE APPURTENANCE PROPERTIES

Elev. (ft)	Description	Weight		EPA		Lines
		W/o Ice (kips)	W/ Ice (kips)	W/o Ice (ft^2)	W/ Ice (ft^2)	
150.00	(12) APX16PV-16PVL ON 12' LP MOUNT W/ S.R.	2.35	6.75	70.50	121.90	(15) 1-5/8 in.
140.00	(12) 7752.00 ON 12' LP MOUNT W/ S.R.	2.45	7.00	95.90	156.30	(15) 1-5/8 in.
130.00	(12) 7752.00 ON 12' LP MOUNT W/ S.R.	2.45	7.00	95.90	156.30	(15) 1-5/8 in.
120.00	(12) DB848H65E-XY ON 12' LP MOUNT W/ S.R.	2.10	5.95	96.20	194.70	(15) 1-5/8 in.



ROHN Products

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File: 060-3664 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
 Customer: OPTASITE
 Site: LEDYARD, CI
 Type: POLE-TPR
 Pole: tapered Steel

Page: 4
 03/15/2007
 11:44 AM

PRESSURES

Seg.	Elev. (ft)	Kz	W/o Ice		With Ice		Operational	
			G _n ·qz	Cf	G _n ·qz	Cf	G _n ·qz	Cf
1-11	148.758	1.376	53.007	0.650	9.203	1.200	11.857	0.650
1-10	146.275	1.371	52.820	0.650	9.170	1.200	11.815	0.650
1-9	143.792	1.366	52.629	0.650	9.137	1.200	11.772	0.650
1-8	141.308	1.361	52.437	0.650	9.104	1.200	11.729	0.650
1-7	138.825	1.356	52.241	0.650	9.070	1.200	11.686	0.650
1-6	136.342	1.351	52.043	0.650	9.035	1.200	11.641	0.650
1-5	133.858	1.346	51.842	0.650	9.000	1.200	11.596	0.650
1-4	131.375	1.340	51.638	0.650	8.965	1.200	11.551	0.650
1-3	128.892	1.335	51.431	0.650	8.929	1.200	11.504	0.650
1-2	126.408	1.330	51.221	0.650	8.893	1.200	11.457	0.650
1-1	122.917	1.322	50.920	0.650	8.840	1.200	11.390	0.650
2-13	122.917	1.322	50.920	0.650	8.840	1.200	11.390	0.650
2-12	119.113	1.313	50.584	0.650	8.782	1.200	11.315	0.650
2-11	116.004	1.306	50.303	0.650	8.733	1.200	11.252	0.650
2-10	112.896	1.298	50.016	0.650	8.683	1.200	11.188	0.650
2-9	109.788	1.291	49.723	0.650	8.633	1.200	11.122	0.650
2-8	106.679	1.283	49.423	0.650	8.580	1.200	11.055	0.650
2-7	103.571	1.275	49.117	0.650	8.527	1.200	10.987	0.650
2-6	100.463	1.267	48.803	0.650	8.473	1.200	10.916	0.650
2-5	97.354	1.258	48.481	0.650	8.417	1.200	10.844	0.650
2-4	94.246	1.250	48.151	0.650	8.360	1.200	10.771	0.650
2-3	91.138	1.241	47.812	0.650	8.301	1.200	10.695	0.650
2-2	88.229	1.233	47.487	0.650	8.244	1.200	10.622	0.650
2-1	85.521	1.225	47.176	0.650	8.190	1.200	10.553	0.650
3-14	88.229	1.233	47.487	0.650	8.244	1.200	10.622	0.650
3-13	85.521	1.225	47.176	0.650	8.190	1.200	10.553	0.650
3-12	82.358	1.215	46.803	0.650	8.126	1.200	10.469	0.650
3-11	78.742	1.204	46.363	0.650	8.049	1.200	10.371	0.650
3-10	75.125	1.192	45.906	0.650	7.970	1.200	10.268	0.650
3-9	71.508	1.179	45.432	0.650	7.887	1.200	10.162	0.650
3-8	67.892	1.167	44.938	0.650	7.802	1.200	10.052	0.650
3-7	64.275	1.153	44.423	0.650	7.712	1.200	9.937	0.650
3-6	60.658	1.139	43.885	0.650	7.619	1.200	9.816	0.650
3-5	57.042	1.125	43.321	0.650	7.521	1.200	9.690	0.650
3-4	53.425	1.109	42.727	0.650	7.418	1.200	9.557	0.650
3-3	49.808	1.093	42.101	0.650	7.309	1.200	9.417	0.650
3-2	46.396	1.077	41.477	0.650	7.201	1.200	9.278	0.650
3-1	43.188	1.061	40.856	0.650	7.093	1.200	9.139	0.650
4-12	46.396	1.077	41.477	0.650	7.201	1.200	9.278	0.650
4-11	43.188	1.061	40.856	0.650	7.093	1.200	9.139	0.650
4-10	39.504	1.041	40.096	0.650	6.961	1.200	8.969	0.650
4-9	35.346	1.017	39.168	0.650	6.800	1.200	8.761	0.650
4-8	31.188	0.990	38.150	0.650	6.623	1.200	8.533	0.650
4-7	27.029	0.961	37.018	0.650	6.427	1.200	8.280	0.650
4-6	22.871	0.928	35.738	0.650	6.205	1.200	7.994	0.650
4-5	18.713	0.889	34.260	0.650	5.948	1.200	7.663	0.650
4-4	14.554	0.850	32.744	0.650	5.685	1.200	7.324	0.650
4-3	10.396	0.850	32.744	0.650	5.685	1.200	7.324	0.650
4-2	6.238	0.850	32.744	0.650	5.685	1.200	7.324	0.650
4-1	2.079	0.850	32.744	0.650	5.685	1.200	7.324	0.650



ROHN Products

A Division of Radian Communication Services, Inc.

File: 060-3664 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASITE
Site: LEDYARD, CI
Type: POLE-TPR
Pole: Tapered Steel

Page: 5
03/15/2007
11:44 AM

MOMENTS, FORCES AND DEFLECTIONS

Node	Elev.	Axial (kips)	Moment		Shear		Torsion (ft-k)	Operational		
			My (ft-k)	Mz (ft-k)	Vy (kips)	Vz (kips)		Deflection (in)	Twist (deg)	Sway (deg)
46	150.000	7.434	0.00	9.02	0.02	1.04	1.405	13.244	0.027	0.759
45	147.517	3.190	0.00	19.52	6.52	0.00	0.000	12.850	0.027	0.758
44	145.033	3.440	0.00	36.46	6.88	0.00	0.000	12.456	0.026	0.756
43	142.550	3.693	0.00	54.34	7.25	0.00	0.000	12.063	0.026	0.753
42	140.067	6.837	0.00	77.03	15.43	0.00	0.000	11.672	0.026	0.750
41	137.583	7.228	0.00	117.03	16.02	0.00	0.000	11.283	0.025	0.745
40	135.100	7.545	0.00	158.46	16.40	0.00	0.000	10.897	0.024	0.739
39	132.617	7.864	0.00	200.90	16.79	0.00	0.000	10.514	0.023	0.731
38	130.133	10.992	0.00	248.33	24.65	0.00	0.000	10.136	0.022	0.723
37	127.650	11.528	0.00	312.22	25.47	0.00	0.000	9.762	0.021	0.712
36	125.167	12.406	0.00	377.99	26.03	0.00	0.000	9.395	0.020	0.700
35	120.667	15.434	0.00	502.94	32.77	0.00	0.000	8.740	0.018	0.688
34	117.558	16.714	0.00	609.70	34.95	0.00	0.000	8.296	0.017	0.675
33	114.450	17.468	0.00	722.68	35.46	0.00	0.000	7.861	0.016	0.660
32	111.342	18.229	0.00	837.35	35.98	0.00	0.000	7.435	0.015	0.644
31	108.233	18.998	0.00	953.71	36.50	0.00	0.000	7.021	0.014	0.627
30	105.125	19.780	0.00	1071.76	37.03	0.00	0.000	6.618	0.013	0.609
29	102.017	20.570	0.00	1191.50	37.56	0.00	0.000	6.227	0.012	0.590
28	98.908	21.366	0.00	1312.94	38.10	0.00	0.000	5.849	0.011	0.570
27	95.800	22.175	0.00	1436.08	38.65	0.00	0.000	5.484	0.010	0.549
26	92.692	22.992	0.00	1560.90	39.20	0.00	0.000	5.133	0.010	0.528
25	89.583	24.101	0.00	1687.41	39.72	0.00	0.000	4.796	0.009	0.506
24	86.875	25.508	0.00	1799.11	40.20	0.00	0.000	4.512	0.008	0.495
24	86.875	25.508	0.00	1799.11	40.20	0.00	0.000	4.512	0.008	0.495
23	84.167	26.832	0.00	1912.28	40.77	0.00	0.000	4.234	0.008	0.484
22	80.550	28.077	0.00	2065.55	41.42	0.00	0.000	3.874	0.007	0.463
21	76.933	29.339	0.00	2221.17	42.07	0.00	0.000	3.531	0.007	0.442
20	73.317	30.618	0.00	2379.13	42.73	0.00	0.000	3.204	0.006	0.421
19	69.700	31.914	0.00	2539.42	43.39	0.00	0.000	2.893	0.006	0.399
18	66.083	33.224	0.00	2702.02	44.05	0.00	0.000	2.599	0.005	0.377
17	62.467	34.554	0.00	2866.93	44.72	0.00	0.000	2.321	0.005	0.355
16	58.850	35.901	0.00	3034.13	45.39	0.00	0.000	2.060	0.004	0.333
15	55.233	37.265	0.00	3203.60	46.06	0.00	0.000	1.816	0.004	0.310
14	51.617	38.646	0.00	3375.32	46.74	0.00	0.000	1.590	0.004	0.288
13	48.000	40.509	0.00	3549.26	47.37	0.00	0.000	1.380	0.003	0.265
12	44.792	42.860	0.00	3705.52	47.97	0.00	0.000	1.206	0.003	0.252
12	44.792	42.860	0.00	3705.52	47.97	0.00	0.000	1.206	0.003	0.252
11	41.583	44.945	0.00	3863.72	48.64	0.00	0.000	1.040	0.003	0.240
10	37.425	46.765	0.00	4071.39	49.39	0.00	0.000	0.842	0.002	0.215
9	33.267	48.611	0.00	4281.81	50.14	0.00	0.000	0.665	0.002	0.191
8	29.108	50.482	0.00	4494.91	50.88	0.00	0.000	0.508	0.002	0.167
7	24.950	52.376	0.00	4710.61	51.60	0.00	0.000	0.373	0.002	0.143
6	20.792	54.295	0.00	4928.81	52.31	0.00	0.000	0.259	0.001	0.119
5	16.633	56.243	0.00	5149.40	53.00	0.00	0.000	0.166	0.001	0.095
4	12.475	58.217	0.00	5372.26	53.68	0.00	0.000	0.093	0.001	0.071
3	8.317	60.217	0.00	5597.32	54.38	0.00	0.000	0.042	0.000	0.047
2	4.158	62.242	0.00	5824.59	55.09	0.00	0.000	0.011	0.000	0.023
1	0.000	62.242	0.00	6054.05	55.09	0.00	0.000	0.000	0.000	0.000



ROHN Products
A Division of Radlan Communication Services, Inc.

File: 060-3664 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASIIIE
Site: LEDYARD, CT
Type: POLE-TPR
Pole: Tapered Steel

Page: 6
03/15/2007
11:44 AM

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)		
46	150.000	0.419	0.823	0.117	0.064	1.274	63.263	0.0223
45	147.517	0.177	1.717	0.722	0.000	2.416	62.729	0.0339
44	145.033	0.187	3.097	0.749	0.000	3.845	62.196	0.0590
43	142.550	0.197	4.460	0.775	0.000	5.259	61.662	0.0843
42	140.067	0.359	6.112	1.623	0.000	9.106	61.129	0.1189
41	137.583	0.374	8.982	1.657	0.000	12.103	60.595	0.1729
40	135.100	0.384	11.771	1.669	0.000	14.941	60.062	0.2262
39	132.617	0.394	14.451	1.681	0.000	17.670	59.529	0.2785
38	130.133	0.542	17.305	2.430	0.000	23.752	58.995	0.3388
37	127.650	0.559	21.090	2.472	0.000	27.758	58.462	0.4143
360	125.167	0.593	24.761	2.487	0.000	31.541	57.928	0.4892
361	125.167	0.362	15.433	1.521	0.000	18.110	65.000	0.2711
35	120.667	0.439	19.426	1.863	0.000	23.334	65.000	0.3410
34	117.558	0.466	22.684	1.949	0.000	26.950	65.000	0.3973
33	114.450	0.478	25.916	1.942	0.000	30.166	65.000	0.4528
32	111.342	0.490	28.963	1.935	0.000	33.197	65.000	0.5051
31	108.233	0.502	31.838	1.929	0.000	36.059	65.000	0.5544
30	105.125	0.514	34.553	1.923	0.000	38.764	65.000	0.6010
29	102.017	0.525	37.120	1.917	0.000	41.321	65.000	0.6451
28	98.908	0.536	39.548	1.912	0.000	43.742	65.000	0.6868
27	95.800	0.547	41.848	1.908	0.000	46.036	65.000	0.7263
26	92.692	0.558	44.027	1.904	0.000	48.210	65.000	0.7638
25	89.583	0.576	46.094	1.898	0.000	50.273	65.000	0.7994
240	86.875	0.601	47.811	1.895	0.000	52.004	65.000	0.8292
251	89.583	0.421	34.402	1.386	0.000	36.743	65.000	0.5962
24	86.875	0.439	35.662	1.383	0.000	38.014	65.000	0.6181
23	84.167	0.455	36.868	1.384	0.000	39.237	65.000	0.6390
22	80.550	0.468	38.397	1.380	0.000	40.770	65.000	0.6654
21	76.933	0.480	39.838	1.377	0.000	42.215	65.000	0.6902
20	73.317	0.492	41.197	1.374	0.000	43.577	65.000	0.7137
19	69.700	0.504	42.478	1.372	0.000	44.864	65.000	0.7358
18	66.083	0.516	43.689	1.369	0.000	46.079	65.000	0.7567
17	62.467	0.528	44.832	1.367	0.000	47.228	65.000	0.7765
16	58.850	0.540	45.913	1.365	0.000	48.315	65.000	0.7952
15	55.233	0.551	46.935	1.363	0.000	49.344	65.000	0.8128
14	51.617	0.563	47.903	1.361	0.000	50.317	65.000	0.8296
13	48.000	0.581	48.819	1.358	0.000	51.243	65.000	0.8456
120	44.792	0.606	49.592	1.356	0.000	52.037	65.000	0.8592
131	48.000	0.519	44.648	1.215	0.000	46.643	65.000	0.7730
12	44.792	0.542	45.327	1.213	0.000	47.340	65.000	0.7851
11	41.583	0.560	45.976	1.213	0.000	48.008	65.000	0.7965
10	37.425	0.573	46.773	1.210	0.000	48.811	65.000	0.8103
9	33.267	0.585	47.519	1.208	0.000	49.562	65.000	0.8233
8	29.108	0.598	48.217	1.205	0.000	50.266	65.000	0.8355
7	24.950	0.610	48.870	1.202	0.000	50.924	65.000	0.8468
6	20.792	0.622	49.481	1.198	0.000	51.539	65.000	0.8575
5	16.633	0.634	50.051	1.195	0.000	52.112	65.000	0.8675
4	12.475	0.646	50.581	1.191	0.000	52.646	65.000	0.8767
3	8.317	0.658	51.076	1.188	0.000	53.144	65.000	0.8854
2	4.158	0.669	51.535	1.185	0.000	53.608	65.000	0.8935
1	0.000	0.659	51.963	1.167	0.000	53.984	65.000	0.9006



ROHN Products

A Division of Radlan Communication Services, Inc.

File: 060-3664 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASITE
Site: LEDYARD, CI
Type: POLE-TPR
Pole: Tapered Steel

Page: 7
03/15/2007
11:44 AM

SUMMARY OF BASE PLATE DESIGN

P L A T E		A N C H O R B O L T S	
Pole Diameter at Base	= 60.00 in.	Size	= 1.50 in X 74 in. Long
Plate Diameter	= 69.50 in.	Grade	= F1554 Gr 105
Plate Thickness	= 1.75 in.	No. Of Bolts	= 34
Plate Weight (Black)	= 687.22 lbs	Bolt Circle	= 65.000 in.
Fy	= 50.00 ksi	Fy	= 105.00 ksi
Fu	= 65.00 ksi		

MAXIMUM POLE REACTIONS:

Axial = 94.69 kips
Moment = 6,054.05 ft-kips
Shear = 55.44 kips
Torsion = 41.23 ft-kips

ANCHOR BOLTS:

Axial = 106.1 kips/bolt
Moment = 2.1 in-kips/bolt
Shear = 2.1 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 = 0.851 < 1.0 OK

PLATE:

Bolt Group Tension Capacity = 4,530.3 kips
Plate Tension Capacity = 5,189.7 kips
Plate Shear Capacity = 9,708.9 kips

PLATE STRESS RATIO = 0.873 < 1.0 OK



ROHN
Products

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Type: POLE-TPR
Pole: Tapered Steel

Page: 8
03/15/2007
11:44 AM

NOIES

LOAD COMBINAIIONS

Load Combo Description

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

UNCHECKED APPURTENANCES

ID EditedBy Description

1-5/8 in.		1-5/8 in.
3/8in SD		3/8in Safety Device
Generic		

MISCELLANEOUS NOIES

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

Customer: OPTASITE
 Project: 150' TSP
 Site: LEDYARD, CT
 Engr. File: 060-3664
 Build Code: ANSI/TIA-222-G-2005



Mat Foundation

ver 1.1.1

Design Parameters

Description	Load Case					Service
	1	2	3	4	5	
Total Moment, ft/kips	6,054.10					833.50
Total Shear, kips	55.40					7.70
Total Tower Wt, kips	94.70					52.70
Max. Uplift, kips	n/a					n/a
Shear, kips	N/a					N/a
Max Download, kips	n/a					n/a
Shear	N/a					N/a
Soil L.F.	1.20					1.00
Concrete L.F.	1.20					1.00

Foundation	
Ht. AGL, ft	0.50
Depth, ft.	6.00
Pole	
Butt OD, ft	5.42
Offset, in	.00
Soil	
Blow Count	N/a
Inplace Unit Wt, pcf	110.00
Submerged Unit Wt, pcf	60.00
Friction Angle, ϕ , deg.	30.00
Cohesion, ksf	N/a
Uplift Angle, deg.	30.00
Water Depth, ft	None
Ult Bearing Capacity, ksf	10.00

Mat	
Thickness, ft	3.25
Width, ft	24.50
EA, in	21.00
Batter, in/ft	0.00

Pier	
Height, ft	3.25
Diameter, ft	7.50
No. Piers	1
Shape	Round

Anchor Bolts	
Diameter, in	1.5000
No.	34
Length, in	74.00
Bolt Circle, in	65.00
Projection, in	7.50

Pocket	
Diameter, in	N/a
Thickness, in	N/a

Concrete	
28 Day Strength, ksi	4.00
Dry Unit Wt, pcf	150.00
Wet Unit Wt, pcf	88.00

Rebar Fy	
Vertical, ksi	60.00
Circular, ksi	60.00
Horizontal, ksi	60.00

Results

ϕM_N - Parallel Axis 7,139.8 ft-kips
 ϕM_N - Diagonal Axis 7,530.2 ft-kips
 Moment - Interaction Ratio 0.898 ✓
 ϕV_N - Lateral Load 138.82 kips
 Lateral Load - Interaction Ratio 0.399 ✓

Final Mat Dimension : 24.50 x 24.50 x 3.25 ft. thick w/ (1) 7.50 ft dia Pier

Final Pocket Dimension : Pockets not required

Total Volume of Concrete : 77.6 yd³

Designed By: BJD
 Date: 26 Mar,07 @ 08:20 AM

Checked By: HA
 Date: 3/27/07

Customer: OPTASITE
 Project: 150' TSP
 Site: LEDYARD, CT
 Engr. File: 060-3664
 Build Code: ANSI/TIA-222-G-2005



Mat Foundation

ver.1.1.1

Design: Min. Foundation Width

Controlling Load Case: 1 [Wind w/Max. Dead Load]

Foundation Width = 24.50 ft

$M_U = 6,414.2$ ft-kips

	ϕM_N , ft-kips	x, ft	N
Parallel	7,139.8	3.712	0.152
Diagonal	7,530.2	9.537	0.275

$\phi M_N = 7,139.78$ ft-kips IRatio = 0.898 ✓
 $\phi V_N = 138.82$ kips IRatio = 0.399 ✓

Mat Design

$\gamma_c = 131.67$ pcf

	x, ft	N	σ_R , ksi	Moment, ft-kips			Shear, kips		
				Rt	Lt	M_U /ft	Rt	Lt	V_U /ft
Parallel	5.789	0.236	4.80	5,066.95	1,790.97	206.81	467.90	293.81	19.10
Diagonal	11.953	0.345	4.77	5,141.70	1,691.31	148.40	467.90	293.81	13.50
Use			4.80			206.81			19.10

Punching Shear

	Download			Uplift		
	Interior	Edge	Corner	Interior	Edge	Corner
b_o , ft	37.92	N/a	N/a	N/a	N/a	N/a
V_{su} , psi	184.18	N/a	N/a	N/a	N/a	N/a
ϕV_c , psi	215.03	N/a	N/a	N/a	N/a	N/a
IR	0.86	N/a	N/a	N/a	N/a	N/a

Critical Sections: a = 12.25 ft.

b = 12.25 ft

c = 12.25 ft

g = 12.25 ft (min. of a, b, & c)

Mat Reinforcement

Min. Steel Area (Strength) = 1.336 in²/ft.

Min Steel Area (Temperature) = .421 in²/ft.

Height of compression block, x = 3.61 in.

26 - #10 Horizontal bars equally spaced @11.52 in, each way, top and bottom
 (Total of 104)

One-Way Shear

$V_U = 19.10$ kips

$\phi V_c = 43.87$ kips ✓

Min. Slab Thickness = 19.8 in.

Designed By: BJD
 Date: 26 Mar,07 @ 08:20 AM

Checked By: *HA*
 Date: 3/27/07

Customer: OPTASITE
Project: 150' TSP
Site: LEDYARD, CT
Engr. File: 060-3664
Build Code: ANSI/TIA-222-G-2005



Mat Foundation

ver.1.1.1

Pier Design

Controlling Load Case: 1 [Wind w/Max. Dead Load]

C = 94.70 kips	Vc = 55.40 kips	Mc = 6,234.15 ft-kips
I = 00 kips	Vt = 00 kips	Mt = .00 ft-kips
Fy = 60.00 ksi	Fyt = 60.00 ksi	L.F. = 1.00
H = 90.00 in.	Ds = 81.00 in.	F'c = 4.00 ksi
U = 1.00	Irs = Round	

*** NOTE: Pier cross section is Round ***

SUMMARY OF ANALYSIS

Minimum area of steel required	= 38.335 in ²	✓	(Rhomin = 0.0060)
Area of steel provided	= 40.537 in ²	✓	(Rhoactual = 0.0064)
Maximum steel area limit	= 508.939 in ²		(Rhomax = 0.0800)

(32) #10 Vertical Bars equally spaced w/ #5 Circular Ties @ 3" on center

CIRCULAR TIE DATA

$V_u < 0.85 * V_c / 2$, shear reinforcement is not required

Use maximum tie spacing specified in ACI 318,
Section 7.10.5 for compression reinforcement.

DEVELOPMENT LENGTH MODIFIERS FOR BAR DEVELOPMENT

Modifier for tension development = 1.000

Modifier for compression development = 0.670

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

Designed By: BJD
Date: 26 Mar,07 @ 08:20 AM

Checked By: HA
Date: 3/27/07

Page 3 of 4