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Also admitted in Massachusetts

March 7, 2014

*Via Hand Delivery*

Melanie A. Bachman  
Acting Executive Director  
Connecticut Siting Council  
10 Franklin Square  
New Britain, CT 06051

Re: **Docket No. 438 – Development and Management Plan-Part 2**

Dear Ms. Bachman:

Enclosed please find fifteen (15) copies of the following materials.

1. A Tower and Foundation design by Engineered Endeavors for 150 foot monopole tower. As discussed at the hearing, the tower has been designed to be expandable to 170 feet if a need exists in the future.
2. A Geotechnical and Geophysical Testing Report for the approved Gallup Road cell site.
3. A Wetland and Vernal Pool Evaluation Report prepared by Dean Gustafson, with All-Points Technology Corporation, P.C.
4. Revised D&M Plans (Part 2) incorporating construction notes, the proposed tower design and protective measures associated with the Wetland and Vernal Pool Evaluation report.

Together this material constitutes the “D&M Plan – Part 2” for Docket No. 438. We respectfully request that this matter be reviewed and placed on the next available Siting Council agenda for approval.



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# ROBINSON & COLE<sup>LLP</sup>

Melanie A. Bachman  
March 7, 2014  
Page 2

Thank you in advance for your cooperation. If you have any questions or need any additional information please do not hesitate to contact me.

Sincerely,



Kenneth C. Baldwin

KCB/see  
Enclosures  
Copy to:

Sandy M. Carter (w/enclosures)  
Dean Gustafson  
Anthony R. Befera





**ENGINEERED ENDEAVORS**

*The Experienced Point of View*

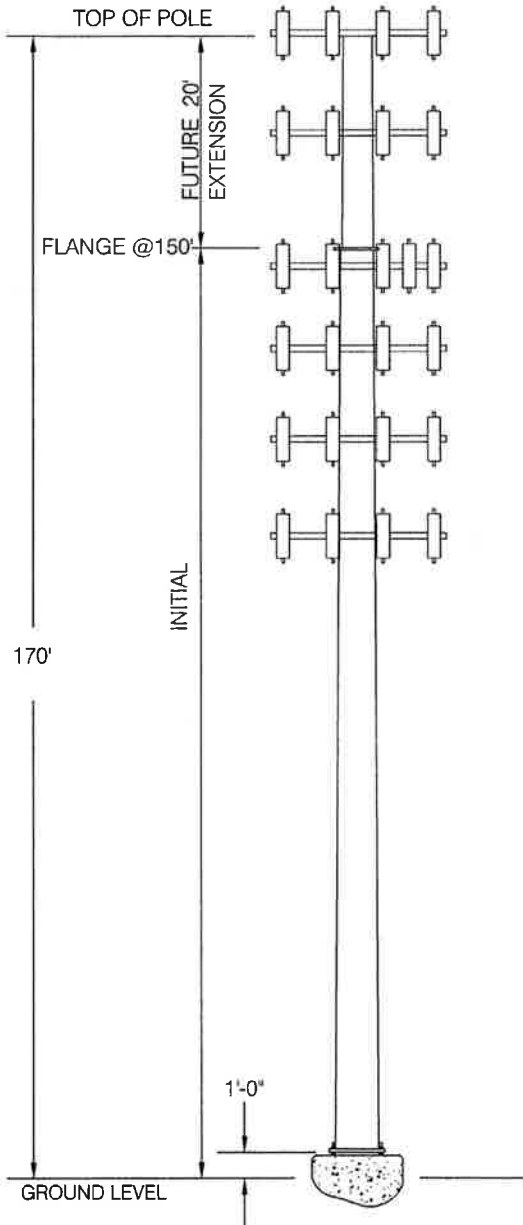
Customer: VERIZON WIRELESS  
Description: 150' / 170' MONOPOLE  
EEI Job Number: 17125

**SITE INFORMATION**

Location: VOLUNTOWN, CT  
Site Name: PALMER POND  
Site Number: N/A

**DESIGN INFORMATION**

Designed By: MRM  
Design Date: 1/15/2014  
Status: RELEASE



**ANTENNA LOADING**

- 170': 60 ft<sup>2</sup> PANEL ANTENNAS MOUNTED ON LOW PROFILE PLATFORM (FUTURE)  
(12) 1 5/8" Ø CABLES
- 160': 60 ft<sup>2</sup> PANEL ANTENNAS MOUNTED ON LOW PROFILE PLATFORM (FUTURE)  
(12) 1 5/8" Ø CABLES
- 150': 100 ft<sup>2</sup> PANEL ANTENNAS MOUNTED ON SQUARE LOW PROFILE SQUARE PLATFORM (VERIZON WIRELESS)  
(18) 1 5/8" Ø CABLES
- 140': 220 ft<sup>2</sup> EQUIPMENT MOUNTED ON LOW PROFILE PLATFORM (FUTURE)  
(12) 1 5/8" Ø CABLES
- 130': 60 ft<sup>2</sup> PANEL ANTENNAS MOUNTED ON LOW PROFILE PLATFORM (FUTURE)  
(12) 1 5/8" Ø CABLES
- 120': 60 ft<sup>2</sup> PANEL ANTENNAS MOUNTED ON LOW PROFILE PLATFORM (FUTURE)  
(12) 1 5/8" Ø CABLES

**DESIGN CRITERIA**

DESIGNED IN ACCORDANCE WITH THE TIA 222-G AND ASCE 7 FOR 115 MPH 3-SECOND GUST WIND SPEED

- STRUCTURE CLASSIFICATION - II
- EXPOSURE - C
- TOPOGRAPHIC CATEGORY - 1

DESIGNED IN ACCORDANCE WITH THE TIA/EIA 222 F FOR 90 MPH FASTEST MILE WIND SPEED

**ENGINEERED ENDEAVORS**

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# 150' / 170' MONOPOLE VERIZON WIRELESS PALMER POND VOLUNTOWN, CT

## TABLE OF CONTENTS

T1 - BILL OF MATERIAL & NOTES  
S1 - ELEVATION VIEW & DETAILS  
ABT - ANCHOR BOLTS & TEMPLATES

**SYMBOL LEGEND**  
 AGL = ABOVE GROUND LEVEL  
 BC = BOLT CIRCLE  
 CL = CENTERLINE  
 ELEV = ELEVATION  
 (E) = EXISTING  
 FV = FIELD VERIFY  
 FW = FLAT WASHER  
 HN = HEX NUT  
 LW = LOCK WASHER  
 OC = ON CENTER  
 OD = OUTSIDE DIAMETER  
 (P) = PROPOSED  
 TBD = TO BE DETERMINED  
 TOS = TOP OF STEEL  
 TYP = TYPICAL  
 NTS = NOT TO SCALE

## DESIGN NOTES

- MONOPOLE IS DESIGNED IN ACCORDANCE WITH TIA-222-C AND ASCE 7 FOR 115 MPH 3-SECOND GUST WIND SPEED EXPOSURE - C TOPOGRAPHIC CATEGORY - 1
- DESIGNED IN ACCORDANCE WITH THE TIA 222 FOR 90 MPH FASTEST MILE WIND SPEED
- ALL APPLICABLE MATERIALS SHALL BE HOT DIPPED GALVANIZED PER ASTM A123 ALL HARDWARE SHALL BE HOT DIPPED GALVANIZED PER ASTM A153, UNLESS OTHERWISE NOTED

## STRUCTURE NOTES

- EE WILL NOT HONOR ANY BACKCHARGES WHICH HAVE NOT RECEIVED PRIOR WRITTEN AUTHORIZATION CONTACT EE AT (440) 564 5494
- THE INSTALLER SHALL THOROUGHLY REVIEW EE'S STRUCTURAL ASSEMBLY & ERECTION PROCEDURES PRIOR TO INITIATING THE INSTALLATION OF THE MONOPOLE.
- THE ORIENTATION OF THE MONOPOLE SHALL BE VERIFIED PRIOR TO INSTALLATION
- FOR MULTIPLE SECTION MONOPOLES
  - FOR PROPER SECTION TO SECTION ALIGNMENT A "Z" HORIZONTAL WELD BEAD AND A MARK ARE POSITIONED ON EACH SECTION AT EACH SPICE. THE "Z" HORIZONTAL WELD BEAD ARE ON THE MATCHING CORNERS THE MARK NUMBER IS ON THE ADJACENT FLAT THE CORNERS WITH WELD BEADS SHALL BE ALIGNED FROM TOP TO BOTTOM OF THE MONOPOLE/MARK NUMBERS SHALL BE MATCHED FOR EACH SIDE & THE DISTANCE BETWEEN TWO WELD BEADS SHOULD BE 18" (54")
  - ALL SECTIONS OF THE MONOPOLE SHALL BE JACKED TOGETHER WITH A MINIMUM JACKING FORCE OF 10,000 LB APPLIED TO EACH SIDE FOR MAXIMUM RECOMMENDED JACKING FORCE. SPICE LENGTH TOLERANCE AND AIR GAP BETWEEN SECTIONS REFER TO EE'S STRUCTURE ASSEMBLY & ERECTION PROCEDURES
  - SPICES - ALL JACKING EQUIPMENT SHALL BE SUPPLIED BY THE INSTALLER
  - ALL LONGITUDINAL SEAM WELDS WITHIN THE SUP-JOINT AREA IN THE FEMALE SECTION SHALL BE 100% PENETRATION
- ALL BOLTED CONNECTIONS WITH A325 HIGH-STRENGTH BOLTS SHALL BE ASSEMBLED IN ACCORDANCE WITH SPECIFICATIONS FOR STRUCTURAL JOINTS USING A325 OR A490 BOLTS. HIGH STRENGTH BOLTS SHALL BE INSTALLED TO SNUG-TIGHT CONDITION PER ASTM A325/A490 AND THEN PRE-TENSION AS REQUIRED. TURN-OF-NUT METHOD IS RECOMMENDED BUT IS NOT LIMITED TO
  - SHIMS WILL BE SUPPLIED BY EE, IF REQUIRED
- MONOPOLE BASE PLATE SHALL HAVE FULL PENETRATION WELD TO SHAFT.
  - ANCHOR RODS SHALL BE TIGHTENED AFTER THE MONOPOLE IS PLUMB. BOTH TOP & BOTTOM NUT SHALL BE TIGHTENED FOR DETAIL OF ANCHOR ROD INSTALLATION INSTRUCTIONS, REFER TO EE'S STRUCTURE ASSEMBLY & ERECTION PROCEDURES.
- MATERIALS
  - STRUCTURAL STEEL - REFER TO DRAWING
  - BOLTS
    - STRUCTURAL STEEL A325 HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED
    - ANCHOR RODS A615-GR75 UNLESS OTHERWISE NOTED
  - WELDING
    - ALL WELDING SHALL MEET AWS LATEST D 11 EDITION
- ASSEMBLY MARKING PROCEDURE
  - EACH INDIVIDUAL ASSEMBLY SHALL HAVE A METAL TAG WELDED TO IT WHICH WILL BE ENGRAVED WITH THE ASSEMBLY MARK NO. AS SHOWN IN THE MATERIAL BLOCK. (MINIMUM OF 5/8" HIGH LETTERS)

## BILL OF MATERIALS

Item	Part Number	Description	Qty	Weight Per 1	Wt Per Row
1	17125-P01-GS-01	SHAFT ASSY. (TOP SECTION)	1		
2	17125-P01-GS-02	SHAFT ASSY. (UPPER MID SECTION)	2		
3	17125-P01-GS-03	SHAFT ASSY. (LOWER MID SECTION)	3		
4	17125-P01-GS-04	SHAFT ASSY. (BOTTOM SECTION)	4		
5	17125-P01-P36-01	REMOVAL COVER PLATE	59 94	2256.20	59 94
6	K11130	12 SQUARE ANTENNA PLATFORM	1		2,256.20
7	K11154	4 SECTOR UNIVERSAL BRACKET (16"-37" A.F.)	344.78		344.78
8	K12060	6'-3" LOW PROFILE PLATFORM ANTENNA MOUNT	43.58		653.70
9	K10062	BUSS BAR	7.50		7.50
10	K10333	7'-0" LIGHTNING ROD	28.60		28.60
11	K12067	5'-0" LIGHTNING ROD EXTENSION MOUNT FOR LOW PROFILE PLATFORM	34.07		34.07
12					
13					
14					
15					
		STRUCTURE ASSEMBLY AND ERECTION PROCEDURE	1		
		INTERMEDIATE PLATFORM ASSEMBLY PROCEDURE	1		
		HARDWARE STARTS HERE			
30	DBL-150	150'-0" SAFETY CLIMB KIT			344.78
31	L2010	SAFETY CLIMB HARNESS			43.58
32	S10006	95/8" x 6 1/2" LG. BUTTON HEAD STEP BOLT w/(1) H.N. & (1) SQUARE NUT EACH	1.08		1.08
33	K11497	10" x 30' ACCESS PORT COVER PLATE & BOLTS	31.39		188.34
34	K11499	6" x 18" HANDHOLE COVER PLATE & BOLTS	10.48		125.76
35	BX-325-G-1.0 x 4.00	Ø1" x 4" (A325) HEX BOLT w/ (1) H.N. (A194-2H), (2) F.W. (F436)	1.81		7.24
36					
37					
		FOR ANCHOR BOLTS REFER TO DWG. 17125-P01-ABT			
40	ANCHOR BOLT				
41					
		STRUCTURE BLACK WEIGHT		3,706.13	
		STRUCTURE GALV WEIGHT		3,928.50	



**ENGINEERED ENDEAVORS**  
 THE ENGINEER HAS REVIEWED THIS DRAWING FOR CONFORMANCE WITH THE WRITTEN CONSENT OF REGISTERED ENGINEERS.  
 ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.

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**FOR APPROVAL**

REVISION HISTORY

REV #	DATE	BY	DESCRIPTION
1			ISSUED FOR REVIEW

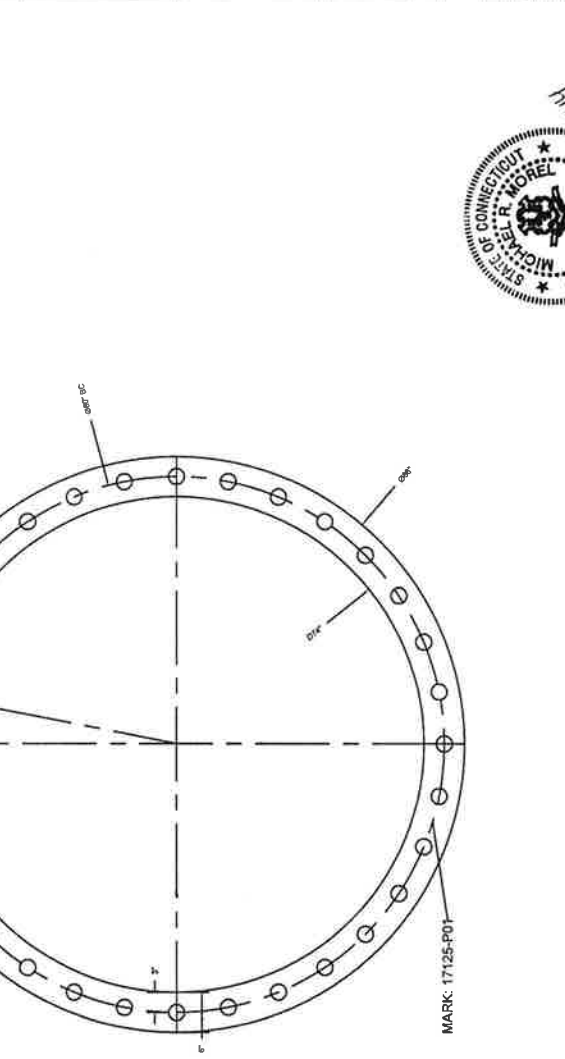
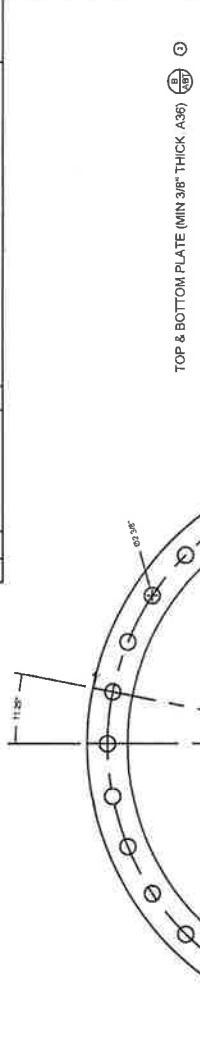
150' / 170' MONOPOLE  
 VERIZON WIRELESS  
 PALMER POND  
 VOLUNTOWN, CT

BILL OF MATERIALS & NOTES

17125-P01-T1



BILL OF MATERIALS				17125-P01-RVH		
Rev	Item	Part Number	Qty	Description	Weight Per 1	Wt Per Row
1		2.25-ABB D-4	32	2 1/4" x 1/2" LG (ABS) (635) ANCHOR ROD (W/4) HEX NUTS (A194 GROUP) & (2) FLAT WASHERS	77.22	2471.04
2		32-80.00-2.25C	2	TOP & BOTTOM SETTING TEMPLATE	144.99	289.98
3				CAGED ANCHOR RODS & TEMPLATE WEIGHT		2701.02



ENTIRE BOLT & NUT ASSEMBLY HAS BEEN GALVANIZED PER ASTM A153

ANCHOR BOLT CAGE ASSEMBLY (3)

STATE OF CONNECTICUT  
MICHAEL R. MOREL  
No. 21720  
LICENSED PROFESSIONAL ENGINEER

*Michael R. Morel*

**ENGINEERED ENDEAVORS**  
18975 Kippen Road • Norwalk, CT 06855-0787  
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REV #	DATE	BY	DESCRIPTION
1			ISSUED FOR REVIEW

150' / 170' MONOPOLE  
VERIZON WIRELESS  
PALMER POND  
VOLUNTOWN, CT

**ANCHOR BOLTS & TEMPLATES**

DRAWING NUMBER: 17125-P01-ABT  
PROJECT NUMBER: 17125

# COMMUNICATIONS STRUCTURE WIND LOADING DEVELOPMENT

## Per the ANSI/TIA 222-G-2005



**CUSTOMER:** VERIZON WIRELESS  
**SITE LOCATION:** VOLUNTOWN, CT  
**SITE NAME:** PALMER POND  
**SITE NUMBER:** TEST

**CURRENT DATE:** 01/15/14  
**STRUCTURE:** 150' / 170' MONOPOLE  
**JOB NUMBER:** 17125TEST  
**STATUS:** RELEASE

### Load Combinations

- 6  $1.0D + 1.0W_o$       SERVICE DEAD LOAD FACTOR = 1.0  
                                 SERVICE WIND LOAD FACTOR = 1.0
- 1  $1.2D + 1.6W_o$       WIND DEAD LOAD FACTOR = 1.2  
                                 WIND w/o ICE FACTOR = 1.6
- 3  $1.2D + 1.0D_i + 1.0W_i$       WIND DEAD LOAD w/ICE FACTOR = 1.2  
   WIND w/ ICE FACTOR = 1.0  
   DEAD LOAD FACTOR FOR ICE = 1.0

MAXIMUM DEFLECTION (in) = 60.84  
 MAXIMUM ROTATION @ TOP (°) = 4.00

WEIGHT OF ICE (pcf) = 56  
 TEMPERATURE FACTOR = N/A to non-guy structures

### General Information

STRUCTURE HEIGHT (ft) = 169.00  
 NUMBER OF MONOPOLE SIDES = 18  
 DESIGN WIND SPEED (mph) = 115  
 WIND SPEED w/ ICE (mph) = 40  
 RADIAL ICE (in) = 0.75  
 OPERATIONAL WIND SPEED (mph) = 60

DIRECTIONALITY DESIGN,  $K_d$  = 0.95  
 DIRECTIONALITY SERVICE,  $K_d$  = 0.85  
 DESIGN GUST RESPONSE FACTOR,  $G_h$  = 1.10  
 SERVICE GUST RESPONSE FACTOR,  $G_h$  = 1.10  
 FORCE COEFFICIENT w/o ICE,  $C_f$  = 0.65  
 FORCE COEFFICIENT w/ ICE,  $C_f$  = 1.20  
 ACROSS POINTS FACTOR = 1.015

STRUCTURE CLASSIFICATION	II	(Importance Factor)
DESIGN		SERVICE (Section 2.8.3)
Wind Load w/o Ice	1.00	1.00
Wind Load w/ Ice	1.00	
Ice Thickness	1.00	
Earthquake	1.00	
EXPOSURE CATEGORY -	C	
	$Z_g$ = 900	
	$a$ = 9.5	
	$K_e$ = 1.0	
	$K_{zmin}$ = 0.85	
TOPOGRAPHIC CATEGORY-	1	
	$K_t$ = N/A	
	$f$ = N/A	

# COMMUNICATIONS STRUCTURE WIND LOADING DEVELOPMENT

## Per the ANSI/TIA 222-G-2005



**ENGINEERED  
ENDEAVORS**  
*The Experienced Point of View*

**CUSTOMER:** VERIZON WIRELESS  
**SITE LOCATION:** VOLUNTOWN, CT  
**SITE NAME:** PALMER POND  
**SITE NUMBER:** TEST

**CURRENT DATE:** 01/15/14  
**STRUCTURE:** 150' / 170' MONOPOLE  
**JOB NUMBER:** 17125TEST  
**STATUS:** RELEASE

### Antenna Loading

DESCRIPTION	QTY	HEIGHT (ft)	Kz	CASE 1		CASE 2		CASE 3	
				EPA (ft <sup>2</sup> )	WEIGHT (lbs)	EPA (ft <sup>2</sup> )	WEIGHT (lbs)	EPA <sub>i</sub> (ft <sup>2</sup> )	WEIGHT <sub>i</sub> (lbs)
1 PANEL ANTENNA	12	169	1.413	5.01	35.00	5.01	35.00	6.31	197.20
2 LOW PROFILE PLATFORM	1	169	1.413	22.00	1650.00	22.00	1650.00	28.00	2955.00
3 PANEL ANTENNA	12	159	1.395	5.01	35.00	5.01	35.00	6.30	196.04
4 LOW PROFILE PLATFORM	1	159	1.395	22.00	1650.00	22.00	1650.00	28.00	2955.00
5 VZW LOAD	1	149	1.376	100.00	35.00	100.00	35.00		
6 SQ LOW PROFILE PLATFO	1	149	1.376	22.00	1650.00	22.00	1650.00	28.00	2955.00
7 ATT LOAD	1	139	1.356	220.00	35.00	220.00	35.00		
8 LOW PROFILE PLATFORM	1	139	1.356	22.00	1650.00	22.00	1650.00	28.00	2955.00
9 PANEL ANTENNA	12	129	1.335	5.01	35.00	5.01	35.00	6.26	192.12
10 LOW PROFILE PLATFORM	1	129	1.335	22.00	1650.00	22.00	1650.00	28.00	2955.00
11 PANEL ANTENNA	12	119	1.313	5.01	35.00	5.01	35.00	6.25	190.64
12 LOW PROFILE PLATFORM	1	119	1.313	22.00	1650.00	22.00	1650.00	28.00	2955.00
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# COMMUNICATIONS STRUCTURE WIND LOADING DEVELOPMENT

## Per the ANSITIA 222-G-2005



**ENGINEERED  
ENDEAVORS**  
*The Experienced Point of View*

**CUSTOMER:** VERIZON WIRELESS  
**SITE LOCATION:** VOLUNTOWN, CT  
**SITE NAME:** PALMER POND  
**SITE NUMBER:** TEST

**CURRENT DATE:** 01/15/14  
**STRUCTURE:** 150' / 170' MONOPOLE  
**JOB NUMBER:** 17125TEST  
**STATUS:** RELEASE

### Loading Case 1 - Serviceability

The loading developed in Case 1 shall be used for the evaluation of serviceability for the twist and sway limits. The design of a monopole must also take into account the factored loading cases.

WIND VELOCITY (mph) = 60

### Load Combination

1.0D + 1.0Wo

Antenna Loads						Monopole Pressures			
	HEIGHT (ft)	APPURTENANCE FORCES		APPURTENANCE FACTORED FORCES		HEIGHT (ft)	EXPOSURE COEFFICIENT Kz	WIND PRESSURE ON POLE (psf)	
		GRAVITY (kips)	WIND (kips)	GRAVITY (kips)	WIND (kips)				
1	169	0.420	0.733	0.420	0.733	1	6.04	0.850	4.83
2	169	1.650	0.268	1.650	0.268	2	18.11	0.883	5.02
3	159	0.420	0.723	0.420	0.723	3	30.18	0.983	5.59
4	159	1.650	0.265	1.650	0.265	4	42.25	1.056	6.00
5	149	0.035	1.186	0.035	1.186	5	54.32	1.113	6.33
6	149	1.650	0.261	1.650	0.261	6	66.39	1.161	6.60
7	139	0.035	2.572	0.035	2.572	7	78.46	1.203	6.84
8	139	1.650	0.257	1.650	0.257	8	90.54	1.239	7.05
9	129	0.420	0.692	0.420	0.692	9	102.61	1.272	7.24
10	129	1.650	0.253	1.650	0.253	10	114.68	1.303	7.41
11	119	0.420	0.680	0.420	0.680	11	126.75	1.330	7.57
12	119	1.650	0.249	1.650	0.249	12	138.82	1.356	7.71
13						13	150.89	1.380	7.85
14						14	162.96	1.403	7.98
15						15	169.00	1.413	8.04
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**COMMUNICATIONS STRUCTURE WIND LOADING DEVELOPMENT**  
Per the ANSI/TIA 222-G-2005



**ENGINEERED ENDEAVORS**  
*The Experienced Point of View*

**CUSTOMER:** VERIZON WIRELESS  
**SITE LOCATION:** VOLUNTOWN, CT  
**SITE NAME:** PALMER POND  
**SITE NUMBER:** TEST

**CURRENT DATE:** 01/15/14  
**STRUCTURE:** 150' / 170' MONOPOLE  
**JOB NUMBER:** 17125TEST  
**STATUS:** RELEASE

**Loading Case 2 - Design**

WIND VELOCITY (mph) = 115.00

**Load Combination**  
1.2D + 1.6Wo

<b>Antenna Loads</b>						<b>Monopole Pressures</b>			
	APPURTENANCE FORCES			APPURTENANCE FACTORED FORCES			HEIGHT (ft)	EXPOSURE COEFFICIENT Kz	WIND PRESSURE ON POLE (psf)
	HEIGHT (ft)	GRAVITY (kips)	WIND (kips)	GRAVITY (kips)	WIND (kips)				
1	169	0.420	3.008	0.504	4.813	1	6.04	0.850	31.76
2	169	1.650	1.100	1.980	1.760	2	18.11	0.883	33.00
3	159	0.420	2.970	0.504	4.751	3	30.18	0.983	36.75
4	159	1.650	1.086	1.980	1.738	4	42.25	1.056	39.44
5	149	0.035	4.870	0.042	7.792	5	54.32	1.113	41.59
6	149	1.650	1.071	1.980	1.714	6	66.39	1.161	43.38
7	139	0.035	10.558	0.042	16.893	7	78.46	1.203	44.93
8	139	1.650	1.056	1.980	1.689	8	90.54	1.239	46.31
9	129	0.420	2.842	0.504	4.547	9	102.61	1.272	47.54
10	129	1.650	1.039	1.980	1.663	10	114.68	1.303	48.67
11	119	0.420	2.794	0.504	4.470	11	126.75	1.330	49.71
12	119	1.650	1.022	1.980	1.635	12	138.82	1.356	50.67
13						13	150.89	1.380	51.56
14						14	162.96	1.403	52.41
15						15	169.00	1.413	52.81
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# Engineered Endeavors Inc.

7810 Jenther Drive  
Mentor, Ohio 44060  
Tel (440) 918-1101 Fax (440) 918-1108

## Communications Structure Nonlinear Analysis and Design Program

1/15/2014 10:55:52 AM  
Revision 2.3 01/16/09  
Engineer MR MOREL

Customer VERIZON WIRELESS  
Job Name 17125  
Structure 150' / 170' MONOPOLE  
Location VOLUNTOWN, CT  
Site PALMER POND  
Site Number TEST  
Data File LASTPOLE.TXT

OD BOT	OD TOP	NUM SIDES	THICK INCH	TAPER IN/FT	LENGTH FT	JOINT INCH	JOINT TYPE	YIELD KSI	WEIGHT LBS	JOINT HEIGHT
30.31	25.00	18	.1875	.295	18.00	.01	FLANGE	65.00	989.	151.00
42.09	30.31	18	.3125	.295	39.91	70.00	SLIP	65.00	4776.	114.00
51.24	39.62	18	.4375	.295	39.37	83.00	SLIP	65.00	8269.	81.00
61.95	48.20	18	.5000	.295	46.58	99.00	SLIP	65.00	13561.	42.00
72.00	58.39	18	.5625	.295	46.13	.00	BASEPL	65.00	17890.	.00
TOTAL TUBE WEIGHT						45486.	POUNDS			
POLE SHAFT LENGTH						169.00	FEET			

AISC constants are used for stress reductions.  
Tube sections have 18 sides  
Internal bend radius = 4. X T  
Tube diameters are measured flat to flat.  
AISC Tube Shape Coefficient of 1.000 is applied.  
Slip joint length factor is 1.500 times the inner tube diameter.  
An additional length of 6.00 inches is added to the joint.

LOAD CASE 1

Loading Case 1 - Serviceability

DEAD LOAD FACTOR 1.00 RADIAL ICE .00 IN.

WIND VELOCITY 60. MPH BOTTOM 4.8 PSF TOP 8. PSF

MAX BASE ROTATION 0.0 DEG

LOAD CASE 1 Loading Case 1 - Serviceability

ELEV Ft	DIAM In.	THICK In.	EFF FY Ksi	RATIO	Pu Kips	Mu Ft-Kips	Vu Kips	Tu Ft-Kips	Displ Inches	Tilt Deg
169.00	25.00	.1875	65.00	.003	2.20	.	1.08	.0	19.62	1.04
164.00	26.48	.1875	65.00	.014	2.20	5.	1.08	.0	18.53	1.03
159.00	27.95	.1875	65.00	.023	2.46	11.	1.17	.0	17.45	1.03
159.00	27.95	.1875	65.00	.026	4.78	11.	2.29	.0	17.45	1.03
155.00	29.13	.1875	64.03	.040	4.78	20.	2.29	.0	16.60	1.02
151.00	30.31	.1875	62.87	.053	5.02	30.	2.37	.0	15.75	1.00
151.00	30.31	.3125	65.00	.031	5.24	30.	2.40	.0	15.75	1.00
149.00	30.90	.3125	65.00	.035	5.24	35.	2.40	.0	15.34	1.00
149.00	30.90	.3125	65.00	.036	7.29	35.	3.99	.0	15.34	1.00
144.00	32.38	.3125	65.00	.049	7.29	55.	3.99	.0	14.30	.98
139.00	33.85	.3125	65.00	.061	7.83	75.	4.10	.0	13.29	.96
139.00	33.85	.3125	65.00	.062	10.08	75.	7.07	.0	13.29	.96
134.00	35.33	.3125	65.00	.081	10.08	111.	7.07	.0	12.30	.93
129.00	36.80	.3125	65.00	.098	10.67	146.	7.19	.0	11.34	.90
129.00	36.80	.3125	65.00	.099	13.35	146.	8.29	.0	11.34	.90
124.00	38.28	.3125	65.00	.116	13.35	188.	8.29	.0	10.41	.86
119.00	39.76	.3125	65.00	.131	13.99	230.	8.40	.0	9.53	.82
119.00	39.76	.3125	65.00	.132	16.72	230.	9.49	.0	9.53	.82
114.00	41.23	.3125	65.00	.147	16.72	277.	9.49	.0	8.69	.78
114.00	40.48	.4375	65.00	.111	18.57	277.	9.62	.0	8.69	.78
109.50	41.81	.4375	65.00	.119	18.57	321.	9.62	.0	7.97	.75
105.00	43.14	.4375	65.00	.127	19.45	364.	9.74	.0	7.28	.71
99.00	44.91	.4375	65.00	.135	20.51	424.	9.88	.0	6.42	.67
93.00	46.68	.4375	65.00	.143	21.77	484.	10.04	.0	5.61	.62
87.00	48.45	.4375	65.00	.149	23.08	545.	10.19	.0	4.86	.57
81.00	50.22	.4375	65.00	.154	24.43	607.	10.36	.0	4.17	.52
81.00	49.22	.5000	65.00	.142	27.50	607.	10.53	.0	4.17	.52
76.50	50.55	.5000	65.00	.144	27.50	655.	10.53	.0	3.69	.49
72.00	51.88	.5000	65.00	.147	28.71	703.	10.66	.0	3.25	.46
66.00	53.65	.5000	65.00	.150	30.17	767.	10.80	.0	2.70	.41
60.00	55.42	.5000	65.00	.152	31.89	833.	10.97	.0	2.21	.37
54.00	57.19	.5000	65.00	.154	33.66	900.	11.14	.0	1.77	.33
48.00	58.96	.5000	65.00	.156	35.49	968.	11.31	.0	1.38	.29
42.00	60.73	.5000	65.00	.158	37.38	1037.	11.48	.0	1.05	.25
42.00	59.61	.5625	65.00	.147	42.38	1037.	11.66	.0	1.05	.25
36.00	61.38	.5625	65.00	.147	42.38	1107.	11.66	.0	.76	.21
30.00	63.15	.5625	65.00	.148	44.59	1178.	11.82	.0	.53	.17
24.00	64.92	.5625	65.00	.149	46.86	1250.	11.98	.0	.33	.13
18.00	66.69	.5625	65.00	.149	49.20	1322.	12.14	.0	.19	.10
12.00	68.46	.5625	65.00	.150	51.60	1396.	12.29	.0	.08	.07
6.00	70.23	.5625	65.00	.150	54.07	1471.	12.43	.0	.02	.03

LOAD CASE 1 Loading Case 1 - Serviceability

ELEV Ft	DIAM In.	THICK In.	EFF FY Ksi	RATIO	Pu Kips	Mu Ft-Kips	Vu Kips	Tu Ft-Kips	Displ Inches	Tilt Deg
.00	72.00	.5625	65.00	.150	57.88	1546.	12.66	.0	.00	.00
Max Deflection Percentage 1.0%				Max Tilt 1.04 Degrees						

REACTION COMPONENTS (KIPS AND FT-KIPS)

TRANSVERSE SHEAR	VERTICAL FORCE	WIND SHEAR	MOMENT ABOUT TRANSVERSE	MOMENT ABOUT VERTICAL	MOMENT ABOUT WIND AXIS
.000	-57.875	12.647	1546.195	.000	.000

LOAD CASE 2

Loading Case 2 - Design

DEAD LOAD FACTOR 1.00 RADIAL ICE .00 IN.

WIND VELOCITY 115. MPH BOTTOM 31.8 PSF TOP 52.8 PSF

MAX BASE ROTATION 0.0 DEG

LOAD CASE 2 Loading Case 2 - Design

ELEV Ft	DIAM In.	THICK In.	EFF FY Ksi	RATIO	Pu Kips	Mu Ft-Kips	Vu Kips	Tu Ft-Kips	Displ Inches	Tilt Deg
169.00	25.00	.1875	65.00		1.79		7.12	.0	127.15	6.76
164.00	26.48	.1875	65.00		1.79	35.	7.12	.0	120.17	6.74
159.00	27.95	.1875	65.00		2.00	74.	7.72	.0	113.23	6.69
159.00	27.95	.1875	65.00		3.90	74.	15.03	.0	113.23	6.69
155.00	29.13	.1875	64.03		3.90	133.	15.03	.0	107.72	6.62
155.00	29.13	.1875	64.03		4.10	133.	15.56	.0	107.72	6.62
151.00	30.31	.1875	62.87		4.10	195.	15.56	.0	102.28	6.53
151.00	30.31	.3125	65.00		4.20	195.	16.45	.0	102.28	6.53
149.00	30.90	.3125	65.00		4.20	227.	16.45	.0	99.59	6.49
149.00	30.90	.3125	65.00		5.57	227.	26.14	.0	99.59	6.49
144.00	32.38	.3125	65.00		5.57	357.	26.14	.0	92.92	6.39
144.00	32.38	.3125	65.00		6.08	357.	26.90	.0	92.92	6.39
139.00	33.85	.3125	65.00		6.08	490.	26.90	.0	86.38	6.25
139.00	33.85	.3125	65.00		6.66	490.	46.33	.0	86.38	6.25
134.00	35.33	.3125	65.00		6.66	721.	46.33	.0	79.99	6.08
134.00	35.33	.3125	65.00		7.32	721.	47.09	.0	79.99	6.08
129.00	36.80	.3125	65.00		7.32	955.	47.09	.0	73.79	5.88
129.00	36.80	.3125	65.00		9.88	955.	54.34	.0	73.79	5.88
124.00	38.28	.3125	65.00		9.88	1225.	54.34	.0	67.82	5.64
124.00	38.28	.3125	65.00		10.67	1225.	55.19	.0	67.82	5.64
119.00	39.76	.3125	65.00		10.67	1500.	55.19	.0	62.10	5.37
119.00	39.76	.3125	65.00		13.45	1500.	62.24	.0	62.10	5.37
114.00	41.23	.3125	65.00		13.45	1810.	62.24	.0	56.66	5.09
114.00	40.48	.4375	65.00		15.48	1810.	63.25	.0	56.66	5.09
109.50	41.81	.4375	65.00		15.48	2093.	63.25	.0	52.00	4.88
109.50	41.81	.4375	65.00		16.54	2093.	63.92	.0	52.00	4.88
105.00	43.14	.4375	65.00		16.54	2380.	63.92	.0	47.54	4.66
99.00	44.91	.4375	65.00		17.80	2768.	64.86	.0	41.90	4.36
93.00	46.68	.4375	65.00		19.32	3162.	65.92	.0	36.65	4.05
93.00	46.68	.4375	65.00		20.91	3162.	66.97	.0	36.65	4.05
87.00	48.45	.4375	65.00		20.91	3563.	66.97	.0	31.77	3.74
87.00	48.45	.4375	65.00		22.55	3563.	68.09	.0	31.77	3.74
81.00	50.22	.4375	65.00		22.55	3971.	68.09	.0	27.28	3.43
81.00	49.22	.5000	65.00		25.87	3971.	69.25	.0	27.28	3.43
76.50	50.55	.5000	65.00		25.87	4282.	69.25	.0	24.17	3.21
76.50	50.55	.5000	65.00		27.30	4281.	70.08	.0	24.17	3.21
72.00	51.88	.5000	65.00		27.30	4596.	70.08	.0	21.25	2.99
72.00	51.88	.5000	65.00		29.01	4596.	70.95	.0	21.25	2.99
66.00	53.65	.5000	65.00		29.01	5021.	70.95	.0	17.68	2.71
60.00	55.42	.5000	65.00		31.03	5453.	72.11	.0	14.46	2.42
60.00	55.42	.5000	65.00		33.10	5453.	73.22	.0	14.46	2.42

LOAD CASE 2 Loading Case 2 - Design

ELEV Ft	DIAM In.	THICK In.	EFF FY Ksi	RATIO	Pu Kips	Mu Ft-Kips	Vu Kips	Tu Ft-Kips	Displ Inches	Tilt Deg
54.00	57.19	.5000	65.00		33.10	5892.	73.22	.0	11.59	2.15
48.00	58.96	.5000	65.00		35.24	6338.	74.30	.0	9.07	1.87
48.00	58.96	.5000	65.00		39.73	6338.	75.48	.0	9.07	1.87
42.00	60.73	.5000	65.00		39.73	6791.	75.48	.0	6.88	1.61
42.00	59.61	.5625	65.00		44.72	6791.	76.65	.0	6.88	1.61
36.00	61.38	.5625	65.00		44.72	7250.	76.65	.0	5.01	1.36
30.00	63.15	.5625	65.00		46.93	7716.	77.71	.0	3.45	1.12
24.00	64.92	.5625	65.00		49.20	8189.	78.77	.0	2.19	.88
18.00	66.69	.5625	65.00		51.54	8668.	79.79	.0	1.22	.66
12.00	68.46	.5625	65.00		53.93	9152.	80.77	.0	.54	.43
6.00	70.23	.5625	65.00		56.40	9642.	81.70	.0	.13	.21
.00	72.00	.5625	65.00		60.21	10138.	83.20	.0	.00	.00

Max Deflection Percentage 6.3%

Max Tilt 6.76 Degrees

REACTION COMPONENTS (KIPS AND FT-KIPS)

TRANSVERSE SHEAR	VERTICAL FORCE	WIND SHEAR	MOMENT ABOUT TRANSVERSE	MOMENT ABOUT VERTICAL	MOMENT ABOUT WIND AXIS
.000	-60.206	83.085	10138.141	.000	.000

# TIA-222-G Design Equations for Poly-Sided Tapered Tubes

ADDENDUM II Updates

Torsion is assumed negligible

EI Job Number: 17125

Number of Sides = 18  
Number of Sections = 5

## Resistance Factors for LRFD Steel Design

Axial Compression = 0.85  
Flexure = 0.90  
Shear = 0.90  
Torsion = 0.90

Yield Strength = 65  
Bend Radius Factor = 6  
Compact Section = 0.6  
Increase in Strength = 1.333333  
Modulus of Elasticity = 29000

## POLE PROPERTIES FROM ANALYSIS

	Section 1 OK	Section 2 OK	Section 3 OK	Section 4 OK	Section 5 OK	Section 6 OK
Diameter, AF	30.31	41.23	50.22	60.73	72	
Diameter, AP	30.777581	41.866039	50.994724	61.66686	73.110716	0
Thickness	0.18750	0.3125	0.4375	0.5	0.5625	
Axial (kips)	4.2	15.5	22.6	39.73	60.2	
Moment (ft-kips)	195	1810	3970	6791	10138	
Shear (kips)	16.5	63.25	68.1	75.5	83.2	

## Interaction Equation for Tapered Poly

	0.311	0.916	0.967	0.989	0.934	
ADDENDUM II	<b>0.281</b>	<b>0.775</b>	<b>0.782</b>	<b>0.814</b>	<b>0.782</b>	
Strength, F <sub>y</sub>	63.70	65.00	65.00	65.00	65.00	
Strength, F <sub>y</sub> Addendum II	70.78	76.94	80.50	79.11	77.76	
ASD Strength, F <sub>a</sub>	50.96	52.00	52.00	52.00	52.00	
D/t	161.65	131.94	114.79	121.46	128.00	
Flat width, w	4.8816125	6.4985309	7.7751382	9.474049	11.306968	
w/t	26.035266	20.795299	17.771744	18.9481	20.101276	
(F <sub>y</sub> /E) <sup>.5</sup> *(w/t)	1.2326	0.9845	0.8414	0.8971	0.9517	



**SECTION PROPERTIES**

Area	in2	17.93	40.59	69.13	95.59	127.54	
Moment of Inertia	in4	2054.01	8580.35	21633.95	43786.10	82191.89	
Section Modulus (Across Points)	in3	133.47	409.90	848.48	1420.09	2248.42	

**MAXIMUM RESISTANCE OF EACH SECTION**

**NOMINAL AXIAL COMPRESSIVE STRENGTH (kips)**

1141.9	2638.0	4493.4	6213.0	8290.3	0.0
970.7	2242.3	3819.4	5281.1	7046.7	0.0

**NOMINAL FLEXURAL STRENGTH (ft-kips)**

Mn	708.5	2220.3	4595.9	7692.1	12179.0	0.0
$\phi$ Mn	637.7	1998.2	4136.3	6922.9	10961.1	0.0
ADDENDUM II Mn	787.3	2628.2	5691.7	9362.4	14569.4	
$\phi$ Mn	708.5	2365.4	5122.5	8426.2	13112.5	0.0

**NOMINAL SHEAR STRENGTH (kips)**

566.7	1309.2	2230.0	3083.4	4114.3	0.0
510.0	1178.3	2007.0	2775.0	3702.9	0.0

BASE PLATE AT ELEVATION	.00	FEET
TUBE DIAMETER	72.00	INCHES
DESIGN MOMENT	10138.14	KIP FT
DESIGN MOMENT IS .00 DEGREES FROM THE WIND DIRECTION		
APPLIED AXIAL FORCE	60.2	KIPS
APPLIED SHEAR	83.20	KIPS

## BOLT DATA

BOLT TYPE	A615 - G75	
BOLTS ARE EVENLY SPACED		
DIAMETER	2.250	INCHES
EFFECTIVE AREA	3.250	SQ IN
DESIGN STRESS	100.000	KSI
TOTAL LENGTH	10.0	FEET
BOTTOM TEMPLATE MUST BE BOLTED ON		
MINIMUM EMBEDMENT	6.0	FEET
NUMBER OF BOLTS	32	
BOLT CIRCLE DIAMETER	80.00	INCHES
APPLIED AXIAL STRESS	59.068	KSI
MAX BOLT FORCE	191.972	KIPS
MAX BOLT SHEAR	1.297	KIPS
BOLT PHI	.800	
TENSION RESISTANCE	45.450	KIPS
SHEAR RESISTANCE	23.550	KIPS
RATIO	.553	

## PLATE DATA

DIAMETER OF PLATE	86.00	INCHES
BEND WIDTH REDUCTION	.850	
MATERIAL	A572MOD50	
PLATE YIELD	50.0	KSI
PROVIDED THICKNESS	3.500	INCHES
REQUIRED THICKNESS	2.918	INCHES
BOLT HOLE DIAMETER	2.625	INCHES
CENTER HOLE SIZE	62.00	INCHES
NET WEIGHT	2591.7	POUNDS
RAW STOCK WEIGHT	7497.1	POUNDS
SURFACE AREA	36.34	SQ FT
MAX APPLIED STRESS	31.29	KSI
APPLIED MOMENT	2.21	KIP-FT
RESIST MOMENT	8.29	KIP-FT
RATIO	.27	
PLATE PHI	.90	

CONCRETE STRENGTH	3000.	PSI
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Base Plate - use 86.00 inch ROUND x 3.500 inch A572MOD50  
with (32) 2.250 diameter x 6.0 foot caged A615 - GR75 bolts  
on a 80. inch bolt circle.

FLANGE AT ELEVATION	151.00	FEET
TUBE DIAMETER	30.31	INCHES
DESIGN MOMENT	195.23	KIP FT
DESIGN MOMENT IS .00 DEGREES FROM THE WIND DIRECTION		
APPLIED AXIAL FORCE	4.1	KIPS
APPLIED SHEAR	15.56	KIPS

## BOLT DATA

BOLT TYPE	A325 - G92	
BOLTS ARE EVENLY SPACED		
DIAMETER	1.000	INCHES
EFFECTIVE AREA	.606	SQ IN
DESIGN STRESS	100.000	KSI
TOTAL LENGTH	4.5	INCHES
NUMBER OF BOLTS	12	
BOLT CIRCLE DIAMETER	35.00	INCHES
APPLIED AXIAL STRESS	37.382	KSI
MAX BOLT FORCE	22.654	KIPS
MAX BOLT SHEAR	1.297	KIPS
BOLT PHI	.750	
TENSION RESISTANCE	45.450	KIPS
SHEAR RESISTANCE	23.550	KIPS
RATIO	.553	

## PLATE DATA

DIAMETER OF PLATE	38.00	INCHES
BEND WIDTH REDUCTION	.850	
MATERIAL	A572MOD50	
PLATE YIELD	50.0	KSI
PROVIDED THICKNESS	1.250	INCHES
REQUIRED THICKNESS	.646	INCHES
BOLT HOLE DIAMETER	1.250	INCHES
CENTER HOLE SIZE	26.00	INCHES
NET WEIGHT	208.2	POUNDS
RAW STOCK WEIGHT	538.1	POUNDS
SURFACE AREA	8.17	SQ FT
MAX APPLIED STRESS	12.01	KSI
APPLIED MOMENT	2.21	KIP-FT
RESIST MOMENT	8.29	KIP-FT
RATIO	.27	
PLATE PHI	.90	

Flange - use 38.00 inch ROUND x 1.250 inch A572MOD50  
with (12) 1.000 diameter x 4.5 inch A325 - Gr92 bolts  
on a 35. inch bolt circle.



**ENGINEERED  
ENDEAVORS**

*The Experienced Point of View*

**DESIGN CALCULATIONS  
FOR A  
SPREAD FOOTER FOUNDATION**

Verizon Wireless  
150' / 170' MONOPOLE  
Palmer Pond Site  
Voluntown, CT

**EEL Project Number 17125**

**January 22, 2014**

10975 Kinsman Road & Newbury, Ohio 44065  
Phone: (440) 564-5484 & Phone: (888) 270-3855  
Fax: (440) 564-5489 & [www.engend.com](http://www.engend.com)

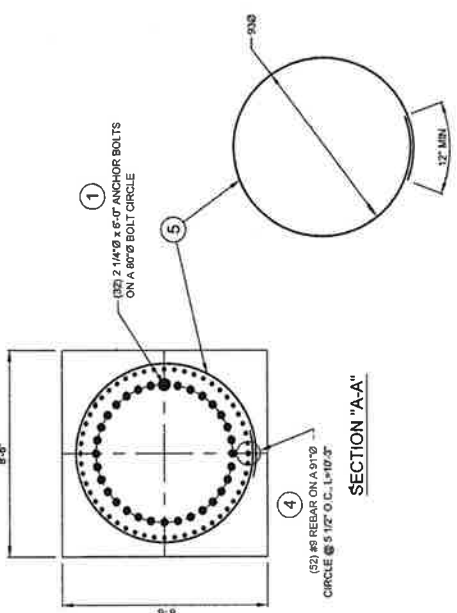
FOUNDATION LOADING (PER TIA-222G MDS-1)	
MOMENT	10138.2 kips-ft
SHEAR	83.1 kips
AXIAL	80.2 kips

MATERIAL LIST		
ITEM	QTY.	DESCRIPTION
1	32	2 1/4"Ø x 6'-0" (A615-GR 75) ANCHOR BOLTS
2	64	#6 REBAR x 36'-0" (ASTM A615-GR 60)
3	100	#8 REBAR x 31'-0" (ASTM A615-GR 60)
4	52	#9 REBAR x 10'-0" (ASTM A615-GR 60)
5	8	#4 REBAR x 25'-0" (ASTM A615-GR 60)
6	10	#4 REBAR x 8'-0" (ASTM A615-GR 60)

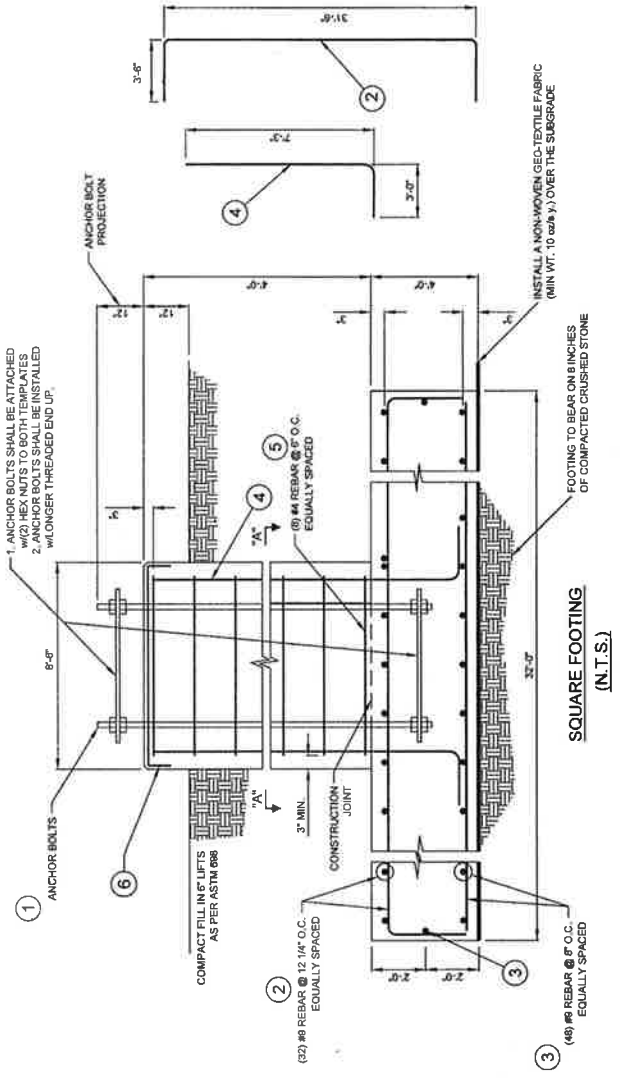
VOL. CONCRETE @ 4000 PSI (TYPE II CEMENT)	162.4 yd <sup>3</sup>
STEEL (ASTM A615-GR 60)	23800.0 lbs

**GENERAL NOTES:**

- FOUNDATION DESIGN IS BASED ON THE FOLLOWING: 1. JOB 1713, PALM SPRING 1713 SOIL REPORT BY DESIGN EARTH TECHNOLOGY, INC. REPORT NO. 2013.11.11.1920213
- FOUNDATION EMBEDMENT IS SHOWN FROM THE GROUND LEVEL AT THE TIME OF SOIL INVESTIGATION AS DEPICTED IN THE SOIL REPORT. SHOULD THE ACTUAL SOIL CONDITIONS DIFFER FROM THOSE IN THE REPORT, THE GEOTECHNICAL ENGINEER AND FOUNDATION DESIGNER SHOULD BE NOTIFIED IN ORDER TO REEVALUATE THE FOUNDATION DESIGN.
- SOIL REPORT SHOULD BE CONSULTED PRIOR TO CONSTRUCTION. STEEL CASTING OR SLURRY METHOD MAY BE REQUIRED TO PREVENT SETTLEMENT OF THE FOUNDATION. THE CASTING SHALL BE FILLED WITH PRECASTED GROUT.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES.
- SPECIAL INSPECTION IS REQUIRED IN ACCORDANCE WITH 2009 IRC AND CT BUILD CODE CHAPTER 17, SECTION 1704.
- 5.1. FOUNDATION EXCAVATION SHALL BE INSPECTED PRIOR TO INSTALLATION OF REINFORCEMENT.
- 5.2. VERIFY ACTUAL SOIL CONDITIONS AGAINST THE GEOTECHNICAL REPORT.
- 5.3. CONCRETE
- 5.3.1. VERIFY STRENGTH, SLUMP, AIR, TEMPERATURE OF CONCRETE, AND DESIGN MIX.
- 5.3.2. REINFORCING STEEL SHALL CONFORM TO ASTM A615-GR 60.
- 5.3.3. REINFORCING STEEL SHALL CONFORM TO ASTM A615-GR 60.
- 5.3.4. MINIMUM SPICE LENGTH FOR CONSTRUCTION BARS: #6 BARS AND SMALLER - 4x BARS AND LARGER - 6x BARS.
- 5.3.5. HORIZONTAL STRIPS SHALL BE STAGGERED ALONG THE REBAR CAGE WITH NO MORE THAN 50% OF SPICES IN ONE PLACE.
- 5.3.6. CONCRETE
- 5.3.6.1. MAX. DESIGN AND CONSTRUCTION PROCEDURES SHALL BE IN COMPLIANCE WITH ACI 318-08, ACI 308.3R-08 AND ALL APPLICABLE STATE AND LOCAL CODES.
- 5.3.6.2. ALL REBAR SHALL BE PLACED IN ITS PROPER POSITION TO AVOID SEGREGATION DUE TO TIE PLACEMENT. TIES SHALL BE DEPOSITED AS NEARLY AS PRACTICAL IN ITS PROPER POSITION TO AVOID SEGREGATION DUE TO TIE PLACEMENT.
- 5.3.6.3. CONCRETE SHALL BE THOROUGHLY CONSOLIDATED BY ALL SUITABLE MEANS DURING PLACEMENT AND SHALL BE THOROUGHLY WORKED AROUND REINFORCEMENT AND EMBEDDED FITTINGS AND INTO CORNERS OF FORMS.
- 5.3.6.4. ANCHOR BOLT INSTALLATION, ANCHOR BOLT ORIENTATION SHALL BE VERIFIED WITH THE SITE PLANS AND MONOPOLE DRAWING FOR PROPER ACCESS, PORT ORIENTATION AND ANCHOR BOLT ALIGNMENT PRIOR TO CONCRETE PLACEMENT.



INSTALL 2" BELOW TOP OF CONCRETE (VERT. BARS AND ANCHOR BOLTS NOT SHOWN)



VERIZON WIRELESS  
170'-0" MONOPOLE  
PALMER POND  
VOLUNTOWN, CT



REV	DESCRIPTION	DATE	BY	CHK
0	COMPLETED DRAWING	10/20/24	B.F.	

SCALE: N.T.S.	PROJECT NO: 17125
SHEET 1 of 1	DRAWING NO: 17125S-170.0

# FOUNDATION DESIGN CALCULATIONS FOR A SPREAD FOOTER FOUNDATION



CUSTOMER: Verizon Wireless                      DATE: 1/22/2014  
 LOCATION: Voluntown, CT                      STRUCTURE: 150' / 170' MONOPOLE  
 SITE NAME: Palmer Pond                      JOB NUMBER: 17125  
 SITE NUMBER:                                      STATUS: Release

## FOUNDATION DESIGN LOADS

	DESIGN CODE	TIA-222-G	
	OVERTURNING MOMENT, kip-ft	SHEAR, kips	AXIAL, kips
TIA/EIA 222F			
TIA-222-G	10138.20	83.1	60.2
FACTORED $w/\phi=0.75$	13517.6	110.8	80.3

## ANCHOR BOLT DATA

QUANTITY	LENGTH	BOLT CIRCLE Ø	PROJECTION
32	6.0 ft	80.0 in	12.0 in

SOIL UNIT WEIGHT, pcf: 125.00                      CONCRETE UNIT WEIGHT, pcf: 150.00

## MINIMUM FOUNDATION PARAMETERS

PEDESTAL MINIMUM WIDTH 102.0 in                      PEDESTAL PROJECTION 12.0 in  
 FOUNDATION MINIMUM HEIGHT 5.50 ft

## ACTUAL FOUNDATION SIZE

	HEIGHT, ft	WIDTH, ft
SLAB	4.00	32.00
PEDESTAL	4.00	8.50

## STABILITY

Foundation Weight, kips                      657.75  
 Concrete, cub.yd.                              162.41  
 Soil Weight, kips                              356.91  
 Total weight foundation and soil (unfactored), kips                      1014.66

Total Vertical Load, kips                      967.37  
 Total Overturning Moment, kip-ft                      10803.00  
 Total Resisting Moment, kip-ft                      15477.93

OVERTURNING SAFETY FACTOR **1.43**

Kern of Eccentricity, ft                      5.33  
 Actual Eccentricity, ft                      11.17                      Uplift Exists!  
 Allowable Gross Soil Pressure, ksf (refer soil report)                      10

Max soil pressure, ksf per TIA-222-G                      5.6  
 per TIA/EIA-222-F                              n/a                      SF = 2

## CONCRETE REINFORCEMENT

	BAR SIZE	BAR WEIGHT (lbs/ft)	QUANTITY	LENGTH (ft)	WEIGHT (lbs)
TOP PAD	# 9	3.40	64	38.50	8377.60
BOTTOM PAD	# 9	3.40	100	31.50	10710.00
VERTICAL BARS	# 9	3.40	52	9.25	1635.40
HORIZONTAL TIES	# 4	1.50	8	28.09	313.03

TOTAL STEEL WEIGHT (lbs) 21036.03

## FOOTING STRENGTH DESIGN

Concrete, psi 3000  
Steel, ksi 60

Concrete cover, in 3  
Distance, d (slab), in 44

### NOTES

### TWO-WAY SHEAR IN THE SLAB

Vertical Load, kips	60.20	
Bearing Soil Pressure, ksf	0.06	
Shear in the slab, kips	51.73	
Design shear $V_n$ , kips	2392.63	$\phi = 0.85$ OK

### ONE-WAY SHEAR IN THE SLAB

Max soil pressure, ksf	4.17	
Actual Eccentricity, ft	11.17	
Kern of Eccentricity, ft	5.33	
Pressure Distribution Zone, ft	14.50	
Effective Pressure Zone, ft	8.08	
Max Shear Force, kips	1078.5	
Design Shear, kips	1573.2	$\phi = 0.85$ OK

### SLAB DESIGN IN FLEXURE

Max Soil Pressure, ksf	4.17	
Actual Eccentricity, ft	11.17	
Kern of Eccentricity, ft	5.33	
Pressure Distribution Zone, ft	14.50	
Effective Pressure Zone, ft	11.75	
Soil Pressure at Effective Zone Edge	0.79	
Shear Force at Critical Section, kip	932.4	
Bending Moment, k-ft	6721.8	
Coefficient of Resistance, $R_n$	120.6	$\phi = 0.90$
Min. Required Reinf. Ratio by Analysis	0.00206	
Min. Reinf. Ratio per ACI 318, 200/Fy	0.00330	
Min. Reinf. Ratio per ACI 318	0.00274	ACI-318 Sect.10.5.3
Design Reinforcement Ratio	0.00274	
Min. Steel Area, sq.in.	46.27	
Bar size	9	
Bar section area, in <sup>2</sup>	1.00	

### BOTTOM BARS

Min. No. of Bars/One direction	47.00	
Actual No. of Bars/One direction	48	OK
Actual Steel Area, sq.in.	48.00	
Steel Ratio Actual	0.00284	OK
Revised Coefficient of Resistance, $R_n$	170.44	
Design Moment, kip-ft	9503.20	
Total bottom bars	100	
Horizontal Spacing (shor), in	8.04	OK

### TOP BARS

Min. Steel Area, sq.in (0.18%)	30.41	
Minimum Number of Bars REQUIRED	31	One Direction
Actual Number of Bars	32	OK
Top Steel Area, sq.in	32.00	
Total Top Bars	64	
Horizontal Spacing, in	12.19	OK

## PEDESTAL DESIGN

Pedestal Width, in	102
Concrete Strength, ksi	3
Reinforcement Strength, ksi	60
Actual Rebars QTY	52
Nominal Bars QTY	12
Minimum reinforcement ratio	0.0033
Actual reinforcement ratio	0.0050
Concrete cover, in	3
Rebar layout radius, in	47.50

Ultimate Moment 10470.6 ft-kips

Rebar	9
Area, sq.in	1
Area, sq.in	4.33
Rebar space, in	5.74
$\epsilon_u$	0.003
$\epsilon_y$	0.00207

### BENDING ABOUT THE MAJOR AXIS

Rebar Number	Angle degrees	Coordinate in	Edge Dist. in
1	0	47.50	3.50
2	30	41.14	9.86
3	60	23.75	27.25
4	90	0.00	51.00
5	120	-23.75	74.75
6	150	-41.14	92.14

Rebar Number	Angle degrees	Coordinate in	Edge Dist. in
7	180	-47.50	98.50
8	210	-41.14	92.14
9	240	-23.75	74.75
10	270	0.00	51.00
11	300	23.75	27.25
12	330	41.14	9.86

Location of Neutral Axis  
Compression Zone

c = 9.37 in  
a = 7.96 in

#### Compression Zone

Rebar Number	$\epsilon$ in/in	Force kips
1	0.0019	225.14

#### Tension Zone

Rebar Number	$\epsilon$ in/in	Force kips
2	0.0002	19.84
3	0.0057	260.00
4	0.0133	260.00
5	0.0209	260.00
6	0.0265	260.00
7	0.0285	260.00
8	0.0265	260.00
9	0.0209	260.00
10	0.0133	260.00
11	0.0057	260.00
12	0.0002	19.84

Concrete, kips 2071.69

Total Compression, kips 2296.82

Total Tension, kips 2379.69

#### Moment Due to Compression

Rebar Number	Force kips	Arm in	Moment k-ft
1	225.14	47.50	891.16
2	0.00	41.14	0.00
12	0.00	41.14	0.00

#### Moment Due to Tension

Rebar Number	Force kips	Arm in	Moment k-ft
2	19.84	41.14	-68.03
3	260.00	23.75	-514.58
4	260.00	0.00	0.00
5	260.00	-23.75	514.58
6	260.00	-41.14	891.28
7	260.00	-47.50	1029.17
8	260.00	-41.14	891.28
9	260.00	-23.75	514.58
10	260.00	0.00	0.00
11	260.00	23.75	-514.58
12	19.84	41.14	-68.03

Concrete	2071.69	47.02	8117.13
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Total In Compression 9008.29

Total in Tension 2675.68

Design Moment about the Major Axis, kip-ft 10515.57 OK



**BENDING ABOUT THE DIAGONAL**

Rebar Number	Angle, deg phi	Coord., in c1	Edge Dist., in di
1	0	47.50	24.62
2	30	41.14	30.99
3	60	23.75	48.37
4	90	0.00	72.12
5	120	-23.75	95.87
6	150	-41.14	113.26

Rebar Number	Angle, deg phi	Coord., in c1	Edge Dist., in di
7	180	-47.50	119.62
8	210	-41.14	113.26
9	240	-23.75	95.87
10	270	0.00	72.12
11	300	23.75	48.37
12	330	41.14	30.99

Location of Neutral Axis  
Compression Zone

c = 32.20 in  
a = 27.37 in

**Compression Zone**

Rebar Number	$\epsilon$ in/in	Force kips
1	0.00071	260.00

Concrete, kips 1910.34

Total Compression, kips 2170.34

**Tension Zone**

Rebar Number	$\epsilon$ in/in	Force kips
2	-0.0001	-14.19
3	0.0015	189.36
4	0.0037	260.00
5	0.0059	260.00
6	0.0076	260.00
7	0.0081	260.00
8	0.0076	260.00
9	0.0059	260.00
10	0.0037	260.00
11	0.0015	189.36
12	-0.0001	-14.19

Total tension, kips 2170.34

**Moment Due to Compression**

Rebar Number	Force kips	Arm in	Moment k-ft
1	260.00	47.50	1029.17
2	0.00	41.14	0.00
12	0.00	41.14	0.00

Concrete	1910.34	63.00	10029.51
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Total in Compression, kips 11058.68

**Moment Due to Tension**

Rebar Number	Force kips	Arm in	Moment k-ft
3	189.36	23.75	-374.78
4	260.00	23.75	-514.58
5	260.00	0.00	0.00
6	260.00	-23.75	514.58
7	260.00	-47.50	1029.17
8	260.00	-41.14	891.28
9	260.00	-23.75	514.58
10	260.00	0.00	0.00
11	189.36	23.75	-374.78

Total in Tension, kips 1685.47

Design Moment, kip-ft 11469.74

Pedestal Design Moment, kip-ft            OK



# DESIGN EARTH TECHNOLOGY

P.O. Box 187, Guilford, CT 06437  
Phone/Fax: (203) 458-9806 ■ Email: docdirt@aol.com

## GEOTECHNICAL AND GEOPHYSICAL TESTING REPORT

**PROPOSED VERIZON WIRELESS COMMUNICATIONS TOWER  
53 GALLUP ROAD (PALMER POND)  
VOLUNTOWN, CONNECTICUT**

**PREPARED FOR:**

**CEN TEK ENGINEERING, Inc.**

19 Mark L PE

**NOVEMBER 2013**



# DESIGN EARTH TECHNOLOGY

P.O. Box 187, Guilford, CT 06437  
Phone/Fax: (203) 458-9806 ■ Email: docdirt@aol.com

November 29, 2013

Mr. Carlo F. Centore, P.E.  
Centek Engineering, Inc.  
63-2 North Branford Road  
Branford, CT 06405

Re: Proposed Verizon Communications Tower  
53 Gallup Road (Palmer Pond)  
Voluntown, Connecticut  
DET Job No. 2013.13

Dear Mr. Centore:

**Lawrence J. Marcik, Jr., P.E. dba Design Earth Technology (DET)** has completed a geotechnical engineering investigation for the above referenced project. Included in this report is a summary of subsurface conditions, delineation of engineering characteristics of the foundation materials, and the implications of the conditions and characteristics with respect to the design and construction of the proposed communication tower foundation. This report was prepared under our agreement dated November 25, 2013 and your subsequent authorization.

The purpose of this study is to develop geotechnical engineering recommendations for the proposed foundation design. The subsurface investigation and sampling program was conducted by **DET** for the sole purpose of obtaining subsurface information as part of a geotechnical investigation. No services were performed to evaluate subsurface environmental conditions, however, the client requested that as a courtesy, **DET** log any noticeable non-typical visual and/or odorous conditions from the soil and rock core samples.

## SITE DESCRIPTION

The project site is located off of Gallup Road in Voluntown, Connecticut. The project location is shown on the attached "Location Plan, Figure No. 1". The general site is located within a farming community. This parcel is located near a large active farm that has many open fields used for haying, cow corn, and cow grazing. The specific cell tower site area is located in a wooded area just off of Gallup Road. Surface relief at the proposed project ranges from elevation 464 at Gallup Road to elevation 450 at the north corner of the proposed lease area. At the proposed cell tower center, the existing ground elevation is about 459.

## **PROJECT DESCRIPTION**

The proposed project consists of the construction of an +/-150' monopole communications tower and the installation of new Verizon Wireless equipment.

## **SUBSURFACE EXPLORATION**

Associated Borings Company, Inc. performed the subsurface exploration work on November 25, 2013. Locations of the subsurface explorations are shown on Figure No. 2 and logs have been included in Appendix A. The subsurface exploration program consisted of a total of one (1) boring and four (4) bedrock verification probes (power drill soundings). All subsurface penetrations were conducted in the area of the proposed Verizon Wireless facilities. The tower and compound locations were staked out by the project surveyor.

The boring was advanced to a depth of 15 feet (15' soil and 10' rock core) below existing grade while the probes were advanced 10 feet below existing grades.

The auger boring was drilled using a 3.25" inside diameter (I.D.) standard hollow-stem auger techniques. Standard Penetration Tests (SPT) were performed in the test boring with spilt spoon samples recovered. Spilt spoon samples were taken from depths of 2' to 7' and then from 8' to 9' and then from 10' to 11.5'. The SPT consists of driving a 1 3/8" I.D. split spoon sampler with a 140-pound hammer falling 30 inches. The blows for 6 inches of penetration are recorded for a total of 24 inches. The sum of the blows required to drive the sampler from 6 inches to 18 inches penetration is referred to as the Standard Penetration Resistance (N).

The rock cores were drilled using a standard NQ-2 size core bit resulting in the diameter core sample being  $\pm 2"$ . The coring was conducted using a standard bedrock core boring technique. Rock verification probes (power drill soundings) were drilled using solid stem auger technique.

Logs of the probes and soil boring with rock cores are included in Appendix A. See attached photograph for a view of the subsurface drilling equipment used in drill the boring and probes.

## **RESISTIVITY TESTING**

In place soil resistivity testing was conducted by DET personnel on November 29, 2013 within the vicinity of the proposed tower facilities. Two (2) test sections were established in an approximate northeast-southwest direction and two (2) test sections were established in an approximate northwest-southeast direction. Approximate test section locations are illustrated in Figure 2. Each section was tested up to an electrode "A" spacing of 40 feet. Test results yielded resistivity values within acceptable ranges for the given soil/rock types and moisture conditions typically found in the New England geology. It should be noted, however, that resistivity measurements are strongly influenced by local variations in surface conductivity caused by soil/rock weathering, soil/rock moisture content, soil temperature, rugged topography and existing subsurface manmade conductive materials. Attempts were made (where possible) during field operations to minimize some of these effects on the test results. Results of the resistivity tests are summarized in Table No. 1 with detailed calculations shown in Appendix B. See attached photograph of a typical resistivity test.

## **LABORATORY TESTING**

The laboratory testing program consisted of two (2) Gradation Analyses. All tests were conducted in accordance with applicable ASTM standards. Laboratory test data is attached in Appendix C.

## **SUBSURFACE CONDITIONS**

Based upon our review of the testing program, the site is covered with a somewhat shallow layer of natural soil consisting of a topsoil layer (with many boulders and cobbles) underlain by a subsoil layer (with many boulders and cobbles) underlain by glacial drift (with many boulders and cobbles). This natural undisturbed glacial drift layer generally consists of boulders, cobbles, gravel, sand, silt, clay in varying proportions and underlain by bedrock. The somewhat shallow layer of natural soils is about 15 feet deep.

The bedrock surface at the site is about 15 feet below grade. According to the "Bedrock Geological Map of Connecticut", by John Rodgers, the bedrock at the site is classified as "Plainfield Formation", inter-layered thinly bedded quartzite, mica schist and dark granitic gneiss. Schist & gneiss are metamorphic type rocks. A geologist was not retained to log the core samples obtained so no determination of specific rock type was made. To assess the engineering properties of the bedrock, rock cores were conducted in boring B1. The rock cores were reviewed by this writer to determine "Rock Quality Designation" (RQD). The RQD values were conducted to measure the rock core quality of fracture frequency. The results of RQD varied between 0 and 16. The average of the two RQD tests is 8. For specific results of RQD, see boring log in Appendix A. The bedrock quality classification is very poor.

Groundwater was not observed in boring B1 at 15'. It should be noted, however, that groundwater levels vary depending upon season, precipitation and other conditions that may be different from those at the time of drilling.

## **GEOTECHNICAL DESIGN CONSIDERATIONS**

### ***Tower Foundation***

The natural soils (glacial drift) below about three (3) feet from existing grade (below the topsoil and subsoil) are suitable for support for the tower foundation. The natural, dense sands, gravels, boulders, cobbles, and silt will become disturbed during the foundation excavation normal excavation procedures. To minimize this disturbance we recommend that the following procedures be used in the preparation of the foundation excavations:

- Excavate down to proposed subgrade (natural undisturbed soil), which will be approximately 12" below bottom of proposed mat foundation, a minimum of 3' down from existing grades.
- Remove all loose soil that was disturbed during the excavation process. This work is typical conducted with hand shovels.
- Obtain subgrade approval by the project geotechnical engineer.
- Install a non-woven geo-textile fabric with a minimum weight of 10 oz./s.y. as a separation layer. This fabric is to be installed on all soil subgrades.

- Install an 12" thick layer of ½" size crushed stone (in two 6" layers) and compact with a hand operated vibratory roller weighing at least 1000 lbs. and a centrifugal force of 14,000 lbs., making a minimum of 6 passes in two directions. This stone is used to minimize the softening of the subgrade soils and aid in dewatering the excavation (if required). The ½" size crushed stone shall meet the CTDOT gradation and hardness requirements. See Figure No. 3 for additional details.

Provided that the foundations are prepared as recommended above, a maximum net allowable soil bearing of 3 tons per square foot (tsf) may be used to size the mat foundation. The net pressure is the pressure in excess of the minimum surrounding overburden pressure. Bearing pressures of up to one third in excess of the above value can be used for transient live loads due to wind and/or earthquakes. It is estimated that total settlements will not exceed about ½" with differential settlements of about half of the total settlement. All bottoms of footings **must** be a minimum of 42" below finished grade to provide for frost protection.

#### **EARTHQUAKE DESIGN (SEISMIC)**

Seismic design requirements for the State of Connecticut are based on the Connecticut State Building Code, which incorporates the Seismic design Category approach from the International Building Code. The seismic design Category determination is based on a few category factors. One such category is the "Site Classification (soil type)". From our test borings, we consider that the site subsurface conditions match the General Description of "Very Dense Soil and Soft Rock". The site classification is therefore "C".

For transfer of ground shear into the natural soil, the friction factor between the concrete and natural deposit can be 0.45.

The proposed foundation is to bear on dense soil. This dense soil will not liquefy during a seismic event and needs not be addressed in the foundation design.

The writer is not aware of any known "active" bedrock fault in the area of the proposed structure.

Passive earth pressure is not typically used in resisting sliding of structures due to the potential of this earthen material being removed in the future. If this material can be guaranteed to remain in place for the life of the structure, the following design parameters can be used for design:

- ⇒ Dry unit weight of gravel backfill soil should be 125 pound per cubic foot (pcf).
- ⇒ Ultimate passive earth pressure coefficient ( $K_p = 3.0$ )
- ⇒ A factor of safety of 3 is to be used in the design to obtain "allowable" passive pressure from ultimate passive pressure.

## GEOTECHNICAL CONSTRUCTION CONSIDERATIONS

### General

This section provides comments related to foundation construction and other geotechnical aspects of the project. It will aid personnel responsible for preparation of Contract Plans and Specifications and those involved with the actual construction and construction monitoring. The contractor must evaluate potential construction problems on the basis of his own knowledge and experience in the area and on the basis of similar projects in other localities, taking into consideration their own proposed construction methods and procedures.

### Excavation

Materials to be excavated are expected to be mostly boulders and cobbles in various sizes, topsoil, subsoil, and natural dense soil, hence excavation is expected to be somewhat difficult because of the boulders and cobbles. These boulders and cobbles will be a site issue for the contractor.

In the access drive and compound construction, if filling or cutting is required to construct the facilities, the organic topsoil layer to be removed, the embankment material shall be clean granular fill compacted to 95% maximum dry density using ASTM D1557. Embankment fill slopes should generally be no steeper than an inclination of 2(H):1(V).

### Dewatering/Groundwater

Normal groundwater levels are expected to be below the proposed excavation. Therefore, dewatering is expected to be limited to pumping of surface runoff, precipitation that enters the excavation, and localized groundwater. It is anticipated that dewatering will be performed by localized sump techniques, if needed.

### Materials

Gravel backfill is material used to backfill the foundation and is to be obtained from off-site borrow sources. This material shall consist of inert material that is hard, durable stone and coarse stone, free from loam and clay, surface coatings and deleterious materials. These materials shall conform to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
1-1 <sup>1</sup> / <sub>2</sub> "	100
3/4"	45 – 80
1/4"	25 – 60
No. 10	15 – 45
No. 40	5 – 25
No. 100	0 – 10
No. 200	0 – 5

Placement and Compaction of Foundation Backfill

- A. All backfill materials shall be placed in horizontal layers not exceeding 6". Each layer shall be spread evenly and thoroughly blade mixed during spreading to ensure uniformity of material in each layer. Each layer shall be evenly compacted with an approved hand operated compactor, making a minimum of at least five (5) passes.
- B. In no case shall fill be placed over frozen material or snow. No fill material shall be placed, spread, or compacted during unfavorable weather conditions where soil moisture precludes achievement of the specified compaction. When the work is interrupted by heavy rains or snow, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
- C. Gravel fill shall be compacted in individual layers (not exceeding 6") to 95% maximum dry density using ASTM D1557.

**LIMITATIONS**

Explorations

The analysis and recommendations submitted in this report are based in part upon the data obtained from a limited number of widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction excavation. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report at that time.

The soil profiles described and shown in this report are generalized and are intended to convey trends in subsurface conditions. The boundaries between strata and bedrock are approximate and generalized. They have been developed by data that is limited in number and widely spaced.

Water level readings have been observed in the drill holes at times and under conditions stated on the boring log and in this report. This data has been reviewed, analyzed, and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, time of the year and other factors not evident at the time measurements were taken.

Designer Review

In the event that any changes in the design or location of the monopole or proposed site development, the conclusions and recommendations contained in this report shall not be considered valid unless these changes are reviewed by this office and conclusions of this report modified.

Construction



It is recommended that Design Earth Technology retained to provide geotechnical field monitoring services based on familiarity with the subsurface conditions, design concepts and specifications, technical expertise, and experience in monitoring of site development construction.

Carlo F. Centore, P.E.

November 29, 2013

Page 7

Use of This Report

This report has been prepared for specific application and use of the proposed Verizon Wireless Tower to be located off of Gallup Road in Voluntown, Connecticut and is in accordance with generally accepted soil and foundation engineering practices. No other warranty expressed or implied is made.

If you have any questions regarding the above information, please call.

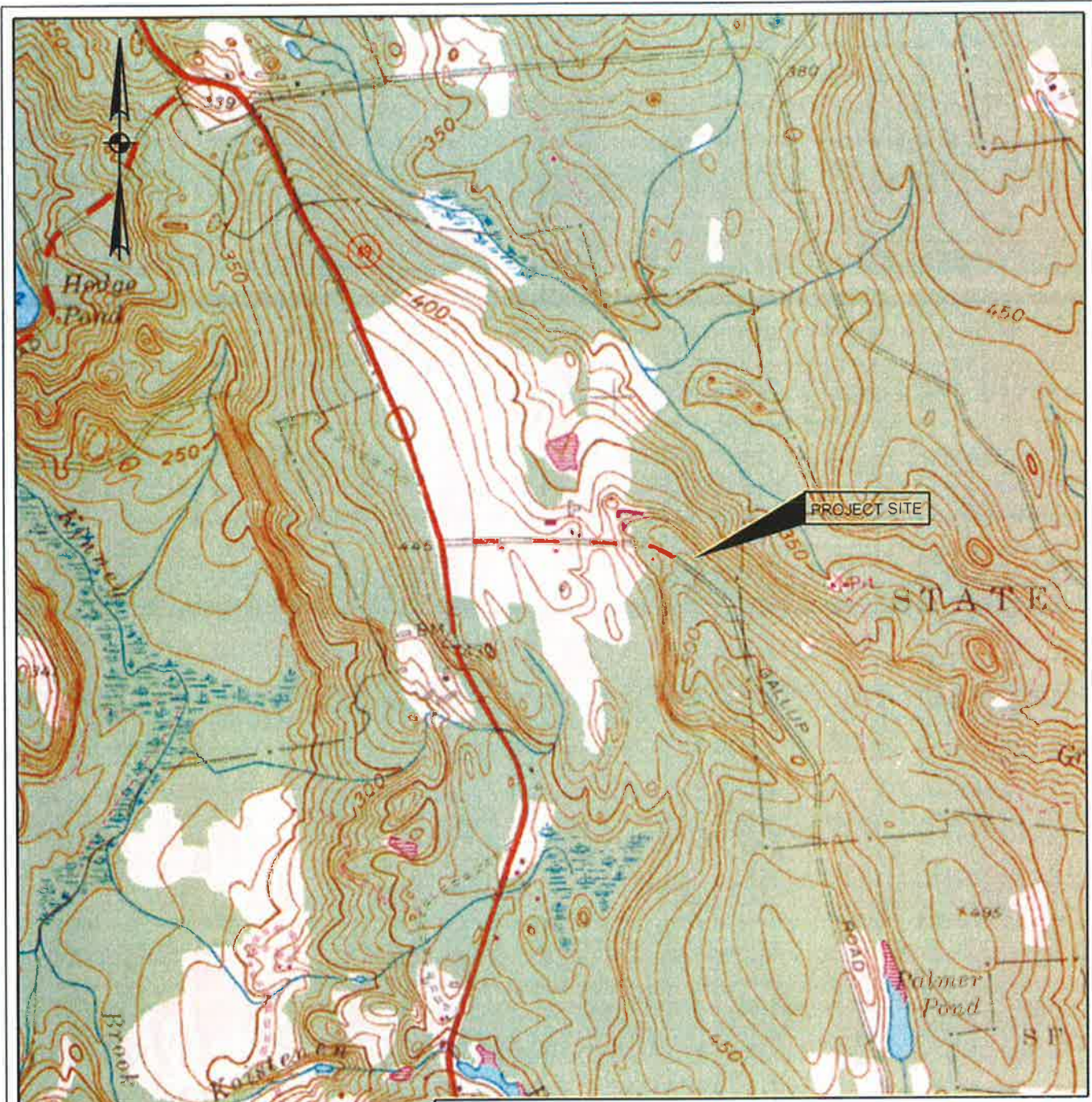
Sincerely,

DESIGN EARTH TECHNOLOGY

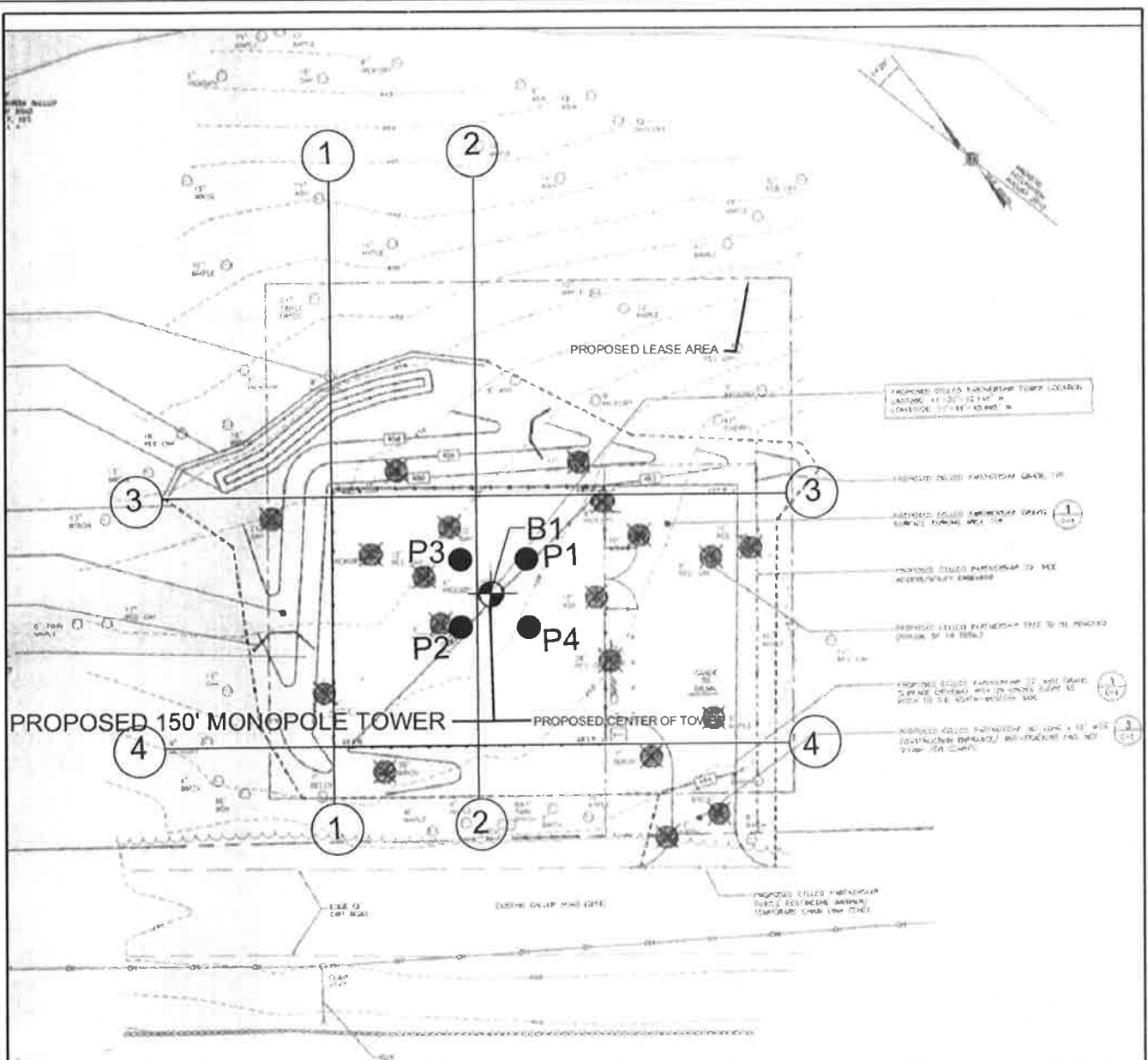
A handwritten signature in blue ink, appearing to read "Lawrence J. Marcik, Jr., P.E.", is written over the printed name below.

Lawrence J. Marcik, Jr., P.E.

# FIGURES



<b>JOB TITLE:</b> GEOTECHNICAL REPORT FOR A PROPOSED VERIZON WIRELESS COMMUNICATION FACILITY AT 53 GALLUP ROAD (PALMER POND) VOLUNTOWN, CONNECTICUT		<b>DATE:</b> NOVEMBER 29, 2013
<b>PREPARED FOR:</b> <b>CEN TEK ENGINEERING, INC.</b>		<b>SCALE:</b> NTS
<b>SOURCE:</b> U.S.G.S. QUADRANGLE VOLUNTOWN	 <b>DESIGN EARTH TECHNOLOGY</b> P.O. Box 187 • Guilford, CT 06437 Phone/Fax: (203) 458-9806 Email: docdit@aol.com	<b>PROJECT No.:</b> 2013-13
<b>FIGURE TITLE:</b> LOCATION PLAN		<b>DRAWN:</b> LJM
		<b>FIGURE No.:</b> <b>1</b>
		<b>CAD FILE:</b> Location Plan



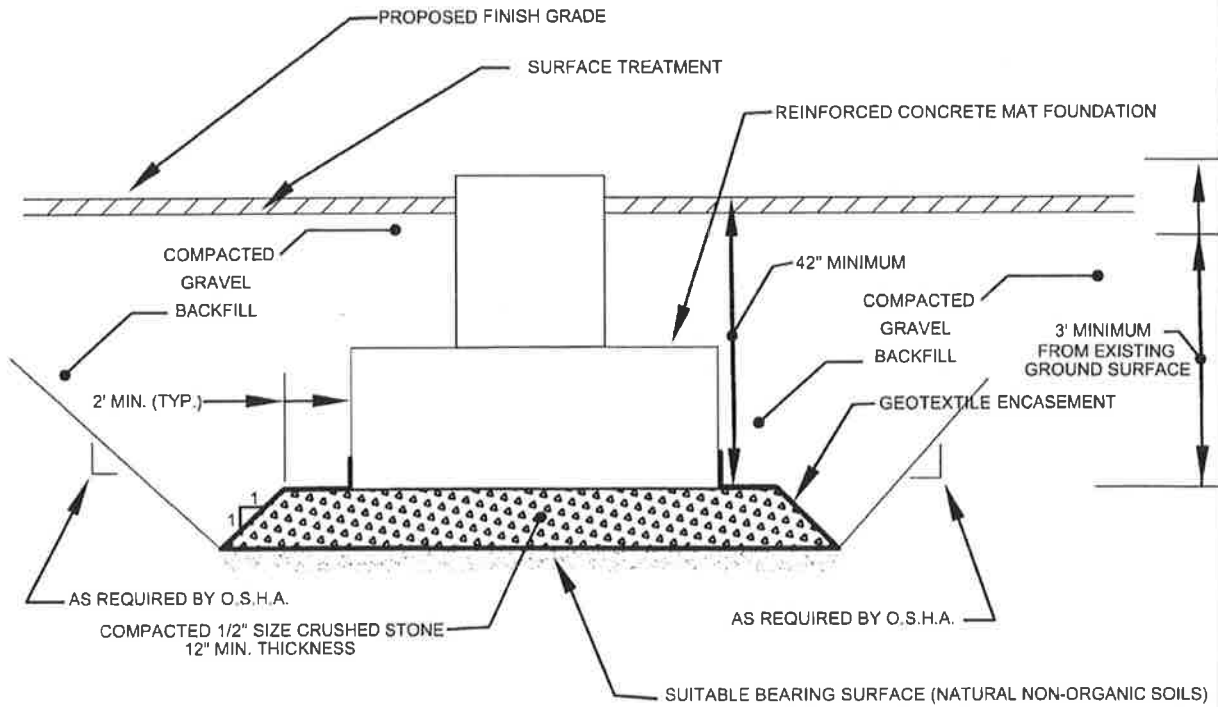
**LEGEND**

	P4 — TYPICAL PROBE
	B1 — TYPICAL BORING
	1 — SECTION NUMBER

<b>JOB TITLE:</b> GEOTECHNICAL REPORT FOR A PROPOSED VERIZON WIRELESS COMMUNICATION FACILITY AT 53 GALLUP ROAD (PALMER POND) VOLUNTOWN, CONNECTICUT	
<b>PREPARED FOR:</b> <b>CEN TEK ENGINEERING, INC.</b>	<b>DATE:</b> NOVEMBER 29, 2013
	<b>SCALE:</b> 1" = 30' +/-
	<b>PROJECT No.:</b> 2013-13
	<b>DRAWN:</b> LJM
	<b>FIGURE No.:</b> 2
<b>FIGURE TITLE:</b> SKETCH OF LOCATIONS OF SUBSURFACE EXPLORATIONS	
<b>CAD FILE:</b> Figures	



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SECTION

**FOUNDATION BEARING SURFACE PREPARATION**

NOT TO SCALE

JOB TITLE: GEOTECHNICAL REPORT FOR A  
 PROPOSED VERIZON WIRELESS COMMUNICATION FACILITY  
 AT  
 53 GALLUP ROAD (PALMER POND)  
 VOLUNTOWN, CONNECTICUT

PREPARED FOR:  
**CEN TEK ENGINEERING, INC.**

DATE:  
 NOVEMBER 29, 2013

SCALE  
 NTS

PROJECT No.:  
 2013-13

DRAWN:  
 LJM

FIGURE No.  
 3



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FIGURE TITLE FOUNDATION DETAILS

CAD FILE: Figures

# TABLES

**TABLE 1**

**PROPOSED VERIZON WIRELESS TOWER  
53 GALLUP ROAD (PALMER POND)  
VOLUNTOWN, CT**

**IN-SITU SOIL RESISTIVITY RESULTS<sup>1</sup>**

<b>ELECTRODE SPACING (ft)</b>	<b>Section No.</b>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
5	479,707	793,767	202,990	512,262
10	572,585	572,585	746,850	561,095
20	492,538	804,300	850,260	428,194
30	364,807	838,770	464,196	276,909
40	270,398	667,952	228,268	173,882

- NOTES: 1. Resistivity values indicated are in OHM-CM
2. <sup>1</sup>Test completed using Wenner Four Probe Method with a Det 2/2 Auto Earth Tester as manufactured by Avo, Inc.

# APPENDICES



# APPENDIX A

Thomas Lloret		<b>TEST BORING REPORT</b> <b>ASSOCIATED BORINGS CO., INC.</b> <b>119 MARGARET CIRCLE, NAUGATUCK, CT 06770</b> <b>Tel (203) 729-5435 Fax (203) 729-5116</b>						SHEET 1 OF 1				
DRILLER								CME-45B				
Larry Marcik, Jr.								DRILLING EQUIPMENT				
INSPECTOR								Design Earth Technology				
SOILS ENGINEER		PROJECT NAME: 53 Gallup Road						CLIENT				
Surface Elevation:		PROJECT NUMBER:						LOCATION: Voluntown, Connecticut				
Date Started: 11/25/2013		Auger		Casing		Sampler		Core Bar		Hole No. <b>B-1</b>		
Date Finished: 11/25/2013		Type		HSA		SS		NQ-2		Line & Station		
Groundwater Observations		Size I. D.		3 1/4 in		2 in				Offset		
AT 'AFTER 0 HRS		Hammer				140 lb		Bit		N Coordinate		
AT 'AFTER HRS		Fall				30 in				E. Coordinate		
DEPTH	Casing blows per foot	SAMPLE					BLOWS PER 6 INCHES ON SAMPLER				STRATA CHANGE; DEPTH, ELEV.	FIELD IDENTIFICATION OF SOIL, REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
		DEPTH IN FEET FROM - TO	NO.	PEN. INCH	REC. INCH	TYPE						
							0-6	6-12	12-18	18-24		
5		2.0 - 3.0	1	12	4	D	3	7			0.5	Topsoil
		3.0 - 5.0	2	24	3	D	17	30	40	50		Br. M-F Sand, Some C-F Gravel, Little Silt, Cobbles
		5.0 - 7.0	3	24	6	D	17	30	46	65		
		8.0 - 9.0	4	12	8	D	18	50	X	X		
10		10.0 - 11.5	5	18	12	D	12	39	61	X		
15		15.0 - 20.0	1	60	60	C					15	
20		20.0 - 25.0	2	60	48	C					20	Cored Run # 1 From 15.0 feet to 20.0 feet Recovery - 60" RQD - 0/60 = 0%
25											25	Cored Run # 2 From 20.0 feet to 25.0 feet Recovery - 48" RQD - 10/60 = 16%
30												
35												
40												
From Ground Surface to		Feet Used		Inch Casing Then		Inch Casing For		Feet				
Footage in Earth 15.0		Footage in Rock 10.0		No. of Samples 5		Hole No. B-1						
SAMPLE TYPE CODING:		D = DRIVEN		C = CORE		A = AUGER		UP = UNDISTURBED PISTON				
PROPORTIONS USED:		TRACE = 1-10%		LITTLE = 10-20%		SOME = 20-35%		AND = 35-50%				


Jaime Lloret	<b>TEST BORING REPORT</b> <b>ASSOCIATED BORINGS CO., INC.</b> 119 MARGARET CIRCLE, NAUGATUCK, CT 06770 Tel (203) 729-5435 Fax (203) 729-5116	SHEET	1	OF	1
DRILLER Larry Marcik, Jr.					
INSPECTOR		PROJECT NAME: Gallup Road			
DATE: 11/25/2013	PROJECT NUMBER:	DRILLING EQUIPMENT Design Earth Technology CLIENT			
	LOCATION: Voluntown, Connecticut				
<b>POWER DRILL SOUNDING REPORT</b>					

Station	Offset	Elev	Probe #	From	To	Remarks: Soil Encountered, Groundwater Depth, Refusal Etc.
			P-1	0.0	10.0	Soil
						End of Boring - 10.0 GWO - None
			P-2	0.0	10.0	Soil
						End of Boring - 10.0 GWO - None
			P-3	0.0	10.0	Soil
						End of Boring - 10.0 GWO - None
			P-4	0.0	10.0	Soil
						End of Boring - 10.0 GWO - None

PROPORTIONS USED: TRACE = 1-10% LITTLE = 10-20% SOME = 20-35% AND = 35-50%

# APPENDIX B

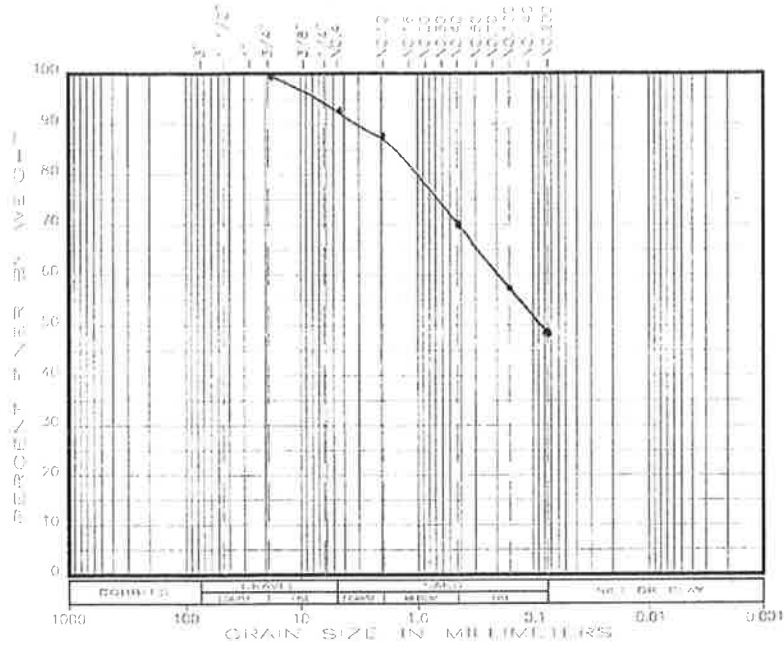
**RESISTIVITY  
DATA**

<b>SITE:</b> Voluntown, Connecticut (53 Gallup Road )
<b>DATE:</b> November 29, 2013
<b>SIGNATURE:</b> 

<b>A=(FT)</b>	<b>5</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>
<b>FORMULA □ = (OHM-CM)</b>	<b>957.5*R</b>	<b>1915*R</b>	<b>3830*R</b>	<b>5745*R</b>	<b>7660*R</b>
<b>AREA 1 MEASURED R (OHM)</b>	501	299	128.6	63.5	35.3
<b>AREA 1 CALCULATED (OHM-CM)</b>	479,707	572,585	492,538	364,807	270,398
<b>AREA 2 MEASURED R (OHM)</b>	829	299	210	146	87.2
<b>AREA 2 CALCULATED (OHM-CM)</b>	793,767	572,585	804,300	838,770	667,952
<b>AREA 3 MEASURED R (OHM)</b>	212	390	222	80.8	29.8
<b>AREA 3 CALCULATED (OHM-CM)</b>	202,990	746,850	850,260	464,196	228,268
<b>AREA 4 MEASURED R (OHM)</b>	535	293	111.8	48.2	22.7
<b>AREA 4 CALCULATED (OHM-CM)</b>	512,262	561,095	428,194	276,909	173,882

# APPENDIX C

# REPORT OF GRADATION ANALYSIS



BORING NO. 1	SAMPLE NO. 3
ORIGIN OF MATERIAL: From Split Spoon Sampler	
VISUAL CLASSIFICATION: Silt/Clay and Medium to Fine Sand, Trace Coarse Sand, Trace Fine Gravel	
PROPOSED USE: Foundation Soil	
ASTM METHOD USED: D422	
DEVIATION FROM ASTM METHOD: Washed through the Nos. 100 & 200 sieves	
DESCRIPTION OF SAMPLING PROCEDURE USED: Split Spoon Sampler	
DESCRIPTION OF ANY MEASUREMENT UNCERTAINTY: NONE	
REMARKS: 1. Depth of sample 5 to 7 feet	

SIEVE SIZE	% PASSING
3/4"	100
No. 4	92
No. 10	88
No. 40	70
No. 100	57
No. 200	49



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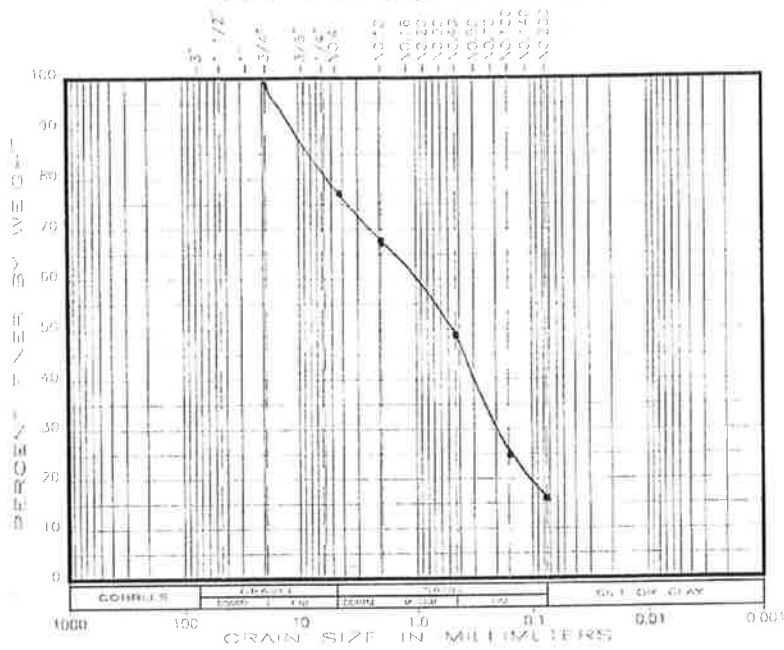
RESPECTFULLY SUBMITTED,

*Lawrence J. Marcik, Jr. PE*  
 Lawrence J. Marcik, Jr., P.E.  
 DESIGN EARTH TECHNOLOGY

THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL AND WITH THE WRITTEN APPROVAL OF THIS OFFICE.  
 THIS REPORT RELATES ONLY TO THE ITEMS TESTED.

Date:	November 29, 2013	Project No.:	2013-13
Test By:	LJM, Jr.	Checked By:	LJM, Jr.
Project:	Proposed Verizon Wireless Communications		
	Tower at 53 Gallup Road (Palmer Pond)		
	Voluntown, Connecticut		
Prepared For:	Centek Engineering, Inc.		
			GA-1

# REPORT OF GRADATION ANALYSIS



BORING NO. 1	SAMPLE NO. 5
ORIGIN OF MATERIAL: From Split Spoon Sampler	
VISUAL CLASSIFICATION: Medium to Fine Sand, Trace Coarse Sand, Some Fine Gravel, Little Silt/Clay	
PROPOSED USE: Foundation Soil	
ASTM METHOD USED: D422	
DEVIATION FROM ASTM METHOD: Washed through the Nos. 100 & 200 sieves	
DESCRIPTION OF SAMPLING PROCEDURE USED: Split Spoon Sampler	
DESCRIPTION OF ANY MEASUREMENT UNCERTAINTY: NONE	
REMARKS: 1. Depth of sample 10 to 11.5 feet	

SIEVE SIZE	% PASSING
3/4"	100
No. 4	77
No. 10	67
No. 40	49
No. 100	25
No. 200	16



**DESIGN EARTH TECHNOLOGY**

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RESPECTFULLY SUBMITTED,

*Lawrence J. Marcik, Jr., P.E.*

Lawrence J. Marcik, Jr., P.E.  
 DESIGN EARTH TECHNOLOGY

THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL AND WITH THE WRITTEN APPROVAL OF THIS OFFICE.  
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Date:	November 29, 2013	Project No.:	2013-13
Test By:	LJM, Jr.	Checked By:	LJM, Jr.
Project:	Proposed Verizon Wireless Communications		
	Tower at 53 Gallup Road (Palmer Pond)		
	Voluntown, Connecticut		
Prepared For:	Centek Engineering, Inc.		

GA-2



# PHOTOGRAPHS

# PHOTOGRAPHS



**DRILLING TYPICAL PROBE**



**TYPICAL RESISTIVITY TESTING**



**WETLAND & VERNAL POOL  
EVALUATION**

**February 28, 2014**

**Ms. Alexandria Carter  
Verizon Wireless  
99 East River Drive  
East Hartford, CT 06108**

**APT Project No.: CT1411060**

**Re: Proposed Palmer Pond Facility  
53 Gallup Road  
Voluntown, Connecticut**

Dear Ms. Carter,

All-Points Technology Corporation, P.C. ("APT") understands that the Connecticut Siting Council ("Council") has requested that the next phase of the Development and Management Plan contain an evaluation of potential vernal pool impacts. The following evaluation of the proposed telecommunications Facility development on potential vernal pool habitat at 53 Gallup Road in Voluntown, Connecticut is provided.

**Wetland and Vernal Pool Evaluation**

***Wetland Description***

Two wetland areas were identified and delineated in proximity to the proposed Facility. These wetlands consist primarily of a forested hillside seep that drains in to a potential vernal pool and a separate adjacent hillside seep system that flows to the north. The closest delineated wetland boundary to the proposed Facility is approximately 220 feet to the north/northeast.

Wetland 1 is an isolated forested wetland located north-northeast of the proposed telecommunications Facility. An inspection performed on February 26, 2013 revealed inundation depth of approximately 18 inches within a depressional portion of Wetland 1 (identified as Limits of Potential Vernal Pool on enclosed Vernal Pool Impact Analysis Map). An inspection on January 21, 2014 found the pool area to be dry. Due to time of year, obligate vernal pool species were not identified using the pool for breeding habitat. A narrow hillside seep wetland area that extends from the pool to the south-southeast provides some flow into the potential vernal pool area. This wetland system is located within ablation glacial till controlled by shallow bedrock. Due to the limited inspections of this habitat during winter conditions, a complete evaluation of utilization of the pool by herpetofauna or the pool's hydroperiod is not provided. For the purposes of this evaluation, the pool portion of Wetland 1 is assumed to support breeding habitat by vernal pool obligate species.

Wetland 2 is narrow hillside seep located in a wooded cow pasture. This seep generally forms in the southeast corner of the cow pasture and drains downslope to the north away from Wetland 1. No potential vernal pool habitat was observed within Wetland 2.

**ALL-POINTS TECHNOLOGY CORPORATION, P.C.**

3 SADDLEBROOK DRIVE · KILLINGWORTH, CT 06419 · PHONE 860-663-1697 · FAX 860-663-0935

P.O. BOX 504 · 116 GRANDVIEW ROAD · CONWAY, NH 03818 · PHONE 603-496-5853 · FAX 603-447-2124

## ***Wetland Evaluation***

A comprehensive evaluation of functions and values supported by the two wetland areas identified has not been performed. However, a summary evaluation of wetland functions and values has been completed using a qualitative evaluation methodology based on *The Highway Methodology Workbook Supplement, Wetland Functions and Values: A descriptive Approach* issued by the US Army Corps of Engineers New England District ["COE NED"], September 1999, along with best professional judgment from over 25 years of field experience. This evaluation provides a qualitative approach in which wetland functions can be considered principal, secondary, or unlikely to be provided at a significant level. Functions and values can be principal if they are an important physical component of a wetland ecosystem (function only), and/or are considered of special value to society, from a local, regional, and/or national perspective. The New England Division of the Corps recommends that wetland values and functions be determined through "best professional judgment" based on a qualitative description of the physical attributes of wetlands and the functions and values exhibited.

The principal functions associated with Wetland 1 include wildlife habitat (based on potential for herpetofaunal breeding habitat), uniqueness/heritage and aesthetics. Production export (herpetofauna are anticipated to form the base of the food chain for this wetland/upland ecosystem) is considered a secondary function of Wetland 1. Wetland 1 has the potential for nutrient and sediment removal/retention/transformation function; however, due to the surrounding well established mature vegetation (which limits nutrients or sediments that could be transported during a storm event), no opportunity exists to provide this function. Also, the ability to provide flood flow alteration is limited due to the wetland's location near the top of the watershed and its relatively small size.

The principal function of Wetland 2 is associated with groundwater discharge/recharge. Water quality functions such as sediment/toxicant/pathogen retention and nutrient removal/retention/transformation are secondary functions of this wetland as a result of its location within a wooded cow pasture and opportunity to support these functions. However, due to the narrow form, unconfined outlet and moderate slope of this seepage wetland, Wetland 2 does not provide other important hydraulic functions such as flood flow alteration.

## ***Wetland and Vernal Pool Impact Analysis***

As proposed on the Development and Management Plan, Palmer Pond, 53 Gallup Road, Voluntown, CT 06384, latest revision date 11/11/13, Verizon Wireless' stormwater level spreader is located approximately 200 feet south/southwest of the nearest wetland area, Wetland 1. The proposed northeast tower compound is located approximately 220 feet south/southwest of Wetland 1. Therefore, no direct impact to wetland resources will result from the proposed development of the wireless telecommunications Facility and the wetlands' principal and secondary functions will not be adversely affected. In addition, since proposed development activities are located approximately 20 feet north of existing disturbed/developed areas associated with Gallup Road and the proposed development is located more than 200 feet from wetland resources, typical functions supported by wetland upland review areas (wetland buffers) such as water quality protection (erosion control and sediment, nutrient, biological and toxics removal), hydrologic event modification (flood flow and stream bank erosion attenuation) and wildlife habitat will not be adversely affected.

Short-term upland review area impacts associated with the proposed development would be minimized by the proper installation and maintenance of erosion and sedimentation controls in accordance with *2002 Connecticut Guidelines For Soil Erosion and Sediment Control*. Long-term temporary upland review area impacts are minimized by the unoccupied nature of the Facility and limited traffic generated by routine maintenance visits (approximately once per month for Verizon Wireless). Impervious surfaces associated with the proposed Facility have been minimized with the use of a gravel surface within the Facility compound that promotes infiltration. Site clearing and grading activities will not significantly alter the hydrology of nearby wetland areas, including vernal pool habitat

supported by Wetland 1, as existing surface water drainage patterns will not be altered by the proposed development. In addition, the proposed development will not create decoy pools that could adversely affect breeding amphibians.

### ***Physical Impact to Vernal Pool and Surrounding Terrestrial Habitat***

This section details a recognized scientific method for analyzing the potential impact a project may have on a particular vernal pool and its surrounding upland habitat.

Construction and operation of the Facility would not result in direct physical impact to the nearby vernal pool (Wetland 1). It is widely documented that vernal pool dependent amphibians are not only solely dependent upon the actual vernal pool habitat for breeding and egg and juvenile development but require surrounding upland habitat for most of their adult lives. Recent studies recommend protection of adjacent habitat up to 750 feet from the vernal pool edge for obligate pool-breeding amphibians.<sup>1</sup>

In order to evaluate potential impacts to this vernal pool and its surrounding upland habitat, the resource was assessed using methodology developed by Calhoun and Klemens (2002). This methodology assesses vernal pool ecological significance based on two parameters: 1) biological value of the vernal pool, and 2) conditions of the critical terrestrial habitat. The biological rating is based on the presence of federal or state-listed species and abundance and diversity of vernal pool indicator species. (Note: based on the limited observations that were recorded of Wetland 1, the highest biological value is assumed to be supported by the physical pool located in the northern portion of Wetland 1.) The terrestrial habitat is assessed based on the integrity of the vernal pool envelope (within 100 feet of the pool's edge) and the critical terrestrial habitat (within 100-750 feet of the pool's edge). Pools with 25% or less developed areas in the critical terrestrial habitat, such as the vernal pool associated with Wetland 1, are identified as having high priority for maintaining less than 25% development within this terrestrial habitat, including site clearing, grading and construction (Calhoun and Klemens, 2002). Relying on these data, a conservation priority rating of Tier I was assigned to the vernal pool, with Tier I considered to have relatively high breeding activity and intact terrestrial habitat (Tier II and III pools represent lower amphibian productivity and fragmented terrestrial habitat).

The vernal pool evaluated in this assessment was rated based on these criteria for both the existing condition and the proposed condition (e.g., Verizon Wireless' proposed development) to determine if the proposed Facility disturbances would result in a reduction in the tier rating system or reduce the terrestrial habitat integrity below the critical 75% non-development criterion. As previously discussed, it was conservatively assumed that the vernal pool currently has the highest conservation priority rating of Tier I. The results of this analysis show that the proposed development will not result in further degradation of the existing tier rating or terrestrial habitat integrity of the vernal pool due to the minimal disturbance associated with the development of the proposed Facility. The vernal pool envelope will not be impacted as the proposed Facility development is located approximately 200 feet south/southwest of the closest vernal pool edge. The total area of the critical terrestrial habitat associated with the vernal pool, which includes land located off the Subject Property, including Patchaug State Forest, is 44.77± acres with 3.62± acres consisting of existing development (including Gallup Road, Gallup Farm structures, and a residential structure). Please refer to the enclosed Vernal Pool Impact Analysis Map. This equates to approximately 12.4% of the critical terrestrial habitat as being already developed. The proposed Facility compound and access road will result in the development of 0.12± acre, which represents an increase of only 0.27% of the total critical terrestrial habitat of the vernal pool. Therefore, the proposed Verizon Wireless Tower development represents a de minimis

---

<sup>1</sup> Calhoun, A.J.K. and M.W. Klemens. 2002. Best Development Practices (BDPs): Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States. WCS/MCA Technical Paper No. 5.

increase in development of the vernal pool's critical terrestrial habitat. Also, the total footprint of development within the critical terrestrial habitat, including the proposed Verizon Wireless development, remains well below the 25% developed critical threshold at which point vernal pool wildlife can be negatively impacted<sup>2</sup>. Therefore, the proposed development will not result in a likely adverse impact to existing amphibian productivity and will not result in long-term adverse impact to the terrestrial habitat.

The potential exists for possible short-term impact to herpetofauna associated with the nearby vernal pool habitat due to possible encounters with migrating and basking individuals that may intercept the proposed development footprint during construction. Best Management Practices ("BMPs") are proposed during construction in a subsequent section of this document to avoid/minimize the potential for short-term impact to herpetofauna.

### ***Hydraulic Alterations***

Land-use changes (i.e., clearing, increases in impervious surface) can increase surface runoff in the watershed of a vernal pool. Direct inputs of stormwater flows into a pool may produce sudden water level increases in a short period of time and may lengthen the duration of flooding (hydroperiod). Diversion of stormwater flows past a pool may have the opposite effect of decreasing water levels and shortening the pool's hydroperiod. In addition, stormwater features that create temporary pools of water can result in a biological "sink" as breeding amphibians deposit eggs into a water body without the necessary hydraulic period to allow for successful development of the eggs into juveniles.

Site clearing and grading activities will not de-water the nearby vernal pool or alter surface water drainage patterns associated with the pool. Impervious surfaces associated with the proposed Verizon Wireless project have been minimized with the use of a gravel surface within the wireless telecommunications Facility compound. The proposed development will not alter existing surface or subsurface flow conditions or directions. Therefore, the proposed development will not alter the hydrology of the nearby vernal pool. In addition, no stormwater management features are proposed that would result in creation of a temporary pool and "sink", including two grass lined swales and a rip-rap level spreader, which could potentially affect breeding amphibians intercepted on their migration to the nearby vernal pool.

### ***Vernal Pool Recommended Best Management Practices***

As a result of the proposed development's location in proximity to vernal pool habitat, the following BMPs are recommended to avoid unintentional impact or mortality to vernal pool herpetofauna (i.e., spotted salamander, wood frog, turtles, etc.) during construction activities. The complete details of the recommended BMPs are included on the final Development and Management Plan.

APT recommends EITHER the proposed construction activities be seasonally restricted from peak amphibian movement periods (early spring breeding [March 1<sup>st</sup> to May 15<sup>th</sup>] and late summer dispersal [July 15<sup>th</sup> to September 15<sup>th</sup>]) OR a vernal pool protection plan be implemented should Verizon Wireless determine that construction needs to occur during these periods in order to satisfy schedule requirements. APT finds that either of these approaches are equally protective of the nearby vernal pool habitat and the associated herpetofauna. Details of the proposed vernal pool protection plan are provided below.

---

<sup>2</sup> Calhoun, A.J.K. and M.W. Klemens. 2002. Best Development Practices (BDPs): Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States. WCS/MCA Technical Paper No. 5. Pg. 10.

## **Wetland and Vernal Pool Protection Plan**

A qualified professional from APT would serve as the Environmental Monitor for this project to ensure that wetland and vernal pool protection measures are implemented properly. The proposed wetland and vernal pool protection program consists of several components including: isolation of the project perimeter; periodic inspection and maintenance of isolation structures; herpetofauna sweeps; education of all contractors and sub-contractors prior to initiation of work on the site; protective measures; and, reporting.

### **1. Seasonal Monitoring**

- a. Should the construction of the wireless telecommunications facility occur during the peak vernal pool migration and breeding period (March 1 to May 30) and late summer dispersal (July 15<sup>th</sup> to September 15<sup>th</sup>), daily sweeps of the construction area will be performed to avoid potential impact to amphibians and reptiles that may be using nearby wetland/vernal pool habitat.

### **2. Isolation Measures & Erosion and Sedimentation Controls**

- a. Plastic netting used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], reinforced silt fence) has been found to entangle wildlife, including reptiles, amphibians, birds and small mammals. No permanent erosion control products or reinforced silt fence will be used on the Verizon Wireless project. Temporary erosion control products will use either erosion control blankets and fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (netless) or netting composed of planar woven natural biodegradable fiber to avoid/minimize wildlife entanglement.
- b. The extent of the erosion control silt fencing will result in creation of a barrier that will isolate proposed construction areas from surrounding wetland and vernal pool habitat (both on downgradient as well as upgradient sides of the development). Field conditions may require the installation of additional barrier fencing at the direction of the Environmental Monitor. The Contractor shall maintain additional supplies of barrier fencing and erosion controls on site for this purpose.
- c. Installation of conventional silt fencing, which will also serve as an isolation of the work zone from surrounding areas and is required for erosion control compliance, shall be performed by the Contractor following clearing activities and prior to any earthwork. The Environmental Monitor will inspect the work zone area prior to and following erosion control barrier installation to ensure the area is free of vernal pool herpetofauna.
- d. The fencing will consist of conventional erosion control woven fabric, installed approximately six inches below surface grade to bury the bottom of the silt fence and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. In addition to required daily inspection by the Contractor, the fencing will be inspected for tears or breeches in the fabric following installation and either on a weekly or biweekly inspection frequency by the Environmental Monitor throughout the duration of the construction project. If inspections are performed on a biweekly basis, such inspections will also include inspections following storm events of 0.25 inch or greater.
- e. No equipment, vehicles or construction materials shall be stored outside of barrier fencing.
- f. All silt fencing shall be removed within 30 days of completion of work and permanent stabilization of site soils so that reptile and amphibian movement

between uplands and wetlands is not restricted.

### **3. Contractor Education:**

- a. Prior to work on site, the Contractor shall attend an educational session at the pre-construction meeting with APT. This orientation and educational session will consist of an introductory meeting with APT providing photos of herpetofauna and emphasizing the non-aggressive nature of these species, the absence of need to destroy animals that might be encountered and the need to follow Protective Measures as described in Section 5 below.
- b. The Contractor will be provided with cell phone and email contacts for APT personnel to immediately report any encounters with herpetofauna. Educational poster materials will be provided by APT and displayed on the job site to maintain worker awareness as the project progresses.

### **4. Petroleum Materials Storage and Spill Prevention**

- a. Certain precautions are necessary to store petroleum materials, refuel and contain and properly clean up any inadvertent fuel or petroleum (i.e., oil, hydraulic fluid, etc.) spill due to the project's location in proximity to sensitive wetlands.
- b. A spill containment kit consisting of a sufficient supply of absorbent pads and absorbent material will be maintained by the Contractor at the construction site throughout the duration of the project. In addition, a waste drum will be kept on site to contain any used absorbent pads/material for proper and timely disposal off site in accordance with applicable local, state and federal laws.
- c. The following petroleum and hazardous materials storage and refueling restrictions and spill response procedures will be adhered to by the Contractor.
  - i. Petroleum and Hazardous Materials Storage and Refueling
    1. Refueling of vehicles or machinery shall occur a minimum of 100 feet from wetlands or watercourses and shall take place on an impervious pad with secondary containment designed to contain fuels.
    2. Any fuel or hazardous materials that must be kept on site shall be stored on an impervious surface utilizing secondary containment a minimum of 100 feet from wetlands or watercourses.
  - ii. Initial Spill Response Procedures
    1. Stop operations and shut off equipment.
    2. Remove any sources of spark or flame.
    3. Contain the source of the spill.
    4. Determine the approximate volume of the spill.
    5. Identify the location of natural flow paths to prevent the release of the spill to sensitive nearby waterways or wetlands.
    6. Ensure that fellow workers are notified of the spill.
  - iii. Spill Clean Up & Containment
    1. Obtain spill response materials from the on-site spill response kit. Place absorbent materials directly on the release area.
    2. Limit the spread of the spill by placing absorbent materials around the perimeter of the spill.
    3. Isolate and eliminate the spill source.



4. Contact the appropriate local, state and/or federal agencies, as necessary.
5. Contact a disposal company to properly dispose of contaminated materials.

iv. Reporting

1. Complete an incident report.
2. Submit a completed incident report to the Connecticut Siting Council.

**5. Protective Measures**

- a. A thorough cover search of the construction area will be performed by the Environmental Monitor for vernal pool herpetofauna prior to and following installation of silt fencing to remove any species from the work zone prior to the initiation of construction activities.
- b. Prior to the start of construction each day, the Contractor shall search the entire work area for vernal pool herpetofauna.
- c. If herpetofauna are found, they should be carefully grasped in both hands and placed just outside of the isolation barrier in the approximate direction they were heading. Amphibians shall be carefully grasped using a clean damp plastic bag. Turtles shall be carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs.
- d. Special care shall be taken by the Contractor during early morning and evening hours so that possible basking or foraging herpetofauna are not harmed by construction activities.
- e. Any stormwater management features, ruts or artificial depressions that could hold water created intentionally or unintentionally by site clearing/construction activities will be properly filled in and permanently stabilized with vegetation to avoid the creation of vernal pool "decoy pools" that could intercept amphibians moving toward the vernal pools. Stormwater management features such as rip rap apron outfalls will be carefully reviewed in the field to ensure that standing water does not endure for more than a 24 hour period to avoid creation of decoy pools and may be subject to field design changes. Any such proposed design changes will be reviewed by the design engineer to ensure stormwater management functions are maintained.
- f. Erosion control measures will be removed no later than 30 days following final site stabilization so as not to impede migration of amphibians or other wildlife.
- g. All refueling of vehicles will be performed using secondary containment to capture any fuel spills. The Contractor will have spill kits on hand in the event of a fuel release to ensure proper and prompt cleanup.

**6. Herbicide and Pesticide Restrictions**

- a. The use of herbicides and pesticides at the proposed wireless telecommunications Facility and along the proposed access drive are strictly prohibited.

**7. Reporting**

- a. Biweekly inspection reports (brief narrative and applicable photos) will be submitted to the Connecticut Siting Council for compliance verification. Any observations of vernal pool herpetofauna will be included in the reports.

If you have any questions regarding the above-referenced information, please feel free to contact me by telephone at (860) 984-9515 or via email at [dgustafson@allpointstech.com](mailto:dgustafson@allpointstech.com).

Sincerely,

All-Points Technology Corporation, P.C.

A handwritten signature in cursive script that reads "Dean Gustafson". The signature is written in black ink and is positioned to the left of the typed name.

Dean Gustafson  
Senior Wetland Scientist

Enclosures

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# Vernal Pool Impact Analysis Map

# Vernal Pool Impact Analysis Map



**Legend**

Existing Developed Area	Proposed 50' x 52' Compound Area
750' Critical Terrestrial Habitat	Potential Vernal Pool
100' Vernal Pool Envelope	Subject Property
Proposed Access	CTDEEP Parcel (updated 8/10)
APT Delineated Wetland Boundary	

Base Map Source: ESRI World Imagery

1 inch equals 208 feet

**Proposed Verizon Wireless Palmer Pond Facility**  
**53 Gallup Road**  
**Voluntown, Connecticut**



**Thursday, February 27, 2014**

# Cellco Partnership

d.b.a. **verizon** wireless

## WIRELESS COMMUNICATIONS FACILITY DEVELOPMENT AND MANAGEMENT PLAN

PALMER POND  
53 GALLUP ROAD  
VOLUNTOWN, CT 06384

### SITE DIRECTIONS

**FROM:** 99 EAST RIVER DRIVE  
EAST HARTFORD, CONNECTICUT **TO:** 53 GALLUP ROAD  
VOLUNTOWN, CONNECTICUT

1. Head Southwest on E RIVER DR toward PITKIN ST 0.9 mi.
2. Turn RIGHT merge onto CT-2 E toward NETWICH 35.9 mi.
3. Take exit 284 to merge onto I-395 N toward PROVIDENCE 8.2 mi.
4. Take exit 85 for CT-164 toward CT-138/PRESTON CITY/PACHAUG 0.2 mi.
5. Continue straight 0.4 mi.
6. Turn RIGHT at CT-138 E/VOLUNTOWN RD 6.0 mi.
7. Turn RIGHT toward CT-165 W/CT-49 S/BEACH DR/SHETUCKET TURNPIKE 118 ft.
8. Turn RIGHT at CT-165 W/CT-49 S/BEACH DR/SHETUCKET TURNPIKE 187 ft.
9. Take the 1st LEFT onto CT-49 S/PENDLETON HILL RD 2.9 mi.
10. Turn LEFT at GALLUP RD. Destination will be on the LEFT 0.3 mi.

### GENERAL NOTES

1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELCO PARTNERSHIP.

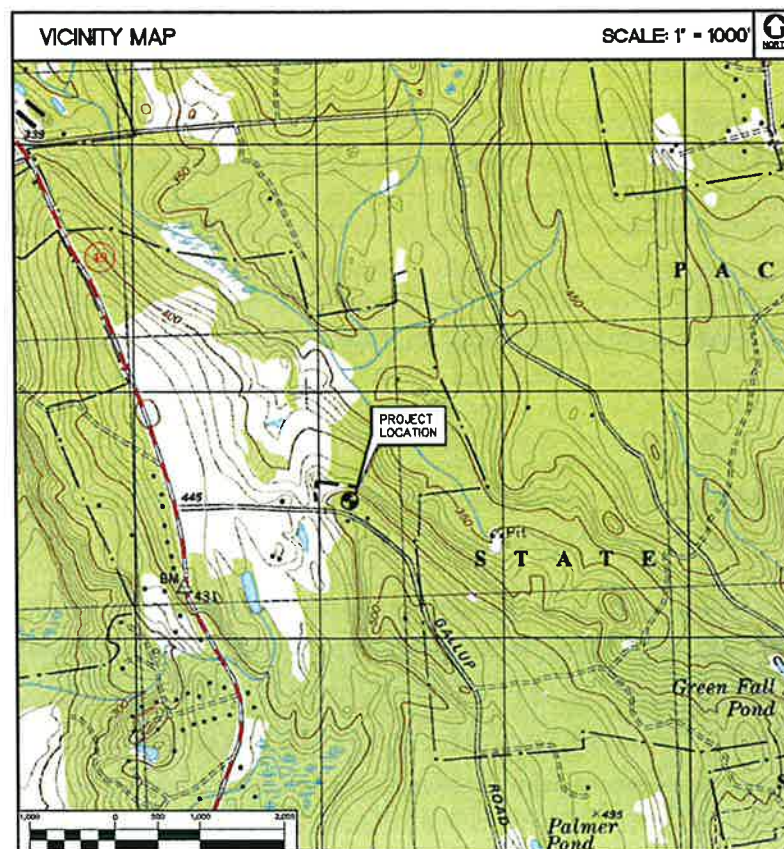
### SITE INFORMATION

THE SCOPE OF WORK SHALL INCLUDE:

1. THE CONSTRUCTION OF A 50'X52' FENCED WIRELESS COMMUNICATIONS COMPOUND WITHIN A 100'X100' LEASE AREA.
2. A TOTAL OF (12) DIRECTIONAL PANEL ANTENNAS ARE PROPOSED TO BE MOUNTED AT A CENTERLINE ELEVATION OF 150'-0"± AGL ON A 150'-0"± PROPOSED STEEL MONOPOLE TOWER.
3. TOTAL ACCESS DRIVE LENGTH IS 30'± OFF OF GALLUP ROAD VIA PROPOSED 12' WIDE GRAVEL ACCESS DRIVE.
4. POWER AND TELCO UTILITIES SHALL BE ROUTED UNDERGROUND FROM EXISTING RESPECTIVE DEMARCS TO THE PROPOSED UTILITY BACKBOARD LOCATED ADJACENT TO THE PROPOSED FENCED COMPOUND. FINAL DEMARC LOCATION AND UTILITY ROUTING TO PROPOSED BACKBOARD WILL BE VERIFIED/DETERMINED BY LOCAL UTILITY COMPANIES. UTILITIES WILL BE ROUTED UNDERGROUND FROM UTILITY BACKBOARD TO THE PROPOSED NOMINAL 12'X30' WIRELESS EQUIPMENT SHELTER LOCATED WITHIN FENCED COMPOUND AREA.
5. THE PROPOSED WIRELESS FACILITY INSTALLATION WILL BE DESIGNED IN ACCORDANCE WITH THE 2003 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT.
6. THERE WILL NOT BE ANY LIGHTING UNLESS REQUIRED BY THE FCC OR THE FAA.
7. THERE WILL NOT BE ANY SIGNS OR ADVERTISING ON THE ANTENNAS OR EQUIPMENT.

### VICINITY MAP

SCALE: 1" = 1000'

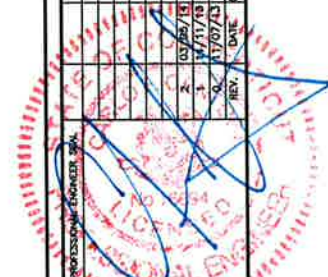


### PROJECT SUMMARY

**SITE NAME:** PALMER POND  
**SITE ADDRESS:** 53 GALLUP ROAD  
VOLUNTOWN, CONNECTICUT 06384  
**PROPERTY OWNER:** BENJAMIN GALLUP & VANNER BYRON  
PO BOX 133  
VOLUNTOWN, CONNECTICUT  
**LESSEE/TENANT:** CELCO PARTNERSHIP  
d.b.a. VERIZON WIRELESS  
99 EAST RIVER DRIVE  
EAST HARTFORD, CT 06108  
**CONTACT PERSON:** SANDY CARTER  
CELCO PARTNERSHIP  
d.b.a. VERIZON WIRELESS  
99 EAST RIVER DRIVE  
EAST HARTFORD, CT 06108  
**TOWER COORDINATES:** LATITUDE 41°-32'-12.140"  
LONGITUDE 71°-49'-45.695"  
PROPOSED GROUND ELEVATION: 462.0'± A.M.S.L.  
COORDINATES AND GROUND ELEVATION BASED ON FAA 1-A  
SURVEY CERTIFICATION AS PREPARED FOR VERIZON  
WIRELESS, BY MARTINEX COUCH AND ASSOCIATES DATED  
NOVEMBER 8, 2013

### SHEET INDEX

SHT. NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	2
C-1.1	SITE PLAN	2
C-1.2	SITE UTILITY PLAN	2
C-2	COMPOUND PLAN AND ELEVATION	2
C-3	SITE CONSTRUCTION, S&E CONTROL NOTES & DETAILS	2
C-4	SITE DETAILS	2
C-5	SITE DETAILS AND ENVIRONMENTAL NOTES	2
C-6	SITE DETAILS AND SHELTER ELEVATIONS	2
C-7	SHELTER FOUND. PLAN, DETAILS AND NOTES	2



Cellco Partnership  
d.b.a. **verizon** wireless

**CENITEK** Engineering  
Cellco Partnership  
2031 488-0350  
2031 488-0357 Fax  
45-2 North Branford Road  
Branford, CT 06405  
www.CenitekEng.com

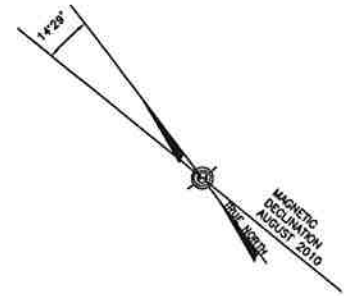
VERIZON WIRELESS  
WIRELESS COMMUNICATIONS FACILITY  
**PALMER POND**  
GALLUP FARM  
53 GALLUP ROAD  
VOLUNTOWN, CT 06384

DATE: 10/11/13  
SCALE: AS NOTED  
JOB NO. 10093

TITLE SHEET

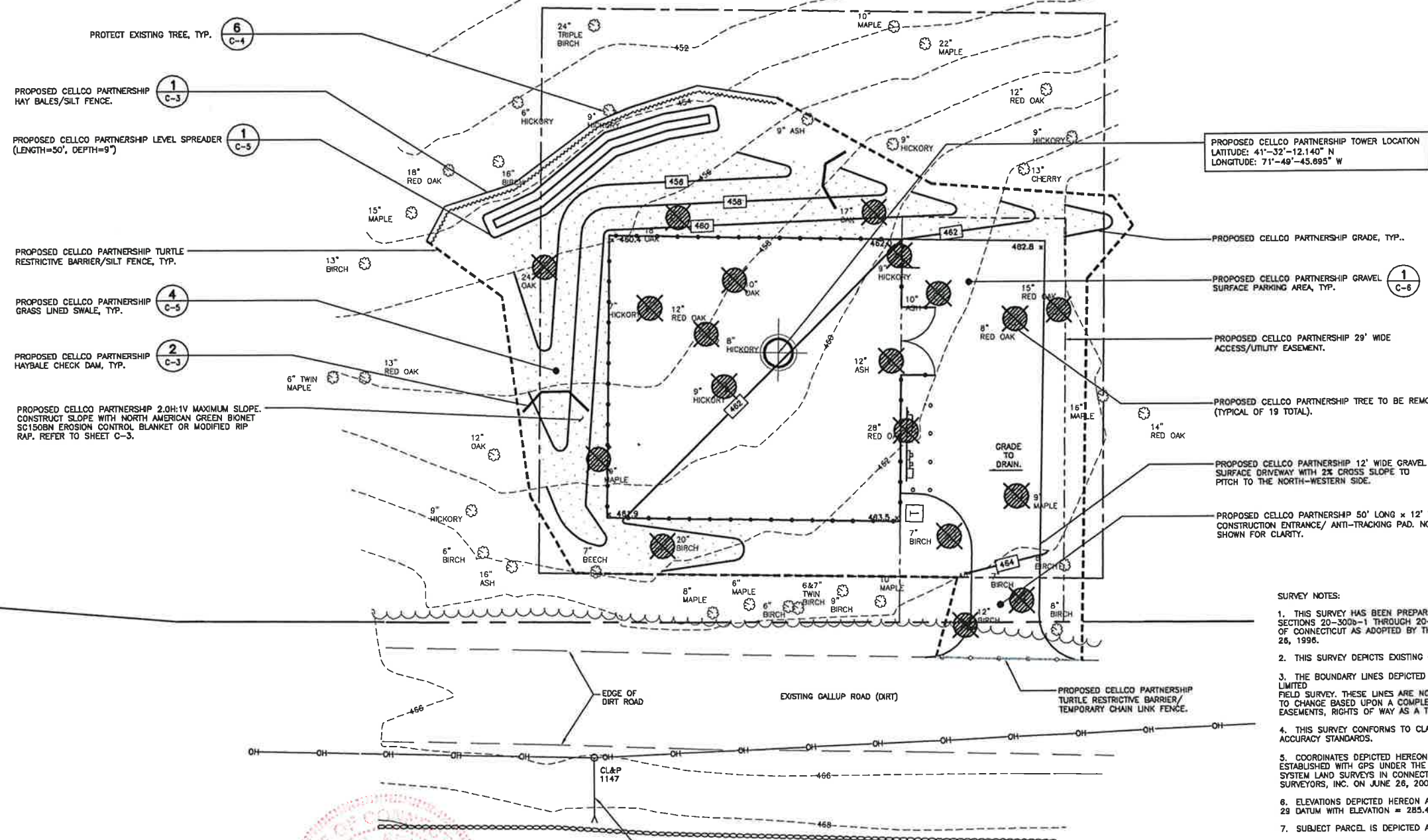
T-1  
Sheet No. 1 of 9

N/F  
BENJAMIN AND BYRON GALLUP  
53 GALLUP ROAD  
VOL. 25 P. 195  
M 14 L 4



SYMBOLS LEGEND	
---	PROPERTY LINE
- - - -	EASEMENT LINE (PROPOSED)
---	DRIVE (EXISTING)
---	ACCESS DRIVE (PROPOSED)
---	LEASE LINE (PROPOSED)
---	CONTOUR LINE
---	GRADING LINE
○	UTILITY POLE
○	EXISTING DECIDUOUS TREE
★	EXISTING CONIFEROUS TREE
⊗	EXISTING DECIDUOUS TREE TO BE REMOVED
⊗	EXISTING CONIFEROUS TREE TO BE REMOVED
⊗	EXISTING DECIDUOUS TREE TO BE PROTECTED DURING CONSTRUCTION
⊗	EXISTING CONIFEROUS TREE TO BE PROTECTED DURING CONSTRUCTION
⊗	SILTATION FENCE/ HAYBALES/ SILTATION FENCE "SANDWICH"
---	SILT FENCE-EROSION & SEDIMENTATION CONTROL
---	FENCE LINE
×	SPOT ELEVATION (PROPOSED)
---	LEASE AREA

ESTIMATED TREE REMOVAL SUMMARY	
TREES PROPOSED TO BE REMOVED IN LOCATION ALONG PROPOSED CELCO PARTNERSHIP 20' WIDE ACCESS EASEMENT	= 8
TREES PROPOSED TO BE REMOVED WITHIN AND AROUND THE PROPOSED CELCO PARTNERSHIP LEASE AREA	= 1
<b>TOTAL TREES PROPOSED TO BE REMOVED</b>	<b>= 9</b>



- 6  
C-4  
PROTECT EXISTING TREE, TYP.
- 1  
C-3  
PROPOSED CELCO PARTNERSHIP HAY BALES/SILT FENCE.
- 1  
C-5  
PROPOSED CELCO PARTNERSHIP LEVEL SPREADER (LENGTH=50', DEPTH=9')
- PROPOSED CELCO PARTNERSHIP TURTLE RESTRICTIVE BARRIER/SILT FENCE, TYP.
- 4  
C-5  
PROPOSED CELCO PARTNERSHIP GRASS LINED SWALE, TYP.
- 2  
C-3  
PROPOSED CELCO PARTNERSHIP HAYBALE CHECK DAM, TYP.
- PROPOSED CELCO PARTNERSHIP 2.0H:1V MAXIMUM SLOPE. CONSTRUCT SLOPE WITH NORTH AMERICAN GREEN BIOMET SC150BN EROSION CONTROL BLANKET OR MODIFIED RIP RAP. REFER TO SHEET C-3.

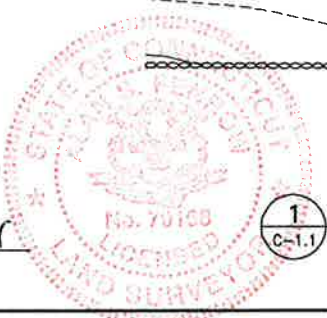
PROPOSED CELCO PARTNERSHIP TOWER LOCATION  
LATITUDE: 41°-32'-12.140" N  
LONGITUDE: 71°-49'-45.895" W

- PROPOSED CELCO PARTNERSHIP GRADE, TYP.
- 1  
C-6  
PROPOSED CELCO PARTNERSHIP GRAVEL SURFACE PARKING AREA, TYP.
- PROPOSED CELCO PARTNERSHIP 29' WIDE ACCESS/UTILITY EASEMENT.
- PROPOSED CELCO PARTNERSHIP TREE TO BE REMOVED (TYPICAL OF 19 TOTAL).
- 1  
C-6  
PROPOSED CELCO PARTNERSHIP 12' WIDE GRAVEL SURFACE DRIVEWAY WITH 2% CROSS SLOPE TO PITCH TO THE NORTH-WESTERN SIDE.
- 3  
C-5  
PROPOSED CELCO PARTNERSHIP 50' LONG x 12' WIDE CONSTRUCTION ENTRANCE/ ANTI-TRACKING PAD. NOT SHOWN FOR CLARITY.

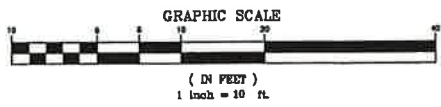
- SURVEY NOTES:
- THIS SURVEY HAS BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON SEPTEMBER 28, 1996.
  - THIS SURVEY DEPICTS EXISTING CONDITIONS FOR A PROPOSED TELECOMMUNICATIONS SITE.
  - THE BOUNDARY LINES DEPICTED (IF ANY) HEREON ARE COMPILED FROM OTHER MAPS, DEEDS, AND A LIMITED FIELD SURVEY. THESE LINES ARE NOT TO BE CONSTRUED AS A BOUNDARY OPINION AND ARE SUBJECT TO CHANGE BASED UPON A COMPLETE BOUNDARY SURVEY. PROPERTY MAY BE SUBJECT TO ENCUMBRANCES, EASEMENTS, RIGHTS OF WAY AS A TITLE SEARCH MAY DISCLOSE.
  - THIS SURVEY CONFORMS TO CLASS D HORIZONTAL ACCURACY STANDARDS AND CLASS T-2 TOPOGRAPHIC ACCURACY STANDARDS.
  - COORDINATES DEPICTED HEREON REFER TO THE CONNECTICUT COORDINATE SYSTEM (NAD 83) ESTABLISHED WITH GPS UNDER THE GUIDELINES AND SPECIFICATIONS FOR GLOBAL NAVIGATION SATELLITE SYSTEM LAND SURVEYS IN CONNECTICUT AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON JUNE 26, 2008.
  - ELEVATIONS DEPICTED HEREON ARE BASED UPON CONNECTICUT GEODETIC SURVEY STATION 1465 NGVD 29 DATUM WITH ELEVATION = 285.492 FEET.
  - SUBJECT PARCEL IS DEPICTED AS LOT 4 ON VOLUNTOWN ASSESSORS MAP 14.
  - SUBJECT PARCEL IS CURRENTLY OWNED BY BENJAMIN AND BYRON GALLUP. VOLUNTOWN LAND RECORDS VOLUME 25 PAGE 195.
  - SUBJECT PARCEL IS IN ZONE X (AREAS DETERMINED TO BE OUTSIDE 500 YEAR FLOOD PLAN), FLOOD INSURANCE RATE MAP TOWN OF VOLUNTOWN, CONNECTICUT NEW LONDON COUNTY PANEL 10 OF 10 COMMUNITY PANEL NUMBER 090143 0010 B EFFECTIVE DATE: JUNE 3, 1998.
  - SUBJECT PARCEL AREA IS ±261.27 ACRES.

MAP REFERENCES:  
1. "PLANIMETRIC DATA AND PROPERTY MAPS 2010 VOLUNTOWN, CONNECTICUT," SCALE: 1"=200' DATED: JANUARY 2010 BY NEW ENGLAND GEOSYSTEMS, GUILFORD, CONNECTICUT. ASSESSOR MAP NUMBER 14.

TO MY KNOWLEDGE AND BELIEF THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON  
THIS MAP IS NOT VALID WITHOUT A LIVE SIGNATURE AND SEAL  
*Alan S. Fenrow* 3/6/14  
ALAN S. FENROW LS #70188 DATE



1  
C-1.1  
SITE PLAN - PROPOSED  
SCALE: 1"=10'



VERIZON WIRELESS  
WIRELESS COMMUNICATIONS FACILITY  
**PALMER POND**  
GALLUP FARM  
53 GALLUP ROAD  
VOLUNTOWN, CT 06384

DATE	10/11/13
SCALE	AS NOTED
JOB NO.	10093

SITE PLAN

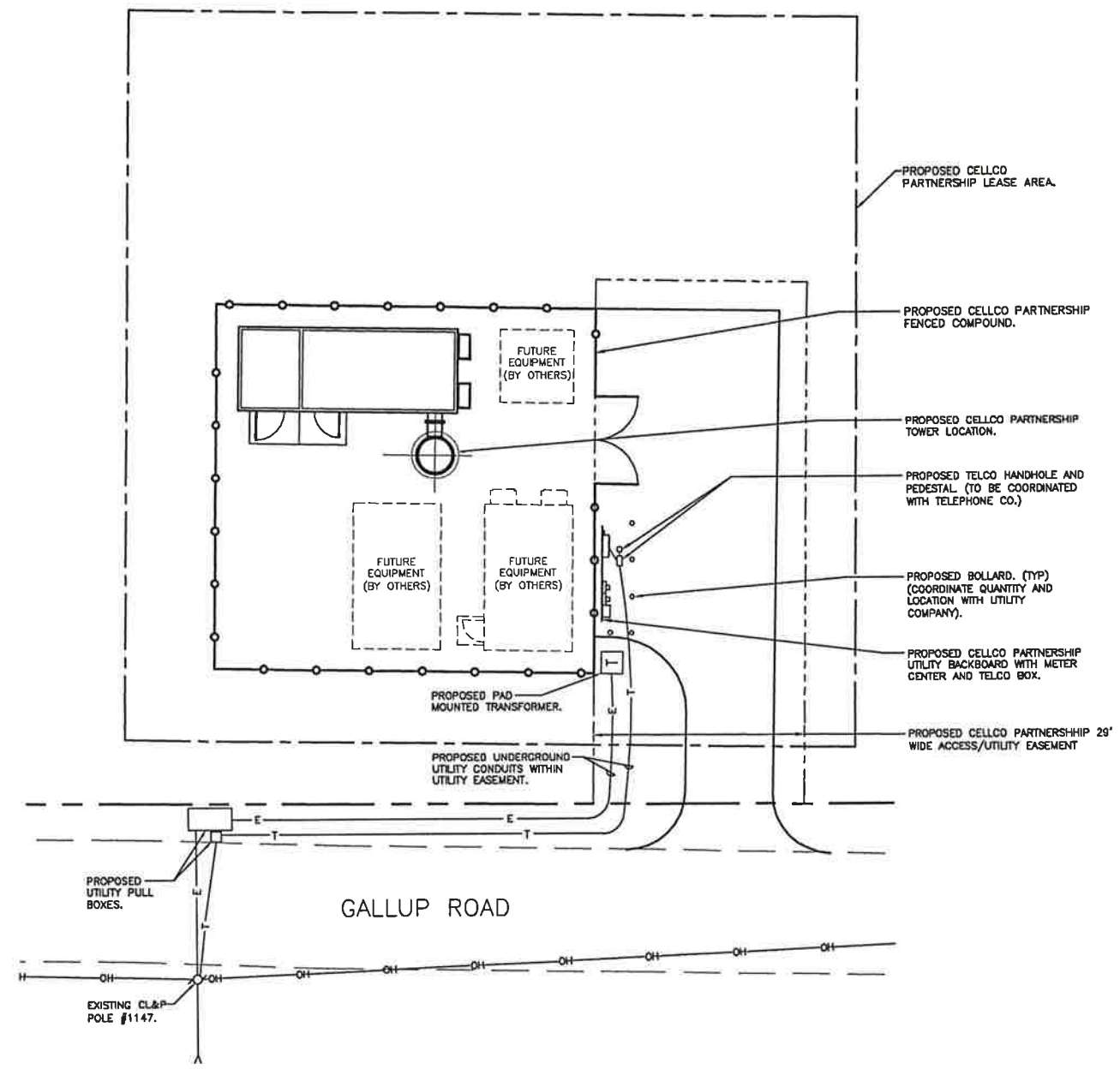
**C-11**  
Sheet No. 2 of 3

**UTILITY NOTES**

1. COORDINATE WITH OWNER FOR ALL EASEMENT DOCUMENTS.
2. UTILITY ROUTING SHOWN ON THIS PLAN IS SCHEMATIC. CONTRACTOR SHALL COORDINATE FINAL ROUTING WITH RESPECTIVE UTILITY COMPANIES PRIOR TO PERFORMING ANY UTILITY TRENCH WORK. ALL UTILITY CONDUITS AND PULL BOXES SHALL BE LOCATED WITHIN THE PROPOSED ACCESS/UTILITY EASEMENT.
3. UTILITY PULL BOXES/SILDS TO BE TRAFFIC RATED AND INSTALLED IN APPROXIMATE LOCATIONS SHOWN ON THIS PLAN, BUT NOT TO EXCEED 450' INTERVALS. CONTRACTOR TO COORDINATE FINAL PULL BOX LOCATIONS WITH RESPECTIVE LOCAL UTILITY COMPANIES.
4. CONTRACTOR SHALL COORDINATE ALL PERMITS AND PROCEDURES FOR CONDUIT INSTALLATION ALONG STREET.
5. PLAN IS FOR UTILITY ROUTING INFORMATION ONLY. SOME OTHER ELEMENTS NOT SHOWN FOR CLARITY. REFER TO CIVIL DRAWINGS FOR ALL OTHER EXISTING AND PROPOSED SITE INFORMATION.

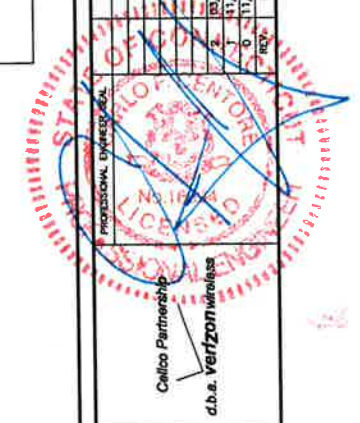
**ELECTRICAL LEGEND**

SYMBOL	DESCRIPTION
-----	PROPERTY LINE
- - - - -	ACCESS/ UTILITY EASEMENT LINE (PROPOSED)
—OH—	UTILITY LINES (OVERHEAD BY UTILITY CO.)
○	UTILITY POLE
—T—T—	UNDERGROUND COMMUNICATION CONDUIT
—E—E—	UNDERGROUND ELECTRICAL CONDUIT AS INDICATED
○—○—	PERIMETER CHAIN LINK FENCE
-----	ROAD



**1** UTILITY ROUTING COMPOUND PLAN  
 C-1.2 SCALE: 1" = 10'

GRAPHIC SCALE  
 ( IN FEET )  
 1 inch = 10 ft



**CEN-TEK** engineering  
 Central in Solution  
 (203) 488-0580  
 (203) 488-8897 Fax  
 652 North Branford Road  
 Branford, CT 06404  
 www.CenTekEng.com

**VERIZON WIRELESS**  
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 GALLUP FARM  
 53 GALLUP ROAD  
 VOLUNTOWN, CT 06384

DATE: 10/11/13  
 SCALE: AS NOTED  
 JOB NO. 10093

SITE UTILITY PLAN

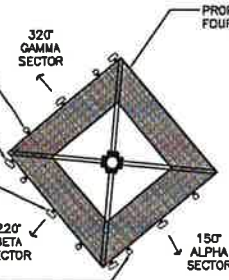
**C-1.2**  
 Sheet No. 1 of 2

PROPOSED CELCO PARTNERSHIP  
OUTER PANEL ANTENNA, TYP. OF A TOTAL  
OF (3), ONE (1) PER SECTOR  
MODEL BXA-171063-12CF  
(DIMS: 72.4"x6.1"Wx4.1"D)

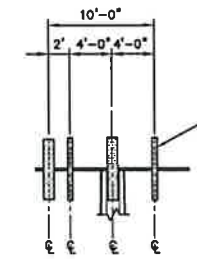
PROPOSED CELCO PARTNERSHIP  
OUTER PANEL ANTENNA, TYP. OF A TOTAL  
OF (3), ONE (1) PER SECTOR  
MODEL BXA-60063-8CF  
(DIMS: 68.6"x11.2"Wx5.3"D)

PROPOSED CELCO PARTNERSHIP  
CENTER PANEL ANTENNA, TYP. OF A  
TOTAL OF (3), ONE (1) PER SECTOR  
MODEL BXA-70063-8CF  
(DIMS: 71.0"x11.2"Wx5.2"D)

PROPOSED CELCO PARTNERSHIP  
INNER PANEL ANTENNA, TYP. OF A  
TOTAL OF (3), ONE (1) PER SECTOR  
MODEL BXA-171063-12CF  
(DIMS: 72.4"x6.1"Wx4.1"D)

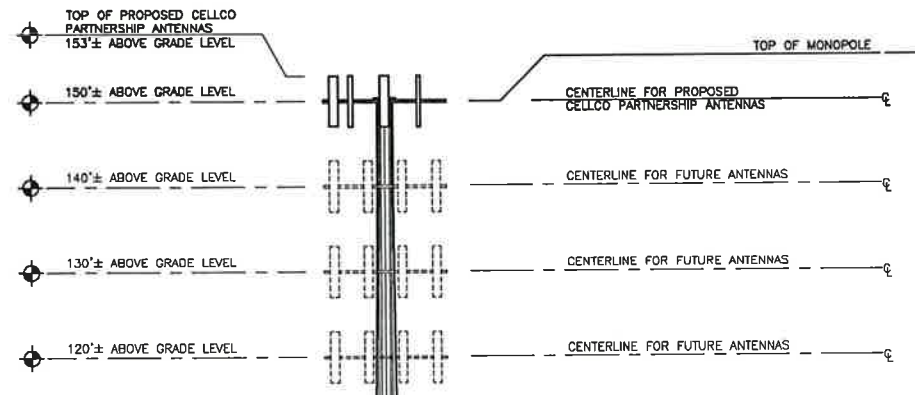


PLAN VIEW



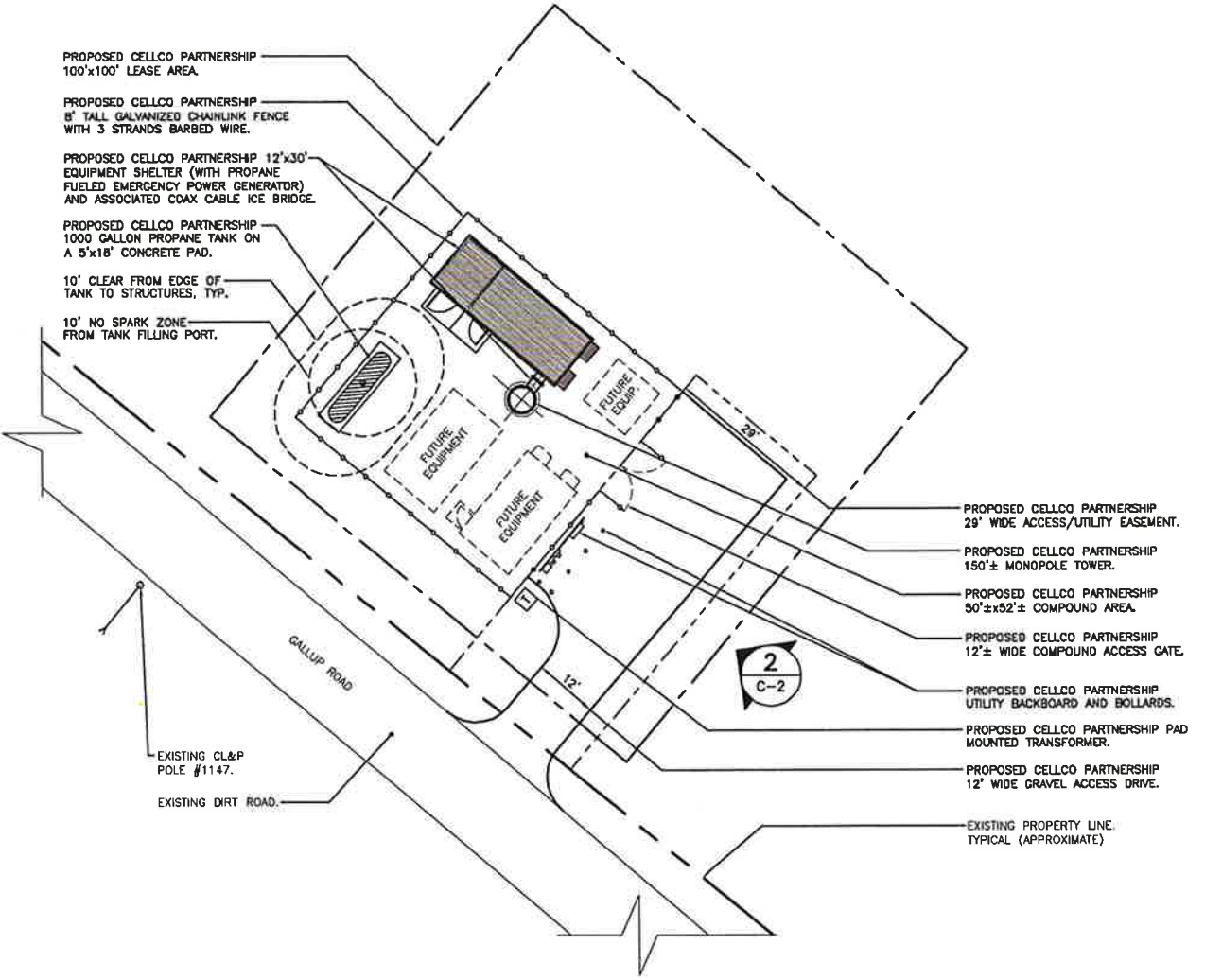
TYPICAL SECTOR ELEVATION

**3 ANTENNA MOUNTING CONFIGURATION**  
C-2 NOT TO SCALE APPROXIMATE NORTH

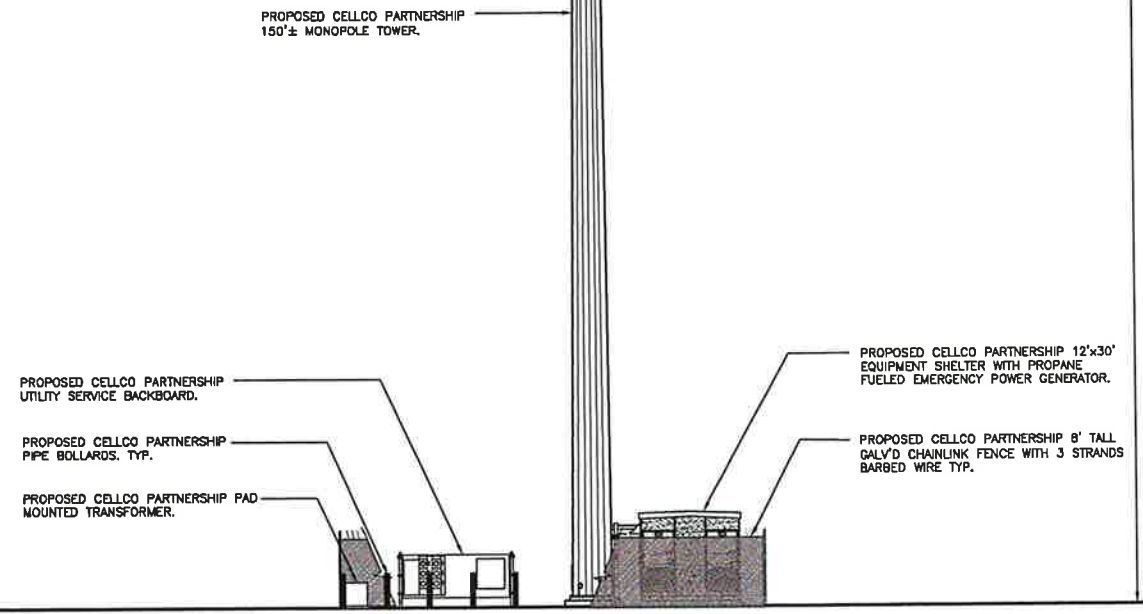
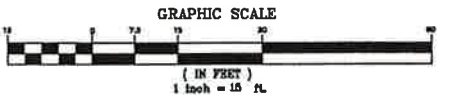


**TOWER AND GEOTECH NOTES:**

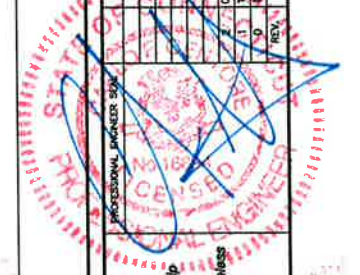
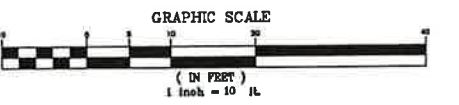
- 150' TALL MONOPOLE TOWER STRUCTURE DESIGNED AND MANUFACTURED BY ENGINEERED ENDEAVORS, INC.
- REFER TO STRUCTURAL DESIGN ANALYSIS OF TOWER AND TOWER FOUNDATION AS PREPARED BY ENGINEERED ENDEAVORS, INC. DATED 02/27/14 (REV. 1) JOB NUMBER: 17125
- REFER TO GEOTECHNICAL EVALUATION AS PREPARED BY DESIGN EARTH TECHNOLOGY (DET), DATED NOVEMBER 29, 2013. DET JOB NO. 2013.13



**1 COMPOUND PLAN**  
C-2 SCALE: 1" = 15' APPROXIMATE NORTH



**2 EAST ELEVATION**  
C-2 SCALE: 1" = 10'



Calico Partnership  
d.b.a. Verizon Wireless

**CENTEX**  
Communications  
1201 468-0081  
Fax: (860) 468-0082  
1432 North Branford Road  
Branford, CT 06405  
www.CentexEng.com

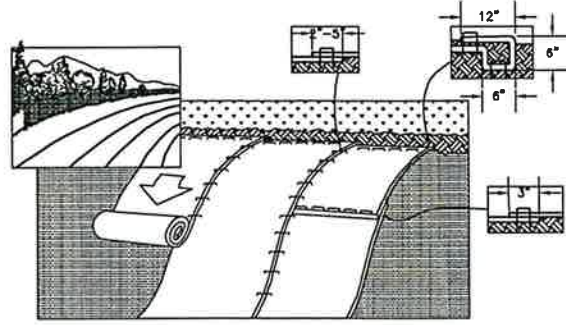
**VERIZON WIRELESS**  
WIRELESS COMMUNICATIONS FACILITY  
**PALMER POND**  
GALLUP FARM  
53 GALLUP ROAD  
VOLLANTOWN, CT 06384

DATE: 10/11/13  
SCALE: AS NOTED  
JOB NO. 10093

COMPOUND  
PLAN AND  
ELEVATION

**C-2**  
Sheet No. 4 of 9





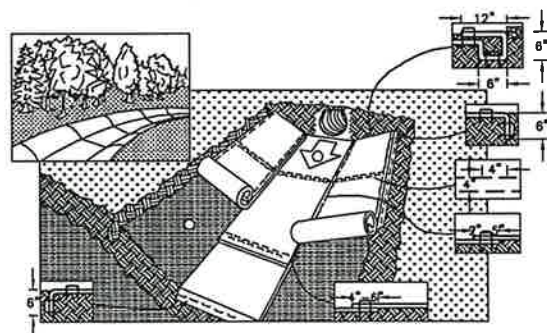
**3** REINFORCEMENT BLANKET INSTALLATION ON SLOPE  
C-3 NOT TO SCALE

**NOTES:**

**1. SLOPE APPLICATIONS:**

- PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-0-SEED DO NOT SEED PREPARED AREA. CELL-0-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
- BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" DEEP BY 12" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE BLANKET.
- ROLL THE BLANKET DOWN OR HORIZONTALLY ACROSS THE SLOPE. BLANKET WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL ROLLED EROSION CONTROL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM™, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
- THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY A 2" - 5" OVERLAP DEPENDING ON BLANKET TYPE.
- CONSECUTIVE ROLLED EROSION CONTROL BLANKET SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SINGLE STYLE) WITH AN APPROXIMATE 3" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART ACROSS ENTIRE BLANKET WIDTH.  
*\*IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY SECURE THE BLANKET.*
- REFER TO MANUFACTURERS STAPLE GUIDE FOR CORRECT STAPLE PATTERN. MINIMUM 4 SPIKES PER ONE SQ. FT.

- THE CONTRACTOR SHALL MAINTAIN THE BLANKET UNTIL ALL WORK ON THE CONTRACT HAS BEEN COMPLETED AND ACCEPTED. MAINTENANCE SHALL CONSIST OF THE REPAIR OF AREAS WHERE DAMAGED BY ANY CAUSE. ALL DAMAGED AREAS SHALL BE REPAIRED TO REESTABLISH THE CONDITIONS AND GRADE OF THE SOIL PRIOR TO APPLICATION OF THE COVERING AND SHALL BE REFERTILIZED, RESEED, AND REMULCHED AS DIRECTED.



**4** REINFORCEMENT BLANKET INSTALLATION IN CHANNEL  
C-3 NOT TO SCALE

**NOTES:**

**1. CHANNEL APPLICATIONS:**

- PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
- BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6" DEEP BY 12" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE BLANKET.
- ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM™, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
- PLACE CONSECUTIVE BLANKETS END OVER END (SHINGLE STYLE) WITH A 4" - 6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE BLANKETS.
- FULL LENGTH EDGE OF BLANKETS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN A 6" DEEP BY 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
- ADJACENT BLANKETS MUST BE OVERLAPPED APPROXIMATELY 2" - 5" AND STAPLED TO ENSURE PROPER SEAM ALIGNMENT. PLACE THE EDGE OF THE OVERLAPPING BLANKET (BLANKET BEING INSTALLED ON TOP) EVEN WITH THE COLORED SEAM STITCH™ ON THE BLANKET BEING OVERLAPPED.
- THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN A 6" DEEP BY 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
- REFER TO MANUFACTURERS STAPLE GUIDE FOR CORRECT STAPLE PATTERN. MINIMUM 4 SPIKES PER ONE SQ. FT. THE CONTRACTOR SHALL MAINTAIN THE BLANKET UNTIL ALL WORK ON THE CONTRACT HAS BEEN COMPLETED AND ACCEPTED. MAINTENANCE SHALL CONSIST OF THE REPAIR OF AREAS WHERE DAMAGED BY ANY CAUSE. ALL DAMAGED AREAS SHALL BE REPAIRED TO REESTABLISH THE CONDITIONS AND GRADE OF THE SOIL PRIOR TO APPLICATION OF THE COVERING AND SHALL BE REFERTILIZED, RESEED, AND REMULCHED AS DIRECTED.

**GENERAL CONSTRUCTION / PRE-CONSTRUCTION NOTES**

- PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES, A MANDATORY ON-SITE PRE-CONSTRUCTION MEETING SHALL BE CONDUCTED WITH THE VERIZON WIRELESS CONSTRUCTION MANAGER, CONTRACTOR'S CONSTRUCTION MANAGER, THE PROJECT EROSION AND SEDIMENTATION CONTROL/ENVIRONMENTAL MONITOR AND THE ENGINEER OF RECORD.
- THE SOUTHERN PROPERTY LINE ADJACENT TO THE PROPOSED ACCESS DRIVE IS STAKED IN FIELD. THE CONTRACTOR SHALL MAINTAIN THE PROPERTY LINE STAKE LOCATIONS DURING THE ENTIRE PERIOD OF CONSTRUCTION. ALL CONSTRUCTION ACTIVITIES SHALL BE CONDUCTED ON THE SUBJECT PROPERTY.

**GENERAL CONSTRUCTION SEQUENCE**

THIS IS A GENERAL CONSTRUCTION SEQUENCE OUTLINE SOME ITEMS OF WHICH MAY NOT APPLY TO PARTICULAR SITES.

- CUT AND STUMP AREAS OF PROPOSED CONSTRUCTION.
- INSTALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES AS REQUIRED.
- REMOVE AND STOCKPILE TOPSOIL. STOCKPILE SHALL BE SEED TO PREVENT EROSION.
- CONSTRUCT CLOSED DRAINAGE SYSTEM. PRECEPT CULVERT INLETS AND CATCH BASINS WITH SEDIMENTATION BARRIERS.
- CONSTRUCT ROADWAYS AND PERFORM SITE GRADING, PLACING HAY BALES AND SILTATION FENCES AS REQUIRED TO CONTROL SOIL EROSION.
- INSTALL UNDERGROUND UTILITIES.
- BEGIN TEMPORARY AND PERMANENT SEEDING AND MULCHING. ALL CUT AND FILL SLOPES SHALL BE SEED OR MULCHED IMMEDIATELY AFTER THEIR CONSTRUCTION. NO AREA SHALL BE LEFT UNSTABILIZED FOR A TIME PERIOD OF MORE THAN 30 DAYS.
- DAILY, OR AS REQUIRED, CONSTRUCT, INSPECT, AND IF NECESSARY, RECONSTRUCT TEMPORARY BERMS, DRAINS, DITCHES, SILT FENCES AND SEDIMENT TRAPS INCLUDING MULCHING AND SEEDING.
- BEGIN EXCAVATION FOR AND CONSTRUCTION OF TOWERS AND PLATFORMS.
- FINISH PAVING ALL ROADWAYS, DRIVES, AND PARKING AREAS.
- COMPLETE PERMANENT SEEDING AND LANDSCAPING.
- NO FLOW SHALL BE DIVERTED TO ANY WETLANDS UNTIL A HEALTHY STAND OF GRASS HAS BEEN ESTABLISHED IN REGARDED AREAS.
- AFTER GRASS HAS BEEN FULLY GERMINATED IN ALL SEEDING AREAS, REMOVE ALL TEMPORARY EROSION CONTROL MEASURES.

**SOIL EROSION AND SEDIMENT CONTROL SEQUENCE**

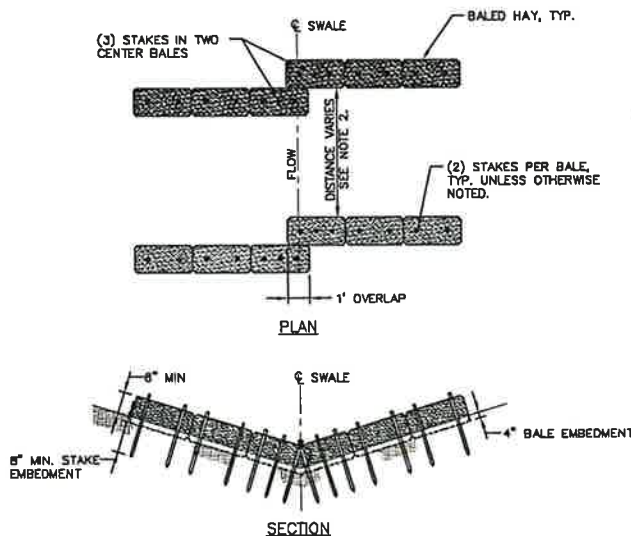
- ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES, SUCH AS CONSTRUCTION ENTRANCE / ANTI TRACKING PAD, SILTATION FENCE, AND SILTATION FENCE / HAY BALE SHALL BE IN PLACE PRIOR TO ANY GRADING ACTIVITY. INSTALLATION OF PROPOSED STRUCTURES OR UTILITIES. MEASURES SHALL BE LEFT IN PLACE AND MAINTAINED UNTIL CONSTRUCTION IS COMPLETED AND/OR AREA IS STABILIZED.
- THE ENTRANCE TO THE PROJECT SITE IS TO BE PROTECTED BY STONE ANTI TRACKING PAD OF ASTM C-33, SIZE NO. 2 OR 3, OR D.O.T. 2" CRUSHED GRAVEL. THE STONE ANTI TRACKING PAD IS TO BE MAINTAINED AT ALL TIMES DURING THE CONSTRUCTION PERIOD.
- THE ENTRANCE TO THE PROJECT SITE IS TO BE PROTECTED BY STONE ANTI TRACKING PAD OF ASTM C-33, SIZE NO. 2 OR 3, OR D.O.T. 2" CRUSHED GRAVEL. THE STONE ANTI TRACKING PAD IS TO BE MAINTAINED AT ALL TIMES DURING THE CONSTRUCTION PERIOD.
- LAND DISTURBANCE WILL BE KEPT TO A MINIMUM AND RESTABILIZATIONS WILL BE SCHEDULED AS SOON AS PRACTICAL.
- ALL SOIL EROSION AND SEDIMENT CONTROL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE CONNECTICUT GUIDELINES FOR EROSION AND SEDIMENT CONTROL INCLUDING THE LATEST DATE FROM THE COUNCIL ON SOIL AND WATER CONSERVATION.
- ANY ADDITIONAL EROSION/SEDIMENTATION CONTROL DEEMED NECESSARY BY TOWN STAFF DURING CONSTRUCTION, SHALL BE INSTALLED BY THE DEVELOPER. IN ADDITION, THE DEVELOPER SHALL BE RESPONSIBLE FOR THE REPAIR/REPLACEMENT/MAINTENANCE OF ALL EROSION CONTROL MEASURES UNTIL ALL DISTURBED AREAS ARE STABILIZED TO THE SATISFACTION OF THE TOWN STAFF.
- IN ALL AREAS, REMOVAL OF TREES, BUSHES AND OTHER VEGETATION AS WELL AS DISTURBANCE OF THE SOIL IS TO BE KEPT TO AN ABSOLUTE MINIMUM WHILE ALLOWING PROPER DEVELOPMENT OF THE SITE. DURING CONSTRUCTION, EXPOSE AS SMALL AN AREA OF SOIL AS POSSIBLE FOR AS SHORT A TIME AS POSSIBLE.
- SILTATION FENCE SHALL BE PLACED AS INDICATED BEFORE A CUT SLOPE HAS BEEN CREATED. SEDIMENT DEPOSITS SHOULD BE PERIODICALLY REMOVED FROM THE UPSTREAM SIDES OF SILTATION FENCE. THIS MATERIAL IS TO BE SPREAD AND STABILIZED IN AREAS NOT SUBJECT TO EROSION, OR TO BE USED IN AREAS WHICH ARE NOT TO BE PAVED OR BUILT ON. SILTATION FENCE IS TO BE REPLACED AS NECESSARY TO PROVIDE PROPER FILTERING ACTION. THE FENCE IS TO REMAIN IN PLACE AND BE MAINTAINED TO INSURE EFFICIENT SILTATION CONTROL UNTIL ALL AREAS ABOVE THE EROSION CHECKS ARE STABILIZED AND VEGETATION HAS BEEN ESTABLISHED.
- SWALE DISCHARGE AREA WILL BE PROTECTED WITH RIP RAP SPLASH PAD/ ENERGY DISSIPATER.
- ALL FILL AREAS SHALL BE COMPACTED SUFFICIENTLY FOR THEIR INTENDED PURPOSE AND AS REQUIRED TO REDUCE SLIPPING, EROSION OR EXCESS SATURATION.
- THE SOIL SHALL NOT BE PLACED WHILE IN A FROZEN OR MUDDY CONDITION, WHEN THE SUBGRADE IS EXCESSIVELY WET, OR IN A CONDITION THAT MAY OTHERWISE BE DETRIMENTAL TO PROPER GRADING OR PROPOSED SODDING OR SEEDING.
- AFTER CONSTRUCTION IS COMPLETE AND GROUND IS STABLE, REMOVE SILTS IN THE RIP RAP ENERGY DISSIPATERS. REMOVE OTHER EROSION AND SEDIMENT DEVICES.

**CONSTRUCTION SPECIFICATIONS - SILT FENCE**

- THE GEOTEXTILE FABRIC SHALL MEET THE DESIGN CRITERIA FOR SILT FENCES.
- THE FABRIC SHALL BE EMBEDDED A MINIMUM OF 8 INCHES INTO THE GROUND AND THE SOIL COMPACTED OVER THE EMBEDDED FABRIC.
- WOVEN WIRE FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES OR STAPLES.
- FILTER CLOTH SHALL BE FASTENED SECURELY TO THE WOVEN WIRE FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP, MID-SECTION AND BOTTOM.
- WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 8 INCHES, FOLDED, AND STAPLED.
- FENCE POSTS SHALL BE A MINIMUM OF 36 INCHES LONG AND DRIVEN A MINIMUM OF 16 INCHES INTO THE GROUND. WOOD POSTS SHALL BE OF SOUND QUALITY HARDWOOD AND SHALL HAVE A MINIMUM CROSS SECTIONAL AREA OF 3.0 SQUARE INCHES.
- MAINTENANCE SHALL BE PERFORMED AS NEEDED TO PREVENT BUILD UP IN THE SILT FENCE DUE TO DEPOSITION OF SEDIMENT.

**MAINTENANCE - SILT FENCE**

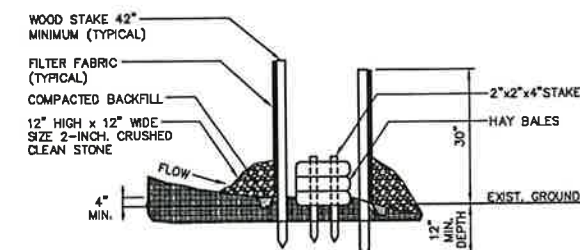
- SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REPAIRS THAT ARE REQUIRED SHALL BE MADE IMMEDIATELY.
- IF THE FABRIC ON A SILT FENCE SHOULD DECOMPOSE OR BECOME INEFFECTIVE DURING THE EXPECTED LIFE OF THE FENCE, THE FABRIC SHALL BE REPLACED PROMPTLY.
- SEDIMENT SHOULD BE INSPECTED AFTER EVERY STORM EVENT. THE DEPOSITS SHOULD BE REMOVED WHEN THEY REACHED APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
- SEDIMENT DEPOSITS THAT ARE REMOVED OR LEFT IN PLACE AFTER THE FABRIC HAS BEEN REMOVED SHALL BE GRADED TO CONFORM WITH THE EXISTING TOPOGRAPHY AND VEGETATED.



**NOTES:**

- CHECKDAM SHALL BE INSTALLED IN LOCATIONS INDICATED ON SITE PLAN (SHEET C-1.1) IN DRAINAGE SWALE WITH BED WIDTHS OF 2 FEET OR LESS.
- THE DISTANCE BETWEEN HAYBALE CHECKDAMS SHALL BE DETERMINED BY THE SLOPE OF THE SWALE. CHECKDAMS SHALL BE SET AT EVERY 2 FEET DROP IN SWALE ELEVATION.
- BALES SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND REPAIR OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.
- INSTALL 3 STAKES PER BALE WITHIN SWALE BED AREAS.
- HAYBALES CAN BE SUBSTITUTED WITH EITHER STRAW WATTLE OR COMPOST SOCK/FILTER (E.G., SILTSOXX™ OR APPROVED EQUIVALENT).

**2** TYP. HAYBALE CHECKDAM  
C-3 NOT TO SCALE (NARROW SWALE)



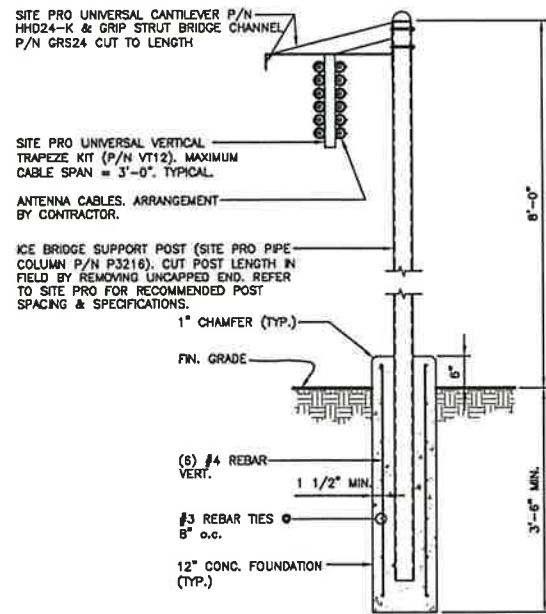
**1** SILTATION FENCE/HAY BALE SILTATION FENCE "SANDWICH" EROSION CONTROL  
C-3 NOT TO SCALE

**VERIZON WIRELESS**  
WIRELESS COMMUNICATIONS FACILITY  
**PALMER POND**  
GALLUP FARM  
53 GALLUP ROAD  
VOLLTOWN, CT 06384

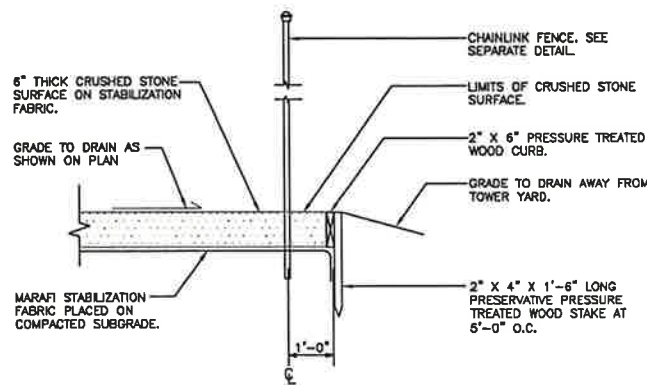
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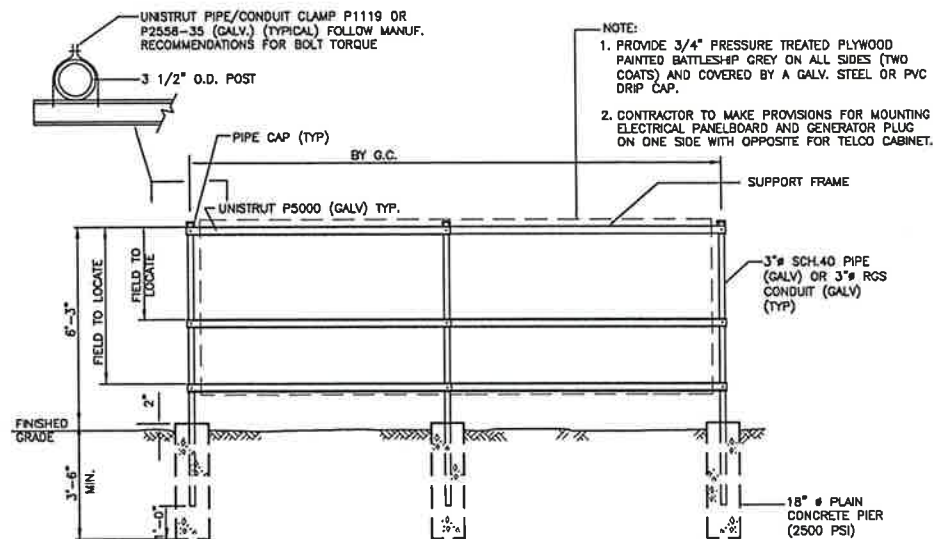
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10093 <td>JOB NO.</td>	JOB NO.
SITE CONSTRUCTION S&E CONTROL NOTES & DETAILS	
<b>C-3</b>	
Sheet No. 3 of 3	



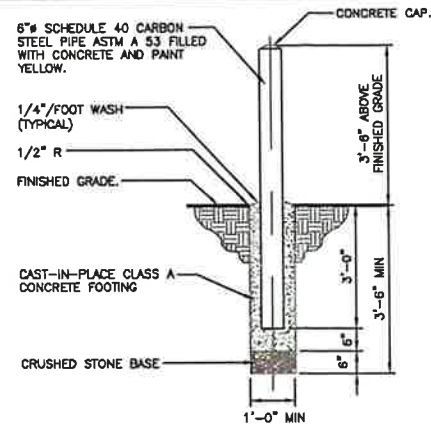
**1 ICE BRIDGE DETAIL**  
C-4 NOT TO SCALE



**5 COMPOUND SURFACING DETAIL**  
C-4 NOT TO SCALE



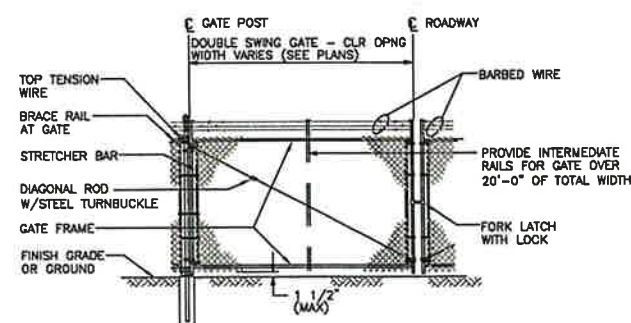
**3 UTILITY SUPPORT FRAME (TYP)**  
C-4 NOT TO SCALE



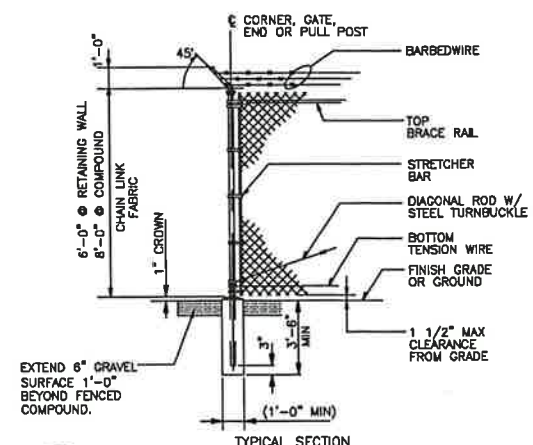
**2 BOLLARD DETAIL**  
C-4 NOT TO SCALE

**WOVEN WIRE FENCE NOTES**

- GATE POST, CORNER, TERMINAL OR PULL POST 2 1/2" # SCHEDULE 40 FOR GATE WIDTHS UP THRU 6 FEET OR 12 FEET FOR DOUBLE SWING GATE PER ASTM-F1083.
- LINE POST: 2" # SCHEDULE 40 PIPE PER ASTM-F1083.
- GATE FRAME: 1 1/2" # SCHEDULE 40 PIPE PER ASTM-F1083.
- TOP RAIL & BRACE RAIL: 1 1/2" # SCHEDULE 40 PIPE PER ASTM-F1083.
- FABRIC: 12 GA. CORE WIRE SIZE 2" MESH, CONFORMING TO ASTM-A392.
- TIE WIRE: MINIMUM 11 GA. GALVANIZED STEEL AT POSTS AND RAILS A SINGLE WRAP OF FABRIC TIE AND AT TENSION WIRE BY HOG RINGS SPACED MAX 24" INTERVALS.
- TENSION WIRE: 7 GA. GALVANIZED STEEL.
- BARBED WIRE: DOUBLE STRAND 12-1/2" O.D. TWISTED WIRE TO MATCH W/FABRIC 14 GA. 4 PT. BARBS SPACED ON APPROXIMATELY 5" CENTERS.
- GATE LATCH: DROP DOWN LOCKABLE FORK LATCH AND LOCK, KEYED ALIKE FOR ALL SITES IN A GIVEN MTA.
- LOCAL ORDINANCE OF BARBED WIRE PERMIT REQUIREMENT SHALL BE COMPLIED WITH IF REQUIRED.
- COMPOUND FENCE HEIGHT = 8' VERTICAL + 1' BARBED WIRE VERTICAL DIMENSION.
- SAFETY FENCE HEIGHT = 6' VERTICAL DIMENSION (NO BARBED WIRE REQUIRED).



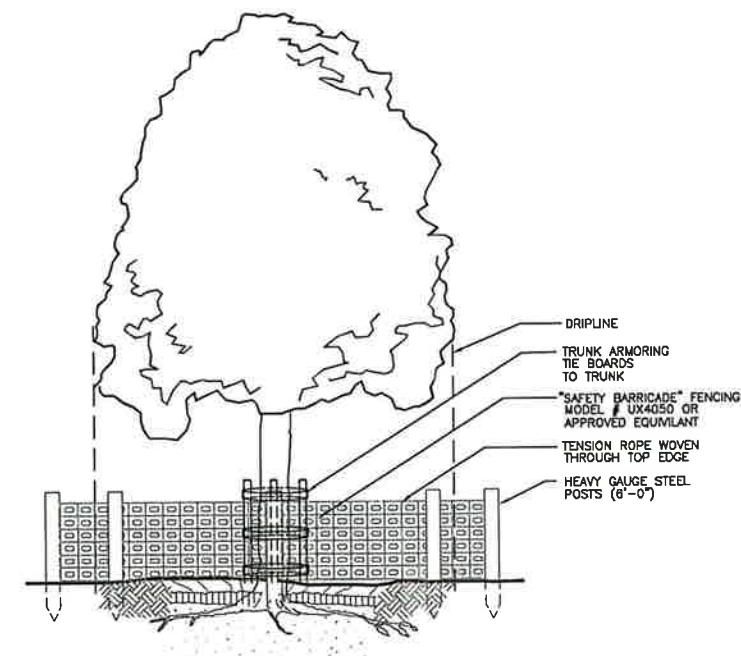
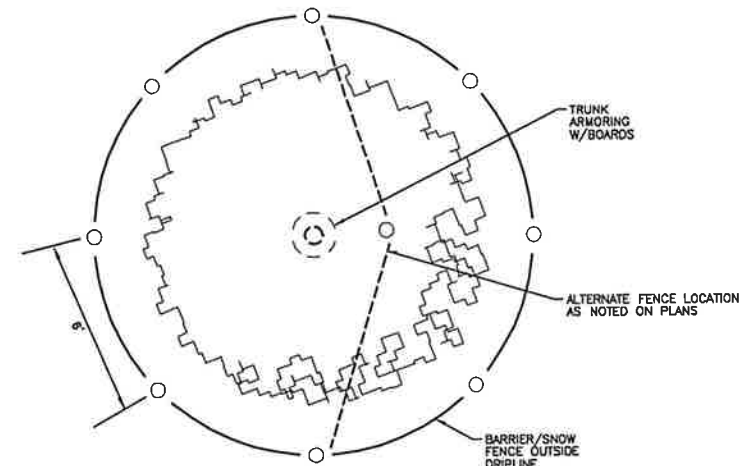
**4A WOVEN WIRE SWING GATE-DOUBLE**  
C-4 NOT TO SCALE



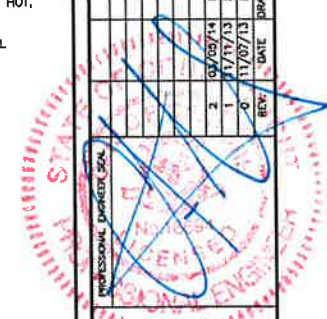
**4 WOVEN WIRE FENCE DETAIL**  
C-4 NOT TO SCALE

**TREE PROTECTION NOTES**

- ALL TREES SHOWN TO BE RETAINED WITHIN THE LIMITS OF CONSTRUCTION ON THE PLANS, SHALL BE PROTECTED DURING CONSTRUCTION WITH FENCING.
- TREE PROTECTION FENCES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITE PREPARATION WORK (CLEARING, GRUBBING, OR GRADING) AND SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
- FENCES SHALL COMPLETELY SURROUND THE TREE OR CLUSTERS OF TREES, LOCATED AT THE OUTERMOST LIMITS OF THE TREE BRANCHES (DRIPLINE) OR CRITICAL ROOT ZONE, WHICHEVER IS GREATER; AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROJECT IN ORDER TO PREVENT THE FOLLOWING:  
3A. SOIL COMPACTION IN CRITICAL ROOT ZONE AREA RESULTING FROM STORAGE OF EQUIPMENT OR MATERIAL.  
3B. CRITICAL ROOT ZONE DISTURBANCES DUE TO GRADE CHANGES OR TRENCHING.  
3C. WOUNDS TO EXPOSED ROOTS, TRUNK, OR LIMBS BY MECHANICAL EQUIPMENT  
3D. OTHER ACTIVITIES DETRIMENTAL TO TREES SUCH AS CONCRETE TRUCK CLEANING, AND FIRES.
- WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN A FENCE THAT IS CLOSER THAN 5 FEET TO A TREE TRUNK, THE TRUNK SHALL BE PROTECTED BY STRAPPED-ON PLANKING TO A HEIGHT OF 8 FEET (OR TO THE LIMITS OF LOWER BRANCHING) IN ADDITION TO THE REDUCED FENCING PROVIDED.
- WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN AREAS OF UNPROTECTED ROOT ZONES UNDER THE DRIPLINE OR CRITICAL ROOT ZONE WHICHEVER IS GREATER, THOSE AREAS SHOULD BE COVERED WITH 4 INCHES OF ORGANIC MULCH TO MINIMIZE SOIL COMPACTION.
- ALL GRADING WITHIN CRITICAL ROOT ZONE AREAS SHALL BE DONE BY HAND OR WITH SMALL EQUIPMENT TO MINIMIZE ROOT DAMAGE. PRIOR TO GRADING, RELOCATE PROTECTIVE FENCING TO 2 FEET BEHIND THE GRADE
- ANY ROOTS EXPOSED BY CONSTRUCTION ACTIVITY SHALL BE PRUNED FLUSH WITH THE SOIL AND BACKFILLED WITH GOOD QUALITY TOP SOIL WITHIN TWO DAYS. IF EXPOSED ROOT AREAS CANNOT BE BACKFILLED WITHIN 2 DAYS, AN ORGANIC MATERIAL WHICH REDUCES SOIL TEMPERATURE AND MINIMIZES WATER LOSS DUE TO EVAPORATION SHALL BE PLACED TO COVER THE ROOTS UNTIL BACKFILL CAN OCCUR.
- PRIOR TO EXCAVATION OR GRADE CUTTING WITHIN TREE DRIPLENS, A CLEAN CUT SHALL BE MADE WITH A ROCK SAW OR SIMILAR EQUIPMENT, IN A LOCATION AND TO A DEPTH APPROVED BY THE FORESTRY MANAGER, TO MINIMIZE DAMAGE TO REMAINING ROOTS.
- TREES MOST HEAVILY IMPACTED BY CONSTRUCTION ACTIVITIES WILL BE WATERED DEEPLY ONCE A WEEK DURING PERIODS OF HOT, DRY WEATHER. TREE CROWNS ARE TO BE SPRAYED WITH WATER PERIODICALLY TO REDUCE DUST ACCUMULATION ON LEAVES.
- NO LANDSCAPE TOPSOIL DRESSING GREATER THAN FOUR (4) INCHES SHALL BE PERMITTED WITHIN THE DRIPLINE OR CRITICAL ROOT ZONE OF TREES, WHICHEVER IS GREATER. NO TOPSOIL IS PERMITTED ON ROOT FLARES OF ANY TREE.



**6 TREE PROTECTION DETAIL**  
C-4 NOT TO SCALE



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**VERIZON WIRELESS**  
WIRELESS COMMUNICATIONS FACILITY

**PALMER POND**

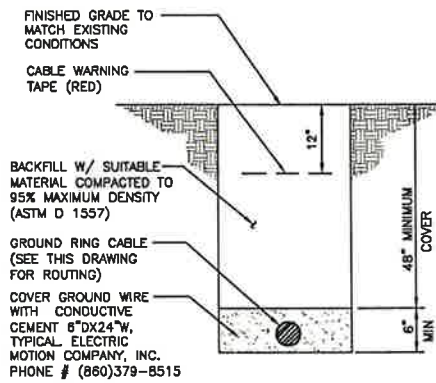
GALLUP FARM  
53 GALLUP ROAD  
VOLLANTOWN, CT 06384

DATE: 10/11/13  
SCALE: AS NOTED  
JOB NO. 10093

SITE DETAILS

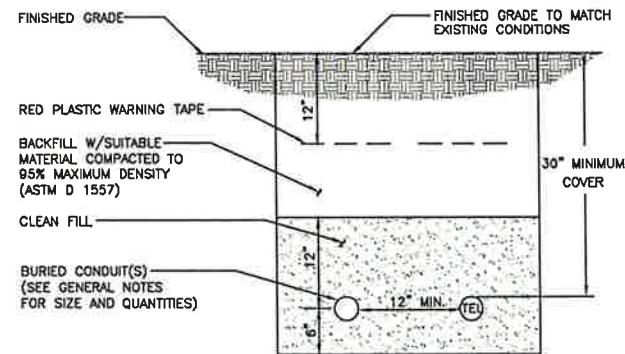
**C-4**  
Sheet No. 4 of 4





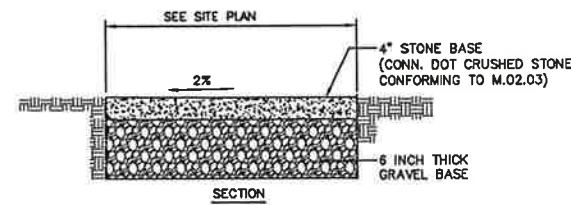
- NOTES:**
- BACK FILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
  - WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.

**7 TYPICAL BURIAL GROUND CABLE DETAIL**  
C-6 NOT TO SCALE

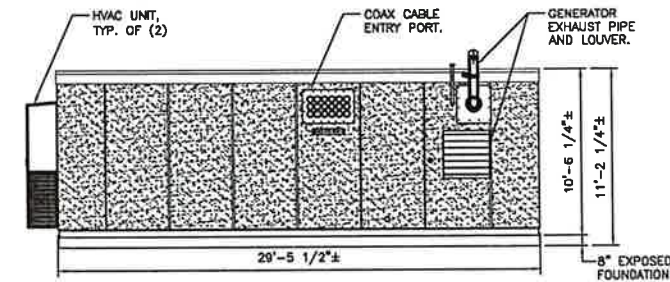


- NOTES:**
- THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
  - WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.

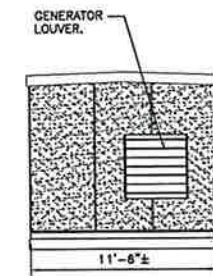
**6 TYPICAL ELECTRICAL/TEL TRENCH DETAIL**  
C-6 NOT TO SCALE



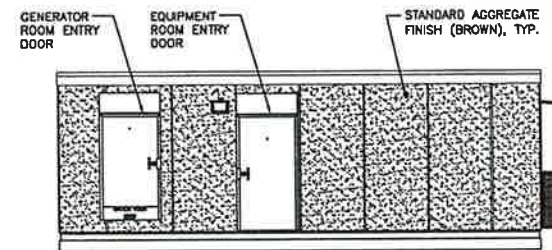
**1 GRAVEL SURFACE PARKING AREA AND ACCESS DRIVE**  
C-6 NOT TO SCALE



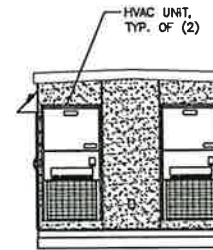
**3 NORTHERN SHELTER ELEVATION**  
C-6 SCALE: 3/16" = 1'-0"



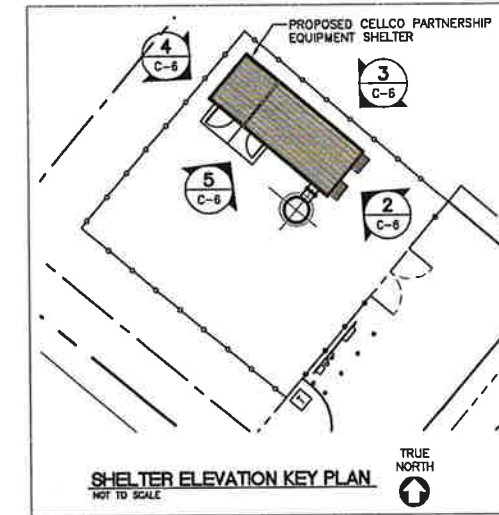
**4 WESTERN SHELTER ELEVATION**  
C-6 SCALE: 3/16" = 1'-0"



**5 SOUTHERN SHELTER ELEVATION**  
C-6 SCALE: 3/16" = 1'-0"



**2 EASTERN SHELTER ELEVATION**  
C-6 SCALE: 3/16" = 1'-0"



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**CEN-TEK**  
Engineering  
(203) 488-0380  
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68-2 North Street Road  
Branford, CT 06405  
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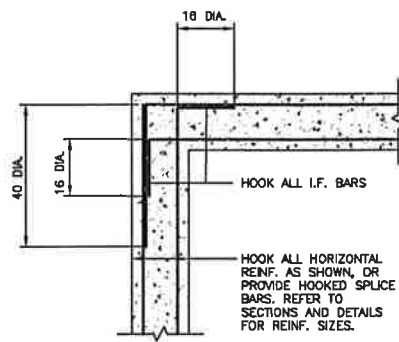
VERIZON WIRELESS  
WIRELESS COMMUNICATIONS FACILITY  
**PALMER POND**  
GALLUP FARM  
53 GALLUP ROAD  
VOLLTOWN, CT 06384

DATE: 10/11/13  
SCALE: AS NOTED  
JOB NO. 10093

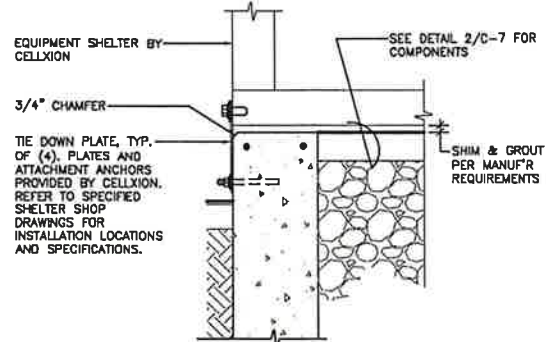
SITE DETAILS  
AND SHELTER  
ELEVATIONS

**C-6**  
Sheet No. 3 of 3

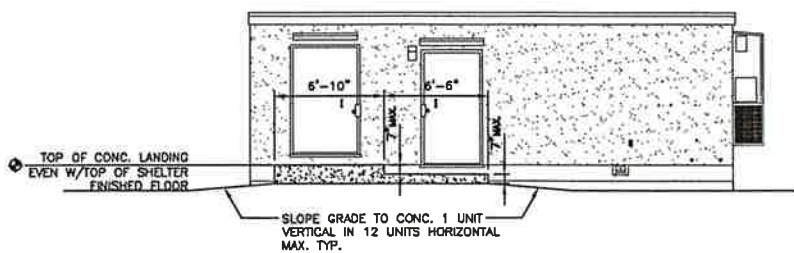
NO.	DATE	BY	DESCRIPTION
1	11/20/13	HR	DAM PLANS - ISSUED FOR CLIENT REVIEW
2	07/05/14	HR	DAM PLANS - PHASE 2 (FINAL)
3	11/21/13	HR	DAM PLANS
4	11/20/13	HR	DAM PLANS
5	11/20/13	HR	DAM PLANS



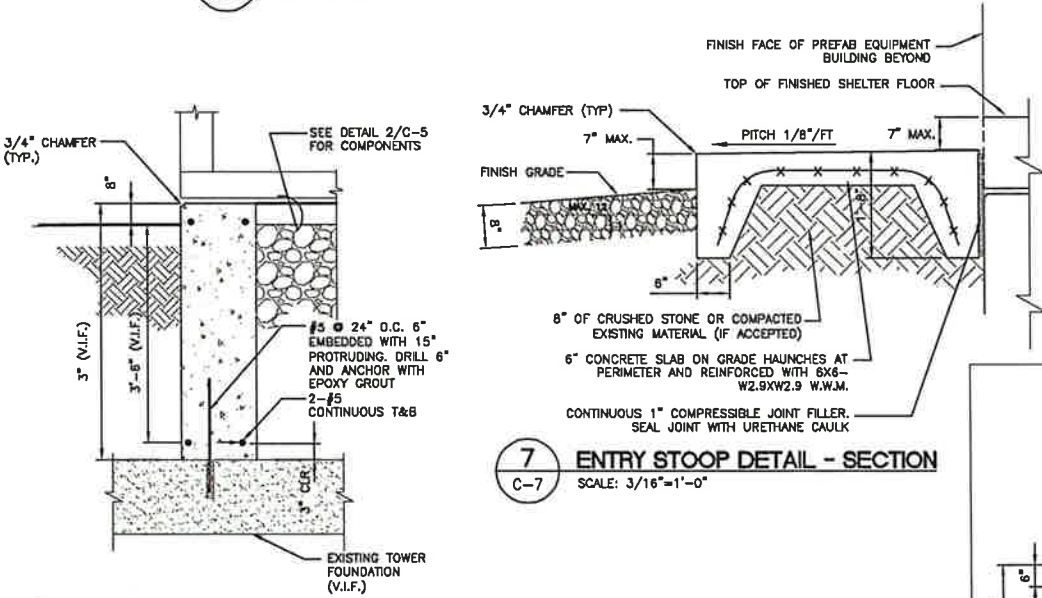
**3 PLAN DETAIL**  
C-7 NOT TO SCALE



**4 BUILDING TIE DOWN**  
C-7 SCALE: 1/4"=1'-0"



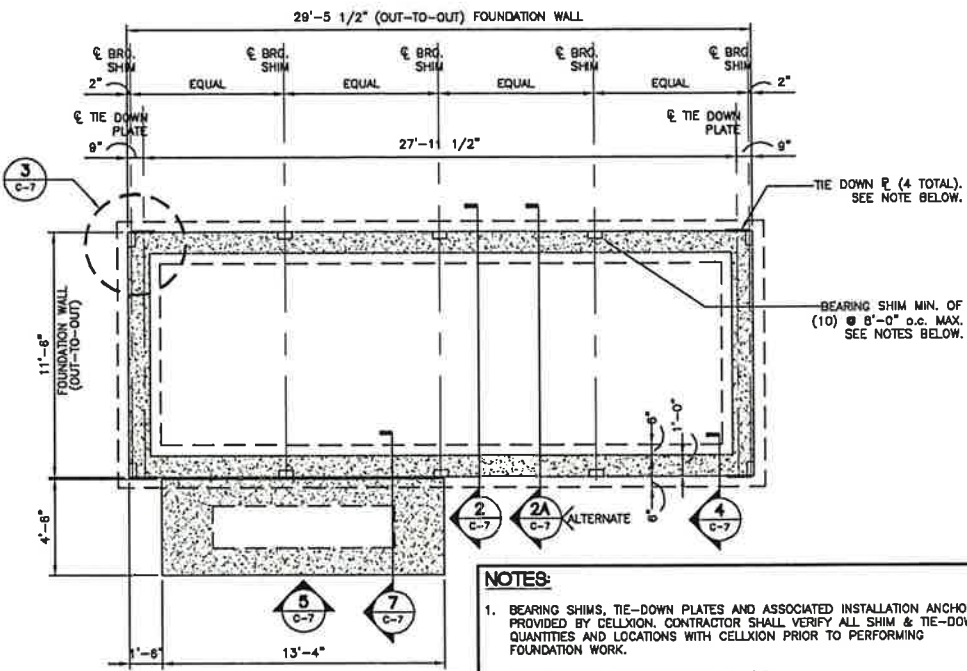
**5 ENTRY STOOP DETAIL - ELEVATION**  
C-7 SCALE: 3/16"=1'-0"



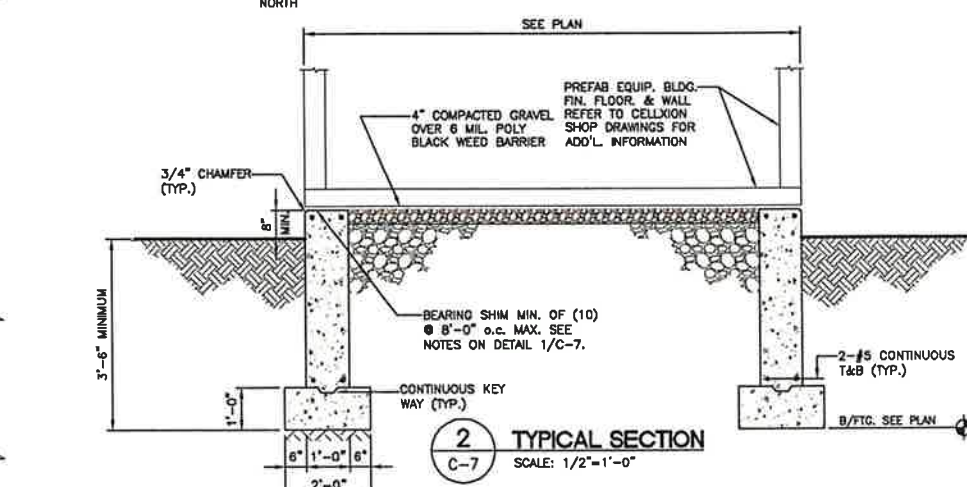
**7 ENTRY STOOP DETAIL - SECTION**  
C-7 SCALE: 3/16"=1'-0"

**6 FOUNDATION OVER TOWER FOUNDATION**  
C-7 SCALE: 3/4"=1'-0"

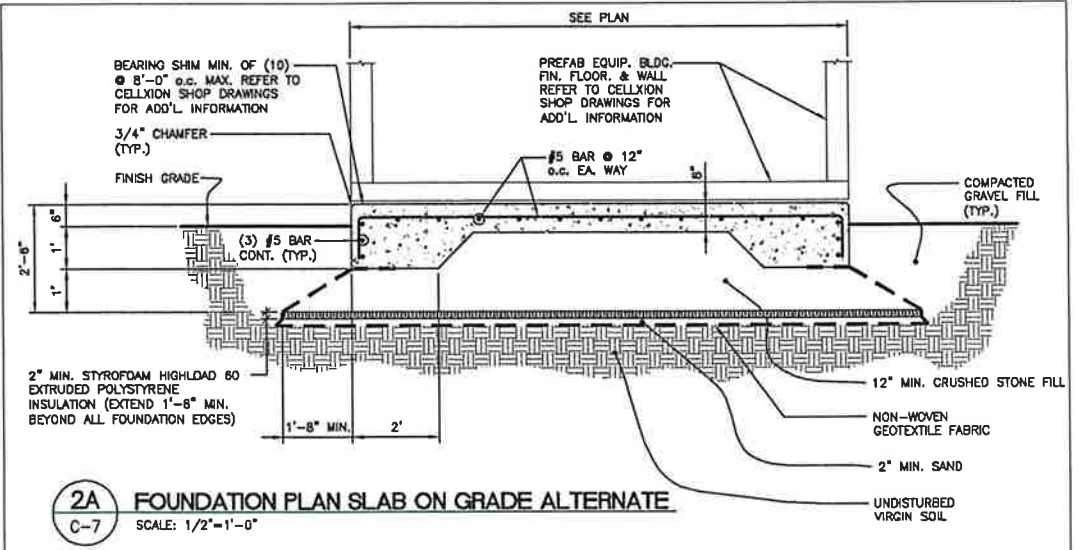
EQUIPMENT SHELTER BY CELLXION VERIFY ALL SHELTER DIMENSIONS, EQUIPMENT DIMENSIONS, EQUIPMENT LOCATIONS AND UTILITY OPENINGS WITH BUILDING SHOP DRAWINGS PRIOR TO COMMENCEMENT OF WORK.



**1 FOUNDATION PLAN**  
C-7 SCALE: 1/4"=1'-0" APPROX. GRID NORTH



**2 TYPICAL SECTION**  
C-7 SCALE: 1/2"=1'-0"



**2A FOUNDATION PLAN SLAB ON GRADE ALTERNATE**  
C-7 SCALE: 1/2"=1'-0"

**FOUNDATION NOTES:**

- IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL NOT PROCEED WITH ANY AFFECTED WORK.
- DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST THE PRE MANUFACTURED EQUIPMENT BUILDING SHOP DRAWINGS.
- THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
- REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

**SITE NOTES:**

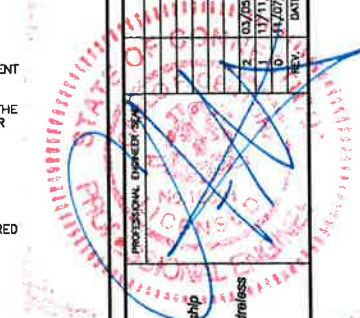
- THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
- ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
- ALL RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED OFF SITE AND BE LEGALLY DISPOSED, AT NO ADDITIONAL COST.
- THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE EQUIPMENT AND TOWER AREAS.
- NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
- THE SUBGRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.
- THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
- CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
- IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.
- DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST THE PRE MANUFACTURED EQUIPMENT BUILDING SHOP DRAWINGS.
- THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.

**COMPACTED GRAVEL FILL:**

- COMPACTED GRAVEL FILL SHALL BE FURNISHED AND PLACED AS A FOUNDATION FOR STRUCTURES, WHERE SHOWN ON THE CONTRACT DRAWINGS OR DIRECTED BY THE ENGINEER.
- GRAVEL SHALL CONFORM TO THE REQUIREMENTS OF ARTICLE M.02.02 OF THE CONNECTICUT D.O.T. STANDARD SPECIFICATIONS. ADMIXTURES AND SURFACE PROTECTIVE MATERIALS USED TO PREVENT THE GRAVEL FROM FREEZING MUST MEET THE APPROVAL OF THE ENGINEER. THE LARGEST STONE SIZE SHALL BE 3-1/2 INCHES.
- SAMPLES OF THE MATERIAL TO BE USED SHALL BE DELIVERED TO THE JOB SITE 5 DAYS PRIOR TO ITS INTENDED USE SO IT MAY BE TESTED FOR APPROVAL.
- AFTER ALL EXCAVATION HAS BEEN COMPLETED, GRAVEL SHALL BE DEPOSITED IN LAYERS NOT EXCEEDING EIGHT (8) INCHES IN DEPTH OVER THE AREAS. IN EXCEPTIONAL CASES, THE ENGINEER MAY PERMIT THE FIRST LAYER TO BE THICKER THAN EIGHT (8) INCHES. EACH LAYER SHALL BE LEVELED OFF BY SUITABLE EQUIPMENT. THE ENTIRE AREA OF EACH LAYER SHALL BE COMPACTED BY USE OF APPROVED VIBRATORY, PNEUMATIC-TIRED OR TREAD-TYPE COMPACTION EQUIPMENT. COMPACTION SHALL BE CONTINUED UNTIL THE DRY DENSITY OVER THE ENTIRE AREA OF EACH LAYER IS NOT LESS THAN 95 PERCENT OF THE MAXIMUM DRY DENSITY ACHIEVED BY AASHTO T-99 METHOD C. THE MOISTURE CONTENT OF THE GRAVEL SHALL NOT VARY BY MORE THAN 3% FROM ITS OPTIMUM MOISTURE CONTENT. NO SUBSEQUENT LAYER SHALL BE DEPOSITED UNTIL THE SPECIFIED COMPACTION IS ACHIEVED FOR THE PREVIOUS LAYER. IF NECESSARY TO OBTAIN THE REQUIRED COMPACTION, WATER SHALL BE ADDED AND GENTLE PUDDLING PERFORMED IF AUTHORIZED. COMPACTED GRAVEL FILL SHALL BE PREVENTED FROM FREEZING BY USE OF APPROVED ADMIXTURES OR BY USE OF APPROVED PROTECTIVE MATERIALS ON THE SURFACE, OR BOTH.

**CONCRETE AND REINFORCING STEEL NOTES:**

- ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318.
- ALL CONCRETE SHALL BE NORMAL WEIGHT, 6% AIR ENTRAINED WITH A MAXIMUM SLUMP OF 4", AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60, DEFORMED BARS. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185 WELDED STEEL WIRE FABRIC. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD UNLESS OTHERWISE INDICATED.
- THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS OTHERWISE NOTED ON THE DRAWINGS:  
 CONCRETE CAST AGAINST EARTH.....3 IN.  
 CONCRETE EXPOSED TO EARTH OR WEATHER:  
 #6 AND LARGER.....2 IN.  
 #5 AND SMALLER & WWF.....1 1/2 IN.  
 CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:  
 SLAB AND WALL.....3/4 IN.  
 BEAMS AND COLUMNS.....1 1/2 IN.
- ALL EXPOSED EDGES OF CONCRETE TO RECEIVE A 3/4" CHAMFER IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.
- CONCRETE EQUIPMENT PAD TO RECEIVE A BRUSHED FINISH.
- INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT DURING DRILLING WITHOUT PRIOR REVIEW BY THE ENGINEER.



DATE	10/11/13
SCALE	AS NOTED
JOB NO.	10093
SHELTER FOUND. PLAN, DETAILS AND NOTES	
<b>C-7</b>	
Sheet No. 3 of 9	

VERIZON WIRELESS  
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