

November 24, 2014

VIA EMAIL & FEDEX

Hon. Robert Stein, Chairman
and Members of the Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Connecticut Siting Council Docket No. 442
Application of New Cingular Wireless PCS, LLC (AT&T)
Norwalk Armory Proposed Tower Facility

Dear Chairman Stein and Members of the Siting Council:

On behalf of New Cingular Wireless PCS, LLC ("AT&T"), please accept for review and Council approval this Development Management Plan ("D&M Plan") filing for the captioned Facility as approved in Docket No. 442.

Tower, Compound & Other Equipment

Enclosed are an original and fifteen (15) sets of 11" x 17" sized construction drawings filed in accordance with the Siting Council's ("Council") Decision and Order dated May 29, 2014 ("Decision and Order"). Full sized sets will follow under separate cover. As per Order Number 1, the D&M Plan incorporates two monopole towers not exceeding 140' above ground level ("AGL"). All panel antennas will be in a flush mounted configuration concealed within radio frequency transparent casing providing a uniform appearance. Neither tower exceeds 56 inches in diameter.

Also included in the D&M Plan are the details of the associated compound, equipment/antennas, utility run and other components of the Facility. The D&M Plan includes site clearing, drainage, and erosion and sedimentation control measures consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control as amended. Disturbance in the City of Norwalk upland review area has been limited to the maximum extent practicable and includes utility routing, telephone cabinets and a small portion of the northeast portion of the compound.

Included with this letter as Attachment 1 is a geotechnical report prepared by the project's civil engineers Dewberry dated April of 2014. Tower and foundation drawings for the tower that will support AT&T's equipment and antennas prepared by the Nello Corporation stamped and signed on July 22, 2014 are included as Attachment 2. Tower and foundation drawings for the tower that will support Verizon's equipment and antennas prepared by Engineered Endeavors stamped and signed on October 31, 2014 are included as Attachment 3. Attachment 4 includes the specification sheet for AT&T's back-up generator as well as the specifications for the model to be deployed within

Verizon's shelter. Antenna and equipment information for AT&T and Verizon is included in Attachments 5 and 6 respectively.

Required Notifications

In accordance with RCSA Section 16-50j-61(d) and the Council's Decision and Order in this Docket copies of this filing are being provided to the Town of New Canaan and the City of Norwalk. In accordance with the provisions of RCSA Section 16-50j-77, AT&T hereby notifies the Council of its intention to begin site work immediately after Council approval of the D&M Plan. Construction of the tower and other site improvements will commence upon issuance of a local building permit. The supervisor for construction related matters for the AT&T Tower is Bryon Morawski of SAI. Mr. Morawski is located at 500 Enterprise Drive, Suite 3A, Rocky Hill, CT 06067 and can be reached by telephone at (860) 513-7223. Mark Gauger will be the supervisor for the tower hosting Verizon's antennas and equipment and can be reached at (203) 494-0023.

We respectfully request that this matter be included on the Council's next available agenda for review and approval.

Thank you for your consideration of the enclosed.

Very truly yours,



Daniel M. Laub

Enclosures

cc: Melanie A. Bachman, Staff Attorney/Acting Executive Director
Michael Perrone, Siting Analyst
Mayor Harry W. Rilling, Norwalk
First Selectman Robert E. Mallozzi III, New Canaan
Major General Thaddeus Martin, Connecticut Military Department
Kenneth Baldwin, Esq.
Sandy Carter, Verizon Wireless
Michele Briggs, AT&T
David Vivian, SAI
Christopher B. Fisher, Esq.

CERTIFICATE OF SERVICE

I hereby certify that on this day, an original and fifteen copies of the foregoing was sent electronically and by overnight delivery to the Connecticut Siting Council with copy to:

Service List:

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597
(860) 275-8200
kbaldwin@rc.com

Municipalities:

Mayor Harry W. Rilling, Norwalk
125 East Ave.
P.O. Box 5125
Norwalk, CT 06856-5125

First Selectman Robert E. Mallozzi III, New Canaan
Police Station, 2nd Floor
174 South Ave
New Canaan, CT 06840

Property Owner:

Major General Thaddeus Martin
Adjutant General of the Connecticut Military Department
Governor William A. O'Neill State Armory
360 Broad Street
Hartford, CT 06105-3706

Dated: November 24, 2014



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Antenna and equipment information for AT&T and Verizon is included in Attachments 5 and 6 respectively.

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Police Station, 2nd Floor
174 South Ave
New Canaan, CT 06840
Robert.Mallozzi@newcanaanct.gov

Property Owner:

Major General Thaddeus Martin
Adjutant General of the Connecticut Military Department
Governor William A. O'Neill State Armory
360 Broad Street
Hartford, CT 06105-3706

Dated: November 7, 2014

Daniel M. Laub

ATTACHMENT 1

Geotechnical Report



New Cingular Wireless PCS, LLC

National Guard Armory – SR1038 Telecommunications Facility

284 New Canaan Avenue
Norwalk, CT

April, 2014



SUBMITTED BY:

Dewberry

200 Broadacres Drive, Suite 410
Bloomfield, NJ 07003-3154
973.338.9100

SUBMITTED TO:

Dewberry

600 Parsippany Road, Suite 301
Parsippany, NJ 07054
973.739.9400

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New Cingular Wireless PCS, LLC

National Guard Armory – SR1038 Telecommunications Facility

284 New Canaan Avenue
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600 Parsippany Road, Suite 301
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Eugene J. Schwarzrock, Professional Engineer Date
Connecticut License No. PEN.0022516

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INTRODUCTION

This project consists of the construction of a monopole tower and associated equipment shelter within a proposed 50 ft. x 80ft. fenced compound for telecommunications use at the National Guard Armory located at 284 New Canaan Avenue, Norwalk, Connecticut. This report presents the findings of a subsurface investigation conducted at this site, and presents recommendations for the design and construction of the proposed tower and shelter.

The project site is located approximately due north of the intersection of Route 15 (Merritt Parkway) and Route 123 (New Canaan Ave.). A new 140 ft. tall monopole and 11.5 ft. x 20 ft. equipment shelter will be located ± 25 ft north of the northern edge of pavement at the rear parking lot of the National Guard Armory. The site is currently a lawn area that slopes gently down to the northeast, with ground elevations ranging from El. 197 in the southwest area of the lease site, to El. 195.5 in the northeast area. Access to the site is direct from the rear parking lot and generally unimpeded. There is a small bridge along the access roadway to the rear parking lot with unknown capacity.

SUBSURFACE INVESTIGATION

On March 7, 2014, one boring was drilled by Soiltesting, Inc. of Oxford, CT at the location of the proposed 140 ft. monopole. Soil sampling at boring B-1 was performed using a 2 in. diameter split spoon sampler driven by a 140 lb. safety hammer with a 30 in. drop, in accordance with provisions of the Standard Penetration Test (SPT), ASTM D 1586. The boring was sampled continuously from the ground surface to a depth of 16 ft., then at 5 ft. intervals to the bottom of the boring at 40 ft. A 4 in. inner diameter hollow stem auger was used to advance and maintain the hole. Bedrock was not encountered; however, at a depth of approximately 36 ft. the in situ material became very dense and spoon refusal was encountered. Boring B-1 was terminated at a depth of 40.1 ft. An experienced boring inspector was present during drilling and all soil samples were identified according to the Burmister Field Classification System (ASTM, 1958). The Boring Location Plan and boring log are included in the Appendix.

SUBSURFACE CONDITIONS

Boring B-1 encountered approximately 3 in. of topsoil underlain by brown medium dense to very dense granular material with varying amounts of silt and gravel to a depth of 10 ft. (EL. ± 187.0) Standard penetration test N-values ranged from 11 to 71. Brown and gray, loose to medium dense silty sands with N-values ranging from 8 to 11 are present beneath this layer of dense sand and continued to a depth of ± 28 ft. (El. ± 169.0). Dense to very dense, silty sand with pockets of clayey silt are present below El. ± 169 and continued to the completion of the boring at a depth of 40 ft. (El. ± 157.0), with spoon refusal encountered at the 35 ft. and 40 ft. sample depths.

Groundwater was encountered during drilling at a depth of ± 6 ft. (El. 190.5.)

DESIGN RECOMMENDATIONS

Based on the subsurface data obtained from the borings, the following foundation alternatives and design criteria are recommended:

Monopole

Considering the favorable relative density of the in situ soils, the use of either a large spread footing or a drilled shaft is considered suitable for support of the proposed monopole.

For the spread footing alternative, a net allowable bearing capacity of 3 TSF (tons per square foot) may be utilized if founded in the granular soils present at depths ranging from 5 to 10 ft. beneath existing ground (El. ± 191.5 to ± 186.5). The subgrade at the bottom of the excavation should be thoroughly compacted prior to footing construction. A minimum embedment depth of 4 ft. is recommended to protect against frost heave and limit settlement to <1 in. It is further recommended that the footing be founded even lower than this so the footing is entirely below grade and not visible. The size of the footing will likely be governed by overturning, however a base friction factor of 0.45 is recommended for a cast-in-place footing founded within the sand present at the recommended elevations.

For the drilled shaft alternative, the design should use Brom's method of analysis or a p-y analysis method as used by modern computer programs which mobilizes lateral soil resistance for support. Commonly accepted factors of safety and design methods should be used in accordance with TIA standards. The top 2 ft. of soil should be neglected in developing the allowable lateral resistance to account for disturbance, etc. at this site. Otherwise, the following criteria are recommended for analysis, assuming the concrete is placed in direct contact with the soil sides, and a permanent steel casing is not used:

Brown & gray Silty Sand with Gravel (2 ft. to 10 ft.)

Moist unit weight of soil,	$\gamma_t = 125$ pcf
Angle of internal friction,	$\phi = 37^\circ$
Lateral earth pressure coefficients:	
	$K_a = 0.25$
	$K_p = 4.02$
Wall friction angle	$\delta = 29^\circ$ (mass concrete on sand) = 17° (steel on sand)

Brown & gray Silty Sand (10 ft. to 28 ft.)

Moist unit weight of soil,	$\gamma_t = 115$ pcf
Angle of internal friction,	$\phi = 30^\circ$
Lateral earth pressure coefficients:	
	$K_a = 0.33$
	$K_p = 3.00$
Wall friction angle	$\delta = 19^\circ$ (mass concrete on sand) = 17° (steel on sand)

Gray Silty Sand (28 ft. to 40 ft.)

Moist unit weight of soil,	$\gamma_t = 125$ pcf
Angle of internal friction,	$\phi = 38^\circ$
Active Earth Pressure Coefficient,	$K_a = 0.24$
Passive Earth Pressure Coefficient,	$K_p = 4.20$
Wall friction angle	$\delta = 29^\circ$ (mass concrete on sand) = 17° (steel on sand)

Based on the relative density of the in-situ soils, a seismic site class of D is recommended.

Liquefaction analysis indicates the lowest factor of safety against liquefaction is >3 , which is above the recommended factor of safety of 1.0.

Equipment Shelter

The proposed 11.5 ft. by 20 ft. equipment shelter is proposed to be set on existing grade after grading the site. It is recommended that the existing soil be removed to a minimum depth of 12 in. below the proposed bottom of slab, the subgrade be thoroughly compacted using at least four passes of a vibratory roller and until no further settlement is observed, and a minimum of 12 in. of $\frac{3}{4}$ in. clean, crushed stone be placed with compaction to the elevation of the bottom of slab. This will provide uniform support for the equipment shelter and help minimize post construction settlement. Settlement/movement will be dependent on seasonal frost heave action, and provision for a minimum of 2 in. of vertical movement should be provided by means of flexible connections. A modulus of subgrade reaction equal to 300 pci may be used for design of this slab following such construction.

CONSTRUCTION RECOMMENDATIONS

Spread footings should not be constructed on saturated or frozen subgrade materials. For wet excavations, all standing water shall be removed by pumping before placing concrete. In wet weather conditions, a 4 in. thick layer of $\frac{3}{4}$ in. clean crushed stone may be placed below the bottom of footing to protect the excavation from softening prior to concrete placement. Frozen subgrade shall be removed and replaced with either compacted structural backfill placed in 8 in. thick loose lifts and compacted to 95% maximum dry density at optimum moisture (ASTM D 1557); or with clean, $\frac{3}{4}$ in. crushed stone, or with additional concrete.

Structural backfill should consist of well-graded, free-draining granular soil with a maximum of 10% non-plastic fines. Structural fill should be compacted to 95% maximum dry density at optimum moisture content (ASTM D 1557). The majority of the on-site sand is suitable for use as structural fill. Compaction tests should be performed according to the following recommended schedule:

For the drilled shaft alternate, construction methods used to install drilled shafts should be in accordance with the procedures outlined in FWHA publication IF-99-025, "Drilled Shafts: Construction Procedures and Design Methods". The method of construction must include full support of the sidewalls during the entire construction period. The construction period is defined as the initial excavation to the final concrete placement. Methods that are considered acceptable and satisfy the above requirement include, but are not limited to:

1. Use of mud slurry (bentonite, etc.) to support the shaft walls prior to concrete placement.
2. Use of steel casing as a temporary form. The casing is installed as the shaft is augered, and then removed as the concrete is placed in order to develop full concrete-soil contact.
3. Use of steel casing as a permanent form. The casing is installed as the shaft is augered; however, it remains part of the drilled shaft. Steel casing significantly reduces shaft friction and is therefore a less efficient design, which would need to be considered prior to construction.

For construction of the equipment shelter slab-on-grade, all loose soil should be proof rolled and compacted until no further subsidence is visible. A double-drum walk-behind vibratory roller should be used for this compaction, with a minimum of 4 passes over the area to receive the slab-on-grade. All water and/or ice must be removed prior to construction of the slab.

An experienced geotechnical engineer should be retained during foundation excavation and construction to verify that the monopole or drilled shaft bear in/on material consistent with these findings and recommendations. Additionally, a licensed professional engineer and/or materials testing firm should be present during construction

of the foundation to ensure that reinforcing steel and concrete are placed and constructed according to this report and the designer's specification(s).

APPENDIX

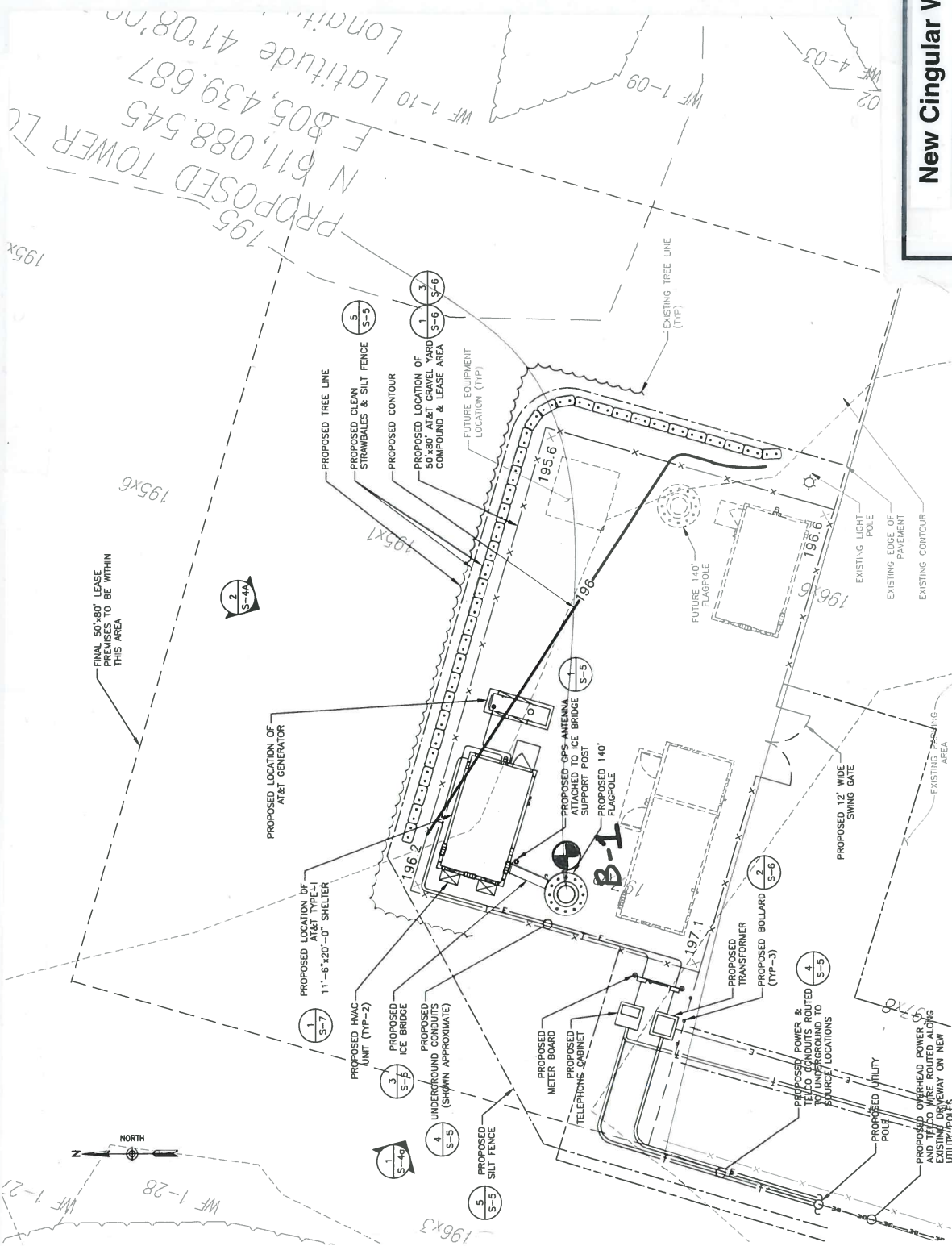
New Cingular Wireless PCS, LLC BORING LOCATION PLAN

National Guard Armory
284 New Canaan Ave, Norwalk, CT

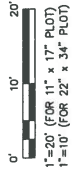
Dewberry Engineers.
200 Broadacres Drive, Suite 410
Bloomfield, New Jersey

SCALE: N.T.S.

DATE: 3-12-2014



1
DETAILED SITE PLAN



Boring Log

ROUTE		LOCAL NAME: New Cingular Wireless PCS, LLC Communications Facility				BORING NO. B-1				
SECTION:		National Guard Armory, 284 New Canaan Ave, Norwalk, CT				FIELD BORING NO.				
STATION:		OFFSET:		REFERENCE LINE:		GROUND ELEVATION: ±196.5				
BORING BY: Soiltesting, Inc		DATE STARTED: 3-7-2014		GROUND WATER ELEVATION						
INSPECTOR: C. Baldwin		DATE COMPLETED: 3-7-2014		0 Hr. ±190.5 (6 ft. deep)		Date: 3-7-2014				
				24 Hr.		Date:				
DEPTH (ft)	CASING BLOWS	SAMPLE NO.	DEPTH		Blows on Spoon			REC. (in)	SOIL DESCRIPTION AND STRATIFICATION	(ft)
					0 / 6	6 / 12	12 / 18			
	Auger	S-1	0	2	4	3		6"	Brown and black m-f SAND, and Silt	
	↓				8	12				
5		S-2	2	4	28	22		15"	Brown and gray m-f(+) SAND, and Silt	
					26	26				
		S-3	4	6	26	35		14"	Brown c-f SAND, little m-f Gravel, little Silt	
					36	35				
		S-4	6	8	33	16		8"	Brown & gray c-f SAND, trace f Gravel, trace Silt	
					14	10				
10		S-5	8	10	16	11		22"	Brown c(+)-f SAND, little m-f(+) Gravel, trace(-) Silt	
					15	22				
		S-6	10	12	4	5		16"	Brown c(+)-f SAND, trace Silt	
					3	6				
		S-7	12	14	3	5		16"	Brown & gray c-f SAND, some Silt	
					6	5				
15		S-8	14	16	5	5		12"	Brown c-f(+) SAND, little Silt, trace(-) f Gravel	
					5	5				
20		S-9	20	22	3	3		20"	Brown m-f SAND, little Silt	
					5	7				
25										
		S-10	25	27	3	3		24"	Gray SILT, and f Sand	
					5	10				
30										
		S-11	30	32	16	21		24"	Gray c-f SAND, some Silt; clayey silt pockets	
					20	20				
35										
		S-12	35	36.3	29	57	100/4	16"	Gray m-f SAND, some Silt; clayey silt pockets	
40										

Nominal I.D. of Hollow Stem Auger	4 in.
Nominal I.D. of Split Barrel Sampler	2 in.
Weight/type of Hammer on Drive Pipe	N/A
Weight/type of Hammer on Split Barrel	140 lb. Safety
Drop of Hammer on Drive Pipe	N/A.
Drop of Hammer on Split Barrel	30 in.
Core Size	N/A

The subsurface information shown hereon was obtained for the Owner's design and estimate purposes. It is made available to authorized users only that they may have access to the same information available to the Owner. It is presented in good faith, but is not intended as a substitute for investigations, interpretation or judgment of such authorized users.

Approximate Change in Strata _____
 Inferred Change in Strata -----

Soil descriptions represent a field identification after D.M. Burmister unless otherwise noted.

ROUTE		LOCAL NAME: New Cingular Wireless PCS, LLC Communications Facility				BORING NO. B-1		
SECTION:		National Guard Armory , 284 New Canaan Ave, Norwalk, CT				FIELD BORING NO.		
STATION:		OFFSET:		REFERENCE LINE:		GROUND ELEVATION: ±196.5		
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				24 Hr.		Date:		
DEPTH (ft)	CASING BLOWS	SAMPLE NO.	Blows on Spoon			REC. (in)	SOIL DESCRIPTION AND STRATIFICATION	(ft)
			0 / 6	6 / 12	12 / 18			
	Auger ↓	S-13	40	40.1	100/1		1"	Gray f SAND, and Silt; weathered rock pieces, possible till
								End of Boring at 40.1 ft
45								
50								
55								
60								
65								
70								
75								
80								

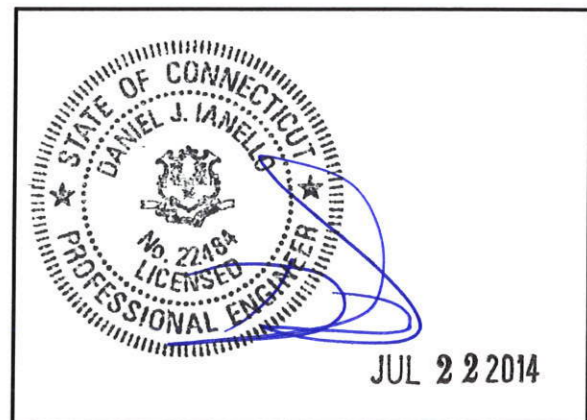
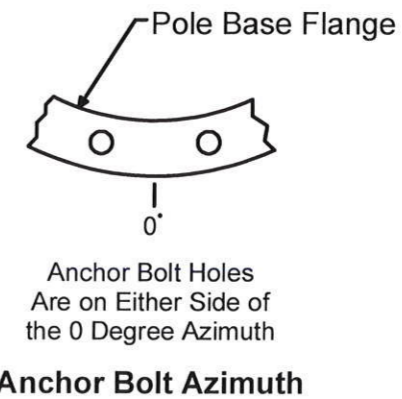
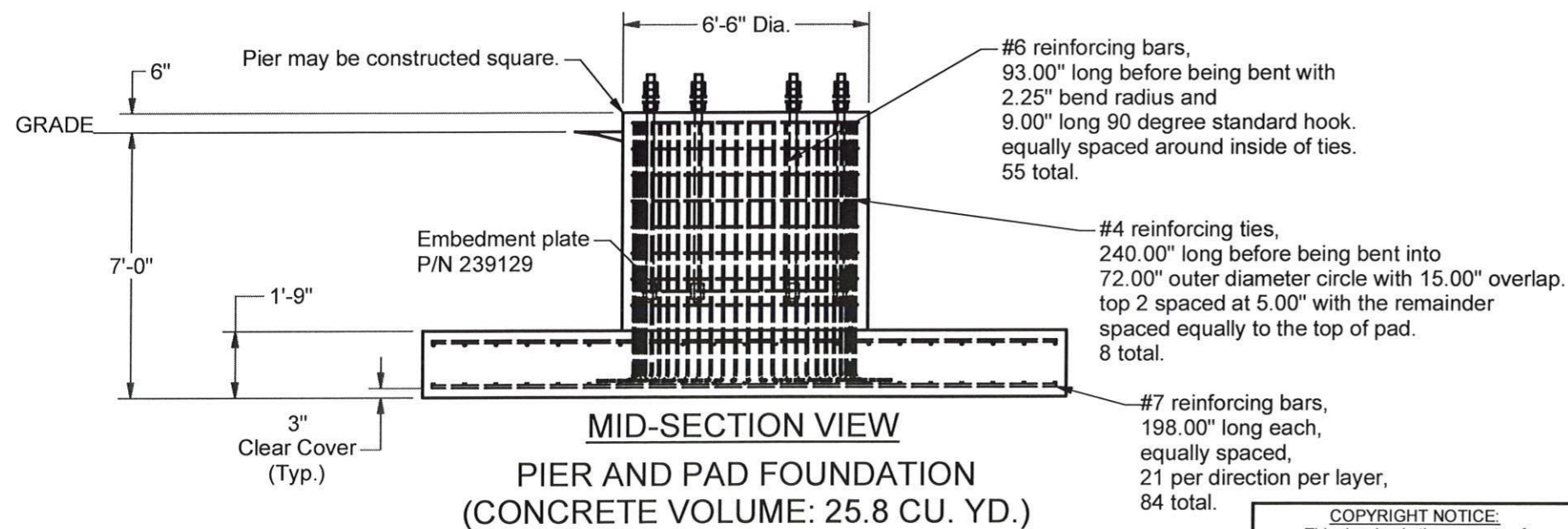
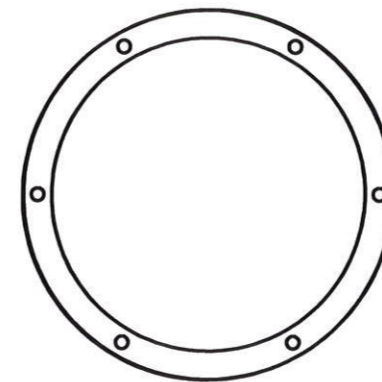
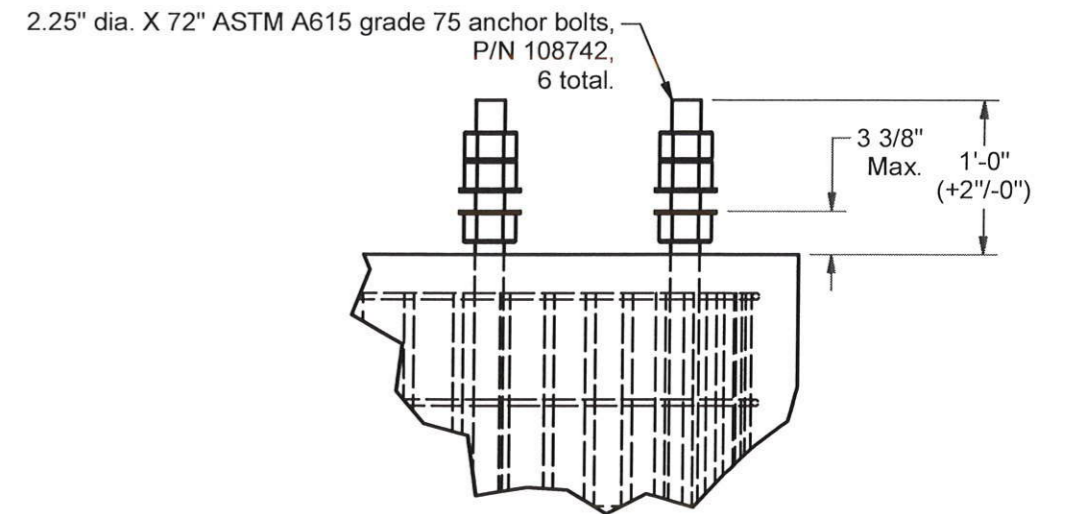
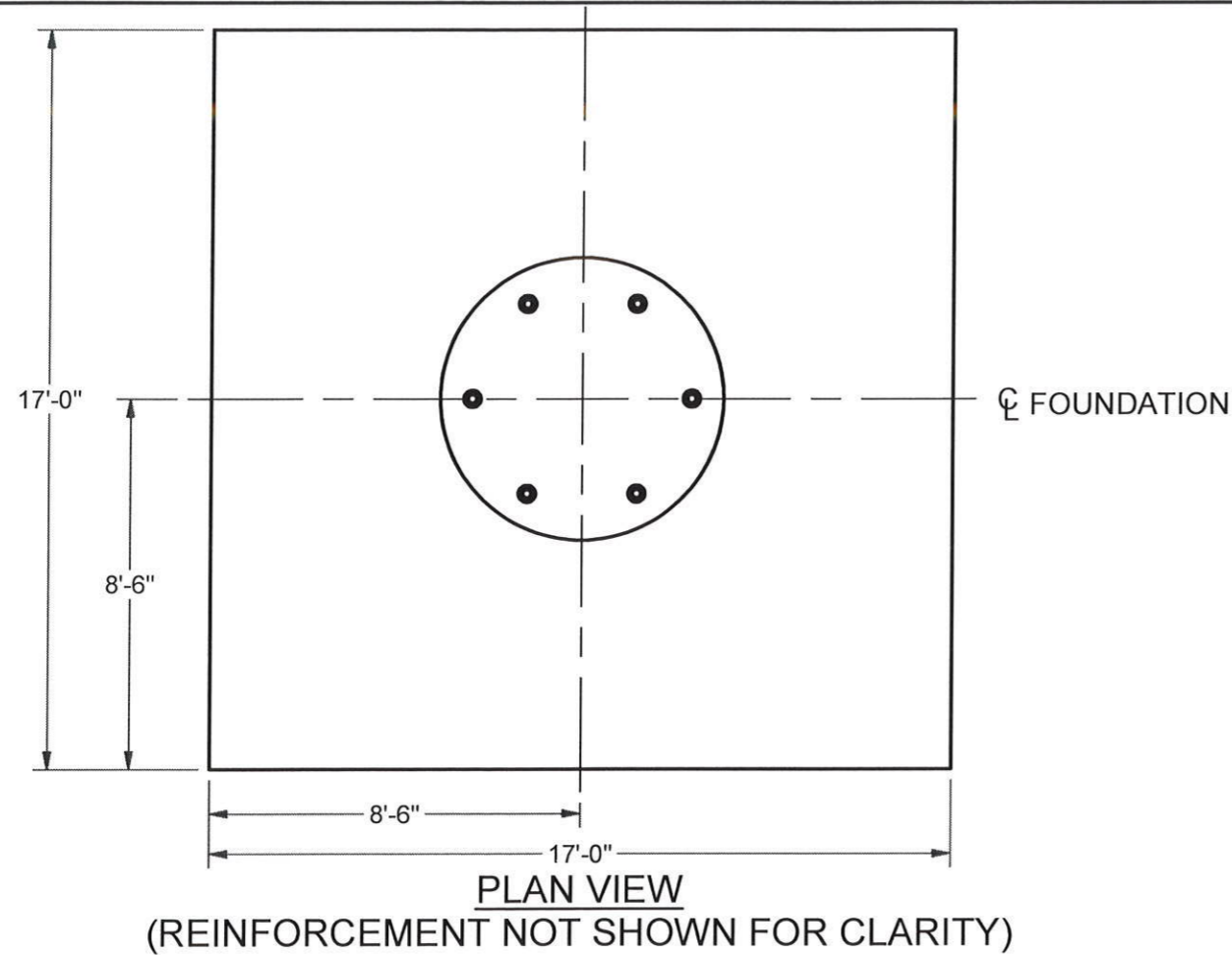
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Nominal I.D. of Split Barrel Sampler	2 in.
Weight/type of Hammer on Drive Pipe	N/A
Weight/type of Hammer on Split Barrel	140 lb. Safety
Drop of Hammer on Drive Pipe	N/A.
Drop of Hammer on Split Barrel	30 in.
Core Size	N/A

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ATTACHMENT 2

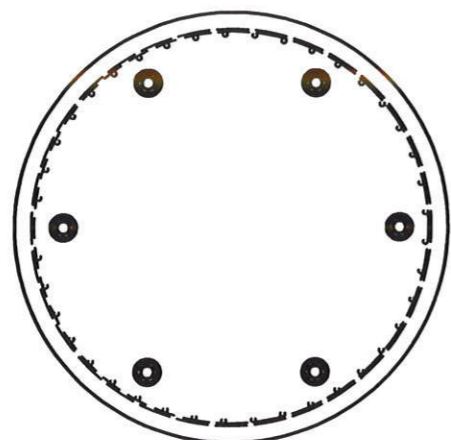


TITLE:
SAI Communications
NUP 54" X 140'
New Canaan - SR1038
Fairfield Co., CT

NELLO CORPORATION
211 W. Washington St.,
Suite 2000
South Bend, IN 46601-1705
Bus: (574)288-3632
Fax: (574)288-5860

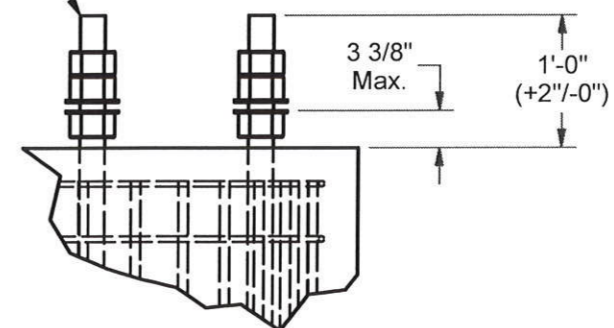
REV	BY	DATE	DESCRIPTION

COPYRIGHT NOTICE: This drawing is the property of Nello Inc. It is not to be reproduced, copied or traced in whole or in part without our written consent.	ORIG. DATE: 7/18/2014	DWG NO: 239127
	DWG. PROG: v1.06	SHEET: 1 OF 3

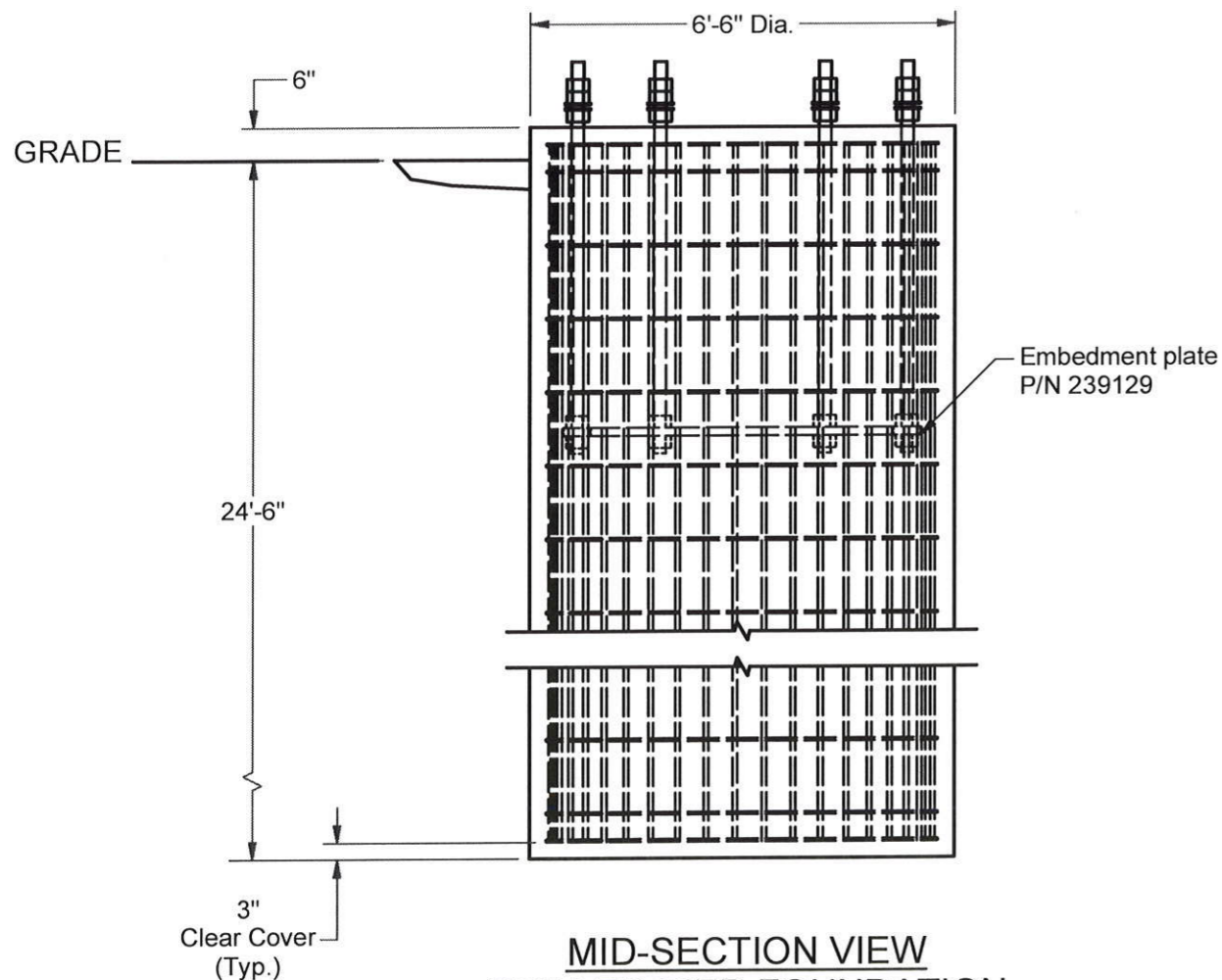


PLAN VIEW

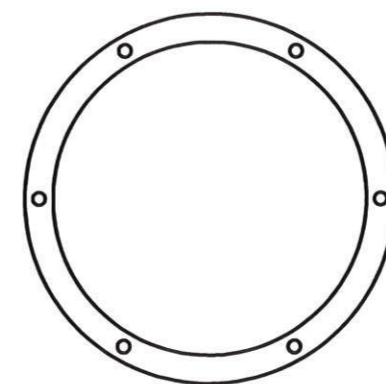
2.25" dia. x 72" ASTM A615
grade 75 anchor bolts,
P/N 108742
6 total.



ANCHOR BOLT DETAIL



MID-SECTION VIEW
DRILLED PIER FOUNDATION
(CONCRETE VOLUME: 30.7 CU. YD. TOTAL)



EMBEDMENT PLATE DETAIL

#7 Reinforcing bars,
294" long.
Equally spaced around inside of ties.
41 Total.

#4 Reinforcing ties,
240.0" long before being bent into circle with
72.00" outer diameter and 15.00" overlap.
Top 2 ties and bottom 2 ties spaced at 5".
Remainder of ties equally spaced at 13.50".
24 Total.



TITLE:
SAI Communications
NUP 54" X 140'
New Canaan - SR1038
Fairfield Co., CT

NELLO
CORPORATION
211 W. Washington St.,
Suite 2000
South Bend, IN 46601-1705
Bus: (574)288-3632
Fax: (574)288-5860

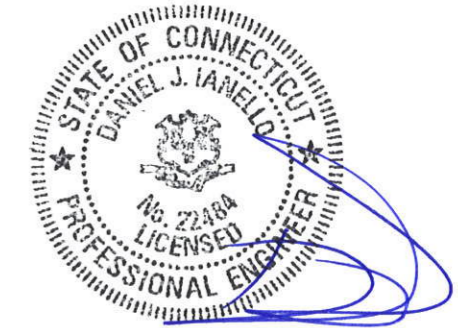
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ORIG. DATE: 7/18/2014 DWG NO: 239127
DWG. PROG: v1.06 SHEET: 2 OF 3

REV	BY	DATE	DESCRIPTION

Foundation Notes

1. This foundation has been designed for the following reactions.
 Shear: 18.0 kips
 Moment: 1338.9 ft-kips
 Weight: 26.4 kips
2. Foundation design is based on the Geotechnical Report dated 04/07/2014, by Dewberry Engineers; Project: National Guard Armory-SR1038.
3. A field inspection shall be performed in order to verify that the actual site soil parameters meet or exceed the assumed soil parameters and that the depth of standard foundations are adequate based on the frost penetration and groundwater depth. Local frost depth must be no deeper than the bottom of the base foundation.
4. Reinforcement shall be deformed and conform to the requirements of ASTM A615 Grade 60 unless otherwise noted. Splices in reinforcement shall not be allowed unless otherwise noted.
5. Welding is prohibited on reinforcing steel and anchorage.
6. Structural backfill placed below pad must be compacted in 8" loose lifts to a 95% of maximum dry density at optimum moisture content in accordance with ASTM D1557. Backfill must be clean and free of organic and frozen soils and foreign materials.
7. Backfill above foundation should be compacted to 95% of maximum dry density at water content within 2 percent of optimum. Backfill must be clean and free of organic and frozen soils and foreign materials.
8. Foundation designs assume level ground at tower site.
9. Loose material shall be removed from bottom of excavation prior to concrete placement.
10. Concrete cover from exposed surface of concrete to surface of reinforcement shall not be less than 3".
11. Concrete and reinforcement installation must conform to ACI 318, "Building Code Requirements for Structural Concrete."
12. Concrete shall develop a minimum compressive strength of 4000 psi in 28 days.
13. Concrete shall be placed as soon as practical after excavating to avoid disturbance of bearing and side wall surfaces.
14. Concrete contractor shall be responsible for properly aligning anchor bolts and materials before and after placing concrete, regardless of whether an anchor bolt template is provided.
15. Positive drainage shall be maintained during construction and throughout the life of the facility to minimize the potential for surface water infiltration.
16. The sub-grade, if practical, should be proof-rolled with vibratory compaction prior to casting foundation or placing structural fill.
17. Overexcavation of unsuitable soils for compacted backfill placement below footings should extend laterally beyond all edges of the footings at least 12 inches per foot of overexcavation depth below footing base elevation.
18. It shall be the contractor's responsibility to locate and prevent damage to any existing underground utilities, foundations or other buried objects that might be damaged or interfered with during construction of the foundation.
19. It is permissible to utilize a cold joint during construction of a pier and pad type foundation. The cold joint must be located at the interface of the piers with the pad, and contractor shall use a bonding agent suitable for cold joints.
20. A concrete mat may be used to level the bearing surface. The concrete in the leveling mat is to have a minimum compressive strength of 2000 psi at 28 days and can not exceed 12" thick.
21. Foundation design assumes an ultimate bearing capacity value of 12,000 psf.
22. Groundwater was encountered at 6 feet bgs during the geotechnical investigation. Dewatering techniques should be anticipated below this depth.
23. Temporary steel casing or drilling slurry may be required for installation of the drilled piers. Permanent casing on drilled piers may not be used.
24. Concrete shall be placed by tremie methods if there is more than 1 inch of water or drilling fluid at the bottom of the shaft excavation or if water infiltration exceeds a rise of 1/4" per minute.



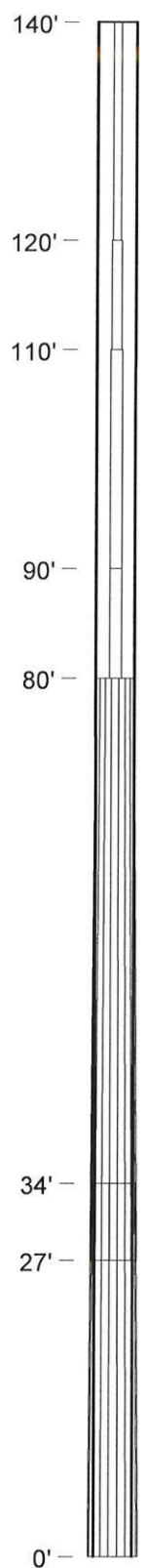
JUL 22 2014

TITLE:
 SAI Communications
 NUP 54" X 140'
 New Canaan - SR1038
 Fairfield Co., CT



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	DWG. PROG: v1.06	SHEET: 3 OF 3

REV	BY	DATE	DESCRIPTION



Pole Section Data

Section	Bottom Height (ft)	Top Height (ft)	Length (ft)	Number of Sides	Bottom OD (in)	Top OD (in)	Wall Thickness (in)	Material	Approximate Weight (lb)	Design Overlap (in)	Minimum Overlap (in)	Maximum Overlap (in)	Design Distance to Top Jacking Nut (in)	Maximum Distance to Top Jacking Nut (in)	Minimum Distance to Top Jacking Nut (in)	Spine Weldment Part Number	Hardware
1	120	140	20	Round	8.6250	8.6250	0.3220	A500-50	780			0				112544	(8) 1" x 5-3/4"
2	110	120	10	Round	10.7500	10.7500	0.3650	A500-50	450			0				112548	(8) 1" x 5-3/4"
3	90	110	20	Round	12.7500	12.7500	0.5000	A500-50	1440			0				112550	(8) 1" x 5-3/4"
4	80	90	10	Round	12.7500	12.7500	0.5000	A572-65	720			0				112549	(8) 1" x 4-1/2"
5	27	80	53	18	50.1242	42.0000	0.1875	A572-65	5350	84	74 7/16	92 3/8	15	24 9/16	6 5/8		
6	0	34	34	18	53.7005	48.4887	0.2500	A572-65	6480			0					

Notes:

- The round pole spine sections shown above may be supplied in 10 or 20 foot long sections.
- Reference drawing 110172 for radome installation instructions.

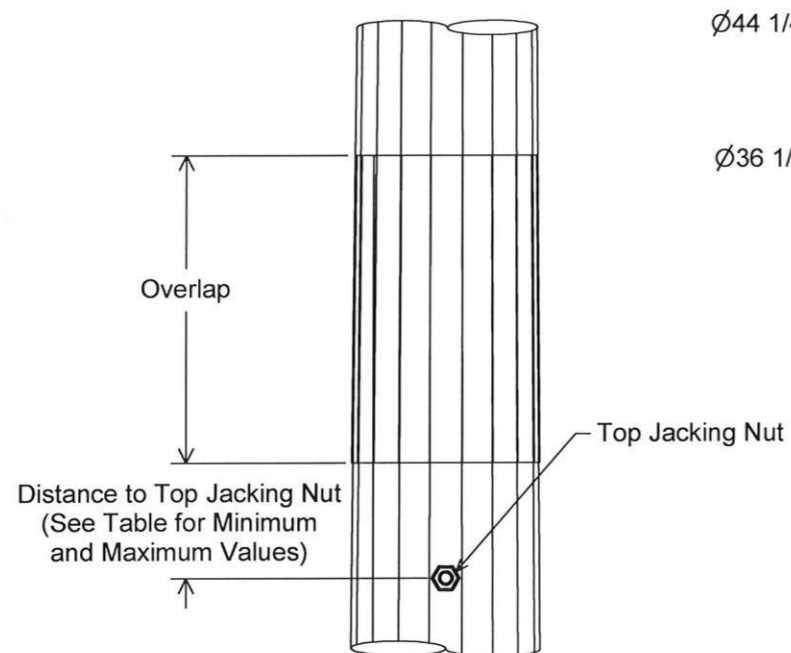
Tower Reactions

No Ice

Shear: 18.0 kips
 Moment: 1338.9 ft-kips
 Weight: 26.4 kips

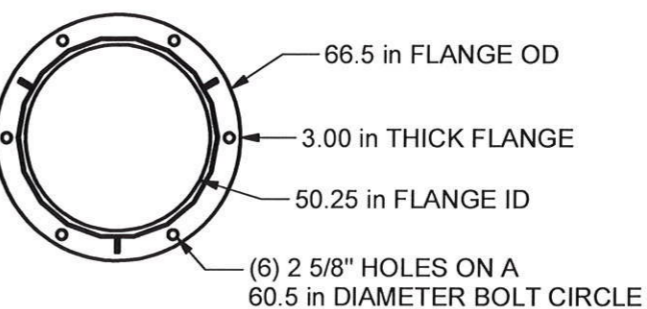
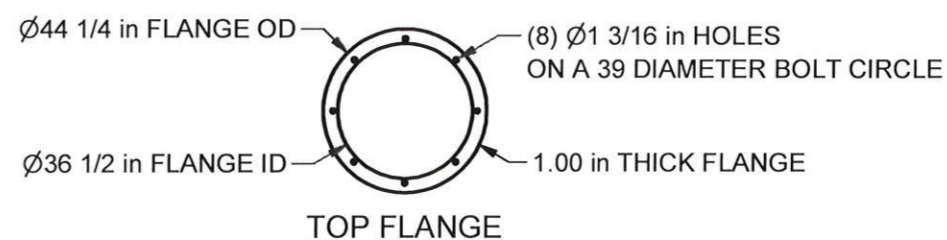
With Ice

Shear: 4.5 kips
 Moment: 316.1 ft-kips
 Weight: 38.3 kips



A jacking nut is placed near the top of each section which will have another section placed on top. The distance from this nut to the bottom of the next section must not exceed the value given in the column labeled "Maximum Distance to Top Jacking Nut."

Pole Splice Detail



BASE FLANGE DETAIL

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 Fairfield Co., CT

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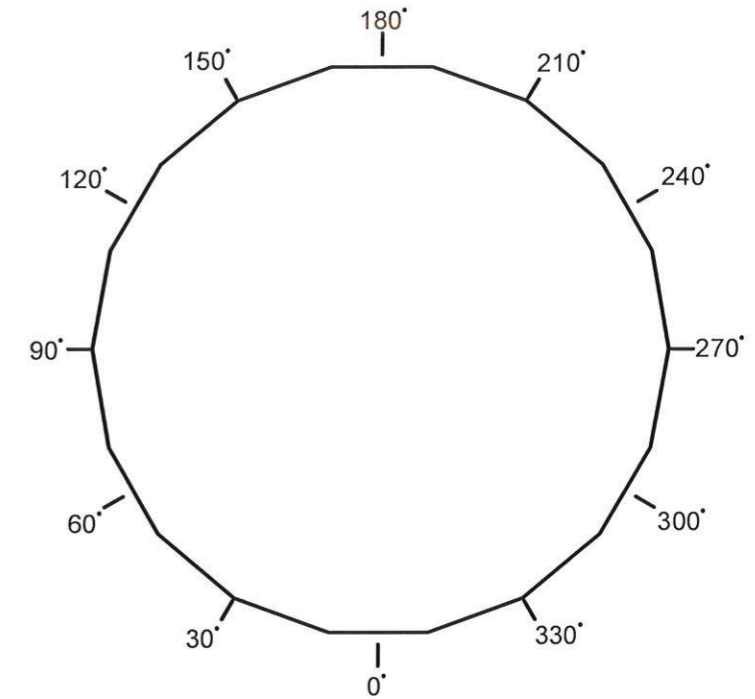
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ORIG. DATE: 7/18/2014 DWG NO: 239126
 DWG. PROG: v2.05 SHEET: 1 OF 4

Portholes

Elevation (ft)	Qty	Size (in)	Azimuth (deg)
7.5	1	10 x 30	0
7.5	1	10 x 30	90
7.5	1	10 x 30	180
7.5	1	10 x 30	270



Step Bolts on This Side of Pole

Note:
The azimuths referenced here are only to illustrate where the pole features are in relation to each other. The azimuths are not to indicate which cardinal direction the anchor bolts or the pole should be positioned.

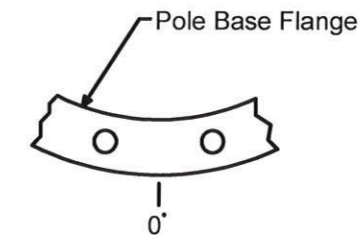
Pole Reference Azimuths

Antenna Loading

Height	Qty.	Description
140'	1	6' Lightning Rod
128' - 140'	1	12' x 18'
120' - 140'	1	42" x 20' Radome w/ 8.625" OD Spine
110' - 120'	1	42" x 10' Radome w/ 10.75" OD Spine
90' - 110'	1	42" x 20' Radome w/ 12.75" OD Spine
80' - 90'	1	42" x 10' Radome w/ 12.75" OD Spine

Feedline Loading

Height	Qty.	Description
0' - 135'	8	LDF7-50A (1-5/8 FOAM)
0' - 125'	8	LDF7-50A (1-5/8 FOAM)
0' - 115'	8	LDF7-50A (1-5/8 FOAM)
0' - 105'	8	LDF7-50A (1-5/8 FOAM)
0' - 95'	8	LDF7-50A (1-5/8 FOAM)



Anchor Bolt Holes Are on Either Side of the 0 Degree Azimuth

Anchor Bolt Azimuth

Professional Engineer Seal for Daniel J. Ianello, State of Connecticut, License No. 22484, dated July 22, 2014.

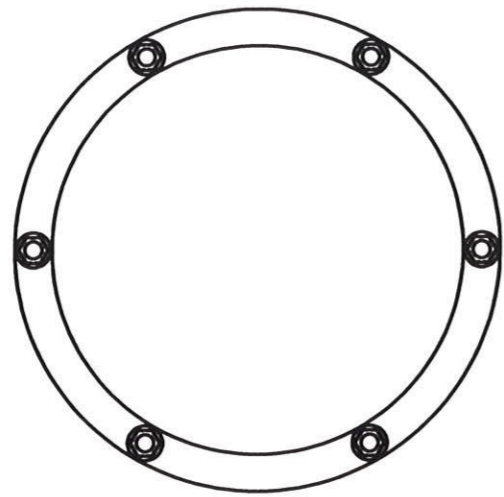
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NUP 54" X 140'
New Canaan - SR1038
Fairfield Co., CT

NELLO CORPORATION
211 W. Washington St., Suite 2000
South Bend, IN 46601-1705
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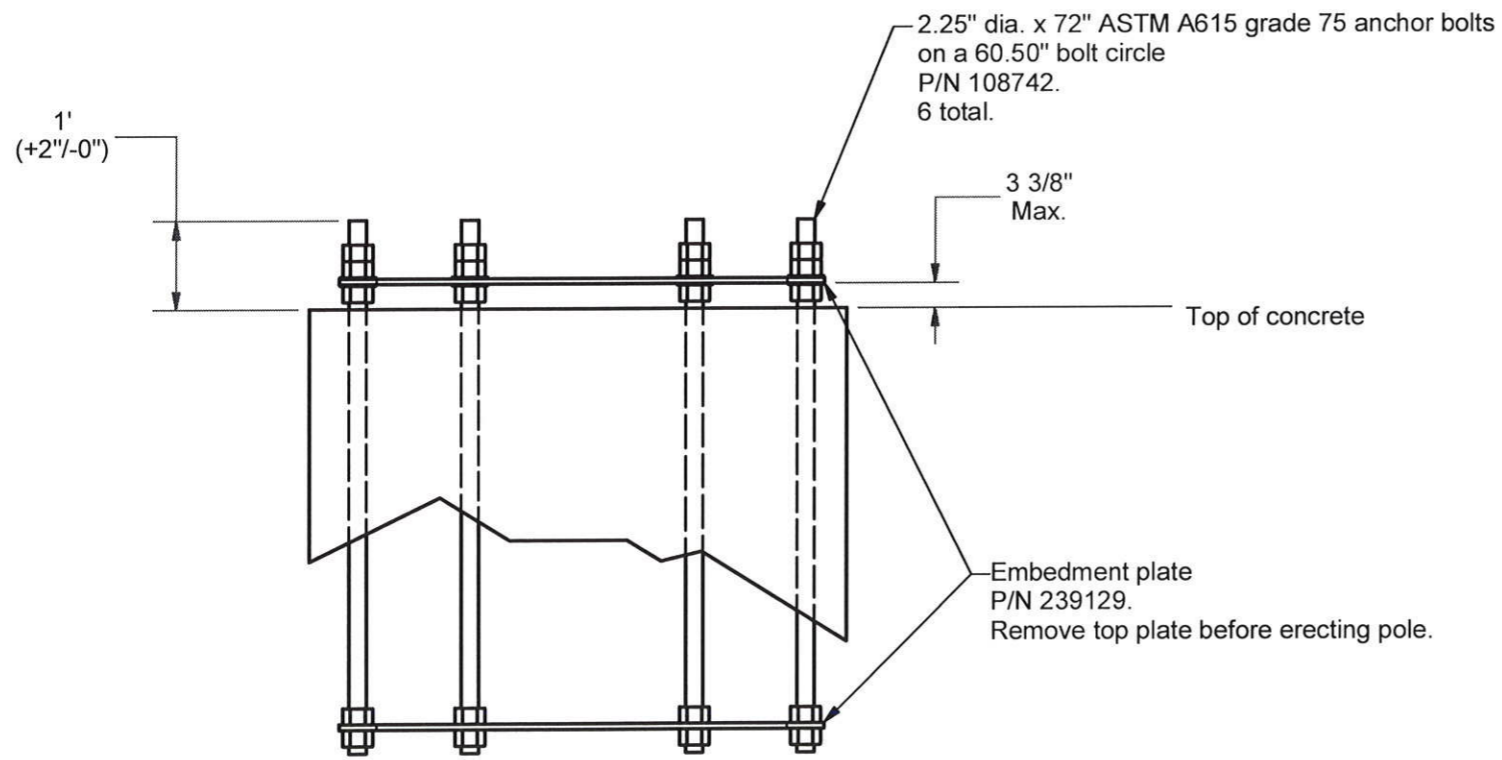
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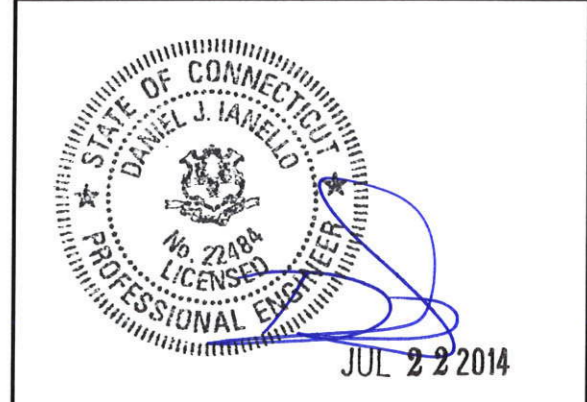
REV	BY	DATE	DESCRIPTION



PLAN VIEW



ANCHOR BOLT DETAIL



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Fairfield Co., CT



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DWG. PROG: v2.05 SHEET: 3 OF 4

REV	BY	DATE	DESCRIPTION

Tower Notes:

1. Tower is designed per TIA-222-G, "Structural Standard for Antenna Supporting Structures and Antennas," for the following loading conditions:
 105 mph 3-second gust basic wind speed with no ice (Equivalent to 135 mph 3-second gust ultimate design wind speed)
 50 mph 3-second gust basic wind speed with 3/4 inch basic ice thickness
 Structure Class: II
 Exposure Category: C
 Topographic Category: 1
2. Tower design loading is assumed to be based on site-specific data and must be verified by others prior to installation.
3. Tower design includes the antennas, dishes, and/or lines listed in the appurtenance loading tables on sheet 2.
4. Antenna mounting pipes may need to be field cut to match the lengths listed in the appurtenance loading tables on sheet 2.
5. Tower member design does not include stresses due to erection since erection equipment and procedures are unknown. Tower installation shall be performed by competent and qualified erectors in accordance with TIA-222-G and OSHA standards and all applicable building codes.
6. Field connections shall be bolted. No field welds shall be allowed unless otherwise noted.
7. Structural bolts shall conform to ASTM A325, except for 1/2 inch diameter and smaller bolts, which shall conform to ASTM A449 or SAE J429 Grade 5.
8. Structural steel and connection bolts shall be galvanized after fabrication in accordance with TIA-222-G.
9. All high strength bolts shall be tightened to a "snug tight" condition as defined in the November 13, 1985, AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
10. Tower shall be marked and lighted in conformance with local building codes, FAA regulations, and TIA-222-G.
11. Tower shall be grounded in conformance with local building codes and TIA-222-G.
12. Allowable tolerance on as-built tower steel height is plus 1% or minus 1/2%.
13. Maintenance and inspection shall be performed over the life of the structure in accordance with TIA-222-G.
14. Material specifications:
 NTP 18-Sided Pole - ASTM A572 Grade 65
 NTP Round Pole - ASTM A53 Grade B or ASTM A500 Grade 50
 Pole Flange - ASTM A572 Grade 50
 Pole Porthole Rim - ASTM A572 Grade 65
15. A jacking nut is placed near the top of each section which will have another section placed on top. The distance from this top jacking nut to the bottom of the next section must not exceed the value given in the column labeled "Maximum Distance to Top Jacking Nut." Jacking may be required to achieve the proper overlap.
16. The horizontal distance between the vertical centerlines at any two elevations shall not exceed 0.25 percent of the vertical distance between the two elevations. Measure early in the morning before the sunward side of the pole expands.
17. Sections must be erected with the 0 degree azimuth lined up to ensure proper fit.
18. Remove anchor bolt template before erecting pole. Non-shrink grout may be placed under base flange after leveling pole. Drain holes must be provided if grouting.
19. Concrete contractor shall be responsible for properly aligning anchor bolts and materials before and after placing concrete, regardless of whether an anchor bolt template is provided.



TITLE: SAI Communications NUP 54" X 140' New Canaan - SR1038 Fairfield Co., CT		 N E L L O CORPORATION 211 W. Washington St., Suite 2000 South Bend, IN 46601-1705 Bus: (574)288-3632 Fax: (574)288-5860
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	DWG. PROG: v2.05	SHEET: 4 OF 4

REV	BY	DATE	DESCRIPTION

ATTACHMENT 3

**140' DISGUISED POLE
SAI COMMUNICATIONS
FAIRFIELD COUNTY
NEW CANAAN/SR-1038, CT**

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

SYMBOL LEGEND

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

DESIGN NOTES

- MONOPOLE IS DESIGNED IN ACCORDANCE WITH TIA-222G FOR 120 MPH 3 SECOND GUST WIND SPEED.
RISK CATEGORY - II
EXPOSURE - C
TOPOGRAPHIC CATEGORY - 1

COATING NOTES

- 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

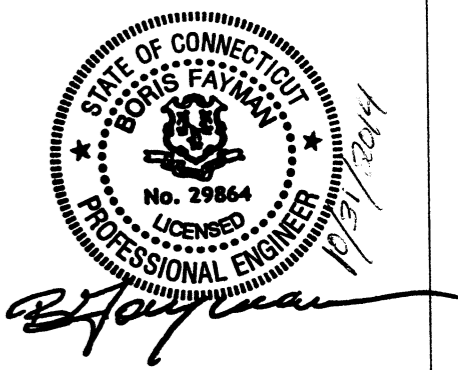
- EE WILL NOT HONOR ANY BACKCHARGES WHICH HAVE NOT RECEIVED PRIOR WRITTEN AUTHORIZATION. CONTACT EE AT (440) 564 5484
- THE INSTALLER SHALL THOROUGHLY REVIEW EE'S STRUCTURAL ASSEMBLY & ERECTION PROCEDURES PRIOR TO INITIATING THE INSTALLATION OF THE MONOPOLE.
- THE ORIENTATION OF THE MONOPOLE SHALL BE VERIFIED PRIOR TO INSTALLATION.
- FOR MULTIPLE SECTION MONOPOLES:
 - FOR PROPER SECTION TO SECTION ALIGNMENT A 2" HORIZONTAL WELD BEAD AND A MARK ARE POSITIONED ON EACH SECTION AT EACH SPLICE. THE 2" 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" (±4").
 - ALL SECTIONS OF THE MONOPOLE SHALL BE JACKED TOGETHER WITH A MINIMUM JACKING FORCE OF 10,000 lbf APPLIED TO EACH SIDE. FOR MAXIMUM RECOMMENDED JACKING FORCE, SPLICE LENGTH TOLERANCE AND AIR GAP BETWEEN SECTIONS REFER TO EE'S STRUCTURE ASSEMBLY & ERECTION PROCEDURES.
 - 1" FIELD ASSEMBLY JACKING NUTS FOR JACKING SECTIONS TOGETHER ARE LOCATED ON OPPOSING SECTION FLATS ABOVE AND BELOW THE SPLICES. ALL JACKING EQUIPMENT SHALL BE SUPPLIED BY THE INSTALLER.
 - ALL LONGITUDINAL SEAM WELDS WITHIN THE SLIP-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.1.1 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

17340-E01

Item	Part Number	Qty	Description	Weight Per 1	Wt Per Row
1	17340-E01-GS-01	1	SHAFT ASSY. (TOP SECTION)	3,491.34	3,491.34
2	17340-E01-GS-02	1	SHAFT ASSY. (BOTTOM SECTION)	7,577.20	7,577.20
3	K12040	1	36" X 10'-0" LIGHT DUTY AMS SYSTEM II	582.00	582.00
4	K12164	1	36" DIA x 20'-0" LG HEAVY DUTY AMS SYSTEM 2.5	2,604.13	2,604.13
5	K1---	1	36" DIA x 20'-0" LG SUPER HEAVY DUTY II AMS SYSTEM 2.5	3,087.13	3,087.13
6	K12165	5	36" DIA x 10'-0" LG PANEL ENCLOSURE FOR AMS SYSTEM 2.5	178.72	893.60
7	K12314	1	36"Ø AMS COVER PLATE	64.45	64.45
8	K10062	1	BUSS BAR	7.50	7.50
9	K10333	1	7'-0" LIGHTNING ROD	28.60	28.60
			PAINT FINISH		
	HD-INS-MONOPOLE	1	STRUCTURE ASSEMBLY AND ERECTION PROCEDURE		
		1	EE AMS SYSTEM II INSTALLATION INSTRUCTIONS		
30	K11497	5	10" x 30" ACCESS PORT COVER PLATE & BOLTS	31.39	156.95
31	K11097	3	6" x 12" HANDHOLE COVER PLATE & BOLTS	7.25	21.75
32		1			
33		1			
34		1			
35		1			
40	ANCHORBOLT	1	FOR ANCHOR BOLTS REFER TO DWG. 17340-E01-ABT		
			STRUCTURE BLACK WEIGHT		18,514.65
			STRUCTURE GALV WEIGHT		19,625.53

STAMP



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10975 Kinsman Road * Newbury, OH 44065-9787
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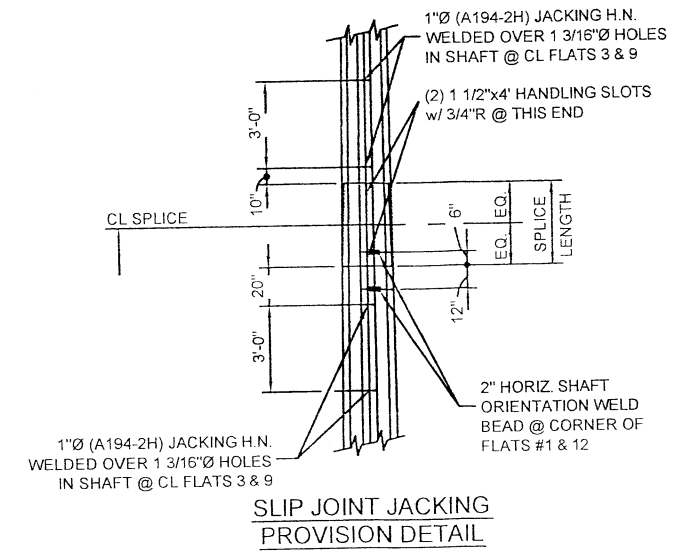
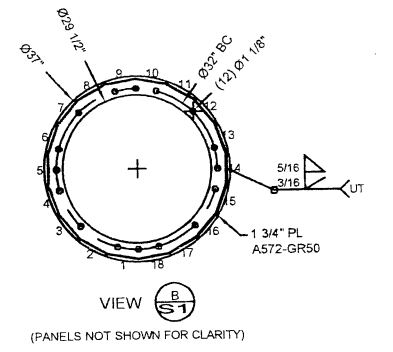
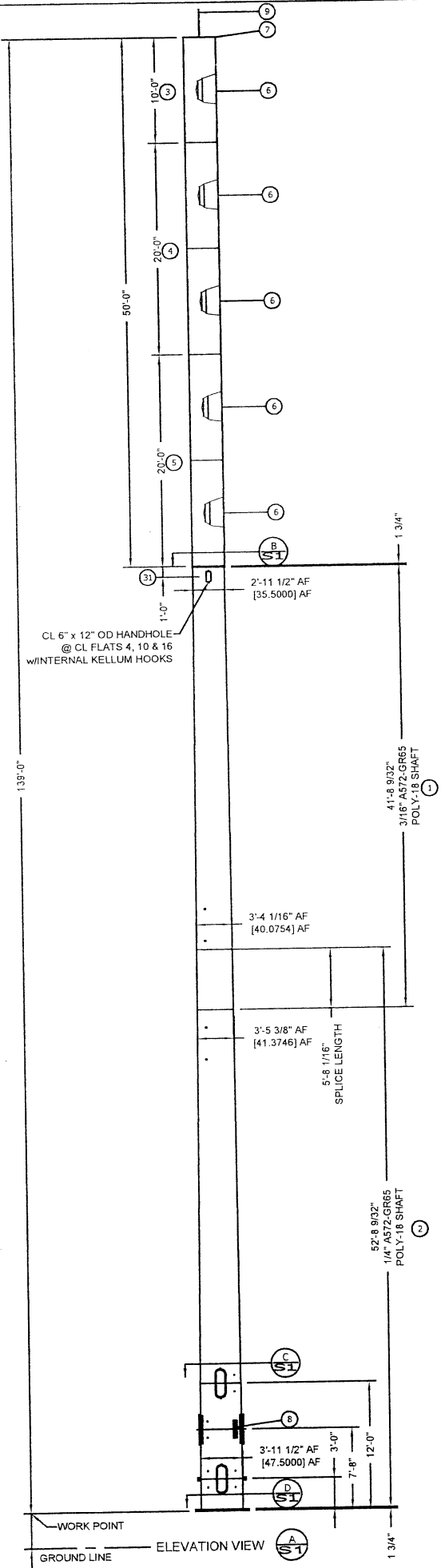
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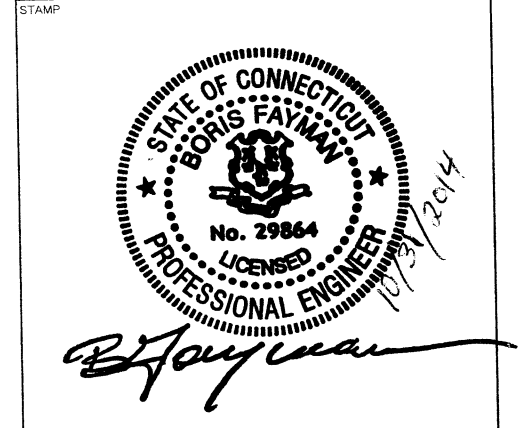
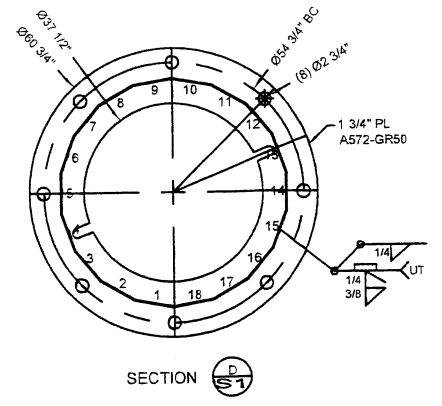
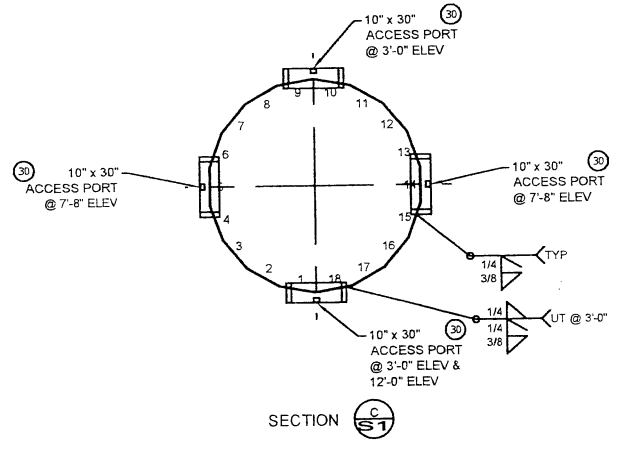
**140' DISGUISED POLE
SAI COMMUNICATIONS
FAIRFIELD COUNTY
NEW CANAAN/SR-1038, CT**

BILL OF MATERIALS & NOTES

DRAWN BY RPH	CREATED 10/31/14	PROJECT NUMBER 17340
DRAWING NUMBER 17340-E01-T1		



NOTE: FOR REQUIRED TOLERANCES AT SLIP JOINTS AND REQ. JACKING FORCES SEE "STRUCTURE ASSEMBLY AND ERECTION PROCEDURES".



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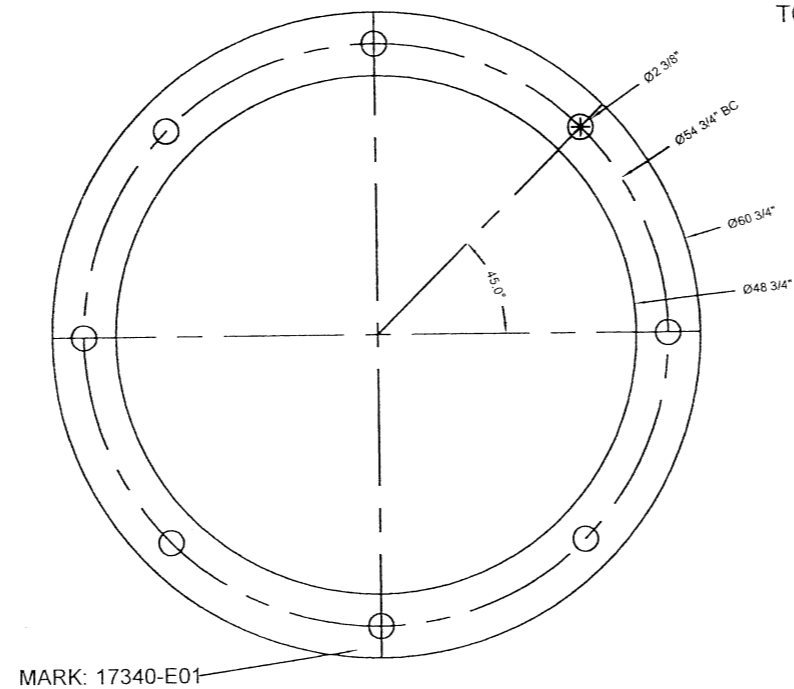
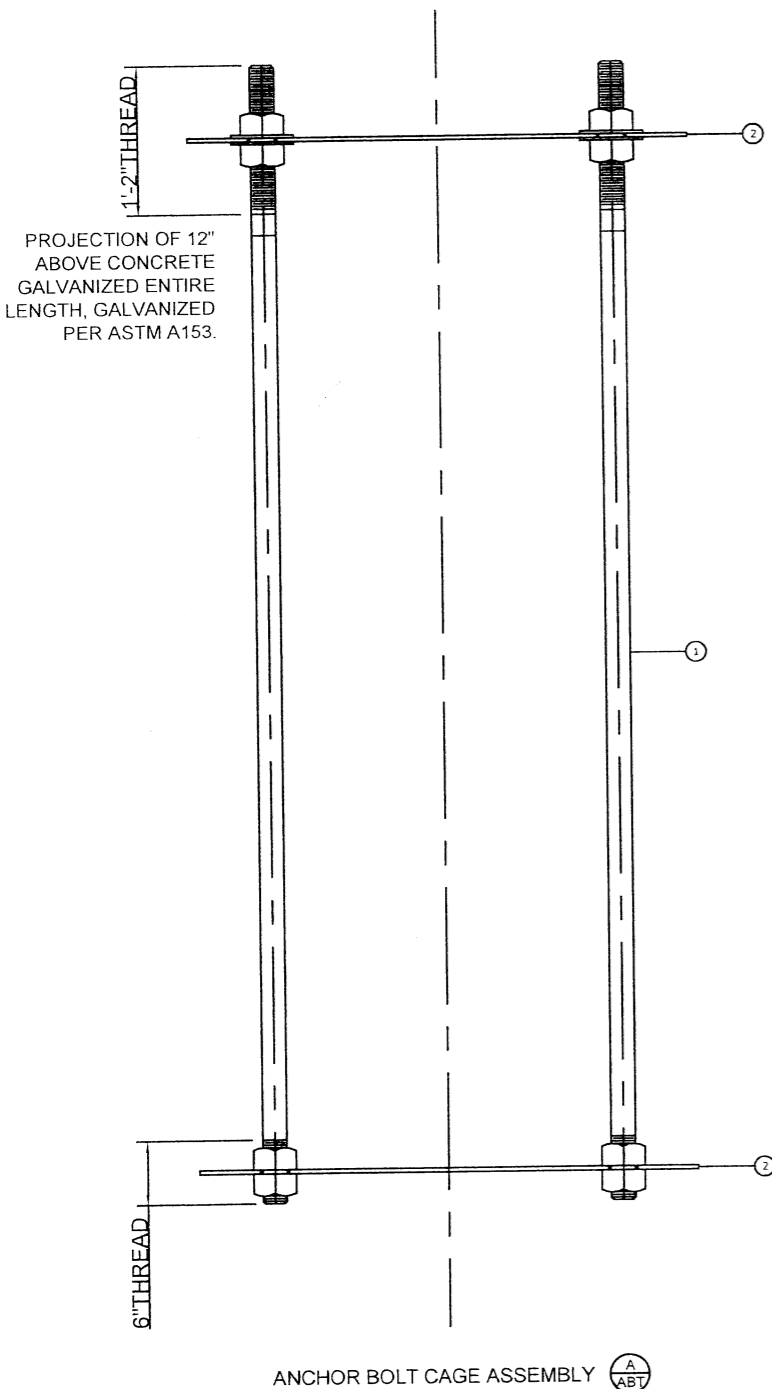
REVISION HISTORY

REV. #	DATE	BY	DESCRIPTION
0	10/31/14	RPH	ISSUED FOR REVIEW

140' DISGUISED POLE
SAI COMMUNICATIONS
FAIRFIELD COUNTY
NEW CANAAN/SR-1038, CT

ELEVATION VIEW & DETAILS

DRAWN BY	CREATED	PROJECT NUMBER
RPH	10/31/14	17340
DRAWING NUMBER	17340-E01-S1	



BILL OF MATERIALS					17340-E01-RPH	
Rev	Item	Part Number	Qty	Description	Weight Per 1	Wt Per Row
1		2.25-AB6.0-4DE	8	2 1/4" x 6'-0" LG (A615-GR75) ANCHOR ROD w/(4) HEX NUTS (A194-GR2H) & (2) FLAT WASHERS (F436)	95.00	760.00
2		8-54.75-2.25	2	TOP & BOTTOM SETTING TEMPLATES	105.73	211.46
UNCAGED ANCHOR RODS & TEMPLATE WEIGHT					971.46	

TOTAL OF (1) ASSEMBLY REQ'D PER STRUCTURE

TOP & BOTTOM PLATES (MIN 3/8" THICK. A36) 2



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REVISION HISTORY

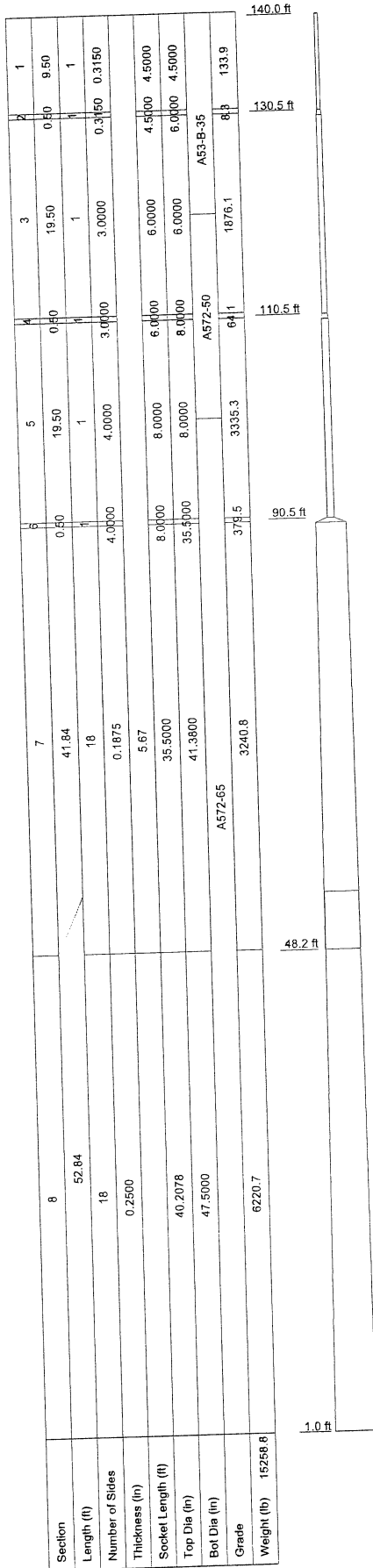
REV. #	DATE	BY	DESCRIPTION
0	10/31/14	RPH	ISSUED FOR REVIEW



140' DISGUISED POLE
SAI COMMUNICATIONS
FAIRFIELD COUNTY
NEW CANAAN/SR-1038, CT

ANCHOR BOLTS & TEMPLATES

DRAWN BY RPH	CREATED 10/31/14	PROJECT NUMBER 17340
DRAWING NUMBER 17340-E01-ABT		



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
36" x 10' LIGHT DUTY AMS	135	36" x 20' SUPER DUTY II-2 AMS	100
36" x 20' HEAVY DUTY AMS	120		

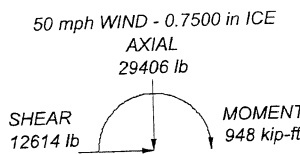
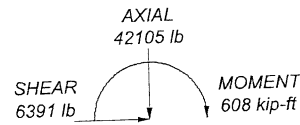
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-35	35000 psi	63000 psi	A572-65	65000 psi	80000 psi
A572-50	50000 psi	65000 psi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 120 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 46.3%

ALL REACTIONS ARE FACTORED



REACTIONS - 120 mph WIND



Boris Fayman

	Engineered Endeavors 10975 Kinsman Rd Newbury, OH 44065 Phone: (440) 564-5484 FAX: (440) 564-5489		Job: EEI Job #17340/New Canaan/SR-1038	
	Project: 140' Disguised Pole		Client: SAI Communications	
	Code: TIA-222-G		Drawn by: Aleksandar Mrkajic	
	Date: 10/31/14		App'd:	
	Path: T:\JOBS\17000\17340-140-Disguised Pole-5C-SAI-CT\17340.eri		Scale: NT Dwg No. E	



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Client	SAI Communications	Designed by	Aleksandar Mrkajic

Tower Input Data

There is a pole section.
 This tower is designed using the TIA-222-G standard.
 The following design criteria apply:
 Tower is located in Fairfield County, Connecticut.
 ASCE 7-10 Wind Data is used.
 Basic wind speed of 120 mph.
 Risk Category II.
 Exposure Category C.
 Topographic Category 1.
 Crest Height 0.00 ft.
 Nominal ice thickness of 0.7500 in.
 Ice thickness is considered to increase with height.
 Ice density of 56.00 pcf.
 A wind speed of 50 mph is used in combination with ice.
 Temperature drop of 50 °F.
 Deflections calculated using a wind speed of 60 mph.
 A non-linear (P-delta) analysis was used.
 Pressures are calculated at each section.
 Stress ratio used in pole design is 1.
 Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

- | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retention Guys To Initial Tension √ Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas SR Members Have Cut Ends Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption | <ul style="list-style-type: none"> Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feedline Torque Include Angle Block Shear Check Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Numbe r of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	140.00-130.50	9.50	0.00	Round	4.5000	4.5000	0.3150		A53-B-35 (35000 psi)
L2	130.50-130.00	0.50	0.00	Round	4.5000	6.0000	0.3150		A53-B-35 (35000 psi)



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Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L3	130.00-110.50	19.50	0.00	Round	6.0000	6.0000	3.0000		A572-50 (50000 psi)
L4	110.50-110.00	0.50	0.00	Round	6.0000	8.0000	3.0000		A572-50 (50000 psi)
L5	110.00-90.50	19.50	0.00	Round	8.0000	8.0000	4.0000		A572-65 (65000 psi)
L6	90.50-90.00	0.50	0.00	Round	8.0000	35.5000	4.0000		A572-65 (65000 psi)
L7	90.00-48.16	41.84	5.67	18	35.5000	41.3800	0.1875	0.7500	A572-65 (65000 psi)
L8	48.16-1.00	52.84		18	40.2078	47.5000	0.2500	1.0000	A572-65 (65000 psi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	J in ⁴	r in	C in	I/C in ³	J in ⁴	I/Q in ²	w in	w/t
L1	4.5000	4.1415	9.0738	1.4815	2.2500	4.0328	18.1229	2.0695	0.0000	0
	4.5000	4.1415	9.0738	1.4815	2.2500	4.0328	18.1229	2.0695	0.0000	0
L2	4.5000	4.1415	9.0738	1.4815	2.2500	4.0328	18.1229	2.0695	0.0000	0
	6.0000	5.6259	22.7454	2.0125	3.0000	7.5818	45.4289	2.8113	0.0000	0
L3	6.0000	28.2743	31.8330	1.0620	3.0000	10.6110	63.5793	14.1287	0.0000	0
	6.0000	28.2743	31.8330	1.0620	3.0000	10.6110	63.5793	14.1287	0.0000	0
L4	6.0000	28.2743	31.8330	1.0620	3.0000	10.6110	63.5793	14.1287	0.0000	0
	8.0000	47.1239	147.3750	1.7700	4.0000	36.8438	294.3485	23.5479	0.0000	0
L5	8.0000	50.2655	100.6080	1.4160	4.0000	25.1520	200.9419	25.1177	0.0000	0
	8.0000	50.2655	100.6080	1.4160	4.0000	25.1520	200.9419	25.1177	0.0000	0
L6	8.0000	50.2655	100.6080	1.4160	4.0000	25.1520	200.9419	25.1177	0.0000	0
	35.5000	395.8407	49134.2355	11.1510	17.7500	2768.1259	98134.6154	197.8022	0.0000	0
L7	36.0476	21.0154	3310.7855	12.5359	18.0340	183.5858	6625.9274	10.5097	5.9180	31.563
	42.0184	24.5147	5255.3313	14.6233	21.0210	250.0034	10517.5776	12.2597	6.9529	37.082
L8	41.6230	31.7065	6395.7183	14.1850	20.4256	313.1232	12799.8519	15.8563	6.6366	26.546
	48.2328	37.4929	10575.2300	16.7738	24.1300	438.2607	21164.3751	18.7500	7.9200	31.68

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in
L1 140.00-130. 50				1	0	1		
L2 130.50-130. 00				1	0	1		
L3 130.00-110. 50				1	0	1		



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 Mrkajic

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft ²	in						
L4 110.50-110.00				1	0	1		
L5 110.00-90.50				1	0	1		
L6 90.50-90.00				1	0	1		
L7 90.00-48.16				1	1	1		
L8 48.16-1.00				1	1	1		

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C_{AA} Front	C_{AA} Side	Weight	
			ft ft ft	°	ft	ft ²	ft ²	lb	
36" x 10' LIGHT DUTY AMS	C	None		0.00	135.00	No	18.00	18.00	600.00
						Ice	37.00	37.00	858.00
						1/2"	56.00	56.00	1116.00
						Ice			
36" x 20' HEAVY DUTY AMS	C	None		0.00	120.00	No	36.00	36.00	3332.00
						Ice	74.00	74.00	3813.00
						1/2"	112.00	112.00	4294.00
						Ice			
36" x 20' SUPER DUTY II-2 AMS	C	None		0.00	100.00	No	36.00	36.00	5314.00
						Ice	74.00	74.00	5795.00
						1/2"	112.00	112.00	6276.00
						Ice			
						1"			
						Ice			

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice



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Comb. No.	Description
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	140 - 130.5	Pole	Max Tension	8	0.10	0.00	0.00
			Max. Compression	26	-1896.59	0.00	0.00
			Max. Mx	8	-684.55	-4.91	0.00
			Max. My	2	-684.55	0.00	4.91
			Max. Vy	8	1086.61	-4.91	0.00
			Max. Vx	2	-1086.61	0.00	4.91



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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L2	130.5 - 130	Pole	Max. Torque	4			-0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-1913.89	0.00	0.00
			Max. Mx	8	-696.03	-5.45	0.00
			Max. My	2	-696.03	0.00	5.45
			Max. Vy	8	1087.46	-5.45	0.00
			Max. Vx	2	-1087.46	0.00	5.45
			Max. Torque	4			-0.00
L3	130 - 110.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-10118.92	0.00	0.00
			Max. Mx	8	-6736.76	-52.67	0.00
			Max. My	2	-6736.76	0.00	52.67
			Max. Vy	8	3775.77	-22.17	0.00
			Max. Vx	2	-3775.77	0.00	22.17
			Max. Torque	4			-0.00
			Max Tension	1	0.00	0.00	0.00
L4	110.5 - 110	Pole	Max. Compression	26	-10204.88	0.00	0.00
			Max. Mx	8	-6829.53	-54.48	0.00
			Max. My	2	-6829.53	0.00	54.48
			Max. Vy	8	3612.97	-54.48	0.00
			Max. Vx	2	-3612.97	0.00	54.48
			Max. Torque	4			-0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-22582.69	0.00	0.00
L5	110 - 90.5	Pole	Max. Mx	8	-17433.63	-142.61	0.00
			Max. My	2	-17433.63	0.00	142.61
			Max. Vy	8	5850.71	-91.99	0.00
			Max. Vx	2	-5850.71	0.00	91.99
			Max. Torque	4			-0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-23061.81	0.00	0.00
			Max. Mx	8	-17906.92	-145.14	0.00
L6	90.5 - 90	Pole	Max. My	2	-17906.92	0.00	145.14
			Max. Vy	8	5060.57	-145.14	0.00
			Max. Vx	2	-5060.57	0.00	145.14
			Max. Torque	4			-0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-29275.28	0.00	0.00
			Max. Mx	8	-21218.78	-387.58	0.00
			Max. My	2	-21218.78	0.00	387.58
L7	90 - 48.164	Pole	Max. Vy	8	8355.14	-387.58	0.00
			Max. Vx	2	-8355.14	0.00	387.58
			Max. Torque	4			-0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-42105.37	0.00	0.00
			Max. Mx	8	-29398.77	-947.52	0.00
			Max. My	2	-29398.77	0.00	947.52
			Max. Vy	8	12630.05	-947.52	0.00
L8	48.164 - 1	Pole	Max. Vx	2	-12630.05	0.00	947.52
			Max. Torque	4			-0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	27	42105.37	0.00	6390.88



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Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
	Max. H _x	20	29405.74	12613.82	0.00
	Max. H _z	2	29405.74	0.00	12613.82
	Max. M _x	2	947.52	0.00	12613.82
	Max. M _z	8	947.52	-12613.82	0.00
	Max. Torsion	12	0.00	-6306.91	-10923.89
	Min. Vert	5	22054.31	-6306.91	10923.89
	Min. H _x	8	29405.74	-12613.82	0.00
	Min. H _z	14	29405.74	0.00	-12613.82
	Min. M _x	14	-947.52	0.00	-12613.82
	Min. M _z	20	-947.52	12613.82	0.00
	Min. Torsion	4	-0.00	-6306.91	10923.89

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	24504.78	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	29405.74	0.00	-12613.82	-947.52	0.00	0.00
0.9 Dead+1.0 Wind 0 deg - No Ice	22054.31	0.00	-12613.82	-929.86	0.00	0.00
1.2 Dead+1.0 Wind 30 deg - No Ice	29405.74	6306.91	-10923.89	-820.58	-473.76	0.00
0.9 Dead+1.0 Wind 30 deg - No Ice	22054.31	6306.91	-10923.89	-805.29	-464.93	0.00
1.2 Dead+1.0 Wind 60 deg - No Ice	29405.74	10923.89	-6306.91	-473.76	-820.58	-0.00
0.9 Dead+1.0 Wind 60 deg - No Ice	22054.31	10923.89	-6306.91	-464.93	-805.29	-0.00
1.2 Dead+1.0 Wind 90 deg - No Ice	29405.74	12613.82	0.00	0.00	-947.52	0.00
0.9 Dead+1.0 Wind 90 deg - No Ice	22054.31	12613.82	0.00	0.00	-929.86	0.00
1.2 Dead+1.0 Wind 120 deg - No Ice	29405.74	10923.89	6306.91	473.76	-820.58	0.00
0.9 Dead+1.0 Wind 120 deg - No Ice	22054.31	10923.89	6306.91	464.93	-805.29	0.00
1.2 Dead+1.0 Wind 150 deg - No Ice	29405.74	6306.91	10923.89	820.58	-473.76	-0.00
0.9 Dead+1.0 Wind 150 deg - No Ice	22054.31	6306.91	10923.89	805.29	-464.93	-0.00
1.2 Dead+1.0 Wind 180 deg - No Ice	29405.74	0.00	12613.82	947.52	0.00	0.00
0.9 Dead+1.0 Wind 180 deg - No Ice	22054.31	0.00	12613.82	929.86	0.00	0.00
1.2 Dead+1.0 Wind 210 deg - No Ice	29405.74	-6306.91	10923.89	820.58	473.76	0.00
0.9 Dead+1.0 Wind 210 deg - No Ice	22054.31	-6306.91	10923.89	805.29	464.93	0.00
1.2 Dead+1.0 Wind 240 deg - No Ice	29405.74	-10923.89	6306.91	473.76	820.58	-0.00
0.9 Dead+1.0 Wind 240 deg - No Ice	22054.31	-10923.89	6306.91	464.93	805.29	-0.00
1.2 Dead+1.0 Wind 270 deg - No Ice	29405.74	-12613.82	0.00	0.00	947.52	0.00
0.9 Dead+1.0 Wind 270 deg - No Ice	22054.31	-12613.82	0.00	0.00	929.86	0.00



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Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
No Ice						
1.2 Dead+1.0 Wind 300 deg - No Ice	29405.74	-10923.89	-6306.91	-473.76	820.58	0.00
0.9 Dead+1.0 Wind 300 deg - No Ice	22054.31	-10923.89	-6306.91	-464.93	805.29	0.00
1.2 Dead+1.0 Wind 330 deg - No Ice	29405.74	-6306.91	-10923.89	-820.58	473.76	-0.00
0.9 Dead+1.0 Wind 330 deg - No Ice	22054.31	-6306.91	-10923.89	-805.29	464.93	-0.00
1.2 Dead+1.0 Ice+1.0 Temp	42105.37	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	42105.37	0.00	-6390.88	-607.69	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	42105.37	3195.44	-5534.66	-526.27	-303.84	0.00
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	42105.37	5534.66	-3195.44	-303.84	-526.27	-0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	42105.37	6390.88	0.00	0.00	-607.69	0.00
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	42105.37	5534.66	3195.44	303.84	-526.27	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	42105.37	3195.44	5534.66	526.27	-303.84	-0.00
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	42105.37	0.00	6390.88	607.69	0.00	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	42105.37	-3195.44	5534.66	526.27	303.84	0.00
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	42105.37	-5534.66	3195.44	303.84	526.27	-0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	42105.37	-6390.88	0.00	0.00	607.69	0.00
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	42105.37	-5534.66	-3195.44	-303.84	526.27	0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	42105.37	-3195.44	-5534.66	-526.27	303.84	-0.00
Dead+Wind 0 deg - Service	24504.78	0.00	-2821.51	-209.51	0.00	0.00
Dead+Wind 30 deg - Service	24504.78	1410.76	-2443.50	-181.44	-104.75	0.00
Dead+Wind 60 deg - Service	24504.78	2443.50	-1410.76	-104.75	-181.44	-0.00
Dead+Wind 90 deg - Service	24504.78	2821.51	0.00	0.00	-209.51	0.00
Dead+Wind 120 deg - Service	24504.78	2443.50	1410.76	104.75	-181.44	0.00
Dead+Wind 150 deg - Service	24504.78	1410.76	2443.50	181.44	-104.75	-0.00
Dead+Wind 180 deg - Service	24504.78	0.00	2821.51	209.51	0.00	0.00
Dead+Wind 210 deg - Service	24504.78	-1410.76	2443.50	181.44	104.75	0.00
Dead+Wind 240 deg - Service	24504.78	-2443.50	1410.76	104.75	181.44	-0.00
Dead+Wind 270 deg - Service	24504.78	-2821.51	0.00	0.00	209.51	0.00
Dead+Wind 300 deg - Service	24504.78	-2443.50	-1410.76	-104.75	181.44	0.00
Dead+Wind 330 deg - Service	24504.78	-1410.76	-2443.50	-181.44	104.75	-0.00

Solution Summary



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Job	EEI Job #17340/New Canaan/SR-1038	Page	8 of 13
Project	140' Disguised Pole	Date	15:17:23 10/31/14
Client	SAI Communications	Designed by	Aleksandar Mrkajic

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-24504.78	0.00	0.00	24504.78	0.00	0.000%
2	0.00	-29405.74	-12613.82	0.00	29405.74	12613.82	0.000%
3	0.00	-22054.31	-12613.82	0.00	22054.31	12613.82	0.000%
4	6306.91	-29405.74	-10923.89	-6306.91	29405.74	10923.89	0.000%
5	6306.91	-22054.31	-10923.89	-6306.91	22054.31	10923.89	0.000%
6	10923.89	-29405.74	-6306.91	-10923.89	29405.74	6306.91	0.000%
7	10923.89	-22054.31	-6306.91	-10923.89	22054.31	6306.91	0.000%
8	12613.82	-29405.74	0.00	-12613.82	29405.74	0.00	0.000%
9	12613.82	-22054.31	0.00	-12613.82	22054.31	0.00	0.000%
10	10923.89	-29405.74	6306.91	-10923.89	29405.74	-6306.91	0.000%
11	10923.89	-22054.31	6306.91	-10923.89	22054.31	-6306.91	0.000%
12	6306.91	-29405.74	10923.89	-6306.91	29405.74	-10923.89	0.000%
13	6306.91	-22054.31	10923.89	-6306.91	22054.31	-10923.89	0.000%
14	0.00	-29405.74	12613.82	0.00	29405.74	-12613.82	0.000%
15	0.00	-22054.31	12613.82	0.00	22054.31	-12613.82	0.000%
16	-6306.91	-29405.74	10923.89	6306.91	29405.74	-10923.89	0.000%
17	-6306.91	-22054.31	10923.89	6306.91	22054.31	-10923.89	0.000%
18	-10923.89	-29405.74	6306.91	10923.89	29405.74	-6306.91	0.000%
19	-10923.89	-22054.31	6306.91	10923.89	22054.31	-6306.91	0.000%
20	-12613.82	-29405.74	0.00	12613.82	29405.74	0.00	0.000%
21	-12613.82	-22054.31	0.00	12613.82	22054.31	0.00	0.000%
22	-10923.89	-29405.74	-6306.91	10923.89	29405.74	6306.91	0.000%
23	-10923.89	-22054.31	-6306.91	10923.89	22054.31	6306.91	0.000%
24	-6306.91	-29405.74	-10923.89	6306.91	29405.74	10923.89	0.000%
25	-6306.91	-22054.31	-10923.89	6306.91	22054.31	10923.89	0.000%
26	0.00	-42105.37	0.00	0.00	42105.37	0.00	0.000%
27	0.00	-42105.37	-6390.87	0.00	42105.37	6390.88	0.000%
28	3195.44	-42105.37	-5534.66	-3195.44	42105.37	5534.66	0.000%
29	5534.66	-42105.37	-3195.44	-5534.66	42105.37	3195.44	0.000%
30	6390.87	-42105.37	0.00	-6390.88	42105.37	0.00	0.000%
31	5534.66	-42105.37	3195.44	-5534.66	42105.37	-3195.44	0.000%
32	3195.44	-42105.37	5534.66	-3195.44	42105.37	-5534.66	0.000%
33	0.00	-42105.37	6390.87	0.00	42105.37	-6390.88	0.000%
34	-3195.44	-42105.37	5534.66	3195.44	42105.37	-5534.66	0.000%
35	-5534.66	-42105.37	3195.44	5534.66	42105.37	-3195.44	0.000%
36	-6390.87	-42105.37	0.00	6390.88	42105.37	0.00	0.000%
37	-5534.66	-42105.37	-3195.44	5534.66	42105.37	3195.44	0.000%
38	-3195.44	-42105.37	-5534.66	3195.44	42105.37	5534.66	0.000%
39	0.00	-24504.78	-2821.51	0.00	24504.78	2821.51	0.000%
40	1410.76	-24504.78	-2443.50	-1410.76	24504.78	2443.50	0.000%
41	2443.50	-24504.78	-1410.76	-2443.50	24504.78	1410.76	0.000%
42	2821.51	-24504.78	0.00	-2821.51	24504.78	0.00	0.000%
43	2443.50	-24504.78	1410.76	-2443.50	24504.78	-1410.76	0.000%
44	1410.76	-24504.78	2443.50	-1410.76	24504.78	-2443.50	0.000%
45	0.00	-24504.78	2821.51	0.00	24504.78	-2821.51	0.000%
46	-1410.76	-24504.78	2443.50	1410.76	24504.78	-2443.50	0.000%
47	-2443.50	-24504.78	1410.76	2443.50	24504.78	-1410.76	0.000%
48	-2821.51	-24504.78	0.00	2821.51	24504.78	0.00	0.000%
49	-2443.50	-24504.78	-1410.76	2443.50	24504.78	1410.76	0.000%
50	-1410.76	-24504.78	-2443.50	1410.76	24504.78	2443.50	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.0000001	0.0000001



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Job	EEI Job #17340/New Canaan/SR-1038	Page	9 of 13
Project	140' Disguised Pole	Date	15:17:23 10/31/14
Client	SAI Communications	Designed by	Aleksandar Mrkajic

2	Yes	6	0.00003047	0.00043816
3	Yes	6	0.00000001	0.00005031
4	Yes	8	0.00000001	0.00049723
5	Yes	7	0.00000001	0.00074047
6	Yes	8	0.00000001	0.00049722
7	Yes	7	0.00000001	0.00074047
8	Yes	6	0.00003047	0.00043816
9	Yes	6	0.00000001	0.00005032
10	Yes	8	0.00000001	0.00049722
11	Yes	7	0.00000001	0.00074047
12	Yes	8	0.00000001	0.00049723
13	Yes	7	0.00000001	0.00074047
14	Yes	6	0.00003047	0.00043816
15	Yes	6	0.00000001	0.00005031
16	Yes	8	0.00000001	0.00049723
17	Yes	7	0.00000001	0.00074047
18	Yes	8	0.00000001	0.00049722
19	Yes	7	0.00000001	0.00074047
20	Yes	6	0.00003047	0.00043816
21	Yes	6	0.00000001	0.00005032
22	Yes	8	0.00000001	0.00049722
23	Yes	7	0.00000001	0.00074047
24	Yes	8	0.00000001	0.00049723
25	Yes	7	0.00000001	0.00074047
26	Yes	4	0.00000001	0.00000001
27	Yes	9	0.00000001	0.00070892
28	Yes	10	0.00000001	0.00033196
29	Yes	10	0.00000001	0.00033196
30	Yes	9	0.00000001	0.00070892
31	Yes	10	0.00000001	0.00033196
32	Yes	10	0.00000001	0.00033196
33	Yes	9	0.00000001	0.00070892
34	Yes	10	0.00000001	0.00033196
35	Yes	10	0.00000001	0.00033196
36	Yes	9	0.00000001	0.00070892
37	Yes	10	0.00000001	0.00033196
38	Yes	10	0.00000001	0.00033196
39	Yes	5	0.00000001	0.00037968
40	Yes	5	0.00000001	0.00088779
41	Yes	5	0.00000001	0.00088779
42	Yes	5	0.00000001	0.00037968
43	Yes	5	0.00000001	0.00088779
44	Yes	5	0.00000001	0.00088779
45	Yes	5	0.00000001	0.00037968
46	Yes	5	0.00000001	0.00088779
47	Yes	5	0.00000001	0.00088779
48	Yes	5	0.00000001	0.00037968
49	Yes	5	0.00000001	0.00088779
50	Yes	5	0.00000001	0.00088779

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 130.5	21.93	39	2.46	0.00
L2	130.5 - 130	17.07	39	2.38	0.00
L3	130 - 110.5	16.82	39	2.37	0.00
L4	110.5 - 110	8.29	39	1.51	0.00
L5	110 - 90.5	8.13	39	1.50	0.00



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Job
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Project
140' Disguised Pole

Date
15:17:23 10/31/14

Client
SAI Communications

Designed by
Aleksandar
Mrkajic

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L6	90.5 - 90	3.93	39	0.38	0.00
L7	90 - 48.164	3.89	39	0.38	0.00
L8	53.836 - 1	1.48	39	0.24	0.00

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
135.00	36" x 10' LIGHT DUTY AMS	39	19.35	2.43	0.00	5355
120.00	36" x 20' HEAVY DUTY AMS	39	12.00	1.94	0.00	1279
100.00	36" x 20' SUPER DUTY II-2 AMS	39	5.42	0.87	0.00	1007

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 130.5	100.71	2	11.36	0.00
L2	130.5 - 130	78.38	2	11.00	0.00
L3	130 - 110.5	77.24	2	10.97	0.00
L4	110.5 - 110	37.95	2	6.99	0.00
L5	110 - 90.5	37.22	2	6.93	0.00
L6	90.5 - 90	17.88	2	1.74	0.00
L7	90 - 48.164	17.70	2	1.74	0.00
L8	53.836 - 1	6.73	2	1.10	0.00

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
135.00	36" x 10' LIGHT DUTY AMS	2	88.85	11.21	0.00	1252
120.00	36" x 20' HEAVY DUTY AMS	2	55.09	8.99	0.00	292
100.00	36" x 20' SUPER DUTY II-2 AMS	2	24.70	4.00	0.00	219

Compression Checks

Pole Design Data



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Job	EEI Job #17340/New Canaan/SR-1038	Page	11 of 13
Project	140' Disguised Pole	Date	15:17:23 10/31/14
Client	SAI Communications	Designed by	Aleksandar Mrkajic

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _v lb	φP _n lb	Ratio P _v / φP _n
L1	140 - 130.5 (1)	TP4.5x4.5x0.315	9.50	0.00	0.0	4.1415	-1735.09	130457.00	0.013
L2	130.5 - 130 (2)	TP6x4.5x0.315	0.50	0.00	0.0	4.1415	-1745.16	130457.00	0.013
L3	130 - 110.5 (3)	TP6x6x3	19.50	0.00	0.0	28.274 3	-6737.06	1272350.00	0.005
L4	110.5 - 110 (4)	TP8x6x3	0.50	0.00	0.0	28.274 3	-6791.33	1272350.00	0.005
L5	110 - 90.5 (5)	TP8x8x4	19.50	0.00	0.0	50.265 5	-17433.60	2940530.00	0.006
L6	90.5 - 90 (6)	TP35.5x8x4	0.50	0.00	0.0	50.265 5	-17679.30	2940530.00	0.006
L7	90 - 48.164 (7)	TP41.38x35.5x0.1875	41.84	0.00	0.0	24.040 3	-21218.80	1269320.00	0.017
L8	48.164 - 1 (8)	TP47.5x40.2078x0.25	52.84	0.00	0.0	37.492 9	-29398.80	2164300.00	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{ux} kip-ft	Ratio M _{ux} / φM _{ux}	M _{uy} kip-ft	φM _{uy} kip-ft	Ratio M _{uy} / φM _{uy}
L1	140 - 130.5 (1)	TP4.5x4.5x0.315	4.87	14.51	0.336	0.00	14.51	0.000
L2	130.5 - 130 (2)	TP6x4.5x0.315	4.87	14.51	0.336	0.00	14.51	0.000
L3	130 - 110.5 (3)	TP6x6x3	52.68	135.00	0.390	0.00	135.00	0.000
L4	110.5 - 110 (4)	TP8x6x3	52.67	135.00	0.390	0.00	135.00	0.000
L5	110 - 90.5 (5)	TP8x8x4	142.62	416.00	0.343	0.00	416.00	0.000
L6	90.5 - 90 (6)	TP35.5x8x4	142.61	416.00	0.343	0.00	416.00	0.000
L7	90 - 48.164 (7)	TP41.38x35.5x0.1875	387.59	1057.75	0.366	0.00	1057.75	0.000
L8	48.164 - 1 (8)	TP47.5x40.2078x0.25	947.53	2108.24	0.449	0.00	2108.24	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V _u lb	φV _n lb	Ratio V _u / φV _n	Actual T _u kip-ft	φT _n kip-ft	Ratio T _u / φT _n
L1	140 - 130.5 (1)	TP4.5x4.5x0.315	1075.34	65228.40	0.016	0.00	21.14	0.000
L2	130.5 - 130 (2)	TP6x4.5x0.315	1075.73	88607.70	0.012	0.00	21.14	0.000
L3	130 - 110.5 (3)	TP6x6x3	3634.77	636173.00	0.006	0.00	79.47	0.000
L4	110.5 - 110 (4)	TP8x6x3	3612.97	1060290.00	0.003	0.00	79.47	0.000
L5	110 - 90.5 (5)	TP8x8x4	5107.14	1470270.00	0.003	0.00	244.90	0.000
L6	90.5 - 90 (6)	TP35.5x8x4	5060.57	11578300.00	0.000	0.00	244.90	0.000
L7	90 - 48.164	TP41.38x35.5x0.1875	8355.07	634658.00	0.013	0.00	2118.08	0.000



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Project	140' Disguised Pole	Date	15:17:23 10/31/14
Client	SAI Communications	Designed by	Aleksandar Mrkajic

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L8	(7) 48.164 - 1 (8)	TP47.5x40.2078x0.25	12630.10	1082150.00	0.012	0.00	4221.64	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 130.5 (1)	0.013	0.336	0.000	0.016	0.000	0.349	1.000	4.8.2 ✓
L2	130.5 - 130 (2)	0.013	0.336	0.000	0.012	0.000	0.349	1.000	4.8.2 ✓
L3	130 - 110.5 (3)	0.005	0.390	0.000	0.006	0.000	0.396	1.000	4.8.2 ✓
L4	110.5 - 110 (4)	0.005	0.390	0.000	0.003	0.000	0.396	1.000	4.8.2 ✓
L5	110 - 90.5 (5)	0.006	0.343	0.000	0.003	0.000	0.349	1.000	4.8.2 ✓
L6	90.5 - 90 (6)	0.006	0.343	0.000	0.000	0.000	0.349	1.000	4.8.2 ✓
L7	90 - 48.164 (7)	0.017	0.366	0.000	0.013	0.000	0.383	1.000	4.8.2 ✓
L8	48.164 - 1 (8)	0.014	0.449	0.000	0.012	0.000	0.463	1.000	4.8.2 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	140 - 130.5	Pole	TP4.5x4.5x0.315	1	-1735.09	130457.00	34.9	Pass
L2	130.5 - 130	Pole	TP6x4.5x0.315	2	-1745.16	130457.00	34.9	Pass
L3	130 - 110.5	Pole	TP6x6x3	3	-6737.06	127235.00	39.6	Pass
L4	110.5 - 110	Pole	TP8x6x3	4	-6791.33	127235.00	39.6	Pass
L5	110 - 90.5	Pole	TP8x8x4	5	-17433.60	294053.00	34.9	Pass
L6	90.5 - 90	Pole	TP35.5x8x4	6	-17679.30	294053.00	34.9	Pass
L7	90 - 48.164	Pole	TP41.38x35.5x0.1875	7	-21218.80	126932.00	38.3	Pass
L8	48.164 - 1	Pole	TP47.5x40.2078x0.25	8	-29398.80	216430.00	46.3	Pass



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FAX: (440) 564-5489

Job	EEI Job #17340/New Canaan/SR-1038	Page	13 of 13
Project	140' Disguised Pole	Date	15:17:23 10/31/14
Client	SAI Communications	Designed by	Aleksandar Mrkajic

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail	
							Summary		
							Pole (L8)	46.3	Pass
							RATING	46.3	Pass
							=		



Anchor Rod and Base Plate Design

Designed per: TIA-222-G

10/13/2014

Page 1

EEI Job #:	17340
Site Name:	New Canaan
Structure:	140' Disguised Pole

Client:	SAI Communications
Site #:	SR1038
Location:	Fairfield County, CT

Pole Properties at Base

Pole Diameter = 47.5 in
Pole Thickness = 0.25 in
Yield Strength = 65 ksi
Monopole Shape = 18-Sided

Base Plate Properties

Base Plate Material = A572GR50
Outside Diameter = 60.75 in
Inside Diameter = 37.5 in
Weight = 910 lbf

Base Reactions

$M_u = 948$ ft-kip
 $V_u = 13$ kip
 $P_u = 29.4$ kip

Effective Base Plate Bend Line

Desantis' Bend Line = 37.87 in
% Reduction = 65 %
Reduced Bend Line = 24.62 in
Brinker's Bend Line = 24.33 in
Effective Bend Line = 24.33 in

Anchor Rod Properties

Anchor Material = A615GR75
Anchor Diameter = 2.25 in
Anchor Length = 6 ft
No. of Anchors = 8
Weight = 714 lbs

Base Plate Thickness

Section Modulus: Plastic
 $\Phi_b = 0.9$
Minimum Thickness = 1.19 in
Actual Thickness = 1.75 in
 $M_{ub} = 390$ in-k
 $\Phi M_n = 838$ in-kip
Capacity Usage = 46.5%

Bolt Circle Diameter & Spacing

Minimum Bolt Circle $\emptyset = 54.73$ in
Actual Bolt Circle $\emptyset = 54.75$ in
Spacing = 21.50 in

Setting Template Properties

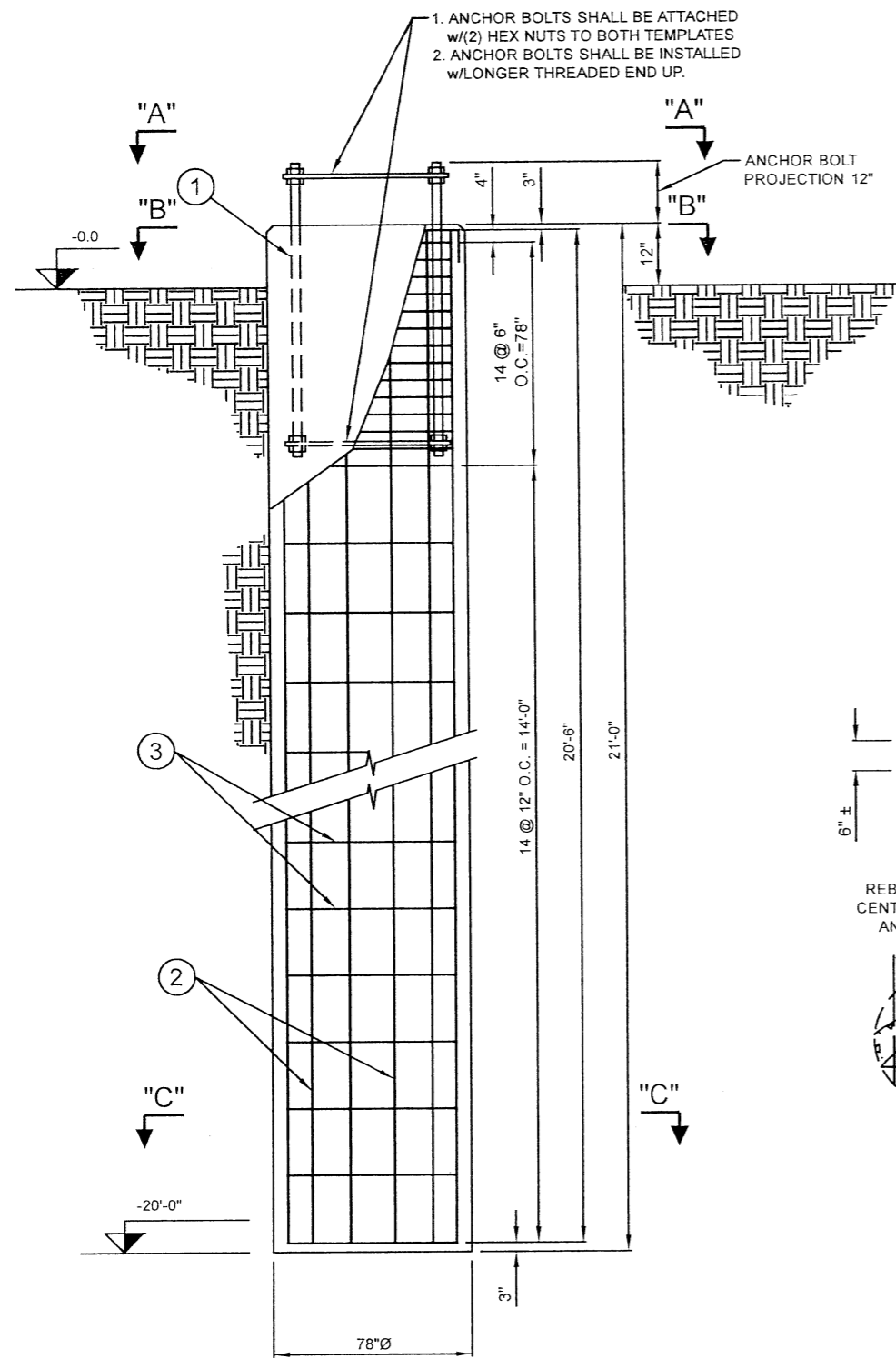
Outside Diameter = 60.75 in
Inside Diameter = 48.75 in
Thickness = 0.375 in
Template Hole $\emptyset = 2.375$ in
Template Weight = 106.0 lbs
Bottom Template Must Be Bolted

Anchor Rod Inter. Eq. 1 (4.9.9)

$P_{ub} = 108$ kip
 $V_{ub} = 1.63$ kip
 $\eta = 0.5$
 $\Phi_t = 0.80$
 $\Phi_t R_{nt} = 260$ kip
Inter. Eq. 1 = 0.43

Anchor Rod Inter. Eq. 2 (4.9.9)

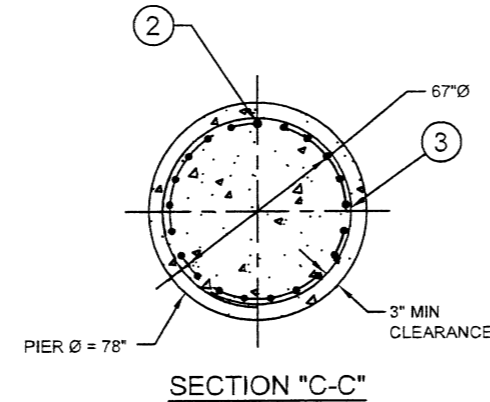
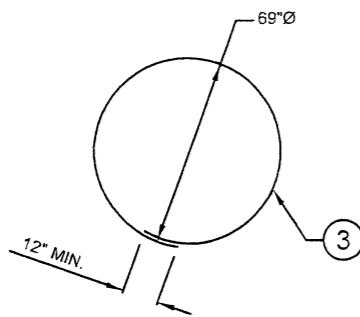
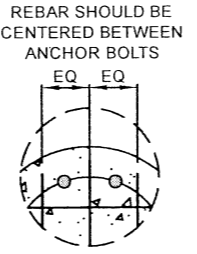
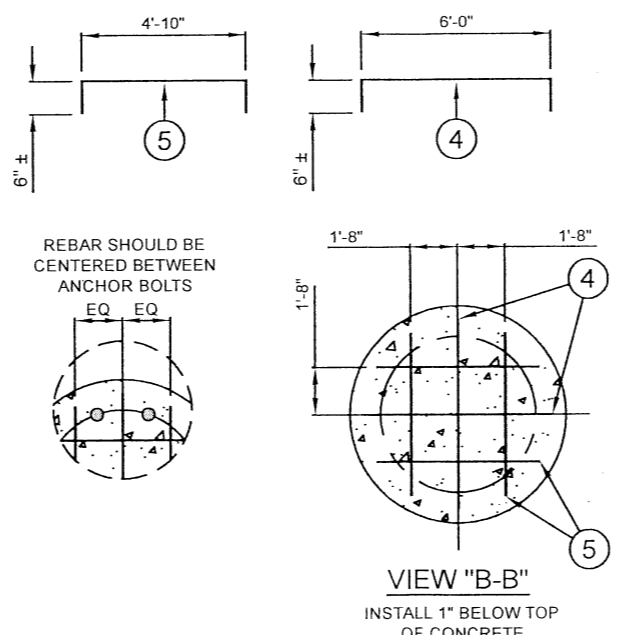
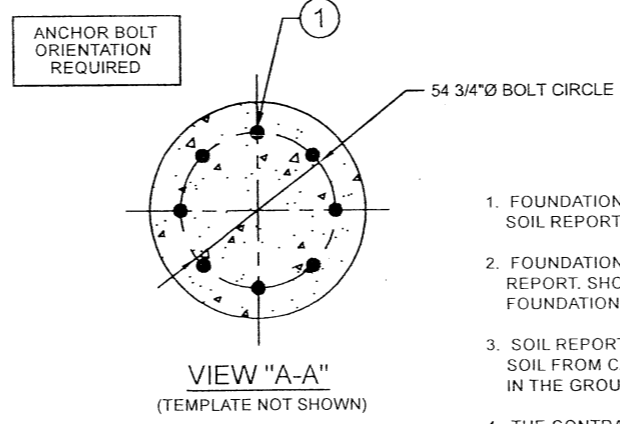
$L_{ar} = 2.25$ in
 $V_{ub} = 1.63$ kip
 $P_{ub} = 108$ kip
 $M_{ub} = 2.38$ kip-in
 $\Phi_v R_{nv} = 134$ kip
 $\Phi_t R_{nt} = 260$ kip
 $\Phi_f R_{nm} = 95$ kip-in
Inter. Eq. 2 = 0.43



FOUNDATION LOADING	
MOMENT	948 kip-ft
SHEAR	12.61 kips
AXIAL	29.41 kips

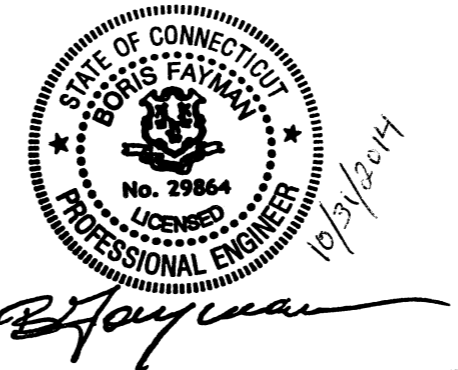
MATERIAL LIST		
ITEM	QTY.	DESCRIPTION
1	8	2 1/4"Ø x 6'-0" (A615-GR75) ANCHOR BOLTS
2	20	#11 REBAR x 20'-6" (ASTM A615-GR.60)
3	28	#5 REBAR x 19'-3" (ASTM A615-GR.60)
4	2	#5 REBAR x 7'-0" (ASTM A615-GR.60)
5	4	#5 REBAR x 5'-10" (ASTM A615-GR.60)

VOL. CONCRETE @ 4000 psi (TYPE II CEMENT)	26 yd ³
STEEL (ASTM A615-GR.60)	2782 lbs



GENERAL NOTES:

- FOUNDATION DESIGN IS BASED ON THE FOLLOWING: EEI JOB# 17340. SOIL REPORT BY DEWBERRY, REPORT NO. N/A - APRIL 2014.
- 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 RE-EVALUATE THE FOUNDATION DESIGN.
- SOIL REPORT SHOULD BE CONSULTED PRIOR TO CONSTRUCTION. STEEL CASING OR SLURRY METHOD MAY BE REQUIRED TO PREVENT SOIL FROM CAVING DURING CONSTRUCTION. THE CASING SHOULD BE REMOVED AFTER COMPLETION OF CONCRETING OR, IF LEFT IN THE GROUND, ALL VOIDS AROUND THE CASING SHALL BE FILLED WITH PRESSURIZED GROUT.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES.
- SPECIAL INSPECTION IS REQUIRED IN ACCORDANCE WITH 2003 IBC.
 - SOIL.
 - FOUNDATION EXCAVATION SHALL BE INSPECTED PRIOR TO INSTALLATION OF REINFORCEMENT.
 - VERIFY DEPTH AND DIAMETER OF THE EXCAVATION.
 - VERIFY ACTUAL SOIL CONDITIONS AGAINST THE GEOTECHNICAL REPORT.
 - REINFORCING STEEL.
 - VERIFY GRADE, LENGTH, DIAMETER, AND QUANTITY OF REBARS AND COMPLIANCE WITH THE DRAWINGS.
 - VERIFY GRADE, LENGTH, DIAMETER, AND QUANTITY OF ANCHOR BOLTS AND BOLT PATTERN ON THE TEMPLATES.
 - CONCRETE.
 - VERIFY STRENGTH, SLUMP, AIR, TEMPERATURE OF CONCRETE, AND DESIGN MIX.
- REINFORCING STEEL.
 - REINFORCING STEEL SHALL CONFORM TO ASTM A615-87, Fy=60 ksi.
 - ALL REINFORCEMENT SHALL BE ASSEMBLED USING STEEL WIRE. WELDING IS NOT PERMITTED.
 - MINIMUM SPLICE LENGTH FOR LONGITUDINAL BARS: No. 6 BARS AND SMALLER - 44 x Øbar; No. 7 BARS AND LARGER 55 x Øbar.
 - HORIZONTAL STIRRUPS SHALL BE STAGGERED ALONG THE REBAR CAGE WITH NO MORE THAN 50% OF SPLICES IN ONE PLACE.
- CONCRETE.
 - MIX DESIGN AND CONSTRUCTION PROCEDURE SHALL BE IN COMPLIANCE WITH ACI 318-11 AND ALL APPLICABLE STATE AND LOCAL CODES.
 - MINIMUM COMPRESSIVE STRENGTH - 4000 psi AT 28 DAYS AND TYPE II CEMENT SHALL BE USED UNLESS STATED OTHERWISE.
 - SLUMP: DRILLED PIER - 7" (±1"). MAT FOUNDATION - 3" (±1").
 - CONCRETE SHALL BE DEPOSITED AS NEARLY AS PRACTICAL IN ITS FINAL POSITION TO AVOID SEGREGATION DUE TO REHANDLING OR FLOWING.
 - CONCRETE SHALL BE THOROUGHLY CONSOLIDATED BY ALL SUITABLE MEANS DURING PLACEMENT AND SHALL BE THOROUGHLY WORKED AROUND REINFORCEMENT AND EMBEDDED FIXTURES AND INTO CORNERS OF FORMS.
- 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.



10975 Kinsman Road * Newbury, OH 44065-9787
 Ph: (440) 564-5484 * Ph: (888) 270-3855
 Fx: (440) 564-5489 * www.engend.com

SAI COMMUNICATIONS
 140'-0" DISGUISED POLE
 NEW CANAAN/SR-1038
 FAIRFIELD COUNTY, CT

REV	DESCRIPTION	DATE	DWN	CHK
0	COMPLETED DRAWING	10/31/2014	AM	

SCALE: N.T.S.	PROJECT NO. 17340
SHEET 1 of 1	DRAWING NO. 17340D-140.0

Monopole Drilled Pier

Checks capacity of a single drilled shaft foundation for a monopole

EEL #: 17340

Site Name: NEW CANAAN

Site #: SR1038



TIA Revision: G

Base Reactions	
Moment (k-ft):	948
Axial (k):	29.41
Shear (k):	12.61

Foundation Dimensions	
Caisson Diameter (ft):	6.5
Extension Above Grade (ft):	1
Depth Below Existing Grade (ft):	20
Volume (yd ³):	26

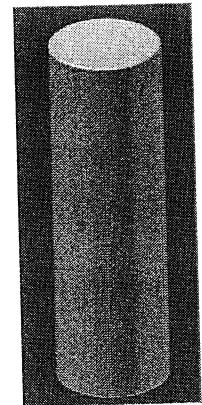
Rebar Properties	
Rebar Size:	11
Rebar Quantity:	20
Tie Size:	5
Tie Quantity:	28

Material Properties	
Rebar Tensile (ksi):	60
Concrete Strength (psi):	3000
Clear cover (in):	5.5
Rebar Weight (lbs):	2782

Soil Properties	
Neglect Top Layer:	Y
Groundwater Depth Below Grade (ft):	999
# of Layers:	4

Analysis Checks				
	Capacity	Demand	Check	Rating
Rebar Area (in ²):	31.20	15.93	OK	N/A
Pier Moment Capacity (k-ft):	4372.90	1010.73	OK	23.1%
Pier-Soil Interaction (FOS):	4.17	1.33	OK	31.9%

Assume 0.33% Minimum Steel



Input the data in the "shaded" columns. If soil layer is submerged, enter the buoyant unit weight

Layer:	From (ft)	To (ft)	Layer Thickness (ft)	Unit Weight of Soil (pcf)	Cohesion (psf)	Internal Friction Angle (deg)
1	0	3.5	3.5	125	0	0
2	3.5	6	2.5	125	0	38
3	6	10	4	62.6	0	38
4	10	20	10	52.6	0	30

Calculation Notes:

1- Sand Resistance = $3 * K_p * \text{Overburden}$ → (Per equations used in PLS-Caisson Software)

2- Cohesion Resistance = $8 * C$ → (Per equations used in PLS-Caisson Software, Full BCD approach)

ATTACHMENT 4

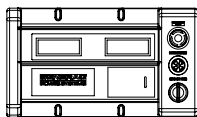
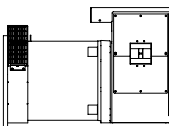
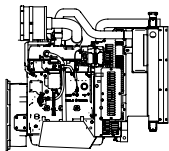
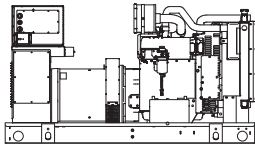
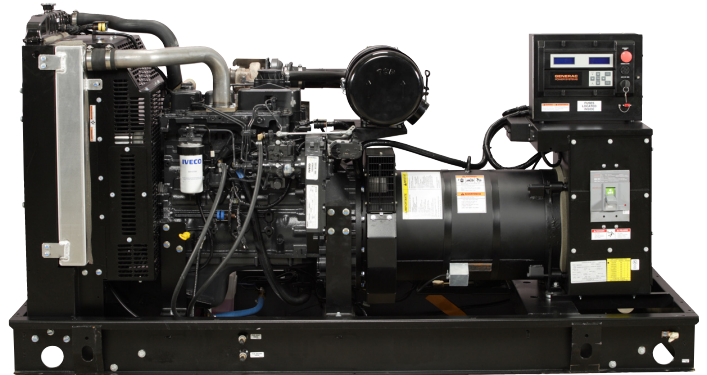
SD050

CUSTOM MODEL

Industrial Diesel Generator Set

EPA Emissions Certification: Tier III

Standby Power Rating
50KW 60 Hz



features

benefits

Generator Set

- PROTOTYPE & TORSIONALLY TESTED
 - UL2200 TESTED
 - RHINOCOAT PAINT SYSTEM
 - SOUND LEVEL 2 ENCLOSURE
- ▶ PROVIDES A PROVEN UNIT
 - ▶ ENSURES A QUALITY PRODUCT
 - ▶ IMPROVES RESISTANCE TO ELEMENTS
 - ▶ 71dba @ 7 METERS (23FT)

Engine

- EPA TIER CERTIFIED
 - INDUSTRIAL TESTED, GENERAC APPROVED
 - POWER-MATCHED OUTPUT
 - INDUSTRIAL GRADE
- ▶ ENVIRONMENTALLY FRIENDLY
 - ▶ ENSURES INDUSTRIAL STANDARDS
 - ▶ ENGINEERED FOR PERFORMANCE
 - ▶ IMPROVES LONGEVITY AND RELIABILITY

Alternator

- TWO-THIRDS PITCH
 - LAYER WOUND ROTOR & STATOR
 - CLASS H MATERIALS
 - DIGITAL 3-PHASE VOLTAGE CONTROL
- ▶ ELIMINATES HARMFUL 3RD HARMONIC
 - ▶ IMPROVES COOLING
 - ▶ HEAT TOLERANT DESIGN
 - ▶ FAST AND ACCURATE RESPONSE

Controls

- ENCAPSULATED BOARD W/ SEALED HARNESS
 - 4-20mA VOLTAGE-TO-CURRENT SENSORS
 - SURFACE-MOUNT TECHNOLOGY
 - ADVANCED DIAGNOSTICS & COMMUNICATIONS
- ▶ EASY, AFFORDABLE REPLACEMENT
 - ▶ NOISE RESISTANT 24/7 MONITORING
 - ▶ PROVIDES VIBRATION RESISTANCE
 - ▶ HARDENED RELIABILITY

primary codes and standards



SD050

application and engineering data

ENGINE SPECIFICATIONS

General

Make	Iveco / FPT
EPA Emissions Compliance	Tier III
EPA Emissions Reference	See Emissions Data Sheet
Cylinder #	4
Type	Diesel
Displacement - L (cu. in.)	4.5 (274)
Bore - mm (in.)	105 (4.1)
Stroke - mm (in.)	132 (5.2)
Compression Ratio	17.5:1
Intake Air Method	Turbocharged
Cylinder Head Type	2 Valve
Piston Type	Aluminum
Crankshaft Type	Forged Steel
Engine Block Type	Cast Iron / Wet Sleeve

Engine Governing

Governor	Electronic Isochronous
Frequency Regulation (Steady State)	+/- 0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full Flow
Crankcase Capacity - L (gal)(qts)	13.6 (3.6) (14.4)

Cooling System

Cooling System Type	Closed
Water Pump	Belt Driven Centrifugal
Fan Type	Pusher
Fan Blade Number	2538 (10)
Fan Diameter (in.)	26
Coolant Heater Wattage	1500
Coolant Heater Standard Voltage	120

Fuel System

Fuel Type	Ultra Low Sulfur Diesel Fuel
Fuel Specifications	ASTM
Fuel Filtering (microns)	5
Fuel Inject Pump Make	Standyne
Fuel Pump Type	Engine Driven Gear
Injector Type	Mechanical
Engine Type	Direct Injection
Fuel Supply Line - mm (in.)	1/4 inch Npt
Fuel Return Line - mm (in.)	1/4 inch Npt

Engine Electrical System

System Voltage	12VDC
Battery Charging Alternator	90 Amp
Battery Size (at 0 oC)	Optima Redtop
Battery Group	34
Battery Voltage	12VC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	390
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	< 3.5%
Telephone Interference Factor (TIF)	< 50
Standard Excitation	PMG
Bearings	Single Sealed Cartridge
Coupling	Direct, Flexible Disc
Load Capacity - Standby	100%
Load Capacity - Prime	100%
Prototype Short Circuit Test	Y

Voltage Regulator Type	Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	+/- 0.25%

CODES AND STANDARDS COMPLIANCE (WHERE APPLICABLE)

- NFPA 99
- NFPA 110
- ISO 8528-5
- ISO 1708A.5
- ISO 3046
- BS5514
- SAE J1349
- DIN6271
- IEEE C62.41 TESTING
- NEMA ICS 1

Rating Definitions:

Standby – Applicable for a varying emergency load for the duration of a utility power outage with no overload capability. (Max. load factor = 70%)

Prime – Applicable for supplying power to a varying load in lieu of utility for an unlimited amount of running time. (Max. load factor = 80%) A 10% overload capacity is available for 1 out of every 12 hours.

SD050

operating data (60Hz)

POWER RATINGS (kW)

Single-Phase 120/240VAC @1.0pf
 Three-Phase 120/208VAC @0.8pf
 Three-Phase 120/240VAC @0.8pf
 Three-Phase 277/480VAC @0.8pf
 Three-Phase 346/600VAC @0.8pf

STANDBY		
50	Amps:	208
-	Amps:	-
-	Amps:	-
-	Amps:	-
-	Amps:	-

NOTE: Generator output limited to 200A.

STARTING CAPABILITIES (sKVA)

sKVA vs. Voltage Dip

Alternator*	kW	480VAC						208/240VAC					
		10%	15%	20%	25%	30%	35%	10%	15%	20%	25%	30%	35%
Standard	50	-	-	-	-	-	-	26	39	52	65	77	90
Upsize 1		-	-	-	-	-	-	-	-	-	-	-	-
Upsize 2		-	-	-	-	-	-	-	-	-	-	-	-

*All Generac industrial alternators utilize Class H insulation materials. Standard alternator provides less than or equal to Class B temperature rise. Upsize 1 provides less than or equal to Class B temperature rise. Upsize 2 provides less than or equal

FUEL

Fuel Consumption Rates

Fuel Pump Lift - in (m)
36(.9)

STANDBY		
Percent Load	gph	lph
25%	1.52	5.75
50%	2.33	8.82
75%	3.08	11.65
100%	4.15	15.71

COOLING

Coolant System Capacity - Gal (L)
4.5 (17.44)

Maximum Radiator Backpressure
1.5" H₂O Column

STANDBY		
Coolant Flow per Minute	gpm (lpm)	32.7(123.8)
Heat rejection to Coolant	BTU/min	123,000
Inlet Air	cfm (m3/min)	6,360 (180.0)
Max. Operating Radiator Air Temp	F° (C°)	122(50)
Max. Operating Ambient Temperature	F° (C°)	122(50)

COMBUSTION AIR REQUIREMENTS

Intake Flow at Rated Power
 cfm (m3/min) 247 (7.00)

EXHAUST

Exhaust Outlet Size (Open Set)
3.0"
 Maximum Backpressure (Post-Silencer)
1.5" Hg

STANDBY		
Exhaust Flow (Rated Output)	cfm (m3/hr)	534(906.7)
Maximum Backpressure	inHg (Kpa)	1.5 (5.1)
Exhaust Temp (Rated Output)	°F (°C)	930(498.8)

ENGINE

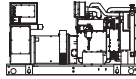
STANDBY		
Rated Engine Speed	rpm	1800
Horsepower at Rated kW	hp	93
Temperature Deration		Consult Factory
Altitude Deration		Consult Factory

* CA units include aftertreatment

SD050

standard features and options

GENERATOR SET



- Genset Vibration Isolation Std
- Factory Testing Std
- Extended warranty Std
- Padlockable Doors Std
- Steel Enclosure (Enclosed Models) Std
- Remote Emergency Shutdown Opt

ENGINE SYSTEM



General

- Oil Drain Extension Std
- Air Cleaner Std
- Industrial Exhaust Silencer (Open Sets, ship loose) Std
- Critical Exhaust Silencer (Enclosed Sets) Std
- Stainless steel flexible exhaust connection Std

Fuel System

- Primary Fuel Filter with Water Separator Std
- Flexible Fuel Lines Std
- UL142 Fuel Tank, 48 Hr Runtime Std
- 2 Gal Overflow Containment with Alarm Std

Cooling System

- 120VAC Coolant Heater (3-wire connection cord) Std
- 50%/50% Coolant Std
- Level 1 Guarding (Open Sets) Std
- Closed Coolant Recovery System Std
- UV/Ozone resistant hoses Std
- Factory-Installed Radiator Std
- Radiator Drain Extension Std
- Fan guard Std
- Radiator duct adapter (Open Sets) Std
- Std

Engine Electrical System

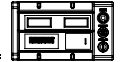
- Battery charging alternator Std
- Battery cables Std
- Battery tray Std
- 75W 120VAC Battery heater Std
- Solenoid activated starter motor Std
- 10A UL float/equalize battery charger Std
- Weather Resistant electrical connections Std
- Duplex GFCI Convenience Outlet Std

ALTERNATOR SYSTEM



- UL2200 GENprotect™ Std
- 100% Rated 200A Main Line Circuit Breaker Std

CONTROL SYSTEM



Control Panel

- Digital H Control Panel - Dual 4x20 Display Std
- Programmable Crank Limiter Std
- 7-Day Programmable Exerciser (requires H-Transfer Switch) Std
- Special Applications Programmable PLC Std
- RS-232 Std
- RS-485 Std
- All-Phase Sensing DVR Std
- Full System Status Std
- Utility Monitoring (Req. H-Transfer Switch) Std
- 2-Wire Start Compatible Std
- Power Output (kW) Std
- Power Factor Std
- Reactive Power Std
- All phase AC Voltage Std
- All phase Currents Std
- Oil Pressure Std
- Coolant Temperature Std
- Coolant Level Std
- Low Fuel Pressure Indication Std
- Engine Speed Std
- Battery Voltage Std
- Frequency Std
- Date/Time Fault History (Event Log) Std
- UL2200 GENprotect™ Std
- Low-Speed Exercise Opt
- Isochronous Governor Control Std
- 40deg C - 70deg C Operation Std
- Weather Resistant Electrical Connections Std
- Audible Alarms and Shutdowns Std
- Not in Auto (Flashing Light) Std
- On/Off/Manual Switch Std
- E-Stop (Red Mushroom-Type) Std
- Remote E-Stop (Break Glass-Type, Surface Mount) -
- Remote E-Stop (Red Mushroom-Type, Surface Mount) -
- Remote E-Stop (Red Mushroom-Type, Flush Mount) -
- NFPA 110 Level I and II (Programmable) Std
- Remote Communication - RS232 Std

Alarms (Programmable Tolerances, Pre-Alarms and Shutdowns)

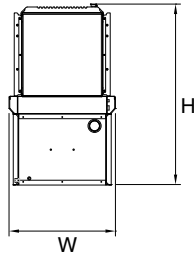
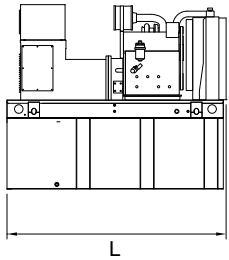
- Low Fuel Std
- Oil Pressure (Pre-programmed Low Pressure Shutdown) Std
- Coolant Temperature (Pre-programmed High Temp Shutdo) Std
- Coolant Level (Pre-programmed Low Level Shutdown) Std
- Engine Speed (Pre-programmed Overspeed Shutdown) Std
- Voltage (Pre-programmed Overvoltage Shutdown) Std
- Battery Voltage Std

Other Options

- Single Side Service _____
- _____
- _____

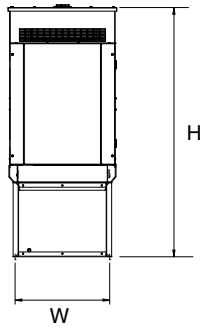
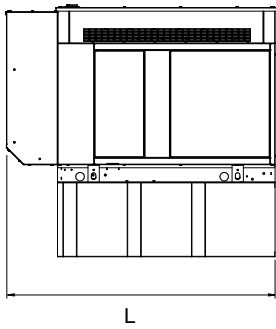
SD050

dimensions, weights and sound levels



OPEN SET

		TANK SIZE						dBa*
RUNTIME HOURS	CAPACITY (GAL)	TANK VOLUME	L	W	H	WT		
○	-	-	-	-	-	-	-	84
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
●	48	210	210	76	38	87	3400	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	



LEVEL 2 SOUND ENCLOSURE

		TANK SIZE						dBa*
RUNTIME HOURS	CAPACITY (GAL)	TANK VOLUME	L	W	H	WT		
○	-	-	-	-	-	-	-	71
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	
●	48	210	210	94.8	38	99	3935	
○	-	-	-	-	-	-	-	
○	-	-	-	-	-	-	-	

*Required gallons based on 100% of standby rating. Weights consider steel enclosure and are without fuel in tank. Sound levels measured at 23ft (7m) and does not account for ambient site conditions.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

SG035

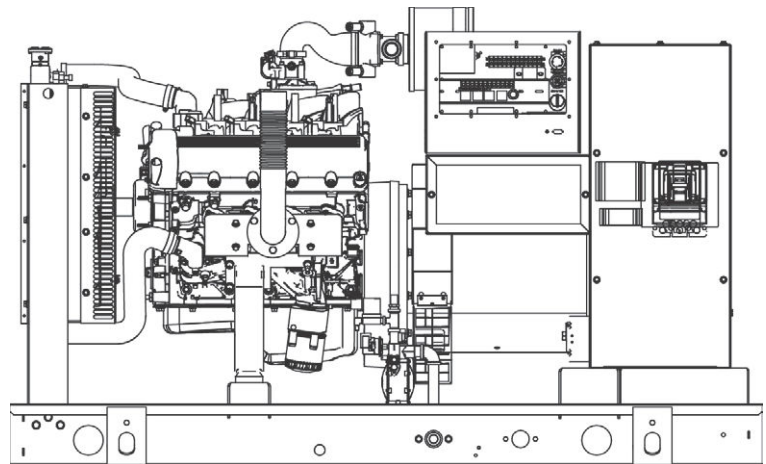
Industrial Spark-Ignited Generator Set

EPA Certified Stationary Emergency

5.4L

Standby Power Rating
35 kW 44 kVA 60 Hz

Prime Power Rating*
32 kW 39 kVA 60 Hz



*EPA Certified Prime ratings are not available in the U.S. or its Territories

Image used for illustration purposes only

Codes and Standards

Generac products are designed to the following standards:



UL2200, UL508, UL142, UL498



NFPA70, 99, 110, 37



NEC700, 701, 702, 708



ISO9001, 8528, 3046, 7637, Pluses #2b, 4



NEMA ICS10, MG1, 250, ICS6, AB1



ANSI C62.41

American National Standards Institute



IBC 2009, CBC 2010, IBC 2012, ASCE 7-05,
ASCE 7-10, ICC-ES AC-156 (2012)

Powering Ahead

For over 50 years, Generac has led the industry with innovative design and superior manufacturing.

Generac ensures superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac's gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally to ensure the most reliable engines power our generators. We choose only engines that have already been proven in heavy-duty industrial application under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

SG035

Standard Features

ENGINE SYSTEM

General

- Oil Drain Extension
- Air Cleaner
- Fan Guard
- Stainless Steel flexible exhaust connection
- Critical Exhaust Silencer (enclosed only)
- Factory Filled Oil
- Radiator duct adapter (open set only)

Fuel System

- Primary and Secondary Fuel Shutoff
- Flexible Fuel Line - NPT Connection

Cooling System

- Closed Coolant Recovery System
- UV/Ozone resistant hoses
- Factory-installed Radiator
- Radiator drain extension
- 50/50 Ethylene glycol antifreeze

Engine Electrical System

- Battery charging alternator
- Battery Cables
- Battery Tray
- Solenoid activated starter motor
- Rubber-booted engine electrical connections

ALTERNATOR SYSTEM

- UL2200 GENprotect™
- Class H insulation material
- 2/3 Pitch
- Skewed Stator
- Brushless Excitation
- Sealed Bearings
- Amortisseur winding
- Full load capacity alternator

GENERATOR SET

- Internal Genset Vibration Isolation
- Separation of circuits - high/low voltage
- Separation of circuits - multiple breakers
- Wrapped Exhaust Piping
- Standard Factory Testing
- 2 Year Limited Warranty (Standby rated Units)
- 1 Year Warranty (Prime rated units)
- Silencer mounted in the discharge hood (enclosed only)

ENCLOSURE (if selected)

- Rust-proof fasteners with nylon washers to protect finish
- High performance sound-absorbing material
- Gasketed doors
- Stamped air-intake louvers
- Air discharge hoods for radiator-upward pointing
- Stainless steel lift off door hinges
- Stainless steel lockable handles
- Rhino Coat™ - Textured polyester powder coat

CONTROL SYSTEM



Control Panel

- Digital H Control Panel - Dual 4x20 Display
- Programmable Crank Limiter
- 7-Day Programmable Exerciser
- Special Applications Programmable PLC
- RS-232/485
- All-Phase Sensing DVR
- Full System Status
- Utility Monitoring
- Low Fuel Pressure Indication
- 2-Wire Start Compatible
- Power Output (kW)
- Power Factor
- kW Hours, Total & Last Run

- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto/Off/Manual Switch
- E-Stop (Red Mushroom-Type)
- NFPA110 Level I and II (Programmable)
- Customizable Alarms, Warnings, and Events
- Modbus protocol
- Predictive Maintenance algorithm
- Sealed Boards
- Password parameter adjustment protection

- Single point ground
- 15 channel data logging
- 0.2 msec high speed data logging
- Alarm information automatically comes up on the display

Alarms

- Oil Pressure (Pre-programmable Low Pressure Shutdown)
- Coolant Temperature (Pre-programmed High Temp Shutdown)
- Coolant Level (Pre-programmed Low Level Shutdown)
- Low Fuel Pressure Alarm
- Engine Speed (Pre-programmed Over speed Shutdown)
- Battery Voltage Warning
- Alarms & warnings time and date stamped
- Alarms & warnings for transient and steady state conditions
- Snap shots of key operation parameters during alarms & warnings
- Alarms and warnings spelled out (no alarm codes)

SG035

Configurable Options

ENGINE SYSTEM

- General
- Engine Block Heater
- Oil Heater
- Air Filter Restriction Indicator
- Stone Guard (Open Set Only)
- Critical Exhaust Silencer (Open Set Only / Standard on Ultra Low Emissions Option)

Engine Electrical System

- 10A UL battery charger
- 2.5A UL battery charger
- Battery Warmer

ALTERNATOR SYSTEM

- Alternator Upsizing
- Anti-Condensation Heater
- Tropical coating
- Permanent Magnet Excitation

GENERATOR SET

- Gen-Link Communications Software (English Only)
- Extended Factory Testing (3 Phase Only)
- IBC Seismic Certification
- 8 Position Load Center
- 2 Year Extended Warranty
- 5 Year Warranty
- 5 Year Extended Warranty

CIRCUIT BREAKER OPTIONS

- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

ENCLOSURE

- Standard Enclosure
- Level 1 Sound Attenuation
- Level 2 Sound Attenuation
- Steel Enclosure
- Aluminum Enclosure
- 150 MPH Wind Kit
- 12 VDC Enclosure Lighting Kit
- 120 VAC Enclosure Lighting Kit
- AC/DC Enclosure Lighting Kit
- Door Alarm Switch

CONTROL SYSTEM

- | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> ○ 21-Light Remote Annunciator ○ Remote Relay Panel (8 or 16) ○ Oil Temperature Sender with Indication Alarm | <ul style="list-style-type: none"> ○ Remote E-Stop (Break Glass-Type, Surface Mount) ○ Remote E-Stop (Red Mushroom-Type, Surface Mount) ○ Remote E-Stop (Red Mushroom-Type, Flush Mount) | <ul style="list-style-type: none"> ○ Remote Communication - Modem ○ Remote Communication - Ethernet ○ 10A Run Relay ○ Ground fault indication and protection functions |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Engineered Options

ENGINE SYSTEM

- Coolant heater ball valves
- Fluid containment pans

GENERATOR SET

- Special Testing
- Battery Box

CONTROL SYSTEM

- Spare inputs (x4) / outputs (x4) - H Panel Only
- Battery Disconnect Switch

ALTERNATOR SYSTEM

- 3rd Breaker Systems

ENCLOSURE

- Motorized Dampers
- Enclosure Ambient Heaters

Rating Definitions

Standby – Applicable for a varying emergency load for the duration of a utility power outage with no overload capability.

Prime – Applicable for supplying power to a varying load in lieu of utility for an unlimited amount of running time. A 10% overload capacity is available for 1 out of every 12 hours. The Prime Power option is only available on International applications.

Power ratings in accordance with ISO 8528-1, Second Edition dated 2005-06-01, definitions for Prime Power (PRP) and Emergency Standby Power (ESP).

SG035

application and engineering data

ENGINE SPECIFICATIONS

General

Make	Generac
Cylinder #	8
Type	V
Displacement - L (Cu In)	5.4 (329.53)
Bore - mm (in)	90.17 (3.55)
Stroke - mm (in)	105.92 (4.17)
Compression Ratio	9:1
Intake Air Method	Naturally Aspirated
Number of Main Bearings	4
Connecting Rods	Forged
Cylinder Head	Aluminum
Cylinder Liners	No
Ignition	Single Fire
Pistons	Aluminum Alloy
Crankshaft	Nodular Iron
Lifter Type	Hydraulic
Intake Valve Material	Steel Alloy
Exhaust Valve Material	Hardened Steel
Hardened Valve Seats	Yes

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	+/- 0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full-flow spin-on cartridge
Crankcase Capacity - L (qts)	5.7 (6)

Cooling System

Cooling System Type	Pressurized Closed Recovery
Water Pump Flow - gpm (lpm)	38 (144)
Fan Type	Pusher
Fan Speed (rpm)	2143
Fan Diameter mm (in)	508 (20)
Coolant Heater Wattage	1500
Coolant Heater Standard Voltage	120 V

Fuel System

Fuel Type	Natural Gas, Propane Vapor
Carburetor	Down Draft
Secondary Fuel Regulator	Standard
Fuel Shut Off Solenoid	Standard
Operating Fuel Pressure	8" - 14" H2O

Engine Electrical System

System Voltage	12 VDC
Battery Charging Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	390
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50
Standard Excitation	Brushless
Bearings	Sealed Ball
Coupling	Flexible Disc
Prototype Short Circuit Test	Yes

Voltage Regulator Type	Full Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	+/- 0.25%

SG035

operating data

POWER RATINGS

	Natural Gas		Propane Vapor	
Single-Phase 120/240 VAC @1.0pf	35 kW	Amps: 146	35 kW	Amps: 146
Three-Phase 120/208 VAC @0.8pf	35 kW	Amps: 121	35 kW	Amps: 121
Three-Phase 120/240 VAC @0.8pf	35 kW	Amps: 105	35 kW	Amps: 105
Three-Phase 277/480 VAC @0.8pf	35 kW	Amps: 53	35 kW	Amps: 53
Three-Phase 346/600 VAC @0.8pf	35 kW	Amps: 42	35 kW	Amps: 42

STARTING CAPABILITIES (sKVA)

		sKVA vs. Voltage Dip											
		480 VAC						208/240 VAC					
Alternator	kW	10%	15%	20%	25%	30%	35%	10%	15%	20%	25%	30%	35%
Standard	35	24	36	48	60	72	84	18	27	36	45	54	63
Upsize 1	40	27	41	54	68	81	95	20	31	41	51	61	71
Upsize 2	50	34	52	69	86	103	120	26	39	52	65	77	90
Upsize 3	60	42	63	83	104	125	146	32	47	62	78	94	110

FUEL CONSUMPTION RATES*

Natural Gas – ft ³ /hr (m ³ /hr)		Propane Vapor – ft ³ /hr (m ³ /hr)	
Percent Load	Standby	Percent Load	Standby
25%	239 (6.8)	25%	69.8 (2.0)
50%	409 (11.6)	50%	119.7 (3.4)
75%	553 (15.7)	75%	161.6 (4.6)
100%	682 (19.3)	100%	219.8 (6.2)

*Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

		Standby
Air Flow (inlet air combustion and radiator)	ft ³ /min (m ³ /min)	2460 (69.7)
Coolant Flow per Minute	gpm (lpm)	38 (144)
Coolant System Capacity	gal (L)	3 (11.36)
Heat Rejection to Coolant	BTU/hr	144,000
Max. Operating Air Temp on Radiator	°F (°C)	122 (50)
Max. Operating Ambient Temperature (before derate)	°F (°C)	110 (43.3)
Maximum Radiator Backpressure	in H ₂ O	0.5

COMBUSTION AIR REQUIREMENTS

Flow at Rated Power	cfm (m ³ /min)	Standby
		87 (2.5)

ENGINE

		Standby
Rated Engine Speed	rpm	1800
Horsepower at Rated kW**	hp	54
Piston Speed	ft/min (m/min)	1251 (381)
BMEP	psi	72

** Refer to "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

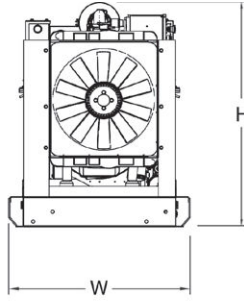
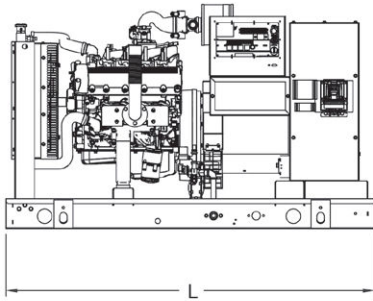
EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m ³ /min)	260 (7.4)
Maximum Recommended Back Pressure	inHg	1.5
Exhaust Temp (Rated Output)	°F (°C)	900 (482)
Exhaust Outlet Size (Open Set)	in	2.5" I.D. Flex (No muffler)

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions. Please consult a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528 and DIN6271 standards.

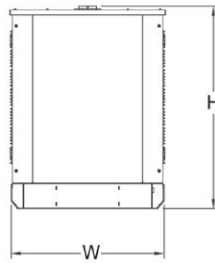
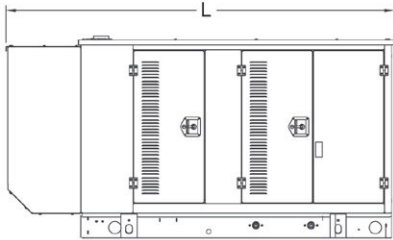
SG035

dimensions and weights



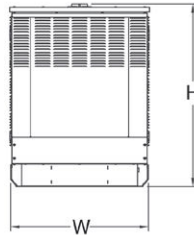
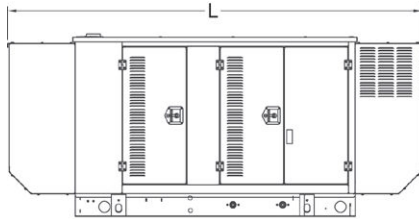
OPEN SET (Includes Exhaust Flex)

L x W x H in (mm)	76 (1930) x 37.4 (949.9) x 47 (1193.8)
Weight lbs (kg)	1575 (714)



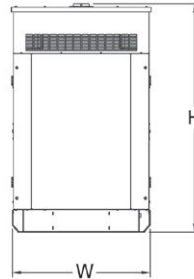
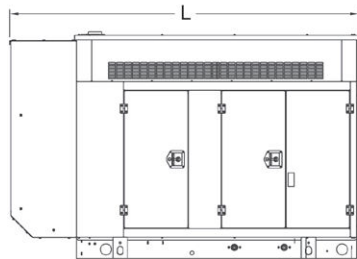
STANDARD ENCLOSURE

L x W x H in (mm)	94.8 (2408.9) x 38 (965.1) x 49.5 (1258.1)
Weight lbs (kg)	Steel: 2100 (952) Aluminum: 1754 (795)



LEVEL 1 ACOUSTIC ENCLOSURE

L x W x H in (mm)	112.5 (2857.1) x 38 (965.1) x 49.5 (1258.1)
Weight lbs (kg)	Steel: 2140 (970) Aluminum: 1767 (801)



LEVEL 2 ACOUSTIC ENCLOSURE

L x W x H in (mm)	94.8 (2407) x 38 (965.1) x 62 (1573.9)
Weight lbs (kg)	Steel: 2328 (1056) Aluminum: 1831 (830)

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

ATTACHMENT 5

65° OctoPORT MULTI-BAND ANTENNA

Model OPA-65R-LCUU-H8



The CCI Octoport Multi-Band Antenna Array is an industry first 8-port antenna with full WCS Band Coverage. With four high band ports covering PCS, AWS and WCS bands, two 700 MHz ports, and two 850 MHz ports our octoport antenna is ready for 4X4 high band MIMO.

Modern networks demand high performance, consequently CCI has incorporated several new and innovative design techniques to provide an antenna with excellent side-lobe performance, sharp elevation beams, and high front to back ratio.

Multiple networks can now be connected to a single antenna, reducing tower loading and leasing expense, while decreasing deployment time and installation cost.

Full band capability for 700 MHz, Cellular 850 MHz, PCS 1900 MHz, AWS 1710/2155 MHz and WCS 2300 MHz coverage in a single enclosure.

All CCI antennas are manufactured under ISO 9001.

Octoport Multi-Band Antenna Array

Benefits

- ◆ RET System allows Independent Tilt of each band specific paired port
- ◆ Reduces tower loading
- ◆ Frees up space for tower mounted Remote Radio Heads
- ◆ Single radome with eight ports
- ◆ All Band design simplifies radio assignments
- ◆ Sharp elevation beam eases network planning

Features

- ◆ High Band Ports include WCS Band
- ◆ Four High Band ports with four Low Band ports in one antenna
- ◆ Sharp elevation beam
- ◆ Excellent elevation side-lobe performance
- ◆ Excellent MIMO performance due to array spacing
- ◆ Excellent PIM Performance
- ◆ A multi-network solution in one radome

Applications

- ◆ 4x4 MIMO on High Band and Dual 2x2 MIMO on 700 & 850 Low Bands
- ◆ Adding additional capacity without adding additional antennas
- ◆ Adding WCS Band without increasing antenna count



65° OctoPORT MULTI-BAND ANTENNA

Model OPA-65R-LCUU-H8

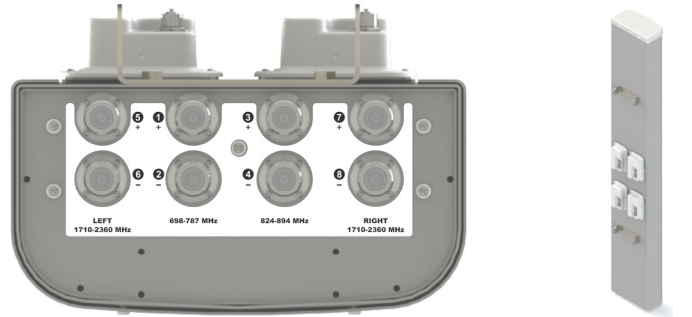
OPA-65R Multi-Band Antenna

Electrical Specifications

Frequency Range	2 X Low Band Ports (L) which cover the range from 698-787 MHz	2 X Low Band Ports (C) which cover the range from 824-894 MHz	4 X High Band Ports (H1 & H2) which cover the full range from 1710-2360 MHz			
			1850-1990 MHz	1710-1755/2110-2170 MHz	2305-2360 MHz	
Gain	14.7 dBi	15.5 dBi	17.0 dBi	16.5 dBi	17.2 dBi	17.1 dBi
Azimuth Beamwidth (-3dB)	65°	61°	62°	67°	64°	61°
Elevation Beamwidth (-3dB)	10.1°	8.5°	5.6°	6.2°	5.0°	4.5°
Electrical Downtilt	2° to 10°	2° to 10°	0° to 8°	0° to 8°	0° to 8°	0° to 8°
Elevation Sidelobes (1st Upper)	< -17 dB	< -17 dB	< -19 dB	< -18 dB	< -18 dB	< -17 dB
Front-to-Back Ratio @180°	> 28 dB	> 28 dB	> 35 dB	> 35 dB	> 35 dB	> 35 dB
Front-to-Back Ratio over ± 20°	> 28 dB	> 27 dB	> 28 dB	> 27 dB	> 27 dB	> 28 dB
Cross-Polar Discrimination (at Peak)	> 24 dB	> 20 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB
Cross-Polar Discrimination (at ± 60°)	> 16 dB	> 14 dB	> 18 dB	> 18 dB	> 18 dB	> 18 dB
Cross-Polar Port-to-Port Isolation	> 25 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB	> 25 dB
VSWR	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1	< 1.5:1
Passive Intermodulation (2x20W)	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc	≤ -150 dBc
Input Power	500 Watts CW	500 Watts CW	300 Watts CW	300 Watts CW	300 Watts CW	300 Watts CW
Polarization	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°	Dual Pol 45°
Input Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Lightning Protection	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground	DC Ground

Mechanical Specifications

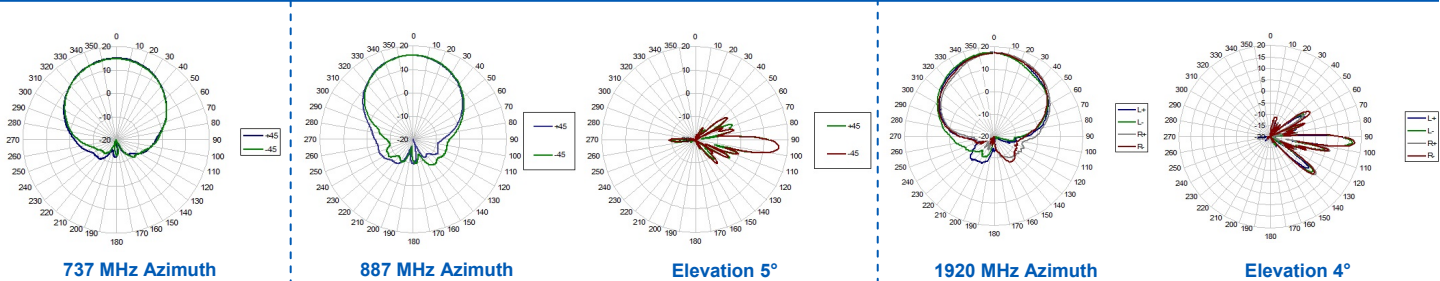
Dimensions (LxWxD)	92.7 x 14.4 x 7.0 inches (2355 x 366 x 179 mm)
Survival Wind Speed	> 150 mph
Front Wind Load	327 lbs (1453 N) @ 100 mph (161 kph)
Side Wind Load	186 lbs (829 N) @ 100 mph (161 kph)
Equivalent Flat Plate Area	12.9 ft ² (1.2 m ²)
Weight (w/o RET/Mounting)	88 lbs (40 kg)
RET System Weight	7.0 lbs (3.0 kg)
Connector	8; 7-16 DIN female long neck
Mounting Pole	2-5 inches (5-12 cm)



Bottom View

Rear View

Antenna Patterns*



*Typical antenna patterns. For detail information on antenna pattern, please contact us at info@cciproducts.com. All specifications are subject to change without notice.

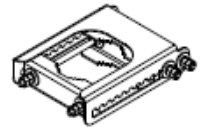
65° OctoPORT MULTI-BAND ANTENNA

Model OPA-65R-LCUU-H8

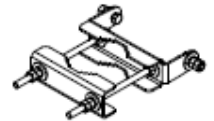
Ordering Information:

OPA-65R-LCUU-H8	8 Foot Octoport Antenna with 65° Azimuth Beamwidth and factory installed RET Actuators (4)
OPA-65R-LCUU-H8-K	Complete Kit with Antenna, Factory Installed Actuators (4) and MBK-01 Mounting Bracket
BSA-RET200	RET Actuator
MBK-01	Mounting Bracket (Top & Bottom) with 0° through 10° Mechanical tilt Adjustment: See Installation Guide 50-000036-01 for Details: Weight 13.6 Lbs. (6.2 kg)

**MBK-01
Top
Mounting
Bracket**



**MBK-01
Bottom
Mounting
Bracket**



RET [Remote Electrical Tilt] System

General Specification

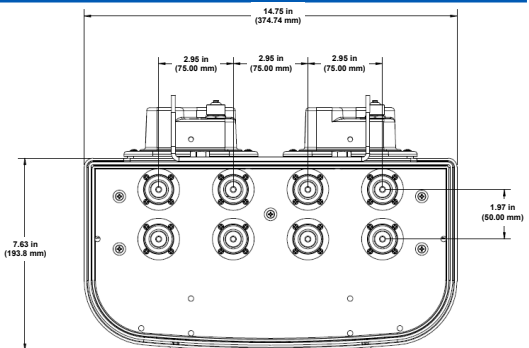
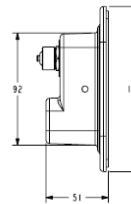
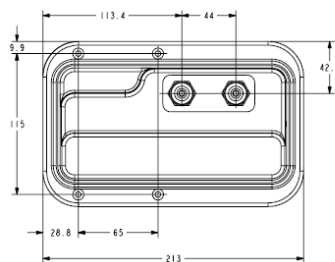
Part Number	BSA-RET200
Protocols	AISG 2.0
RET Type (Reference AISG 1.1)	Type 1
Adjustment Cycles	>10,000 cycles
Tilt Accuracy	±0.1°
Temperature Range	-40°C to +70°C

Electrical Specification

Interface Signal	Data dc
Input Voltage Range	10-30 Vdc
Current consumption during tilting	120mA at Vin = 24V
Current consumption idle	55mA at Vin=24V
Hardware Interface	AISG - RS 485 A/B
Input Connector	1x8-pin Daisy Chain In Male
Output Connector	1x8-pin Daisy Chain Out Female

Mechanical Specification and Dimensions

Housing Material	ASA / ABS / Aluminum
Dimensions (H x W x D)	8 x 5 x 2 inches (213 x 135 x 51 mm)
Weight	1.5 lbs (0.68 kg)



Standards Compliance

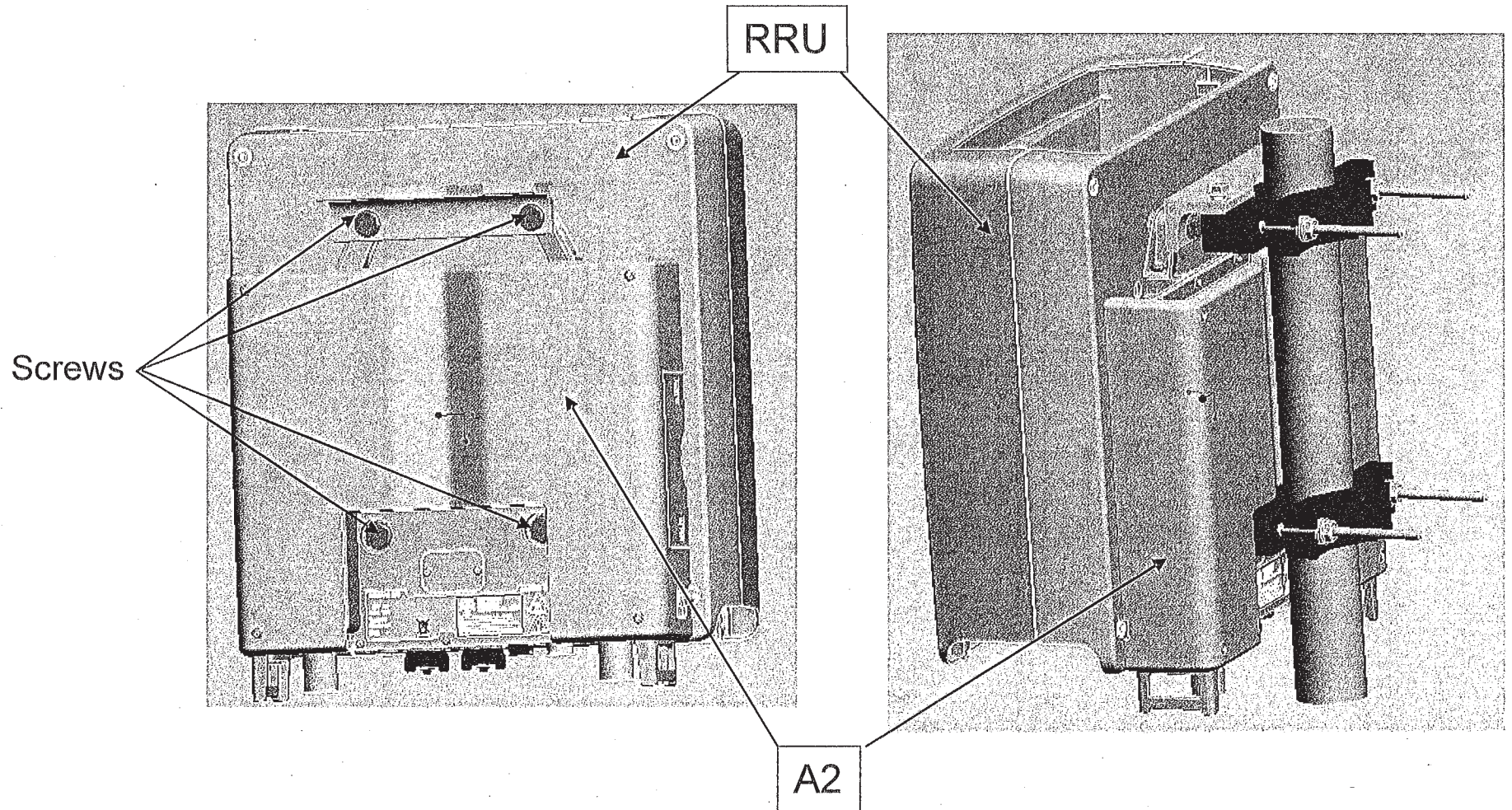
Safety	EN 60950-1, UL 60950-1
Emission	EN 55022
Immunity	EN 55024
Environmental	IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-5, IEC 60068-2-6, IEC 60068-2-11, IEC 60068-2-14, IEC 60068-2-18, IEC 60068-2-27, IEC 60068-2-29, IEC 60068-2-30, IEC 60068-2-52, IEC 60068-2-64, GR-63-CORE 4.3.1, EN60529 IP24

Regulatory Certification

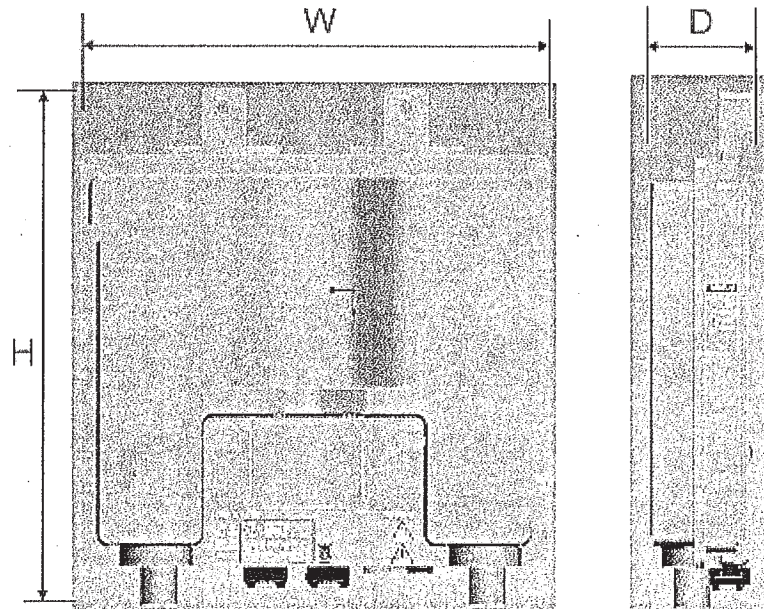
AISG, FCC Part 15 Class B, CE, CSA US

Installation concept

Back to back with RRU



RRUS A2 A2 Building practice

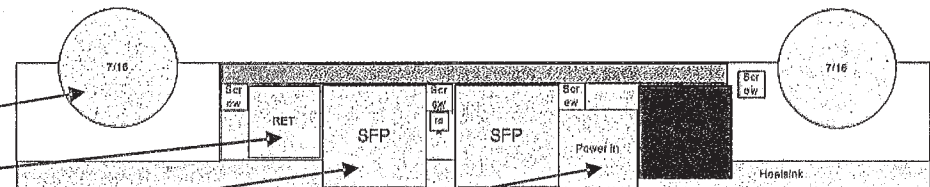


PRELIMINARY DATA

	No solar shield	With solar shield
Height (H)	12.8" (325.5mm)	12.8" (325.5mm)
Width (W)	14.7" (374mm)	15.0" (380mm)
Depth (D)	3.2" (81mm)	3.5" (88mm)
Weight		15 lbs

External Connections

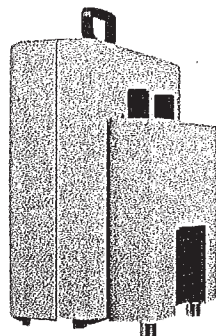
- 2 x 7-16 Ant Connections
- RET Interface
- 2 CPRI Interfaces
- Power In / Out, to RRU



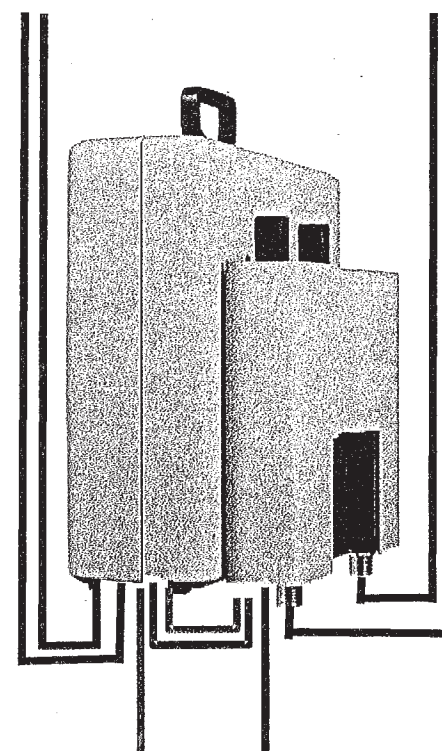
RRUS A2 Module



- › **RRUS A2 Module**
 - › 2 Rx expansion module for RRUS
- › Works with RRUS 01, 11 and 12
 - › Eases deployment for 4Rx diversity



Antenna 1 & 2 Antenna 3 & 4



CPRI - 48 VDC

ATTACHMENT 6

WBX065X19x050

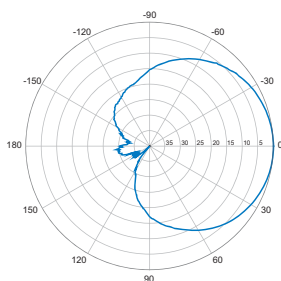
X-Pol | VET Panel | 65° | 19.0 dBi



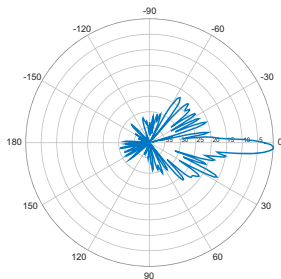
Model Number Options:
 WBX065X19M150 - Manual Electrical Tilt Antenna (aka 5142100)
 WBX065X19R150 - Remote Electrical Tilt Antenna (aka 5142000)

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1900-2170 MHz
Polarization	± 45°	± 45°	± 45°
Horizontal beamwidth	69°	66°	63°
Vertical beamwidth	4.9°	4.6°	4.3°
Gain	15.9 dBd / 18.0 dBi	16.4 dBd / 18.5 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt	2°-10° Variable Electrical Tilt		
Impedance	50Ω		
VSWR	< 1.4:1		
Upper sidelobe suppression	< -18 dB		
Front-to-Back ratio	> 25 dB		
First null	> -20 dB typical		
Inter-port isolation	> 30 dB		
IM3 (2x20W carrier)	< -153 dBc		
Input power	2 x 160 W		
Connector(s)	2 Ports / 7/16 DIN / Female / Bottom		
Operating temperature	-40° to +60° C (-40° to +140° F)		
Mechanical Characteristics			
Dimensions HxWxD	1950 x 157 x 69 mm		76.8 x 6.2 x 2.7 in
Weight without brackets	9.5 kg		20.9 lbs
Survival wind speed	241 km/hr		150 mph
Wind load @ 161 km/hr (100 mph)	Front: 405 N	Side: 176 N	Front: 91 lbf Side: 40 lbf
RET type / Part number	Internal / RETU-CA01		
Mounting Options	Part Number	Fits Pipe Diameter	Weight
Pole mounting bracket kit	MKS05P01	40-115 mm 1.6-4.5 in	2.9 kg 6.5 lbs
Scissor tilt bracket kit	MKS05T03	40-115 mm 1.6-4.5 in	4.1 kg 9.1 lbs
Bar tilt bracket kit	MKS05T04	40-115 mm 1.6-4.5 in	4.0 kg 8.8 lbs
Concealment Options			
UNICELL module	UNX14-19	UNX20-19	
Azimuth swivel	± 30°	± 30°	
Elevation tilt	Fixed	Fixed	
Required mounting kit	UNX14-WBX-AZ	UNX20-WBX-AZ	
FP mounting configuration	None		

1710-1880 MHz

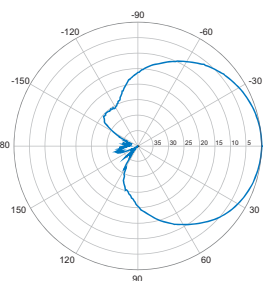


Horizontal

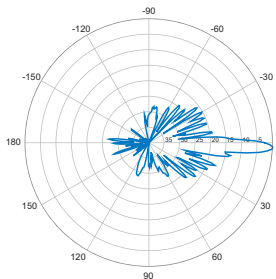


2° | Vertical

1850-1990 MHz

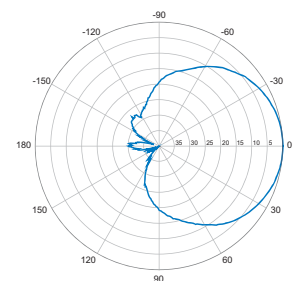


Horizontal

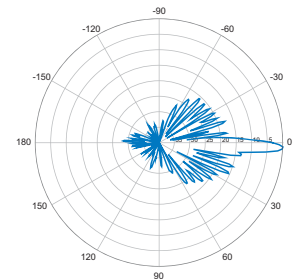


2° | Vertical

1900-2170 MHz



Horizontal



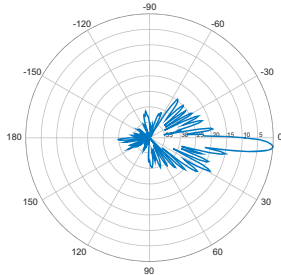
2° | Vertical

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

WBX065X19x050

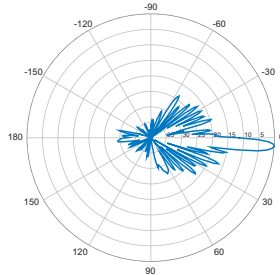
X-Pol | VET Panel | 65° | 19.0 dBi

1710-1880 MHz



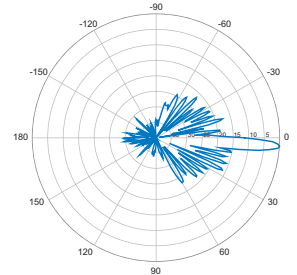
4° | Vertical

1850-1990 MHz

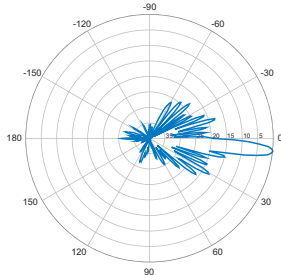


4° | Vertical

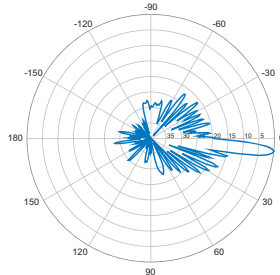
1900-2170 MHz



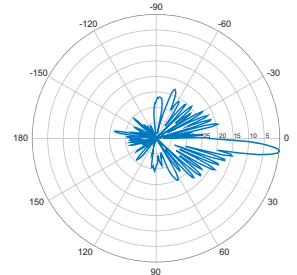
4° | Vertical



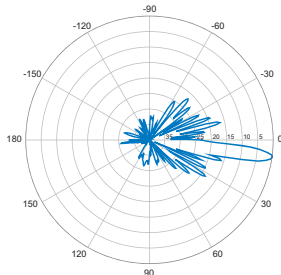
6° | Vertical



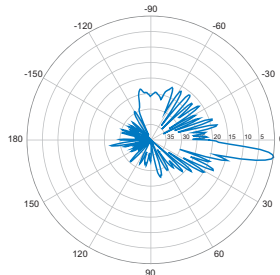
6° | Vertical



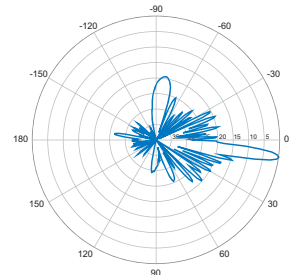
6° | Vertical



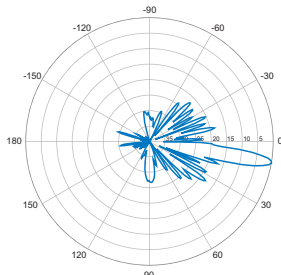
8° | Vertical



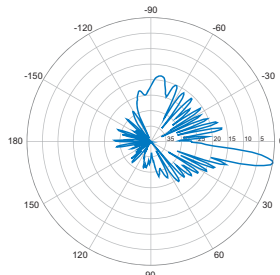
8° | Vertical



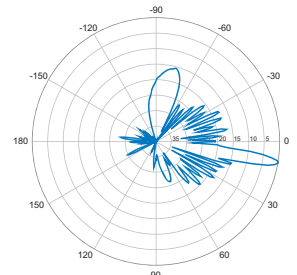
8° | Vertical



10° | Vertical



10° | Vertical



10° | Vertical

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.



X7C-FRO-660-V

X-Pol Antenna, 698-896MHz, Fast-Roll-Off 60° H-Beam
RET/MET



- Designed to improve SNR
- Greatly increases LTE data rates
- Broadband radiator
- Macro Cell, high gain antenna
- Suitable for LTE/CDMA/UMTS/GSM
- AISG 2.0 RET or manual MET tilt control

Electrical Specifications

Frequency Band, MHz	698-824	824-896
Horizontal Beamwidth, 3dB points	62	58
Gain, dBi	15.9	16.0
Vertical Beamwidth, 3dB points	12.0	10.5
Front-to-Back at 180°, dB	>28	
Upper Sidelobe Suppression, Typical, dB	<-18	
Polarization	+/-45°	
Electrical Downtilt	0-10° or 4-14°	
VSWR/Return Loss, dB, Maximum	1.5:1/14.0	
Isolation Between Ports, dB, Minimum	-28	



X7C-FRO-660-V

X-Pol Antenna, 698-896MHz, Fast-Roll-Off 60° H-Beam

RET/MET

Mechanical Specifications

Dimensions, Length/Width/Depth	72.0/14.6/8.0 in (1829/372/204 mm)
Connector (Quantity) Type	(2) 7-16 DIN Female
Connector Torque	220-265 lbf-in (25-30 N-m)
Connector Location	Back
Antenna Weight	35.0 lbs
Bracket Weight	13.2 lbs (6.0 kg)
Standard Bracket Kit	CSSP/N 919011
Mechanical Downtilt Range	0-12°
Radome Material	Ultra High Strength Luran, UV Stabilized, ASTM D1925
Wind Survival	150 mph (241 km/h)
Front Wind Load	205.39 lbf (913.65 N) @100mph
Equivalent Flat Plate	4.09 sq-ft (c=2) @ 100mph

RET Information

Model	CSS-RET-200
Mounting Location	Rear of Antenna
Weight	1.2 lb (0.54 kg)
Communication Standard	AISG 2.0
Control System	CSS-PCU-220



Order Information

Model	Description
X7C-FRO-660-VR0	Antenna with manual RET adjust electrical downtilt 0-10°
X7C-FRO-660-VR4	Antenna with manual RET adjust electrical downtilt 4-14°
X7C-FRO-660-VM0	Antenna with remote MET adjust electrical downtilt 0-10°
X7C-FRO-660-VM4	Antenna with remote MET adjust electrical downtilt 4-14°

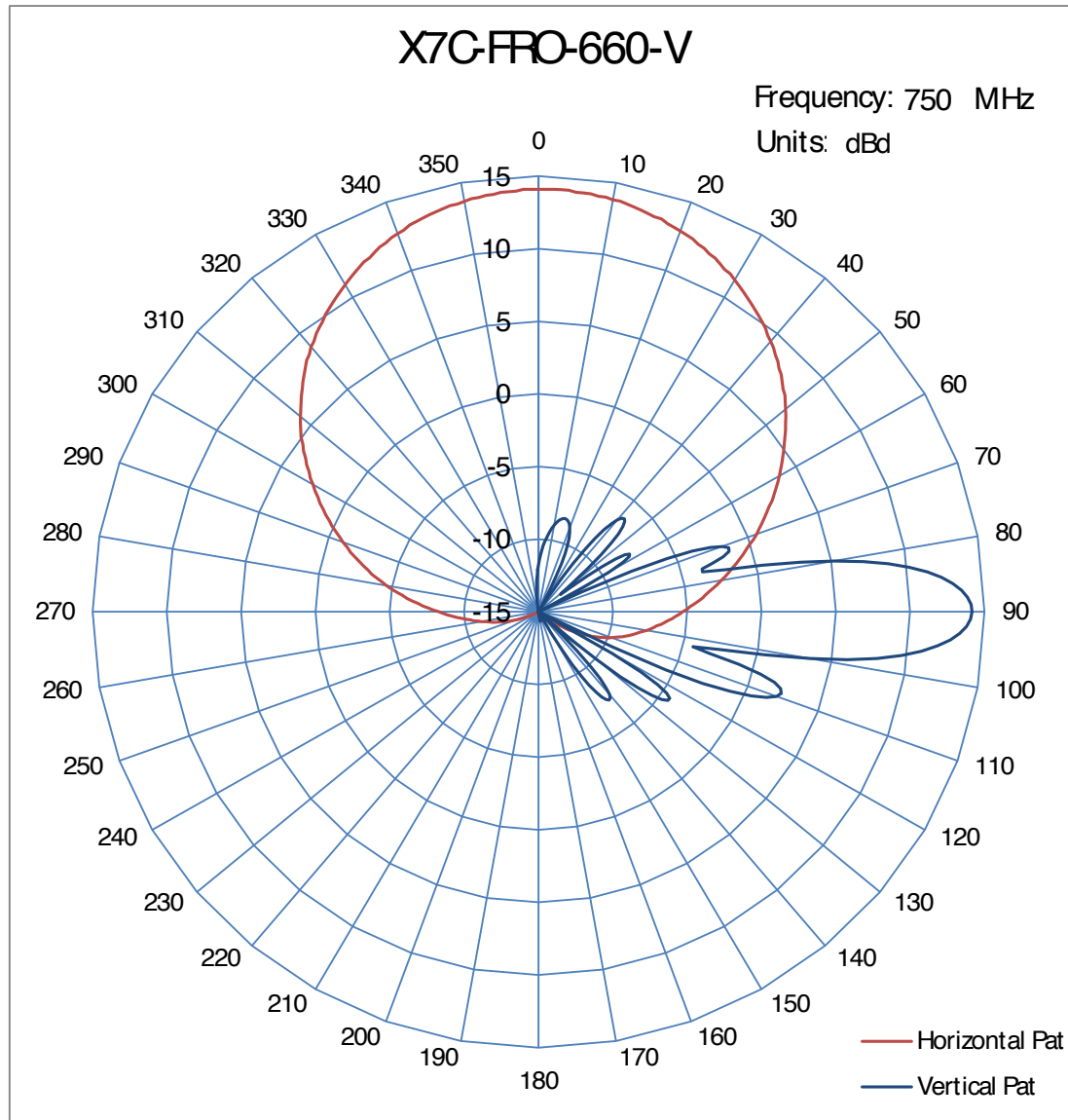


X7C-FRO-660-V

X-Pol Antenna, 698-896MHz, Fast-Roll-Off 60° H-Beam

RET/MET

Patterns Measured @ 750MHz



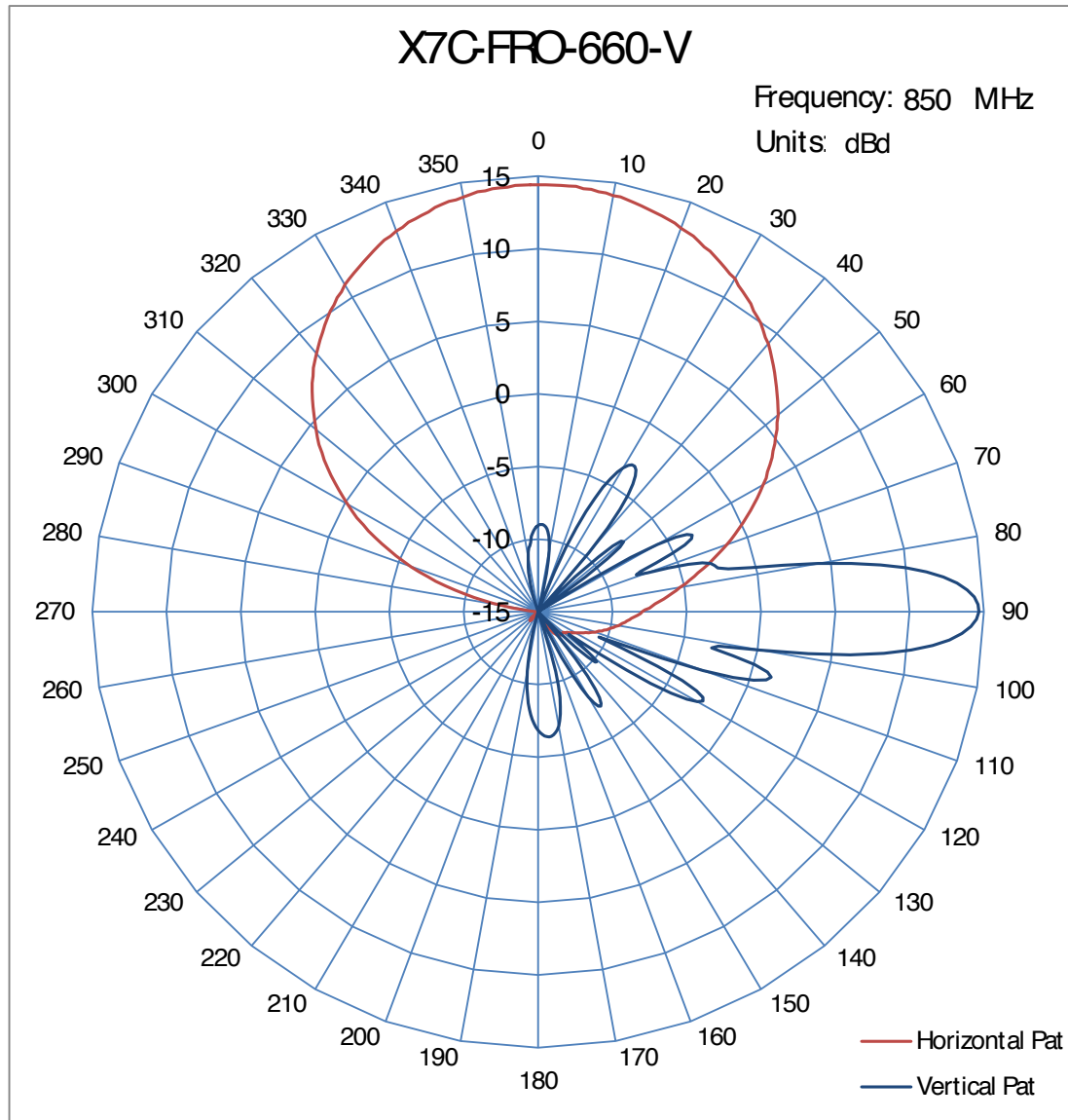


X7C-FRO-660-V

X-Pol Antenna, 698-896MHz, Fast-Fall-Off 60° H-Beam

RET/MET

Patterns Measured @ 850MHz





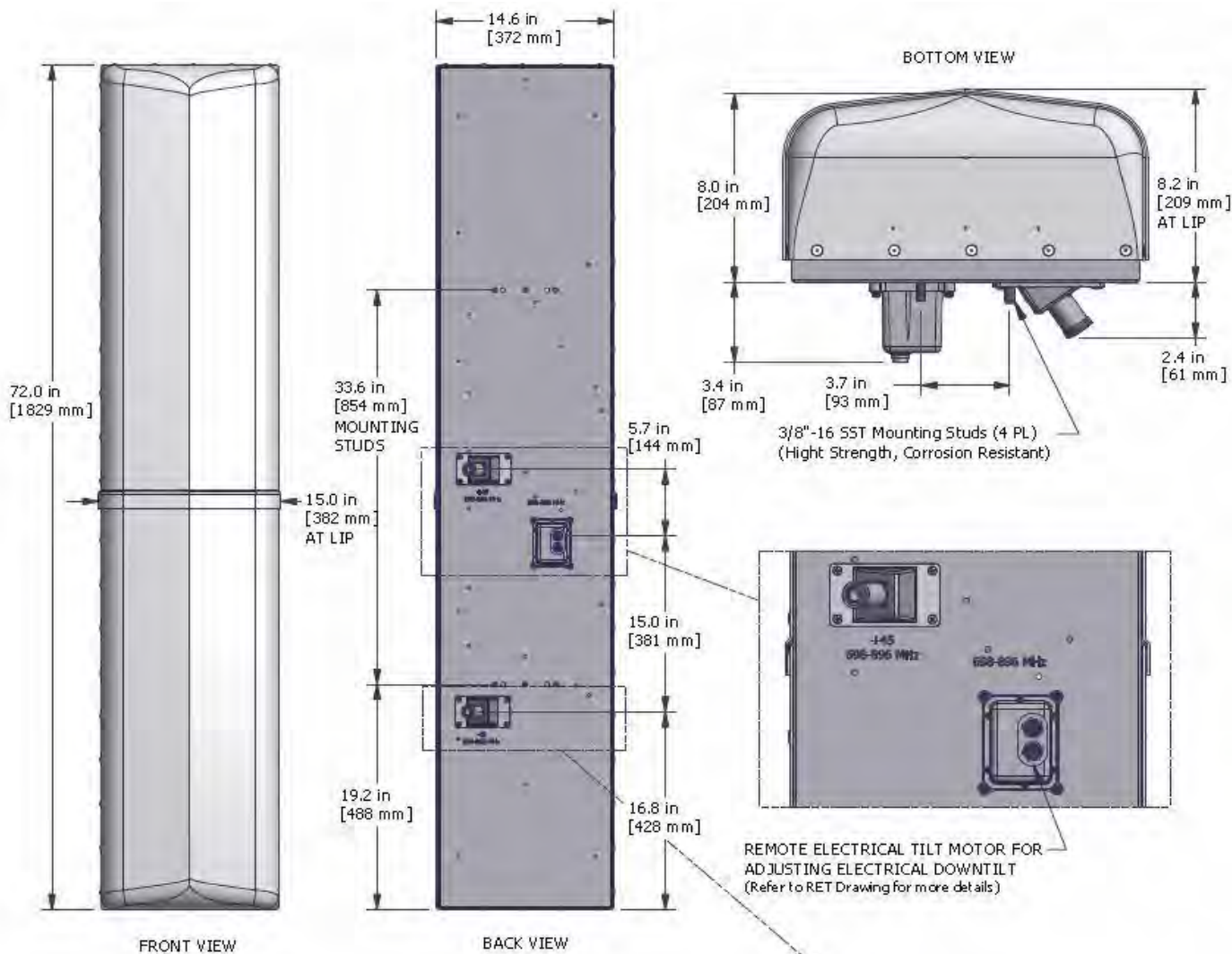
X7C-FRO-660-V

X-Pol Antenna, 698-896MHz, Fast-Roll-Off 60° H-Beam

RET/MET

Mechanical Outline Drawing

X7C-FRO-660-VR





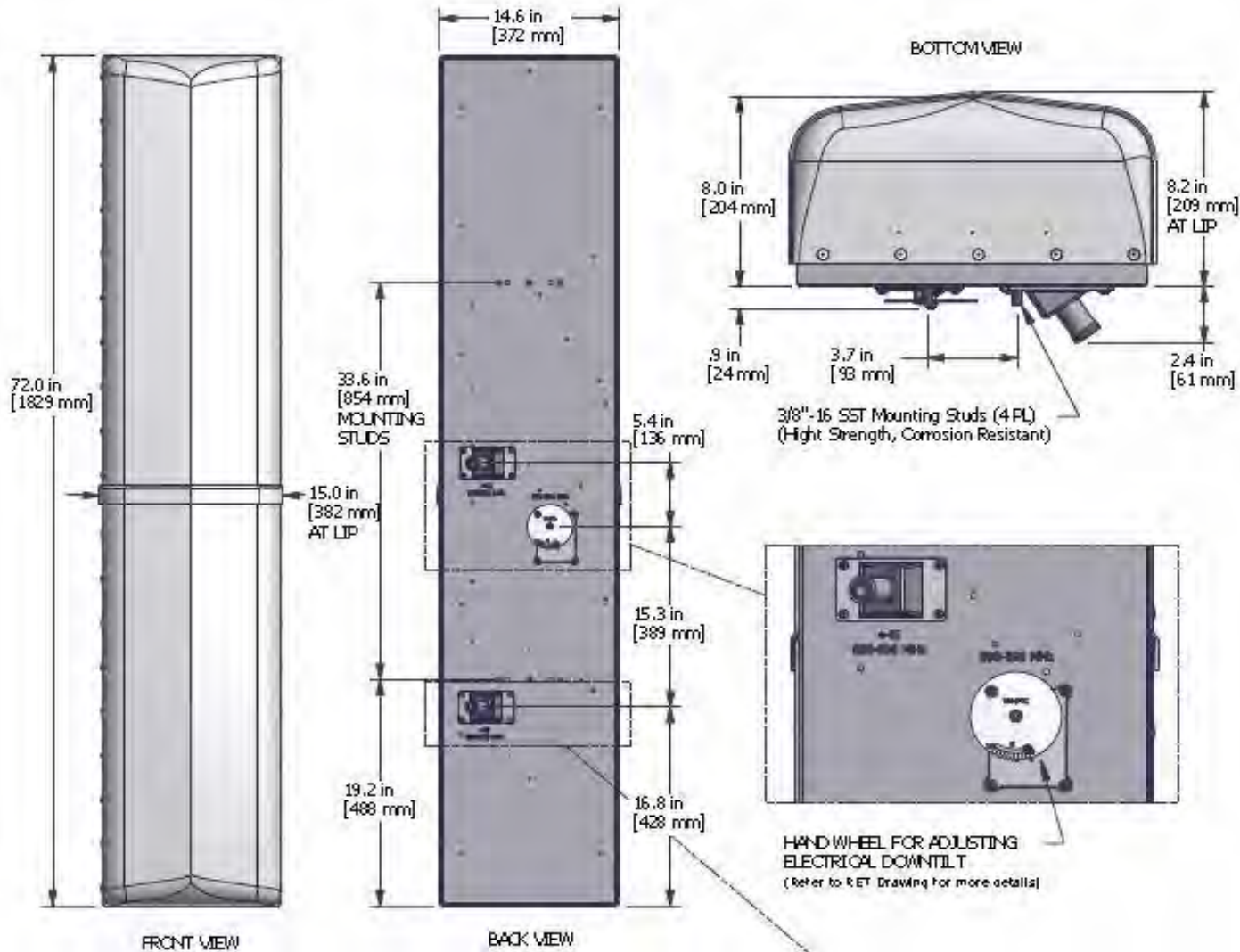
X7C-FRO-660-V

X-Pol Antenna, 698-896MHz, Fast-Roll-Off 60° H-Beam

RET/MET

Mechanical Outline Drawing

X7C-FRO-660-VM



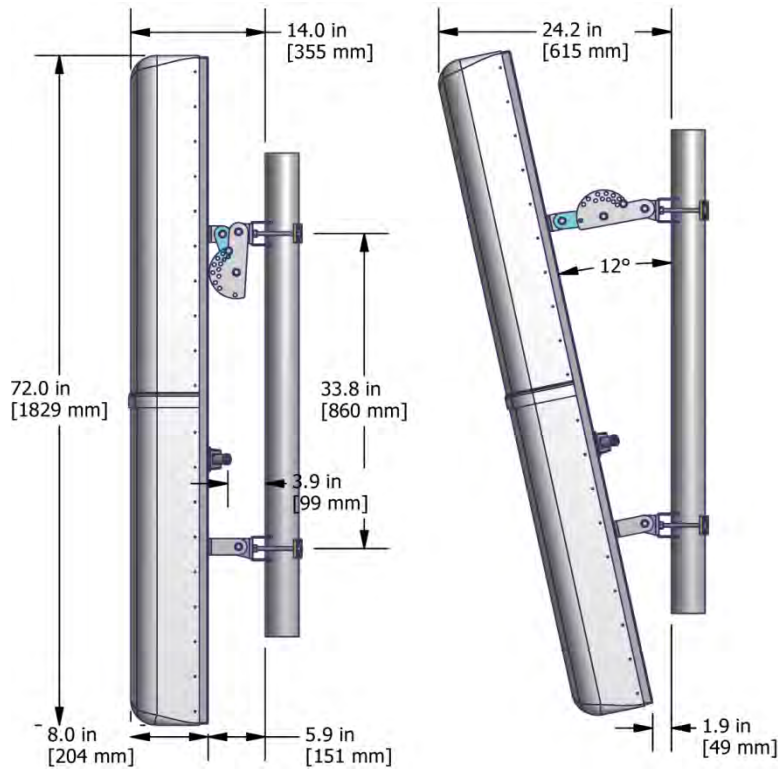


X7C-FRO-660-V

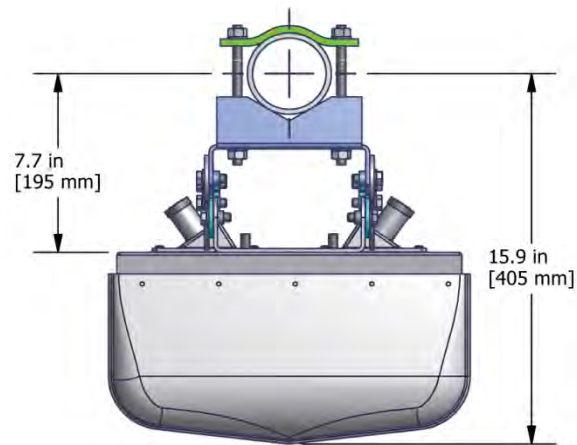
X-Pol Antenna, 698-896MHz, Fast-Poll-Off 60° H-Beam

RET/MET

Standard Bracket Kit

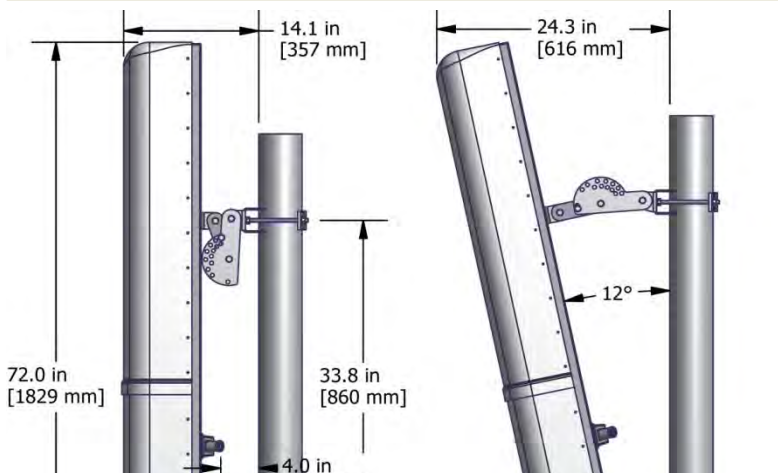


STANDARD (0-12 DEG MDT)
CSS P/N: 919011
(SHOWN MOUNTED ON 3.5" O.D. POLE 3.5" O.D. MAX)

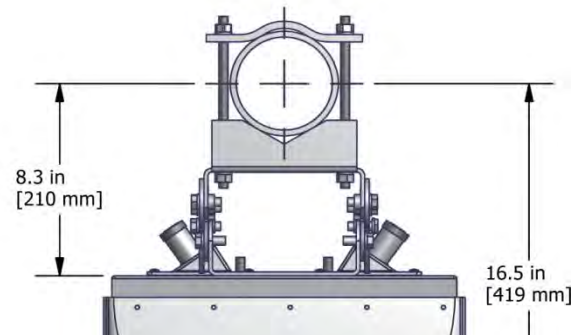


NOTE: DIMENSIONS ARE FOR REFERENCE ONLY.
MAY VARY WITH POLE O.D.

Optional Bracket Kit



OVERSIZED (0-12 DEG MDT)
CSS P/N: 919036
(SHOWN MOUNTED ON 4.5" O.D. POLE 4.5" O.D. MAX)



Alcatel-Lucent RRH2x40-07-L

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-07-L is a high-power, small form-factor Remote Radio Head (RRH) operating in the North American Digital Dividend / 700MHz frequency band (3GPP Bands 12 and 17). The Alcatel-Lucent RRH2x40-07-L is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-07-L is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-07-L has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to two-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 15 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-07-L is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low

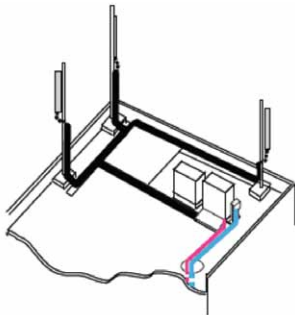
capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-07-L installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-07-L is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-07-L is compact and weighs less than 27 kg (60 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

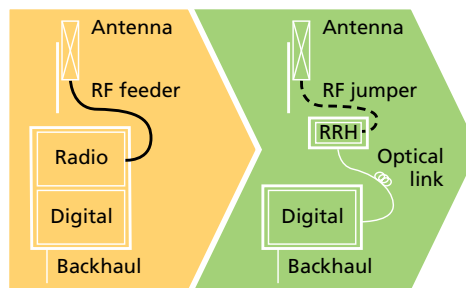
Because of its small size and weight, the Alcatel-Lucent RRH2x40-07-L can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-07-L where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced. The Alcatel-Lucent RRH2x40-07-L provides more RF power while at the same time consuming less electricity.



Macro

Features

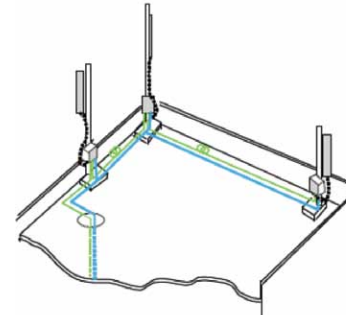
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless), noise-free, and heaterless unit
- Best-in-class power efficiency, with significantly reduced energy consumption



RRH for space-constrained cell sites

Benefits

- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Distributed

Technical specifications

Physical dimensions

- Height: 520 mm (20.5 in.)
- Width: 270 mm (10.63 in.)
- Depth: 226mm (8.9 in.)
- Weight (without mounting kit): less than 27 kg (60 lb)

Power

- Power supply: -48V

Operating environment

- Outdoor temperature range:
 - With solar load: -40°C to +50°C (-40°F to +122°F)
 - Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)

- Enclosure protection
 - IP65 (International Protection rating)

RF characteristics

- Frequency band: 700 MHz; 3GPP Band 12 (incl Band 17)
- Bandwidth: up to 15 MHz
- RF output power at antenna port:
 - 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way
- Noise figure: below 2.5 dB typical
- ALD features
 - TMA
 - Remote electrical tilt (RET) support (AISG v2.0)

Optical characteristics

Type/number of fibers

- Up to 3.12 Gb/s line bit rate
- Single-mode variant
 - One SM fiber (9/125 μm) per RRH2x, carrying UL and DL using CWDM (at 1550/1310 nm)
- Multi-mode variant
 - Two MM fibers (50/125 μm) per RRH2x: one carrying UL, the other carrying DL (at 850 nm)

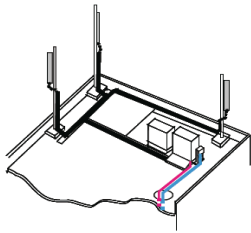
Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

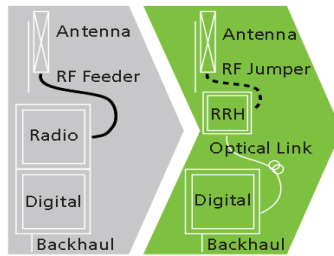
Alarms and ports

- Six external alarms
- Two optical ports to support daisy-chaining

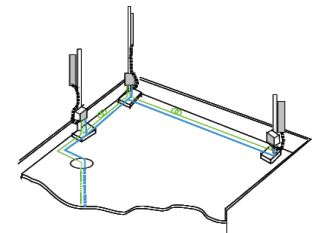
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Macro



RRH for space-constrained cell sites



Distributed

FEATURES

- RRH2x60-1900 integrates two power amplifiers of 60W each at antenna connector
- RRH2x60-1900 can operate WCDMA, LTE or a mix of WCDMA and LTE
- RRH2x60-1900 offers the possibility for WCDMA (non MIMO) to operate the two radio chains independently (2 blocks of 20MHz anywhere in the band)
- RRH2x60-1900 is a very compact and lightweight product
- Advanced power management techniques are embedded to provide

TECHNICAL SPECIFICATIONS

Specifications listed are hardware capabilities. Some capabilities depend on support in a specific software release or future release.

Dimensions and weights

- HxWxD : 510x285x183mm (26.6l)
- Weight : 19.5kg (43lbs)

Electrical Data

- Power Supply : -48V DC (-40.5 to -57V)
- Power Consumption (ETSI average traffic load reference) : 110W for @1x20W; 250W @2x60W

RF Characteristics

- Frequency band: 1900 (3GPP band 2)
- Output power: 2x60W at antenna connectors
- Technologies supported: W-CDMA and

power savings, such as PA bias control or second PA path switch-off

BENEFITS

- MIMO deployment and/or WCDMA and LTE simultaneous operation with only one single unit per sector
- possibility to operate the radio-chains independently (2x20MHz anywhere in the band) addresses nearly all operators' spectrum configurations, which is especially useful in case of disaggregated spectrum or RAN sharing

LTE

- Instantaneous bandwidth: 20MHz (MIMO) or 2x20MHz (non MIMO)
- Rx diversity: 2-way uplink reception
- Typical sensitivity without Rx diversity (3GPP 25.104): -125.7 dBm for W-CDMA and -105 dBm for LTE

Connectivity

- Two CPRI optical ports for daisy-chaining and up to six RRHs per fiber
- Type of optical fiber: Single-Mode (SM) and Multi-Mode (MM) SFPs
- Optical fiber length: up to 500m using MM fiber, up to 20km using SM fiber
- TMA/RETA : AISG 2.0 (RS485 connector and internal Bias-Tee)
- 6 external alarms
- Surge protection for all external ports (DC and RF)

- RRH can be mounted close to the antenna, eliminating nearly all losses in RF cables and thus reducing power consumption by 50% compared to conventional solutions
- Distributed configurations provide easily deployable and cost-effective solutions, near zero footprint and silent solutions, with minimum impact on the neighborhood, which ease the deployment
- RETA and TMA support without additional hardware thanks to the AISG v2.0 port and the integrated Bias-T

Environmental specifications

- Operating temperature: -40°C to 55°C including solar load
- Operating relative humidity: 8% to 100%
- Environmental Conditions : ETS 300 019-1-4 class 4.1E
- Ingress Protection : IEC 60529 IP65
- Acoustic Noise : Noiseless (natural convection cooling)

Safety and Regulatory Data

- EMC : 3GPP 25113, EN 301 489-1, EN 301 489-23, GR 1089
- Safety : IEC60950-1, EN 60825-1
- Regulatory : CE Mark - European Directive : 2002/95/EC (ROHS); 2002/96/EC (WEEE); 1999/5/EC (R&TTE)
- Health : EN 50385

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ALCATEL-LUCENT WIRELESS PRODUCT DATASHEET

RRH2X60-1900 (BAND 2)

The Alcatel-Lucent RRH2x60-1900 is a high power, small form factor Remote Radio Head operating in the 1900MHz frequency band (3GPP Band 2) for WCDMA and LTE technologies. It is designed with an eco-efficient approach, providing operators with the means to achieve high quality and high capacity coverage with minimum site requirements and efficient operation.



A distributed Node B expands the deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of a Node B to be installed separately, within the same site or several kilometers apart. The Alcatel-Lucent RRH2x60-1900 is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with

operations, administration and maintenance (OA&M) information.

SUPERIOR RF PERFORMANCES

The Alcatel-Lucent RRH2x60-1900 integrates all the latest technologies. This allows to offer best-in-class characteristics.

It delivers an outstanding 120 watts of total RF power thanks to its two transmit RF paths of 60 W each.

It is ideally suited to support multiple-input multiple-output (MIMO) 2x2 operation for LTE.

For non-MIMO transmission the two RF chains can operate independently to provide access to two blocks of 20MHz each, anywhere in the band, which makes its perfect for RAN sharing.

The latest generation power amplifiers (PA) used in this product achieve high efficiency (>40%), resulting in improved power consumption figures.

OPTIMIZED TCO

The Alcatel-Lucent RRH2x60-1900 is designed to make available all the benefits of a distributed Node B, with excellent RF characteristics, with low capital expenditures

(CAPEX) and low operating expenditures (OPEX).

The Alcatel-Lucent RRH2x60-1900 is a very cost-effective solution to deploy LTE MIMO.

EASY INSTALLATION

The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment. However, many of these sites can host an Alcatel-Lucent RRH2x60-1900 installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

The Alcatel-Lucent RRH2x60-1900 is a zero-footprint solution and is convection cooled for silent operation, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person as the Alcatel-Lucent RRH2x60-1900 is compact and weighs less than 20 kg, eliminating the need for a crane to host the BTS cabinet to the rooftop. A site can be in operation in less than one day.