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PURCHASER: OPTASITE

NAME OF PROJECT: GROTON NORTH, NEW LONDON
COUNTY, CONNECTICUT
130 FT OF 150 FT. FUTURE TAPERED
STEEL POLE

FILE NUMBER: 060-3663, 57974EH

DRAWING NUMBERS: A070130 AND A070131 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:

3/16/07



130.00 FT
TOP FLANGE 1.75" X 41.25" ROUND
W/ (8) 1" DIA FLANGE BOLTS ON A
38.0" BOLT CIRCLE

SECTION 2
18 SIDES

89.50 FT

SPLICE LENGTH
MIN. = 58.500"
DESIGN = 66.000"
MAX. = 71.500"

SECTION 3
18 SIDES

48.00 FT

SPLICE LENGTH
MIN. = 68.500"
DESIGN = 78.000"
MAX. = 84.500"

SECTION 4
18 SIDES

BASE PLATE 1.750" X 69.500" Round
W/ (34) 1.500" DIA. X 7.4" LONG ANCHOR
BOLTS EQUALLY SPACED ON 66.000" B.C.
W/ 7.5" ANCHOR BOLT PROJECTION
(NO GROUT REQUIRED)

G.L.

DESIGN WIND LOAD PER ANSII/AIA REVISION G USING THE FOLLOWING DESIGN CRITERIA		
BASIC WIND SPEED (NO ICE): 120 MPH		
BASIC WIND SPEED (W/ ICE): 60 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
130.0	(12) 7752.00 ON 12" LP MOUNT W/ SUPPORT RAILS	(15) 1-5/8 in.
120.0	(12) 7752.00 ON 12" LP MOUNT W/ SUPPORT RAILS	(15) 1-5/8 in.
110.0	(12) APX16PV-16PVL ON 12" LP MOUNT W/ SUPPORT RAILS	(15) 1-5/8 in.
100.0	(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.
ALL LOADS ARE TO BE MOVED UP 20 FT WITH FUTURE EXTENSION.

SECTION SCHEDULE				
SEC.	HEIGHT (FT)	DIAMETER (IN)		F _y (KSI)
		BOT.	TOP	
1	0.00	0.000	0.000	0.0
2	46.00	44.001	34.243	65.0
3	48.00	52.231	42.049	65.0
4	48.00	60.000	49.818	65.0

FOR POLYGONAL POLES DIAMETER IS MEASURED ACROSS FLATS.

MAXIMUM REACTIONS	
DOWNLOAD =	94.8 KIPS
SHEAR =	55.6 KIPS
O.T.M =	6114.4 FT.-KIPS

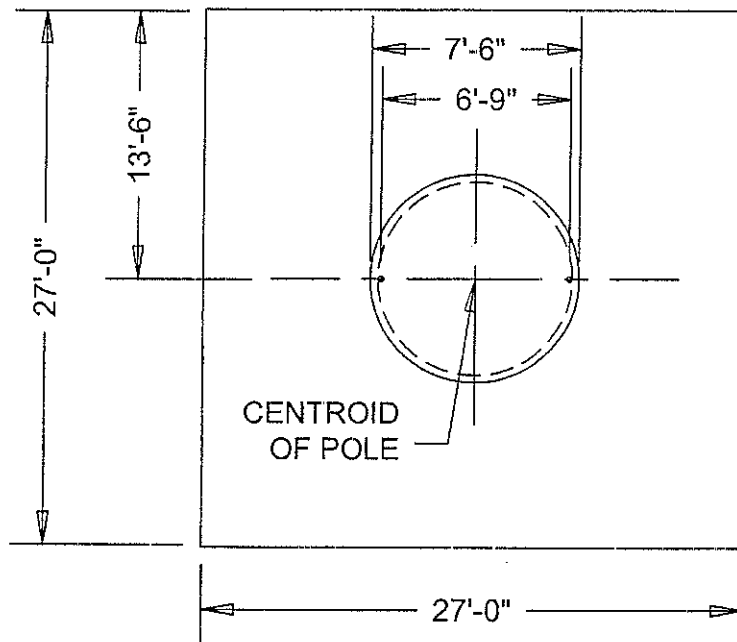
GENERAL NOTES

- RADIAN COMMUNICATION POLE DESIGNS CONFORM TO ANSII/AIA-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 ANSII/AIA-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.
- ELECTION 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 ANSII/AIA-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 ANSII/AIA-222-G.
- ALL HIGH STRENGTH BOLTS ARE TO BE TIGHTENED TO A "SNUG TIGHT" 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 ANSII/AIA-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 & TOP PLATE STEEL CONFORMS TO ASTM A572 GRADE 50 WITH CHARPY IMPACT REQUIREMENTS. POLE ANCHOR BOLTS CONFORM TO ASTM F1554 GRADE 105.
- THIS POLE IS DESIGNED FOR 20' FUTURE EXTENSION.

SITE: GROTON NORTH
COUNTY: NEW LONDON, CT

No. ▲ Revision Description	▲ Date	▲ Rev By	▲ Ctd By	▲ Appd By
THIS DRAWING IS THE PROPERTY OF RADIAN. IT IS NOT TO BE REPRODUCED, COPIED, OR TRASED IN WHOLE OR PART WITHOUT OUR WRITTEN CONSENT.				
Scale: NONE	By: BJD	Date: 3/15/2007	RADIAN	
Drawn: HA	HA	3/15/07	130' OF 150' TAPERED STEEL POLE DESIGN FOR OPTASITE	
Check: HA	HA	3/15/07	DWG. NO.: A070130	
App. Eng: HA	ENG. FILE: 060-3663		SHEET 1 OF 1	
Parent File:	REV			

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



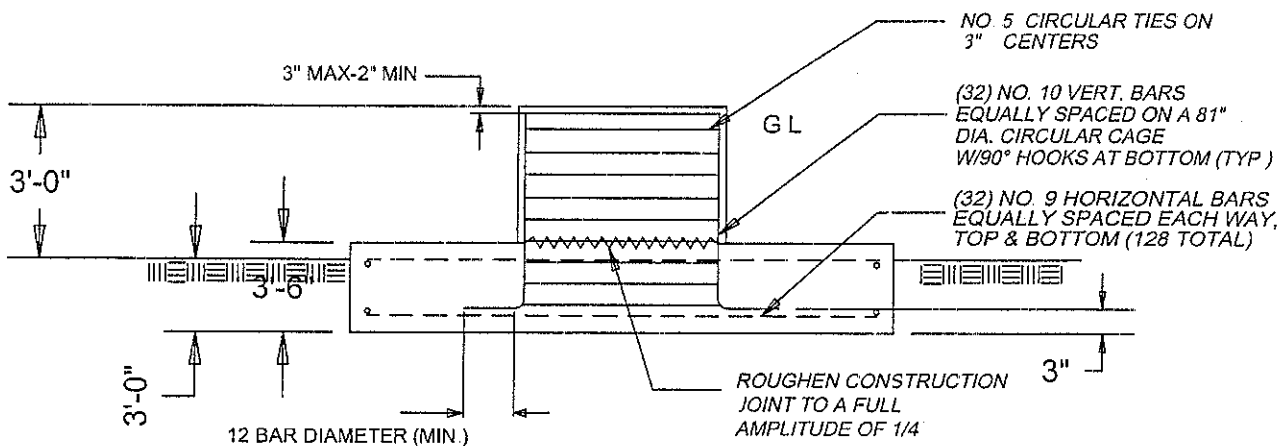
PLAN VIEW

CONCRETE VOLUME

98 6 CU. YDS.

REACTIONS

O.T.M. = 6114.4 FT.-KIPS
DOWNLOAD = 94 8 KIPS
SHEAR = 55 6 KIPS



ELEVATION VIEW

SITE: GROTON NORTH
NEW LONDON COUNTY, CT

No. ▲ Revision Description

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OR PART WITHOUT OUR WRITTEN CONSENT.

▲ Date ▲ Rev By ▲ Ckd By ▲ Appd By



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

Scale: NONE	By	Date
Drawn:	BJD	03/15/07
Checked:	HA	3/16/07
App. Eng.:	HA	3/16/07
Parent File:		

PIER AND PAD FOUNDATION DETAILS
FOR
OPTASITE

ENG. FILE:
060-3663

DWG. NO.: A070131
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 3 Ft. Depth = 20,000 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. 07022CT dated 03/13/07 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: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASITE
Site: GROTON NORTH
Type: POLE-TPR
Pole: Tapered Steel

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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 : ETA Revision G
Exposure : C
Gust response factor: 1.10
Structural Category : II
Topographic Category : 1
Natural Frequency : 0.49 cps
Resonant Velocity : 8.35 mph
Pole Height : 150.00 ft (130 FT INITIALLY)
Top Diameter : 30.000 in
Bottom Diameter : 60.000 in
Embedment Depth : 0.00 ft
Pole Shape : 18-sided Polygon
Joint Type : Hybrid
Shaft Steel Weight : 33.934 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	20.000	0.18750	65	30.000	34.240	0.00	0.2120	1.371 (Future)
2	46.000	0.31250	65	34.240	44.000	66.00	0.2122	6.386
3	48.000	0.43750	65	42.050	52.230	78.00	0.2121	11.228
4	48.000	0.50000	65	49.820	60.000		0.2121	14.949

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 Actual Allowable [Ftot/Fb]
			Axial Load (kips)	Bending Moment (ft-kips)	Horiz Shear (kips)	Torsion (ft-Kips)	
1	Combo005	130.00	8.0302	290.3170	18.9985	0.0000	0.3909
2	Combo005	81.25	25.5052	1851.4550	40.3407	0.0000	0.8400
3	Combo005	38.25	42.9227	3760.5650	48.1282	0.0000	0.8663
4	Combo005	0.00	62.3082	6114.3842	55.2466	0.0000	0.9095
DESIGN REACTIONS →			94.7995	6114.3842	55.6015	41.0373	←
OPERATIONAL REACTIONS →			52.7714	841.7358	7.7624	5.7371	←

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	1.371	@Top	150.00	30.000	0.1875	26.45	160.00	17.74	3994.4	1992.2
		@Bot	130.00	34.240		30.44	182.61	20.26	5952.6	2968.9
2	6.386	@Top	127.25	34.240	0.3125	17.56	109.57	33.65	9812.1	4893.8
		@Splice	86.75	43.420		22.74	138.94	42.76	20126.3	10038.1
		@Bot	81.25	44.000		23.06	140.80	43.33	20949.7	10448.8
3	11.228	@Top	86.25	42.050	0.4375	15.18	96.11	57.78	25345.8	12641.4
		@Splice	44.75	51.540		19.01	117.81	70.96	46941.9	23412.6
		@Bot	38.25	52.230		19.29	119.38	71.92	48869.1	24373.8
4	14.949	@Top	48.00	49.820	0.5000	15.81	99.64	78.27	48227.6	24053.8
		@Bot	0.00	60.000		19.40	120.00	94.42	84679.2	42234.3

Total Shaft Steel Weight = 33.934 kips



ROHN Products

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File: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
 Customer: OPIASIE
 Site: GROTON NORIH
 Type: POLE-TPR
 Pole: Tapered Steel

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PROPERTIES:

(@ Max Segment = 50 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)
45	150.000	30.00	0.1875	26.45	160.00	17.74	3994.4	1992.2
44	148.000	30.42	0.1875	26.85	162.26	17.99	4167.3	2078.5
43	146.000	30.85	0.1875	27.25	164.52	18.25	4345.1	2167.1
42	144.000	31.27	0.1875	27.65	166.78	18.50	4527.8	2258.3
41	142.000	31.70	0.1875	28.04	169.05	18.75	4715.6	2352.0
40	140.000	32.12	0.1875	28.44	171.31	19.00	4908.6	2448.2
39	138.000	32.54	0.1875	28.84	173.57	19.26	5106.7	2547.0
38	136.000	32.97	0.1875	29.24	175.83	19.51	5310.1	2648.5
37	134.000	33.39	0.1875	29.64	178.09	19.76	5518.8	2752.6
36	132.000	33.82	0.1875	30.04	180.35	20.01	5733.0	2859.4
35F	130.000	34.24	0.1875	30.44	182.61	20.26	5952.6	2968.9
35F	130.000	34.24	0.3125	17.56	109.57	33.65	9812.1	4893.8
34	125.950	35.10	0.3125	18.04	112.32	34.50	10576.7	5275.2
33	121.900	35.96	0.3125	18.53	115.07	35.36	11380.0	5675.8
32	117.850	36.82	0.3125	19.01	117.82	36.21	12223.0	6096.3
31	113.800	37.68	0.3125	19.50	120.57	37.06	13106.6	6537.0
30	109.750	38.54	0.3125	19.98	123.32	37.91	14031.8	6998.5
29	105.700	39.40	0.3125	20.47	126.07	38.76	14999.6	7481.1
28	101.650	40.26	0.3125	20.95	128.82	39.62	16010.9	7985.5
27	97.600	41.11	0.3125	21.44	131.57	40.47	17066.6	8512.1
26	93.550	41.97	0.3125	21.92	134.32	41.32	18167.8	9061.3
25	89.500	42.83	0.3125	22.41	137.07	42.17	19315.3	9633.6
240	86.750	43.42	0.3125	22.73	138.93	42.75	20121.4	10035.7
25I	89.500	42.05	0.4375	15.18	96.11	57.78	25344.9	12640.9
24	86.750	42.63	0.4375	15.42	97.45	58.59	26426.1	13180.2
23	84.000	43.22	0.4375	15.65	98.78	59.40	27537.6	13734.5
22	80.400	43.98	0.4375	15.96	100.53	60.46	29038.5	14483.1
21	76.800	44.74	0.4375	16.27	102.27	61.52	30593.0	15258.4
20	73.200	45.51	0.4375	16.58	104.02	62.58	32202.0	16060.9
19	69.600	46.27	0.4375	16.89	105.76	63.64	33866.4	16891.1
18	66.000	47.03	0.4375	17.19	107.51	64.70	35587.2	17749.3
17	62.400	47.80	0.4375	17.50	109.25	65.76	37365.4	18636.2
16	58.800	48.56	0.4375	17.81	111.00	66.82	39201.8	19552.1
15	55.200	49.32	0.4375	18.12	112.74	67.88	41097.4	20497.6
14	51.600	50.09	0.4375	18.42	114.49	68.94	43053.2	21473.0
13	48.000	50.85	0.4375	18.73	116.23	70.00	45070.0	22478.9
120	44.750	51.54	0.4375	19.01	117.81	70.96	46943.8	23413.5
13I	48.000	49.82	0.5000	15.81	99.64	78.27	48227.6	24053.8
12	44.750	50.51	0.5000	16.05	101.02	79.36	50278.0	25076.5
11	41.500	51.20	0.5000	16.29	102.40	80.46	52385.5	26127.6
10	37.350	52.08	0.5000	16.60	104.16	81.85	55161.6	27512.2
9	33.200	52.96	0.5000	16.91	105.92	83.25	58033.8	28944.7
8	29.050	53.84	0.5000	17.22	107.68	84.65	61004.3	30426.3
7	24.900	54.72	0.5000	17.53	109.44	86.04	64074.2	31957.4
6	20.750	55.60	0.5000	17.84	111.20	87.44	67245.7	33539.2
5	16.600	56.48	0.5000	18.15	112.96	88.84	70519.8	35172.2
4	12.450	57.36	0.5000	18.46	114.72	90.23	73898.8	36857.5
3	8.300	58.24	0.5000	18.78	116.48	91.63	77383.7	38595.6
2	4.150	59.12	0.5000	19.09	118.24	93.03	80976.9	40387.7
1	0.000	60.00	0.5000	19.40	120.00	94.42	84679.2	42234.3

**RADIAN****ROHN**
Products**ROHN Products**

A Division of Radian Communication Services Inc

File: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASITE
Site: GROTON NORIH
Type: POLE-TPR
Pole: tapered Steel

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DISCRETE APPURRIANCE 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) 7752 00 ON 12' LP MOUNT W/ S.R.	2.45	7.05	95.90	156.80	(15) 1-5/8 in. ✓
140.00	(12) 7752.00 ON 12' LP MOUNT W/ S.R.	2.45	7.05	95.90	156.80	(15) 1-5/8 in. ✓
130.00	(12) APX16PV-16PVL ON 12' LP MOUNT W/ S.R.	2.35	6.65	70.50	121.10	(15) 1-5/8 in. ✓
120.00	(12) DB844H65E-XY ON 12' LP MOUNT W/ S.R.	2.10	5.95	96.20	194.70	(15) 1-5/8 in. ✓

* INITIAL HTS ARE: 130'; 120'; 110' & 100'



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File: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
 Customer: OPIASITE
 Site: GROTON NORIH
 Type: POLE-TPR
 Pole: Tapered Steel

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PRESSURES

Seg.	Elev (ft)	Kz	W/o Ice		With Ice		Operational	
			G _H -qz	Cf	G _H -qz	Cf	G _H -qz	Cf
1-10	149.000	1.376	53.025	0.650	9.206	1.200	11.861	0.650
1-9	147.000	1.373	52.875	0.650	9.180	1.200	11.827	0.650
1-8	145.000	1.369	52.722	0.650	9.153	1.200	11.793	0.650
1-7	143.000	1.365	52.568	0.650	9.126	1.200	11.759	0.650
1-6	141.000	1.361	52.413	0.650	9.099	1.200	11.724	0.650
1-5	139.000	1.356	52.255	0.650	9.072	1.200	11.689	0.650
1-4	137.000	1.352	52.096	0.650	9.044	1.200	11.653	0.650
1-3	135.000	1.348	51.935	0.650	9.016	1.200	11.617	0.650
1-2	133.000	1.344	51.772	0.650	8.988	1.200	11.581	0.650
1-1	131.000	1.340	51.607	0.650	8.960	1.200	11.544	0.650
1-0	127.975	1.333	51.354	0.650	8.916	1.200	11.487	0.650
2-12	127.975	1.333	51.354	0.650	8.916	1.200	11.487	0.650
2-11	123.925	1.324	51.008	0.650	8.855	1.200	11.410	0.650
2-10	119.875	1.315	50.652	0.650	8.794	1.200	11.330	0.650
2-9	115.825	1.305	50.287	0.650	8.730	1.200	11.248	0.650
2-8	111.775	1.296	49.911	0.650	8.665	1.200	11.164	0.650
2-7	107.725	1.286	49.525	0.650	8.598	1.200	11.078	0.650
2-6	103.675	1.275	49.127	0.650	8.529	1.200	10.989	0.650
2-5	99.625	1.265	48.717	0.650	8.458	1.200	10.897	0.650
2-4	95.575	1.254	48.293	0.650	8.384	1.200	10.802	0.650
2-3	91.525	1.242	47.855	0.650	8.308	1.200	10.704	0.650
2-2	88.125	1.232	47.475	0.650	8.242	1.200	10.619	0.650
2-1	85.375	1.224	47.159	0.650	8.187	1.200	10.549	0.650
3-14	88.125	1.232	47.475	0.650	8.242	1.200	10.619	0.650
3-13	85.375	1.224	47.159	0.650	8.187	1.200	10.549	0.650
3-12	82.200	1.214	46.784	0.650	8.122	1.200	10.465	0.650
3-11	78.600	1.203	46.345	0.650	8.046	1.200	10.367	0.650
3-10	75.000	1.191	45.890	0.650	7.967	1.200	10.265	0.650
3-9	71.400	1.179	45.417	0.650	7.885	1.200	10.159	0.650
3-8	67.800	1.166	44.925	0.650	7.800	1.200	10.049	0.650
3-7	64.200	1.153	44.412	0.650	7.710	1.200	9.934	0.650
3-6	60.600	1.139	43.876	0.650	7.617	1.200	9.814	0.650
3-5	57.000	1.124	43.314	0.650	7.520	1.200	9.689	0.650
3-4	53.400	1.109	42.723	0.650	7.417	1.200	9.556	0.650
3-3	49.800	1.093	42.100	0.650	7.309	1.200	9.417	0.650
3-2	46.375	1.077	41.473	0.650	7.200	1.200	9.277	0.650
3-1	43.125	1.060	40.843	0.650	7.091	1.200	9.136	0.650
4-12	46.375	1.077	41.473	0.650	7.200	1.200	9.277	0.650
4-11	43.125	1.060	40.843	0.650	7.091	1.200	9.136	0.650
4-10	39.425	1.040	40.079	0.650	6.958	1.200	8.965	0.650
4-9	35.275	1.016	39.152	0.650	6.797	1.200	8.758	0.650
4-8	31.125	0.990	38.134	0.650	6.620	1.200	8.530	0.650
4-7	26.975	0.961	37.002	0.650	6.424	1.200	8.277	0.650
4-6	22.825	0.927	35.723	0.650	6.202	1.200	7.991	0.650
4-5	18.675	0.889	34.245	0.650	5.945	1.200	7.660	0.650
4-4	14.525	0.850	32.744	0.650	5.685	1.200	7.324	0.650
4-3	10.375	0.850	32.744	0.650	5.685	1.200	7.324	0.650
4-2	6.225	0.850	32.744	0.650	5.685	1.200	7.324	0.650
4-1	2.075	0.850	32.744	0.650	5.685	1.200	7.324	0.650



ROHN Products

A Division of Radian Communication Services Inc

ROHN

File: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPIASTIE
Site: GROTON NORTH
Type: POLE-TPR
Pole: Tapered Steel

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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)
45	150.000	7 712	0.00	9 42	0 02	1.34	1.807	13 341	0.027	0.769
44	148.000	3 237	0.00	20 83	8 58	0 00	0.000	13 018	0.026	0.768
43	146.000	3 437	0.00	38 59	8 86	0 00	0.000	12 697	0.026	0.766
42	144.000	3 640	0.00	56 97	9 16	0 00	0.000	12 376	0.025	0.764
41	142.000	3 844	0.00	75 97	9 45	0 00	0.000	12 057	0.025	0.761
40	140.000	7 012	0.00	99 53	17 78	0 00	0.000	11 739	0.024	0.758
39	138.000	7 264	0.00	136 40	18.08	0 00	0.000	11 422	0.024	0.753
38	136.000	7 517	0.00	173 91	18.38	0 00	0.000	11 108	0.023	0.747
37	134.000	7 772	0.00	212 06	18.69	0 00	0.000	10 796	0.022	0.740
36	132.000	8 030	0.00	250 86	19.00	0.00	0.000	10 487	0.021	0.733
35	130.000	8 030	0.00	250 86	19.00	0.00	0.000	10 181	0.020	0.725
34	125.950	12 268	0.00	400 88	25.93	0.00	0.000	9 571	0.019	0.712
33	121.900	14 504	0.00	512 29	30.72	0.00	0.000	8 972	0.018	0.698
32	117.850	16 642	0.00	643 57	35.04	0.00	0.000	8 387	0.017	0.681
31	113.800	17 632	0.00	791 17	35.72	0.00	0.000	7 817	0.015	0.661
30	109.750	18 641	0.00	941 67	36.40	0.00	0.000	7 264	0.014	0.639
29	105.700	19 661	0.00	1095 07	37.10	0.00	0.000	6 731	0.013	0.616
28	101.650	20 696	0.00	1251 37	37.80	0.00	0.000	6 219	0.012	0.591
27	97.600	21 747	0.00	1410 57	38.51	0.00	0.000	5 728	0.011	0.564
26	93.550	22 812	0.00	1572 68	39 23	0.00	0.000	5 260	0.010	0.537
25	89.500	24 067	0.00	1737 68	39 84	0.00	0.000	4 817	0.009	0.508
24	86.750	25 505	0.00	1851 46	40 34	0.00	0.000	4 527	0.008	0.497
24	86.750	25 505	0.00	1851 46	40 34	0.00	0.000	4 527	0.008	0.497
23	84.000	26 844	0.00	1966 75	40 91	0.00	0.000	4 244	0.008	0.486
22	80.400	28 088	0.00	2119 86	41 56	0.00	0.000	3 885	0.007	0.465
21	76.800	29 352	0.00	2275 31	42 22	0.00	0.000	3 542	0.007	0.444
20	73.200	30 633	0.00	2433 09	42 87	0.00	0.000	3 215	0.006	0.422
19	69.600	31 927	0.00	2593 20	43 54	0.00	0.000	2 905	0.006	0.401
18	66.000	33 237	0.00	2755 61	44 20	0.00	0.000	2 610	0.005	0.379
17	62.400	34 564	0.00	2920 32	44 87	0.00	0.000	2 333	0.005	0.357
16	58.800	35 911	0.00	3087 32	45 54	0.00	0.000	2 072	0.004	0.334
15	55.200	37 274	0.00	3256 57	46 21	0.00	0.000	1 828	0.004	0.312
14	51.600	38 651	0.00	3428 06	46 88	0.00	0.000	1 601	0.004	0.289
13	48.000	40 534	0.00	3601 76	47 52	0.00	0.000	1 391	0.003	0.267
12	44.750	42 923	0.00	3760 57	48 13	0.00	0.000	1 213	0.003	0.254
12	44.750	42 923	0.00	3760 57	48 13	0.00	0.000	1 213	0.003	0.254
11	41.500	45 025	0.00	3921 37	48 81	0.00	0.000	1 045	0.003	0.241
10	37.350	46 846	0.00	4129 36	49 56	0.00	0.000	0 845	0.002	0.216
9	33.200	48 690	0.00	4340 08	50 31	0.00	0.000	0 668	0.002	0.192
8	29.050	50 558	0.00	4553 48	51 04	0.00	0.000	0 511	0.002	0.168
7	24.900	52 455	0.00	4769 46	51 77	0.00	0.000	0 375	0.002	0.144
6	20.750	54 377	0.00	4987 94	52 48	0.00	0.000	0 260	0.001	0.119
5	16.600	56 324	0.00	5208 80	53 16	0.00	0.000	0 167	0.001	0.095
4	12.450	58 292	0.00	5431 91	53 85	0.00	0.000	0 094	0.001	0.071
3	8.300	60 286	0.00	5657 22	54 54	0.00	0.000	0 042	0.000	0.047
2	4.150	62 308	0.00	5884 71	55 25	0.00	0.000	0 011	0.000	0.024
1	0.000	62 308	0.00	6114 38	55 25	0.00	0.000	0 000	0.000	0.000



ROHN Products

A Division of Radian Communication Services Inc.

File: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASIE
Site: GROTON NORIH
Type: POLE-TPR
Pole: Iapared Steel

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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)		
45	150.000	0.435	0.859	0.151	0.082	1.349	63.263	0.0232
44	148.000	0.180	1.846	0.953	0.000	2.935	62.841	0.0363
43	146.000	0.188	3.327	0.972	0.000	4.459	62.419	0.0631
42	144.000	0.197	4.778	0.990	0.000	5.954	61.997	0.0897
41	142.000	0.205	6.201	1.008	0.000	7.422	61.575	0.1161
40	140.000	0.369	7.909	1.871	0.000	11.779	61.152	0.1520
39	138.000	0.377	10.557	1.878	0.000	14.460	60.730	0.2016
38	136.000	0.385	13.114	1.885	0.000	17.051	60.308	0.2503
37	134.000	0.393	15.585	1.892	0.000	19.557	59.886	0.2981
36	132.000	0.401	17.975	1.899	0.000	21.981	59.464	0.3451
35F	130.000	0.396	20.288	1.875	0.000	24.199	59.042	0.3909
35F	130.000	0.339	12.432	1.503	0.000	15.030	65.000	0.2193
34	125.950	0.356	16.106	1.503	0.000	18.721	65.000	0.2824
33	121.900	0.410	19.602	1.738	0.000	23.032	65.000	0.3434
32	117.850	0.460	23.479	1.936	0.000	27.686	65.000	0.4108
31	113.800	0.476	27.552	1.928	0.000	31.744	65.000	0.4807
30	109.750	0.492	31.335	1.920	0.000	35.515	65.000	0.5456
29	105.700	0.507	34.855	1.914	0.000	39.026	65.000	0.6061
28	101.650	0.522	38.134	1.908	0.000	42.299	65.000	0.6624
27	97.600	0.537	41.195	1.903	0.000	45.355	65.000	0.7150
26	93.550	0.552	44.054	1.899	0.000	48.212	65.000	0.7641
25	89.500	0.571	46.728	1.889	0.000	50.869	65.000	0.8101
240	86.750	0.597	48.449	1.887	0.000	52.607	65.000	0.8400
25I	89.500	0.417	34.851	1.379	0.000	37.169	65.000	0.6038
24	86.750	0.435	36.113	1.377	0.000	38.444	65.000	0.6257
23	84.000	0.452	37.322	1.378	0.000	39.672	65.000	0.6467
22	80.400	0.465	38.829	1.375	0.000	41.184	65.000	0.6727
21	76.800	0.477	40.252	1.372	0.000	42.613	65.000	0.6973
20	73.200	0.489	41.598	1.370	0.000	43.965	65.000	0.7205
19	69.600	0.502	42.870	1.368	0.000	45.244	65.000	0.7425
18	66.000	0.514	44.075	1.366	0.000	46.455	65.000	0.7633
17	62.400	0.526	45.215	1.365	0.000	47.603	65.000	0.7830
16	58.800	0.537	46.296	1.363	0.000	48.691	65.000	0.8017
15	55.200	0.549	47.321	1.361	0.000	49.723	65.000	0.8194
14	51.600	0.561	48.292	1.360	0.000	50.703	65.000	0.8362
13	48.000	0.579	49.214	1.358	0.000	51.637	65.000	0.8523
120	44.750	0.605	50.007	1.356	0.000	52.452	65.000	0.8663
13I	48.000	0.518	44.994	1.214	0.000	46.986	65.000	0.7789
12	44.750	0.541	45.692	1.213	0.000	47.704	65.000	0.7913
11	41.500	0.560	46.359	1.213	0.000	48.391	65.000	0.8030
10	37.350	0.572	47.166	1.211	0.000	49.205	65.000	0.8170
9	33.200	0.585	47.923	1.209	0.000	49.969	65.000	0.8302
8	29.050	0.597	48.634	1.206	0.000	50.686	65.000	0.8426
7	24.900	0.610	49.300	1.203	0.000	51.358	65.000	0.8542
6	20.750	0.622	49.925	1.200	0.000	51.987	65.000	0.8651
5	16.600	0.634	50.509	1.197	0.000	52.575	65.000	0.8753
4	12.450	0.646	51.054	1.194	0.000	53.125	65.000	0.8848
3	8.300	0.658	51.563	1.190	0.000	53.638	65.000	0.8937
2	4.150	0.670	52.038	1.188	0.000	54.119	65.000	0.9021
1	0.000	0.660	52.481	1.170	0.000	54.510	65.000	0.9095



ROHN Products

A Division of Radian Communication Services, Inc.

File: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPIASIIIE
Site: GROTON NORIH
Type: POLE-TPR
Pole: Tapered Steel

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SUMMARY OF TRANSITION 1 - 2 DESIGN

P L A T E		F L A N G E B O L T S	
Pole Diameter at Top	= 34.24 in	Size	= 1 00 in
Plate Diameter	= 41.25 in	Grade	= A325
Plate Thickness	= 1.75 in	No Of Bolts	= 8
Plate Weight (Black)	= 348.19 lbs	Bolt Circle	= 38.000 in
Fy	= 50.00 ksi	Fy	= 92.00 ksi
Fu	= 65.00 ksi		

MAXIMUM POLE REACTIONS:

Axial = 8.03 kips
Moment = 290.32 ft-kips
Shear = 19.00 kips
Torsion = 0.00 ft-kips

FLANGE BOLTS:

Axial = 37.0 kips/bolt
Moment = 0.0 in-kips/bolt
Shear = 2.4 kips/bolt

Axial Capacity = 72.2 kips/bolt
Moment Capacity = 15.3 in-kips/bolt
Shear Capacity = 54.2 kips/bolt

FLANGE BOLT STRESS RATIO = 0.571 < 1.0 OK

PLATE:

Bolt Group Tension Capacity = 520.0 kips
Plate Tension Capacity = 4,148.7 kips
Plate Shear Capacity = 5,566.9 kips

PLATE STRESS RATIO = 0.125 < 1.0 OK



ROHN Products

A Division of Radian Communication Services Inc.

File: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPTASTIE
Site: GROTON NORIH
Type: POLE-TPR
Pole: Tapered Steel

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SUMMARY OF BASEPLATE DESIGN

PLATE	ANCHOR BOLTS
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) = 718.21 lbs	Bolt Circle = 65.000 in.
Fy = 50.00 ksi ✓	Fy = 105.00 ksi ✓
Fu = 65.00 ksi ✓	

MAXIMUM POLE REACTIONS:

Axial = 94.80 kips
Moment = 6,114.38 ft-kips
Shear = 55.60 kips ✓
Torsion = 41.04 ft-kips

ANCHOR BOLTS:

Axial = 107.1 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 = 0.859 < 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

A Division of Radian Communication Services Inc.



File: 060-3663 Site: 1 Cycle: 1 Design: 1 Engineer: BJD
Customer: OPIASIE
Site: GROTON NORIH
Type: POLE-TPR
Pole: Tapered Steel

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NOTES

LOAD COMBINATIONS

Load Combo	Description
------------	-------------

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

ID	EditedBy	Description
----	----------	-------------

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

MISCELLANEOUS NOTES

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

Customer: OPTASITE
 Project: 130' of 150' TSP
 Site: GROTON NORTH
 Engr. File: 060-3663
 Build Code: ANSI/TIA-222-G-2005



Mat Foundation

W/ RAISED PIER

ver 1.1.1

Design Parameters

Description	Load Case					Service
	1	2	3	4	5	
Total Moment, ft-kips	6,114.40					841.70
Total Shear, kips	55.60					7.80
Total Tower Wt, kips	94.80					52.80
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	3.00
Depth, ft	3.00
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	20.00

Mat	
Thickness, ft	✓ 3.50
Width, ft	✓ 27.00
EA, in	21.00
Batter, in/ft	0.00

Pier	
Height, ft	2.50 ✓
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
Concrete	
28 Day Strength, ksi	✓ 4.00
Dry Unit Wt, pcf	150.00
Wet Unit Wt, pcf	88.00

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

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

Results

ϕM_N - Parallel Axis 7,341.6 ft-kips
 ϕM_N - Diagonal Axis 8,590.9 ft-kips
 Moment - Interaction Ratio 0.878 ✓
 ϕV_N - Lateral Load 119.22 kips
 Lateral Load - Interaction Ratio 0.466 ✓

Final Mat Dimension : 27.00 x 27.00 x 3.50 ft thick w/ (1) 7.50 ft dia Pier ✓

Final Pocket Dimension : Pockets not required

Total Volume of Concrete : 98.6 yd³

Designed By: BJD
 Date: 15 Mar, 07 @ 09:53 AM

Checked By: HA
 Date: 3/16/07

Customer: OPTASITE
 Project: 130' of 150' ISP
 Site: GROTON NORTH
 Engr. File: 060-3663
 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 = 27.00 ft

$M_U = 6,448.0$ ft-kips

	ϕM_N , ft-kips	x, ft	N
Parallel	7,341.6	1.417	0.052
Diagonal	8,590.9	6.186	0.162

$\phi M_N = 7,341.64$ ft-kips IRatio = 0.878 ✓
 $\phi V_N = 119.22$ kips IRatio = 0.466 ✓

Mat Design

$\gamma_e = 150.00$ pcf

	x, ft	N	σ_R , ksi	Moment, ft-kips			Shear, kips		
				Rt	Lt	M_U/ft	Rt	Lt	V_U/ft
Parallel	4.531	0.168	4.69	5,451.55	1,328.60	201.91	426.33	196.83	15.79
Diagonal	11.786	0.309	4.13	5,508.54	1,252.62	144.26	426.33	196.83	11.17
Use			4.69			201.91			15.79

Punching Shear

	Download			Uplift		
	Interior	Edge	Corner	Interior	Edge	Corner
b_o , ft	38.92	N/a	N/a	N/a	N/a	N/a
V_{su} , psi	160.56	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	0.75	N/a	N/a	N/a	N/a	N/a

Critical Sections: a = 13.50 ft
 b = 13.50 ft
 c = 13.50 ft
 g = 13.50 ft (min. of a, b, & c)

Mat Reinforcement

Min. Steel Area (Strength) = 1.183 in²/ft.
 Min Steel Area (Temperature) = .454 in²/ft.
 Height of compression block, x = 3.42 in

32 - #9 Horizontal bars equally spaced @10.26 in., each way, top and bottom.
 (Total of 128)

One-Way Shear

$V_U = 15.79$ kips ✓
 $\phi V_c = 47.74$ kips ✓
 Min. Slab Thickness = 17.2 in.

Designed By: BJD
 Date: 15 Mar,07 @ 09:53 AM

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 Date: 3/16/07
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Customer: OPTASITE
Project: 130' of 150' ISP
Site: GROTON NORTH
Engr. File: 060-3663
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 = 94.80 kips	Vc = 55.60 kips	Mc = 6,253.40 ft-kips
T = 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	= 38.458 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 = 0.672

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

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