

April 11, 2014

VIA ELECTRONIC & OVERNIGHT DELIVERY

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

Re: Connecticut Siting Council Docket No. 436
Certificate Holder Message Center Management, Inc. (MCM)
Telecommunications Facility in East Hartford, Connecticut

Dear Chairman Stein and Members of the Siting Council:

This letter and its enclosures are respectfully submitted on behalf of Message Center Management ("MCM") the Certificate holder for the facility approved in Docket 436 ("Facility") located at 465 Hills Street in East Hartford. As noted in MCM's March 17, 2014 notification letter to the Siting Council, construction activity is proceeding for this Facility.

MCM is currently finalizing its order for the approved tower which includes camouflage branching in accordance with Condition One of the Siting Council's Decision and Order and approved Development and Management Plan in Docket 436. The specifications provided in the final/pending order with MCM's tower vendor included more camouflage branching than depicted in the materials previously provided to MCM and submitted to and approved by the Siting Council in its review of the Development and Management Plan. As more branching will only serve to better camouflage the Facility, MCM plans to proceed with that order. However, analysis of the tower loading with this additional branching indicates a need for an expansion of the tower foundation from the 27' x 27' (as per the September 17, 2013 D&M submission on file with the Siting Council) to a new dimension of 32' x 32' (as per the revised Sheet A1 attached).

An enlargement of the foundation and the associated branching are the only deviations from the approved Development and Management Plan. No changes or modifications to the approved tower location, equipment, compound, fencing, access drive or other features of the approved Facility are proposed. While we do not believe this enlarged foundation is a change of any significance to the approved Facility, we submit this letter and enclosures by way of update and notification to the Siting Council in keeping with R.C.S.A. Sec. 16-50j-77(2). Given the minor nature of this change we respectfully request a staff approved amendment to the D&M Plan for the Facility.

In furtherance of the foregoing please find an original and fifteen (15) copies of this letter with the following attachments:

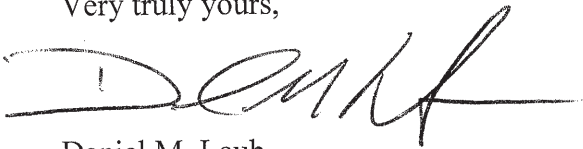
1. Revised Development and Management Plan Sheet A1 prepared by All Points Technology Corporation dated September 12, 2012 and last revised April 10, 2014;

**CUDDY&
FEDER^{LLP}**

2. Structural/Camouflage Drawings Prepared by Larson Camouflage and Vector Engineering including Sheets T-1 and S1-S4 dated August 30, 2013 and last revised April 3, 2014; and
3. Revised Structural Calculations prepared by Vector Engineering dated March 18, 2014.

Two full sized copies of Sheet A1 are also included for the Siting Council's files. Should the Siting Council or Staff have any questions regarding the foregoing, please do not hesitate to contact me.

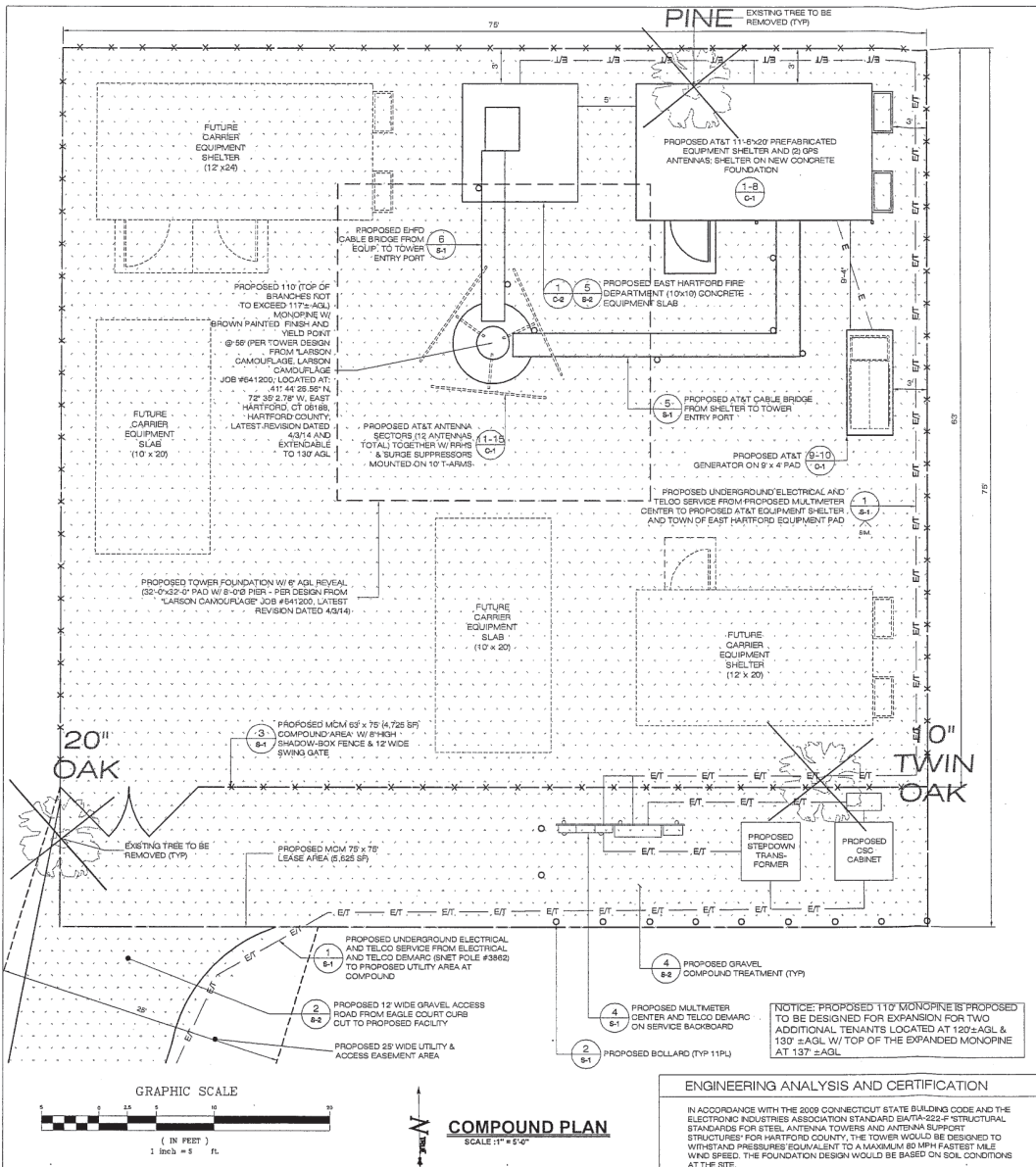
Very truly yours,



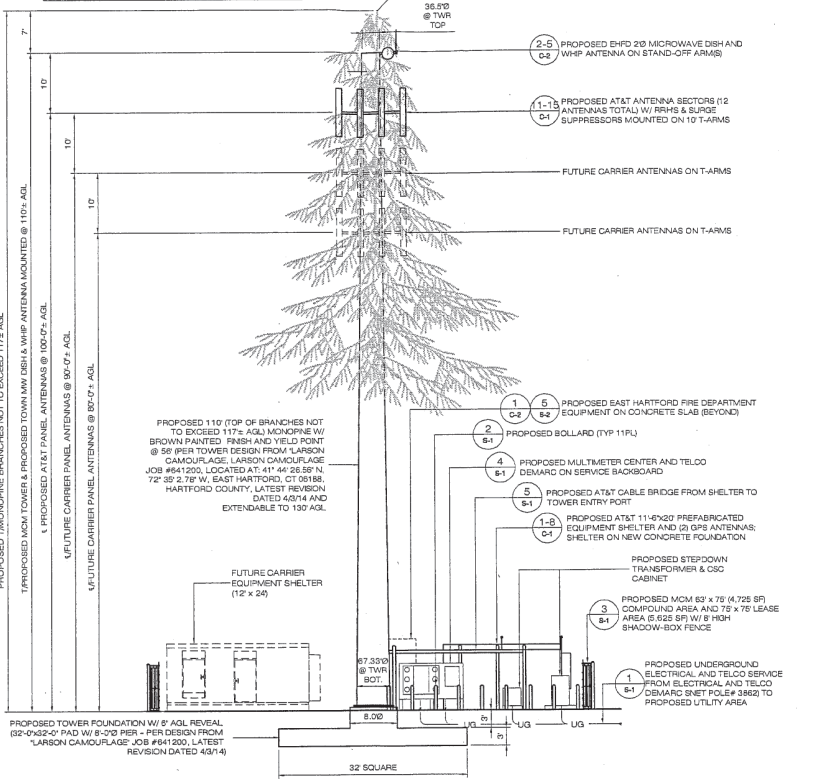
Daniel M. Laub

cc: Maria Scotti, MCM
Virginia King, MCM
Christopher Gelinis, MCM
Tom Flynn, MCM
Michele Briggs, AT&T
Christopher B. Fisher, Esq.

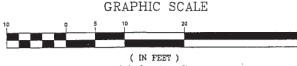
ATTACHMENT 1



NOTICE: PROPOSED 110' MONOPINE IS PROPOSED TO BE DESIGNED FOR EXPANSION FOR TWO ADDITIONAL TENANTS LOCATED AT 120' ± AGL & 130' ± AGL W/ TOP OF THE EXPANDED MONOPINE AT 137' ± AGL



SOUTHERN ELEVATION
SCALE: 1" = 10'-0"



ENGINEERING ANALYSIS AND CERTIFICATION

IN ACCORDANCE WITH THE 2009 CONNECTICUT STATE BUILDING CODE AND THE ELECTRONIC INDUSTRIES ASSOCIATION STANDARD B67A-222.4 STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORT STRUCTURES FOR HARTFORD COUNTY, THE TOWER WOULD BE DESIGNED TO WITHSTAND PRESSURES EQUIVALENT TO A MAXIMUM 80 MPH FASTEST-MILE WIND SPEED. THE FOUNDATION DESIGN WOULD BE BASED ON SOIL CONDITIONS AT THE SITE.

<p>MCM SITE NAME: EAST HARTFORD CT499</p> <p>A-1 FILING NUMBER: CT-242-280</p> <p>MESSAGE CENTER MANAGEMENT 46 WOODLAND STREET HARTFORD, CT 06105 OFFICE: (860) 973-7483</p> <p>MCM</p> <p>ALL-POINTS TECHNOLOGY CORPORATION 3 SADDLEBROOK DRIVE KILLINGWORTH, CT 06449 PHONE: (860)-463-1897 FAX: (860)-463-9933 WWW.ALLPOINTS-TECH.COM</p>	<p>DEVELOPMENT & MANAGEMENT DOCUMENTS</p> <p>EAST HARTFORD 465 HILLS STREET EAST HARTFORD, CT 06118</p> <p>DESIGN TYPE: RAW LAND</p> <p>REVISIONS: REV. 0: 09/15/13: FOR REVIEW: SMC REV. 1: 09/16/13: FOR CSC: SMC REV. 2: 04/10/14: REVISE TOWER: SMC REV. 3: REV. 4:</p>	<p>COMPOUND PLAN & TOWER ELEVATION</p> <p>A-1 FILING NUMBER: CT-242-280 A-1 DRAWING NUMBER: A-1 DRAWN BY: CMS CHECKED BY: SMC DATE: 09/12/12</p> <p>SHEET NUMBER: A-1</p>
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ATTACHMENT 2

LARSON[®] CAMOUFLAGE

1501 South Euclid Avenue
 Tucson, AZ 85713
 (520) 294-3900
 www.larsoncamo.com

VECTOR ENGINEERS
 9138 s. State St., Suite 101 (801) 990-1775
 Sandy, UT 84070 (801) 990-1776 FAX
 www.vectorse.com

DATE: 8/30/13	DESIGNED: KAW	DRAFTER: MGP
REVISIONS		
DATE	DESCRIPTION	
3/18/14	AS SHOWN	
4/3/14	AS SHOWN	

ALL STRUCTURAL COMPONENTS TO BE CONNECTED TOGETHER SHALL BE COMPLETELY FIT UP ON THE GROUND OR OTHERWISE VERIFIED FOR COMPATIBILITY PRIOR TO LIFTING ANY COMPONENT INTO PLACE. REPAIRS REQUIRED DUE TO FIT-UP OR CONNECTION COMPATIBILITY PROBLEMS AFTER PARTIAL ERECTION ARE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR.

110' MONOPINE

LARSON CAMOUFLAGE Job:
641200

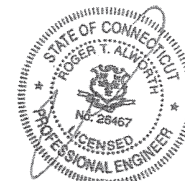
LOCATION:

41° 44' 26.56 " N, 72° 35' 2.78" W
 EAST HARTFORD, CT 06188
 HARTFORD COUNTY

DRAWING INDEX

- T1 TITLE SHEET
- S1 ELEVATION VIEW & NOTES
- S2 DETAILS
- S3 FOUNDATION
- S4 BRANCH LAYOUT

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 JOB #: 641200



4-8-2014

TITLE SHEET

110' MONOPINE
 41° 44' 26.56" N, 72° 35' 2.78" W
 EAST HARTFORD, CT 06188

U1223-277-131

T1 REV
B

TOP OF BRANCHES
116'-0" A.G.L.

(1) TOP BRANCH
(52) 6'-0" BRANCHES
(35) 8'-0" BRANCHES
(25) 10'-0" BRANCHES
(11) 12'-0" BRANCHES

BOTTOM OF BRANCHES
70'-0" A.G.L.

GROUND LEVEL
0'-0"

BRANCHES ARE FOR ILLUSTRATIVE PURPOSES ONLY AND ARE NOT SHOWN TO SCALE.

NOTE: THE MONOPOLE WAS DESIGNED TO ACCOMMODATE A 20'-0" EXTENSION & A FALL ZONE w/ A YIELD POINT AT 56'-0" A.G.L. SEE STRUCTURAL CALCULATIONS FOR FUTURE LOADING

MONOPOLE SECTION CHART					
SECTION	LENGTH	TOP ϕ	BOTTOM ϕ	THICKNESS	WEIGHT
1	54'-0"	36.50"	52.70"	5/16"	8.1 K
2	35'-0"	49.90"	60.40"	5/8"	12.9 K
3	35'-6"	56.68"	67.33"	5/8"	18.7 K *

*INCLUDES EXIT PORT AND BASEPLATE WEIGHT
DESIGN TAPER = 0.3 in/ft

LAP SPICE = 99"
(TOLERANCE = +10%, -10%)

LAP SPICE = 87"
(TOLERANCE = +10%, -10%)

EXIT PORT C.L.
7'-0" A.G.L.
EXIT PORT C.L.
3'-0" A.G.L.
GROUND LEVEL
0'-0"

(1) BA6312-1 WHIP ANTENNA ON 6'-0" SIDE ARM w/ (1) 2'-0" ϕ DISH
TOP CAP PER DTL 1/S2

TOP OF STEEL
110'-0" A.G.L.
ANTENNA C.L.
110'-0" A.G.L.
ANTENNA C.L.
100'-0" A.G.L.
ANTENNA C.L.
90'-0" A.G.L.
ANTENNA C.L.
80'-0" A.G.L.

HAND HOLES PER DTL 2/S2, TYP. @ EACH ANTENNA C.L.

(12) CCI HPA-65R-BUU-H8 PANEL ANTENNAS w/ (9) RRU11's, (6) RRU12's, (6) RRU-A2, (3) RRU-E2, (3) RRU-32, (3) DC2-48-60-18-8F SURGE ARRESTORS ON VALMONT SITE PRO RMV12-496 PLATFORM w/ (1) LWRM & (3) SV197-36

(12) 8'-0" x 1'-0" PANEL ANTENNAS w/ (6) RRU's ON 10'-0" T-ARMS

18-SIDED TAPERED POLE, SECTION 1 (SEE CHART)

18-SIDED TAPERED POLE, SECTION 2 (SEE CHART)

18-SIDED TAPERED POLE, SECTION 3 (SEE CHART)

EXIT PORTS PER DTL 3/S2
BASEPLATE PER DTL 5/S2
PER SHEET S3

4

TYP. S2

GENERAL DESIGN NOTES:

STRUCTURAL DESIGN IS BASED ON THE INTERNATIONAL BUILDING CODE, 2003 EDITION AND THE TIA/EIA-222-F STANDARD

DESIGN LOADS:

WIND:

EQUIVALENT BASIC WIND SPEED: 81 MPH (FASTEST-MILE)
PER THE TIA/EIA-222-F STANDARD

ICE: 1.25" RADIAL ICE THICKNESS @ 71' MPH (FASTEST-MILE)

MATERIAL NOTES:

- 18-SIDED MONOPOLE SHAFT STEEL SHALL CONFORM w/ ASTM A572 GR. 65, U.N.O.
- BASE PLATE STEEL SHALL CONFORM w/ ASTM A572, GR 50, U.N.O.
- REINFORCED ACCESS PORT STEEL SHALL CONFORM w/ ASTM A572 GR. 50, U.N.O.
- ALL OTHER STEEL SHAPES & PLATES SHALL CONFORM w/ ASTM A36, U.N.O.
- ALL BOLTS FOR STEEL-TO-STEEL CONNECTIONS SHALL CONFORM w/ ASTM A325N, U.N.O.
- ALL ANCHOR BOLTS SHALL CONFORM w/ ASTM A615 GR. 75, U.N.O.
- ALL WELDING SHALL BE PERFORMED BY CERTIFIED WELDERS IN ACCORDANCE w/ THE LATEST VERSION OF THE AMERICAN WELDING SOCIETY AWS D1.1.
- ALL STEEL SURFACES SHALL BE GALVANIZED IN ACCORDANCE w/ ASTM A123 AND ASTM A153 STANDARDS.
- ALL BOLTED CONNECTIONS SHALL BE TIGHTENED PER THE "TURN-OF-NUT" METHOD AS DEFINED BY AISC.

ASD BASE DESIGN REACTIONS:

MOMENT, M = 6,146 K-FT (1.0 WIND)
SHEAR, V = 64.6 K (1.0 WIND)
AXIAL, P = 108.4 K (1.0 DEAD + 1.0 ICE)

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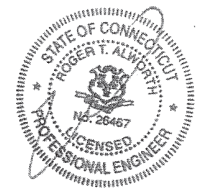
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JOB #: 641200

ELEVATION VIEW & NOTES

110' MONOPOLE
41° 44' 26.56" N, 72° 35' 2.78" W
EAST HARTFORD, CT 06188



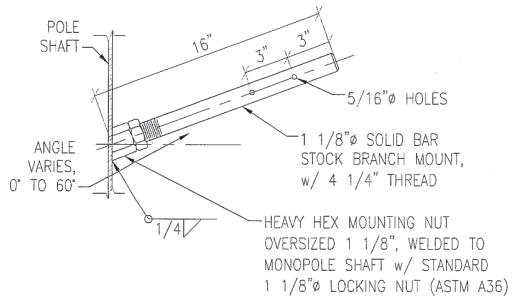
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S1 REV B

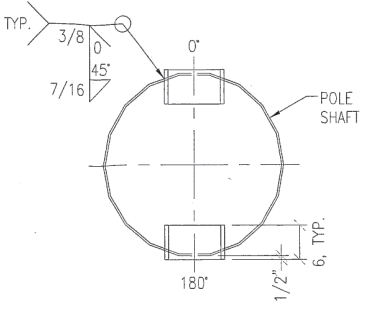
4-8-2014

ELEVATIONS

NTS. 1

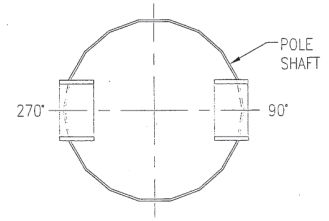


NT.S. 4

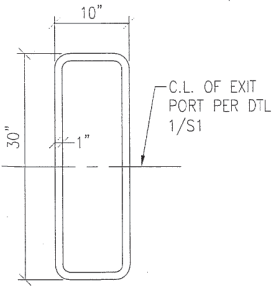


SECTION VIEW @ 7'-0" A.G.L.

SEE SECTION VIEW @ 7'-0" FOR INFORMATION NOT SHOWN



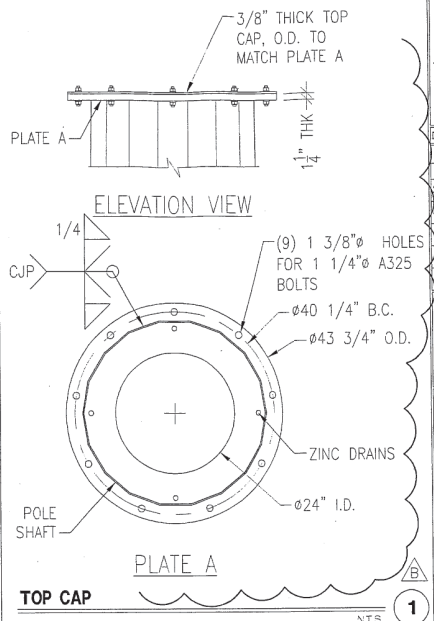
SECTION VIEW @ 3'-0" A.G.L.



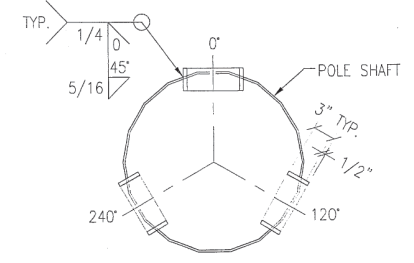
ELEVATION VIEW

EXIT PORTS

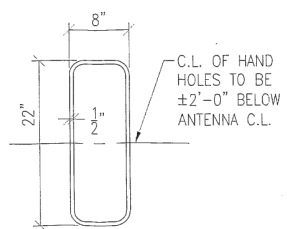
NT.S. 3



NT.S. 1



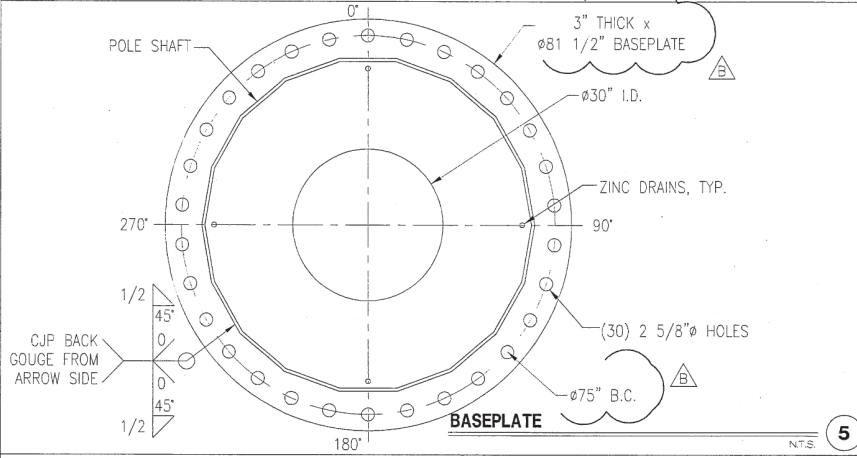
SECTION VIEW



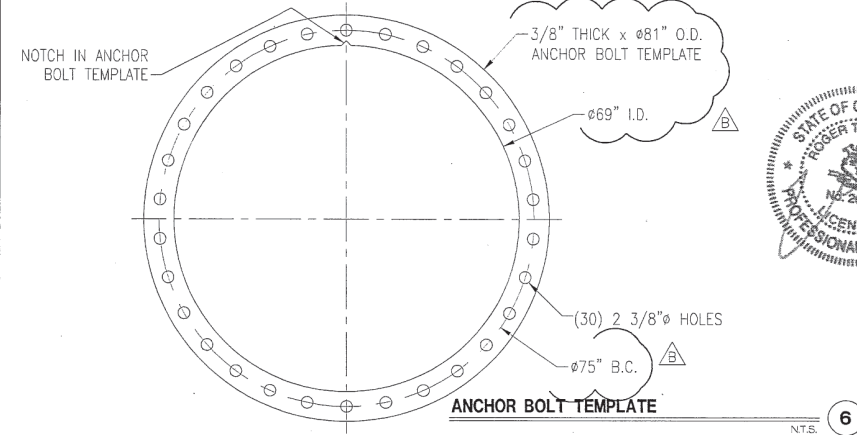
ELEVATION VIEW

HAND HOLES

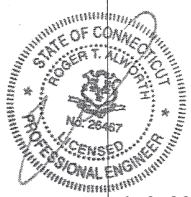
NT.S. 2



NT.S. 5



NT.S. 6



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DETAILS

110' MONOPOLE
41° 44' 26.56" N 72° 39' 2.78" W
EAST HARTFORD, CT 06168

U1223-277-131

S2 REV B

FOUNDATION NOTES:

1. FOUNDATION DESIGN IS BASED ON THE FOLLOWING GEOTECHNICAL REPORT:

TERRACON CONSULTANTS
 JOB NO.: J2135182
 DATE: September 16, 2013

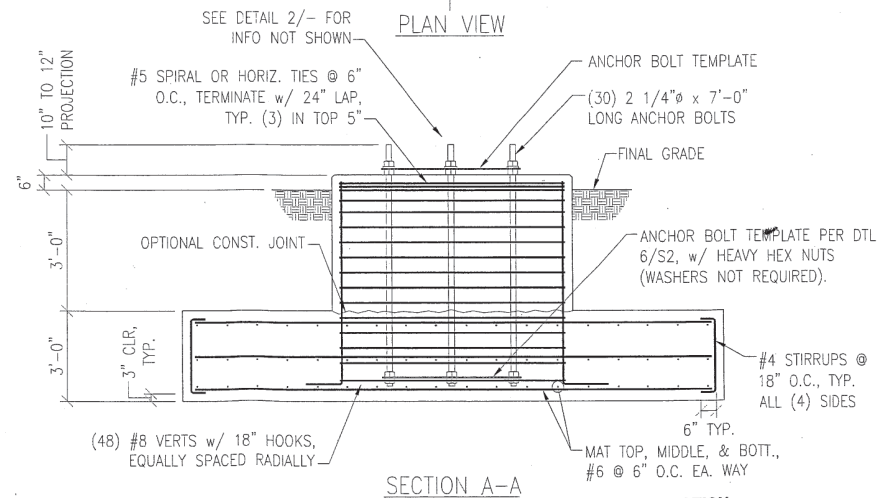
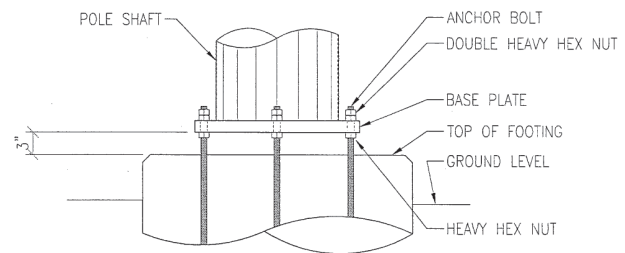
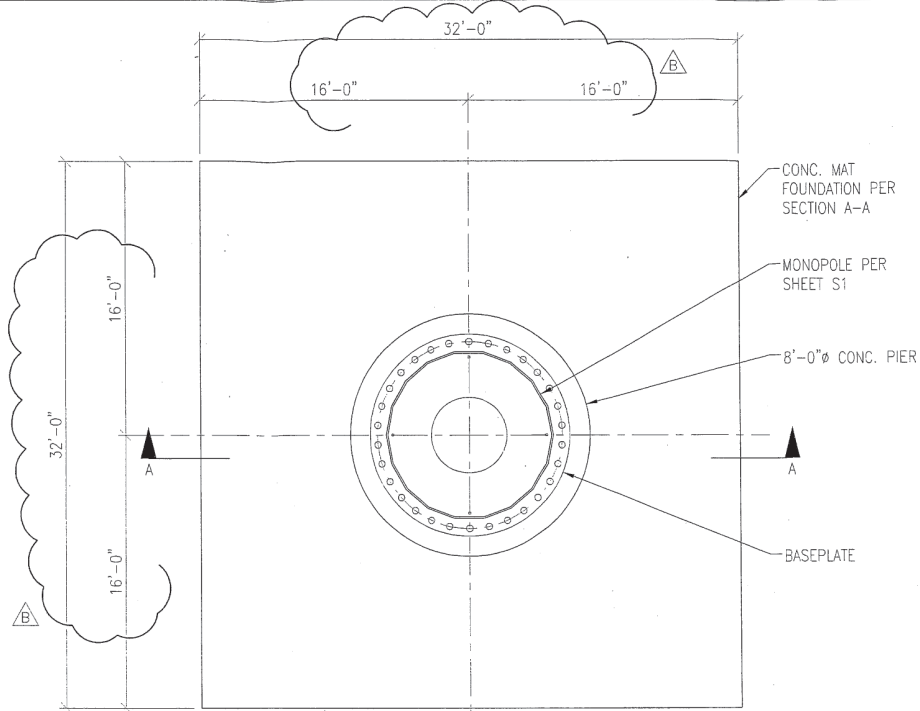
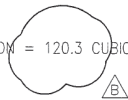
SOILS ENGINEER SHALL OBSERVE AND APPROVE FOUNDATION BEARING MATERIAL

2. ALL CONCRETE SHALL USE TYPE I OR II PORTLAND CEMENT AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. CONCRETE SHALL BE AIR ENTRAINED ($6 \pm 1.5\%$). CONCRETE SHALL HAVE A MAXIMUM WATER/CEMENT RATIO OF 0.50. CONCRETE SHALL HAVE A SLUMP OF 7" ($\pm 1"$). ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH "THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE," ACI 318-08. FOUNDATION INSTALLATION SHALL BE IN ACCORDANCE WITH ACI 336, "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF DRILLED PIERS," LATEST EDITION.

3. REINFORCING STEEL SHALL CONFORM WITH THE REQUIREMENTS OF ASTM A-615, GRADE 60. ALL REINFORCING DETAILS SHALL CONFORM TO "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES," ACI 315, LATEST EDITION, UNLESS DETAILED OTHERWISE ON THIS DRAWING.

4. INSTALLATION OF DRILLED PIERS SHOULD BE OBSERVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER FIRM. GEOTECHNICAL ENGINEER TO PROVIDE A NOTICE OF INSPECTION FOR THE BUILDING INSPECTOR FOR REVIEW AND RECORD PURPOSES.

5. TOTAL ESTIMATED CONCRETE FOR MAT FOUNDATION = 120.3 CUBIC YARDS.



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U1223-277-131
S3
 REV B

NTS. **2**

NTS. **1**

MAT FOUNDATION

BRANCH LAYOUT

Top Plate: three 6' branches and one top branch 6' branches at 0°, 120°, and 240° and 45° angle from vertical

Ø1	202	402	604	805	1006	1207	1408	1609	18010	20011	22012	24013	26014	28015	30016	32017	34018	Dist. From Top	* from Vert.
																		0"	Mount
																		1'-6"	60
																		2'	70
																		2'-6"	90
																		3'	90
																		3'-6"	90
																		4'	90
																		4'-6"	90
																		5'	90
																		5'-6"	90
																		6'	90
																		6'-6"	90
																		7'	90
																		7'-6"	90
																		8'	90
																		8'-6"	90
																		9'	90
																		9'-3"	90
																		10'	Mount
																		10'-6"	90
																		11'	90
																		11'-6"	90
																		12'	90
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																		18'	90
																		18'-6"	90
																		19'	90
																		19'-3"	90
																		20'	Mount

BRANCH LAYOUT

Ø1	202	403	504	805	1006	1207	1408	1609	18010	20011	22012	24013	26014	28015	30016	32017	34018	Dist. From Top	* from Vert.	
																			20'-9"	90
																			21'	90
																			21'-6"	90
																			22'	90
																			22'-6"	90
																			23'	90
																			23'-6"	90
																			24'	90
																			24'-6"	90
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																			27'	90
																			27'-6"	90
																			28'	90
																			28'-6"	90
																			29'	90
																			29'-3"	90
																			30'	Mount
																			30'-9"	90
																			31'	90
																			31'-6"	90
																			32'	90
																			32'-6"	90
																			33'	90
																			33'-6"	90
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																			38'-6"	90
																			39'	90
																			39'-6"	90
																			40'	90

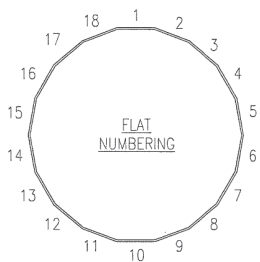
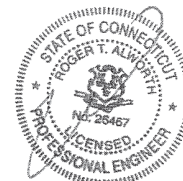


TABLE LEGEND:
 4 = 4'-0" BRANCH
 6 = 6'-0" BRANCH
 8 = 8'-0" BRANCH
 10 = 10'-0" BRANCH
 12 = 12'-0" BRANCH
 TOTAL BRANCH COUNT = 124



4-8-2014



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110' MONOPINE
 41° 44' 26.56" N, 72° 33' 2.76" W
 EAST HARTFORD, CT 06188

U1223-277-131

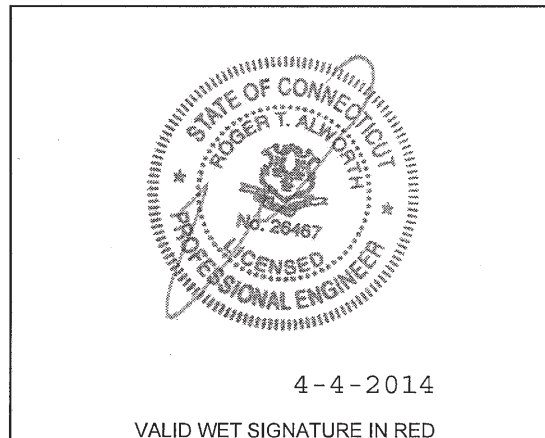
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ATTACHMENT 3



STRUCTURAL CALCULATIONS
for
110' MONOPINE
at
41° 44' 26.56 " N, 72° 35' 2.78" W
EAST HARTFORD, CT 06188
for
LARSON CAMOUFLAGE (641200)



BY: ROGER T. ALWORTH, S.E.
PRINCIPAL

PROJECT #: U1223-277-131

DATE: March 18, 2014

NOTE: The calculations presented in this package are intended for a single use at the location indicated above, for the client listed above. These calculations shall not be reproduced, reused, "card filed", sold to a third party, or altered in any way without the written authorization of Vector Structural Engineers, PC.



JOB NO.: U1223-277-131
DATE: 03/17/14

DESIGNED: KAW
CHECKED: MEG

SHEET

OF

PROJECT: 110' MONOPINE

Design Criteria:

Code: Structural design is based on the International Building Code, 2003 Edition

Wind: Basic wind speed = 81 mph (fastest mile) per the TIA/EIA-222-F standard
Equivalent 3-second gust = 96 mph

Ice: 1.25" radial ice @ 71 mph basic wind speed (fastest mile) per the TIA/EIA-222-F standard

General Notes:

- 1 The contractor shall verify dimensions, conditions and elevations before starting work. The engineer shall be notified immediately if any discrepancies are found.
- 2 The typical notes and details shall apply in all cases unless specifically detailed elsewhere. Where no detail is shown, the construction shall be as shown for other similar work and as required by the building code.
- 3 These calculations are limited to the structural members shown in these calculations only. The connection of the members shown in these calculations to the existing structure shall be by others.
- 4 The contractor shall be responsible for compliance with local construction safety orders. Approval of shop drawings by the architect or structural engineer shall not be construed as accepting this responsibility.
- 5 All structural framing members shall be adequately shored and braced during erection and until full lateral and vertical support is provided by adjoining members.

Structural Steel:

- 1 All structural steel code checks based on the AISC-ASD, 9th Edition per the TIA/EIA-222-F standard
- 2 All 18-sided, tapered shaft steel to be per ASTM A572 GR. 65, U.N.O.
- 3 The design length of slip splices is equal to 1.67 times the inside width of the base of the upper section. Slip splice length tolerance is equal to $\pm 10\%$ of the design slip splice length.
- 4 All other structural steel shapes & plates shall be per ASTM A36, U.N.O.
- 5 All anchor bolts shall be per ASTM A615 GR. 75, U.N.O.
- 6 All bolts for steel-to-steel connections shall be per ASTM A325N, U.N.O.
- 7 All bolted connections shall be tightened per the "turn-of-nut" method as defined by AISC.
- 8 All welding shall be performed by certified welders in accordance with the latest edition of the American Welding Society (AWS) D1.1
- 9 All steel surfaces shall be galvanized in accordance with the ASTM A123 and ASTM A153 standards, U.N.O.

Foundation / Concrete:

- 1 All concrete mixing, placement, forming, and reinforcing installation shall be performed in accordance with the requirements of "Building Code Requirements for Reinforced Concrete", ACI 318-08. Foundation installation shall be in accordance with the requirements of "Standard Specifications for the Construction of Drilled Piers", ACI 336, latest edition
- 2 All concrete shall have a minimum compressive strength of 4000 psi at 28 days.
- 3 Cement for all concrete shall be Type I or II with a minimum of 6% entrained air. Maximum aggregate size shall be $\frac{3}{4}$ ".
- 4 Reinforcing steel shall be per ASTM A615 Gr. 60, U.N.O.
- 5 Foundation design is based upon the project soils report prepared by:

Geotech: Terracon Consultants
Report No: J2135182
Date: 16-Sep-13

- 6 Approximate concrete volume for mat foundation = 101.8 cubic yards



JOB NO.: U1223-277-131
DATE: 03/18/14

DESIGNED: KAW
CHECKED: MEG

SHEET

OF

PROJECT: 110' Monopine

Monopine Branch Layout

Eff. Area Factor:	0.85
Top Crown Radius:	5 ft
C _A Factor:	0.6
Bott. Branch Elev. (ft):	70.0 ft
Top of Steel Elev. (ft):	130.0 ft

Branch Layout Along Pole:

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Branch Length (ft)	Qty	Elevation		Branch Wt. (lbs)	Total Wt. (lbs)	Wind Area		
		Start (ft)	Stop (ft)			Gross (ft ²)	Eff. (ft ²)	C _A A _E (ft ²)
6	18	124.1	130.0	40.0	720	86.7	73.7	44.2
6	40	110.9	124.1	40.0	1600	194.9	165.7	99.4
6	18	104.9	110.9	40.0	720	88.1	74.9	45.0
8	47	89.5	104.9	50.0	2350	295.1	250.9	150.5
10	41	75.9	89.5	66.0	2706	313.8	266.7	160.0
12	18	70.0	75.9	77.0	1386	162.0	137.7	82.6
Total (lbs):					9482			

Top Crown:

Branch Length (ft)	Qty	Total Wt.	Total Wt.
6	3	120	160
6	1	40	
Gross Area (ft²):		39.3	
Eff. Area (ft²):		33.4	
C_AA_E (ft²):		20.0	

Random Branch Distribution:

Total C_AA_E (ft²):	581.8
C_AA_E per ft (ft²/ft):	9.70
Wt. per ft (lbs/ft):	158.0



JOB NO.: U1223-277-131
DATE: 08/30/13

DESIGNED: KAW
CHECKED: MEG

SHEET

OF

PROJECT:

Structural design based on TIA/EIA-222-F.

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Top Hat with (3) 6 ft, and (1) 6 ft branches	132.5	(4) CCI HPA-65R-BUJ-H8-K w/ Mount Pipe	100
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	130	(4) CCI HPA-65R-BUJ-H8-K w/ Mount Pipe	100
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	130	(4) CCI HPA-65R-BUJ-H8-K w/ Mount Pipe	100
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	130	(2) Ericsson RRU A2 Module	100
(2) Generic RRU (24x12x12) 100#	130	(2) Ericsson RRUS-12	100
(2) Generic RRU (24x12x12) 100#	130	(3) Ericsson RRU-11	100
(2) Generic RRU (24x12x12) 100#	130	(2) Generic RRU (36"x12"x12")	100
10'-0" T-Arm	130	(2) Ericsson RRU A2 Module	100
10'-0" T-Arm	130	(2) Ericsson RRUS-12	100
10'-0" T-Arm	130	(4) 8 ft branches	97.2
(18) 6 ft branches	127	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	90
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	120	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	90
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	120	10'-0" T-Arm	90
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	120	10'-0" T-Arm	90
(2) Generic RRU (24x12x12) 100#	120	10'-0" T-Arm	90
(2) Generic RRU (24x12x12) 100#	120	(2) Generic RRU (24x12x12) 100#	90
(2) Generic RRU (24x12x12) 100#	120	(2) Generic RRU (24x12x12) 100#	90
(2) Generic RRU (24x12x12) 100#	120	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	90
10'-0" T-Arm	120	(2) Generic RRU (24x12x12) 100#	90
10'-0" T-Arm	120	(4) 10 ft branches	82.7
10'-0" T-Arm	120	(2) Generic RRU (24x12x12) 100#	80
(4) 6 ft branches	117.5	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	80
6'-0" Standoff Arm	110	10'-0" T-Arm	80
2'-0" Standard	110	10'-0" T-Arm	80
BA6312	110	(2) Generic RRU (24x12x12) 100#	80
(18) 6 ft branches	107.9	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	80
(3) Ericsson RRU-11	100	10'-0" T-Arm	80
(2) Generic RRU (36"x12"x12")	100	10'-0" T-Arm	80
(2) Ericsson RRUS A2 Module	100	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	80
(2) Ericsson RRUS-12	100	(2) Generic RRU (24x12x12) 100#	80
(3) Ericsson RRU-11	100	(18) 12 ft branches	73
(2) Generic RRU (36"x12"x12")	100		
RMV12-496 w/ (1) LWRM .& (3) SV197-36	100		
(3) DC6-48-80-18-8F Surge Suppressor (Enclosed)	100		

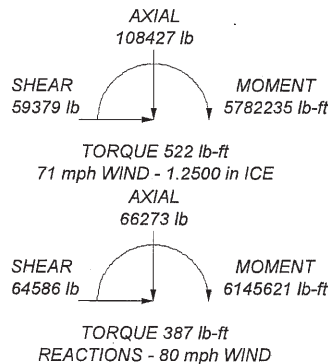
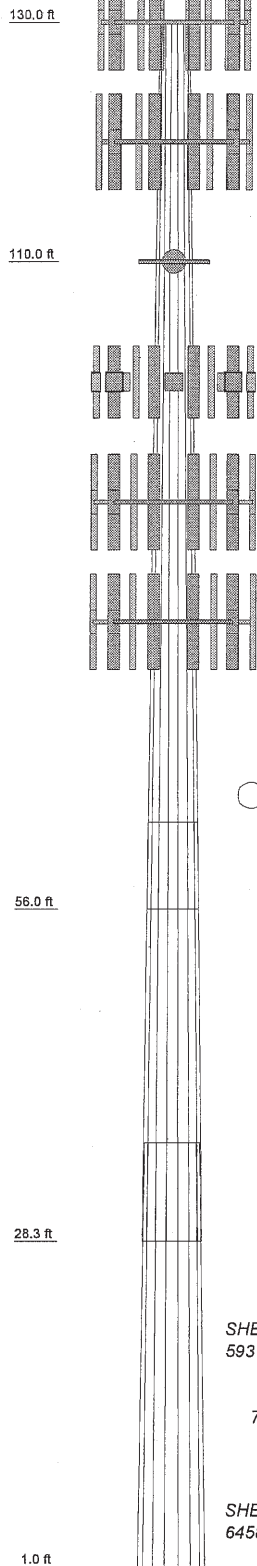
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 71 mph basic wind with 1.25 in ice.
4. Deflections are based upon a 60 mph wind.
5. TOWER RATING: 88.9%

Section	1	2	3	4	
Length (ft)	20.00	54.00	35.00	35.50	
Number of Sides	18	18	18	18	
Thickness (in)	0.1875	0.3125	0.6250	0.6250	
Socket Length (ft)		7.25	8.25		
Top Dia (in)	30.5000	36.5000	49.8000	56.6750	
Bot Dia (in)	36.5000	52.7000	60.4000	67.3250	
Grade		A572-65			
Weight (lb)	1349.2	8071.7	12882.1	14707.6	



<p>Vector Engineering 9138 S. State St. Ste 101 Sandy UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776</p>	<p>Job: 641200</p> <p>Project: U1223-277-131</p>
	<p>Client: Larson Camouflage</p> <p>Code: TIA/EIA-222-F</p> <p>Path:</p>

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		Client	Larson Camouflage	Designed by	kwilson

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation	Face	Ak	Ar	C.A.A. In	C.A.A. Out	Weight
	f	f	f	f	f	f	lb
L1	130.00-110.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	518.40
L2	110.00-56.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	3677.40
L3	56.00-28.25	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2422.57
L4	28.25-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2378.93

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation	Face or Leg	Ice Thickness	Ak	Ar	C.A.A. In	C.A.A. Out	Weight
	f		in	f	f	f	f	lb
L1	130.00-110.00	A	1.250	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	518.40
L2	110.00-56.00	A	1.250	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	3677.40
L3	56.00-28.25	A	1.250	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	2422.57
L4	28.25-1.00	A	1.250	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	2378.93

User Defined Loads

Description	Elevation	Offset From Centroid	Azimuth Angle	Face or Leg	Weight	Fx	Fz	Wind Force	C.A.C
	f	f	°		lb	lb	lb	lb	f
(18) 12 ft branches	73.00	0.00	0.0000	No Ice	1386.00	0.00	0.00	2869.48	82.60
				Ice	1324.60	0.00	0.00	2487.28	90.90
				Service	1386.00	0.00	0.00	1644.08	82.60
(41) 10 ft branches	82.70	0.00	0.0000	No Ice	2976.60	0.00	0.00	5780.92	176.10
				Ice	2706.60	0.00	0.00	3240.91	160.00
				Service	2706.60	0.00	0.00	3673.97	150.50
(47) 8 ft branches	97.20	0.00	0.0000	No Ice	2350.00	0.00	0.00	4917.53	105.60
				Ice	2185.00	0.00	0.00	3191.61	150.50
				Service	2350.00	0.00	0.00	1747.92	45.00
(18) 6 ft branches	107.90	0.00	0.0000	No Ice	720.00	0.00	0.00	1514.44	49.50
				Ice	792.00	0.00	0.00	983.20	45.00
				Service	720.00	0.00	0.00	983.20	45.00

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		Client	Larson Camouflage	Designed by	kwilson

Description	Elevation	Offset From Centroid	Azimuth Angle	Weight	Fx	Fz	Wind Force	C.A.C
	f	f	°	lb	lb	lb	lb	f
(40) 6 ft branches	117.50	0.00	0.0000	No Ice	1600.00	0.00	0.00	3956.14
				Ice	1760.00	0.00	0.00	3426.43
				Service	1600.00	0.00	0.00	2225.33
(18) 6 ft branches	127.00	0.00	0.0000	No Ice	720.00	0.00	0.00	1798.68
				Ice	720.00	0.00	0.00	1560.98
				Service	720.00	0.00	0.00	1011.76
Top Hat with (3) 6 ft and (1) 6 ft branches	132.50	0.00	0.0000	No Ice	176.00	0.00	0.00	463.39
				Ice	176.00	0.00	0.00	413.26
				Service	160.00	0.00	0.00	463.39

Discrete Tower Loads

Description	Face or Leg	Offset Type	Azimuth Horiz Lateral	Placement	C.A.A. Front	C.A.A. Side	Weight
		f	f		f	f	lb
BA6512	C	None	0.0000	110.00	No Ice	0.45	3.00
					1/2" Ice	1.09	1.00
					2" Ice	1.93	11.00
6'-0" Standoff Arm	C	From Face	2.00	0.0000	No Ice	3.01	19.00
					1/2" Ice	1.40	70.00
					1" Ice	1.83	218.55
					2" Ice	2.26	374.77
(4) CCI	A	From Face	3.00	0.0000	No Ice	3.17	710.80
					1/2" Ice	13.37	97.20
					1" Ice	14.10	10.82
					2" Ice	14.83	12.07
HPA-65R-RUJH8-K w/ Mount Pipe	B	From Face	3.00	0.0000	No Ice	16.31	538.90
					1/2" Ice	13.37	97.20
					1" Ice	14.10	10.82
					2" Ice	14.83	12.07
HPA-65R-RUJH8-K w/ Mount Pipe	C	From Face	3.00	0.0000	No Ice	16.31	538.90
					1/2" Ice	13.37	97.20
					1" Ice	14.24	296.65
					2" Ice	14.10	10.82
(2) Eriesson RRUS A2 Module	A	From Face	3.00	0.0000	No Ice	16.31	538.90
					1/2" Ice	2.95	54.42
					1" Ice	2.24	0.62
					2" Ice	2.66	1.04
(2) Eriesson RRUS-12	A	From Face	3.00	0.0000	No Ice	3.69	19.00
					1/2" Ice	3.95	42.19
					1" Ice	4.21	1.85
					2" Ice	4.77	68.57
(3) Eriesson RRU-11	A	From Face	3.00	0.0000	No Ice	2.94	131.73
					1/2" Ice	3.17	51.00
					1" Ice	3.91	0.32
					2" Ice	3.91	146.56
(2) Gemarie RRU (36"x12"x12")	A	From Face	3.00	0.0000	No Ice	4.20	100.00
					1/2" Ice	4.52	134.64
					1" Ice	4.84	173.37
					2" Ice	5.51	263.85

inxTower Vector Engineering 9138 S. State St. Ste 101 Spokane, UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776	Job	641200	Page	6 of 18
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	Client	Larson Camouflage	Designed by	kwilson

Description	Face or Leg	Offset Type	Azimuth Adjustment	Placement	Offsets:			C.A.A. Front	C.A.A. Side	Weight
					Horz	Vert	Lateral			
					ft	ft	ft	ft	ft	lb
(2) Ericsson RRUS A2 Mobile	B	From Face	0.00	0.0000	100.00	No Ice	1.87	0.50	44.09	
			0.00			1/2" Ice	2.05	0.62	54.42	
			0.00			2" Ice	2.24	0.75	66.96	
(2) Ericsson RRUS-12	B	From Face	3.00	0.0000	100.00	No Ice	1.47	1.04	99.48	
			0.00			1/2" Ice	3.69	1.65	147.19	
			0.00			1" Ice	4.21	1.85	168.57	
(3) Ericsson RRU-11	B	From Face	3.00	0.0000	100.00	No Ice	2.94	1.41	131.73	
			0.00			1/2" Ice	3.17	1.59	146.56	
			0.00			2" Ice	3.41	1.96	160.00	
(2) Generic RRU (36"x12"x12")	B	From Face	3.00	0.0000	100.00	No Ice	4.20	4.40	100.00	
			0.00			1" Ice	4.84	4.82	173.37	
			0.00			2" Ice	5.51	5.51	253.83	
(2) Ericsson RRUS A2 Mobile	C	From Face	0.00	0.0000	100.00	No Ice	1.87	0.50	44.09	
			0.00			1/2" Ice	2.05	0.62	54.42	
			0.00			2" Ice	2.24	0.75	66.96	
(2) Ericsson RRUS-12	C	From Face	3.00	0.0000	100.00	No Ice	1.47	1.04	99.48	
			0.00			1/2" Ice	3.69	1.65	147.19	
			0.00			1" Ice	4.21	1.85	168.57	
(3) Ericsson RRU-11	C	From Face	3.00	0.0000	100.00	No Ice	2.94	1.41	131.73	
			0.00			1/2" Ice	3.17	1.59	146.56	
			0.00			2" Ice	3.41	1.96	160.00	
(2) Generic RRU (36"x12"x12")	C	From Face	3.00	0.0000	100.00	No Ice	4.20	4.20	100.00	
			0.00			1" Ice	4.84	4.84	173.37	
			0.00			2" Ice	5.51	5.51	253.83	
RMV12-496 w/ (1) LWRM & (3) SV197-36	C	None		0.0000	100.00	No Ice	14.00	14.00	400.00	
						1/2" Ice	18.00	18.00	800.00	
						1" Ice	20.00	20.00	1200.00	
(3) DCS-48-60-18-8F Surge Suppressor (Enclosed)	C	None		0.0000	100.00	No Ice	0.00	0.00	20.00	
						1/2" Ice	0.00	0.00	20.00	
						1" Ice	0.00	0.00	20.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	3.00	0.0000	90.00	No Ice	11.47	8.70	79.20	
			0.00			1" Ice	12.71	11.38	96.579	
			0.00			2" Ice	14.07	13.58	105.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	3.00	0.0000	90.00	No Ice	11.47	8.70	79.20	
			0.00			1" Ice	12.71	11.38	96.579	
			0.00			2" Ice	14.07	13.58	105.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	3.00	0.0000	90.00	No Ice	11.47	8.70	79.20	
			0.00			1" Ice	12.71	11.38	96.579	
			0.00			2" Ice	14.07	13.58	105.00	
(2) Generic RRU (24x12x12) 100#	A	From Face	3.00	0.0000	80.00	No Ice	3.04	3.04	124.92	
			0.00			1" Ice	3.28	3.28	153.15	
			0.00			2" Ice	3.80	3.80	220.30	
(2) Generic RRU (24x12x12) 100#	B	From Face	3.00	0.0000	80.00	No Ice	3.04	3.04	124.92	
			0.00			1" Ice	3.28	3.28	153.15	
			0.00			2" Ice	3.80	3.80	220.30	
(2) Generic RRU (24x12x12) 100#	C	From Face	3.00	0.0000	80.00	No Ice	3.04	3.04	124.92	
			0.00			1" Ice	3.28	3.28	153.15	
			0.00			2" Ice	3.80	3.80	220.30	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	3.00	0.0000	120.00	No Ice	11.47	8.70	79.20	
			0.00			1" Ice	12.71	11.38	96.579	
			0.00			2" Ice	14.07	13.58	105.00	

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		Client	Larson Camouflage	Designed by	Kwilson

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		Client	Larson Camouflage	Designed by	Kwilson

Tower Pressure - With Ice

$C_H = 1.699$

Section Elevation	z	K_z	q_z	K_d	z	t_z	$A_{d,e}$	F_a	F_c	F_e	$A_{d,e}$	$A_{d,e}$	Leg %	$C_{d,A}$ In	$C_{d,A}$ Out
L1 130.00-110.00	119.70	1.445	19	1.2500	60.000	0.000	60.000	0.000	0.000	0.000	60.000	60.000	100.00	0.000	0.000
L2 110.00-56.00	82.00	1.297	17	1.2500	211.950	0.000	211.950	0.000	0.000	0.000	211.950	211.950	100.00	0.000	0.000
L3 56.00-28.25	41.78	1.07	14	1.2500	135.830	0.000	135.830	0.000	0.000	0.000	135.830	135.830	100.00	0.000	0.000
L4 28.25-1.00	14.33	1	13	1.2500	149.279	0.000	149.279	0.000	0.000	0.000	149.279	149.279	100.00	0.000	0.000

Tower Pressure - Service

$C_H = 1.699$

Section Elevation	z	K_z	q_z	$A_{d,e}$	F_a	F_c	F_e	$A_{d,e}$	Leg %	$C_{d,A}$ In	$C_{d,A}$ Out
L1 130.00-110.00	119.70	1.445	13	55.833	0.000	0.000	55.833	100.00	100.00	0.000	0.000
L2 110.00-56.00	82.00	1.297	12	200.700	0.000	0.000	200.700	100.00	100.00	0.000	0.000
L3 56.00-28.25	41.78	1.07	10	130.049	0.000	0.000	130.049	100.00	100.00	0.000	0.000
L4 28.25-1.00	14.33	1	9	143.602	0.000	0.000	143.602	100.00	100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	F_a	F_c	F_e	$A_{d,e}$	F	w	Ctrl. Force
L1 130.00-110.00	1349.21	A	1	55.833	1452.10	72.60	C
L2 110.00-56.00	8071.74	A	1	55.833	4661.75	86.33	C
L3 56.00-28.25	12882.08	A	1	55.833	2503.85	90.23	C
L4 28.25-1.00	14707.61	A	1	55.833	2584.52	94.84	C
Sum Weight:	37010.65				11202.22		

Section Elevation	β	Add Weight	Self Weight	F_a	F_c	F_e	$A_{d,e}$	F	w	Ctrl. Force
L1 130.00-110.00	L3	2422.57	12882.08	A	1	0.65	200.700	2503.85	90.23	C
L2 110.00-56.00	L2	3677.40	8071.74	A	1	0.65	130.049	4661.75	86.33	C
L3 56.00-28.25	L1	2378.93	14707.61	A	1	0.65	143.602	2584.52	94.84	C
L4 28.25-1.00	L4	8997.30	37010.65	A	1	0.65	6865.14.38	11202.22		
Sum Weight:										

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	β	Add Weight	Self Weight	F_a	F_c	F_e	$A_{d,e}$	F	w	Ctrl. Force
L1 130.00-110.00	L3	518.40	1349.21	A	1	0.65	55.833	1452.10	72.60	C
L2 110.00-56.00	L2	3677.40	8071.74	A	1	0.65	55.833	4661.75	86.33	C
L3 56.00-28.25	L3	2422.57	12882.08	A	1	0.65	200.700	2503.85	90.23	C
L4 28.25-1.00	L4	2378.93	14707.61	A	1	0.65	130.049	2584.52	94.84	C
Sum Weight:										

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	β	Add Weight	Self Weight	F_a	F_c	F_e	$A_{d,e}$	F	w	Ctrl. Force
L1 130.00-110.00	L1	518.40	1349.21	A	1	0.65	55.833	1452.10	72.60	C
L2 110.00-56.00	L2	3677.40	8071.74	A	1	0.65	55.833	4661.75	86.33	C
L3 56.00-28.25	L3	2422.57	12882.08	A	1	0.65	200.700	2503.85	90.23	C
L4 28.25-1.00	L4	2378.93	14707.61	A	1	0.65	130.049	2584.52	94.84	C
Sum Weight:										

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Larson Camouflage		Client	Larson Camouflage	Designed by	kwilson

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Larson Camouflage		Client	Larson Camouflage	Designed by	kwilson

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	ft	Add Weight lb	Self Weight lb	F _a	F _c	e	C _F	R _e	D _F	D _k	A _B	F	w	Ctrl. Face
L1	130.00-110.00	518.40	2421.54	A	1	0.65	1	60.000	1229.11	61.46	C			
L2	110.00-56.00	3677.40	11891.85	B	1	0.65	1	60.000	3877.68	71.81	C			
L3	56.00-28.25	2422.57	15343.46	C	1	0.65	1	211.950	2059.85	74.23	C			
L4	28.25-1.00	2378.93	17418.96	A	1	0.65	1	149.279	2116.19	77.66	C			
Sum Weight:		8997.30	47075.81					572188.00	9282.83					

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	ft	Add Weight lb	Self Weight lb	F _a	F _c	e	C _F	R _e	D _F	D _k	A _B	F	w	Ctrl. Face
L1	130.00-110.00	518.40	2421.54	A	1	0.65	1	60.000	1229.11	61.46	C			
L2	110.00-56.00	3677.40	11891.85	B	1	0.65	1	60.000	3877.68	71.81	C			
L3	56.00-28.25	2422.57	15343.46	C	1	0.65	1	211.950	2059.85	74.23	C			
L4	28.25-1.00	2378.93	17418.96	A	1	0.65	1	149.279	2116.19	77.66	C			
Sum Weight:		8997.30	47075.81					572188.00	9282.83					

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	ft	Add Weight lb	Self Weight lb	F _a	F _c	e	C _F	R _e	D _F	D _k	A _B	F	w	Ctrl. Face
L1	130.00-110.00	518.40	2421.54	A	1	0.65	1	60.000	1229.11	61.46	C			

Section Elevation	ft	Add Weight lb	Self Weight lb	F _a	F _c	e	C _F	R _e	D _F	D _k	A _B	F	w	Ctrl. Face
L2	110.00-56.00	3677.40	11891.85	A	1	0.65	1	60.000	3877.68	71.81	C			
L3	56.00-28.25	2422.57	15343.46	B	1	0.65	1	211.950	2059.85	74.23	C			
L4	28.25-1.00	2378.93	17418.96	C	1	0.65	1	149.279	2116.19	77.66	C			
Sum Weight:		8997.30	47075.81					572188.00	9282.83					

Tower Forces - Service - Wind Normal To Face

Section Elevation	ft	Add Weight lb	Self Weight lb	F _a	F _c	e	C _F	R _e	D _F	D _k	A _B	F	w	Ctrl. Face
L1	130.00-110.00	518.40	1349.21	A	1	0.65	1	55.833	816.80	40.84	C			
L2	110.00-56.00	3677.40	8071.74	B	1	0.65	1	200.700	2622.24	48.56	C			
L3	56.00-28.25	2422.57	12882.08	C	1	0.65	1	130.049	1408.42	50.75	C			
L4	28.25-1.00	2378.93	14707.61	A	1	0.65	1	145.602	1453.79	53.35	C			
Sum Weight:		8997.30	37010.65					386194.34	6301.25					

Tower Forces - Service - Wind 60 To Face

Section Elevation	ft	Add Weight lb	Self Weight lb	F _a	F _c	e	C _F	R _e	D _F	D _k	A _B	F	w	Ctrl. Face
L1	130.00-110.00	518.40	1349.21	A	1	0.65	1	55.833	816.80	40.84	C			
L2	110.00-56.00	3677.40	8071.74	B	1	0.65	1	200.700	2622.24	48.56	C			
L3	56.00-28.25	2422.57	12882.08	C	1	0.65	1	130.049	1408.42	50.75	C			
L4	28.25-1.00	2378.93	14707.61	A	1	0.65	1	145.602	1453.79	53.35	C			
Sum Weight:		8997.30	37010.65					386194.34	6301.25					

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Larson Camouflage		Client	Larson Camouflage	Designed by	kwilson

Section Elevation ft	Add Weight lb	Self Weight lb	F _a	F _c	e	C _r	R _k	D _r	D _k	A _k	A _s	F _l	w	Cr _L Force
Sum Weight:	8997.30	37010.65												

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F _a	F _c	e	C _r	R _k	D _r	D _k	A _k	A _s	F _l	w	Cr _L Force
L1 130.00-110.00	518.40	1349.21	A	0.65	1	55.833	1	1	1	386164.34	6301.25	40.84	C	
L2 110.00-56.00	3677.40	8071.74	B	0.65	1	200.700	1	1	1	386164.34	6301.25	48.56	C	
L3 56.00-28.25	3422.57	12882.08	C	0.65	1	143.602	1	1	1	386164.34	6301.25	50.75	C	
L4 28.25-1.00	2378.93	14707.61	A	0.65	1	143.602	1	1	1	386164.34	6301.25	53.35	C	
Sum Weight:	8997.30	37010.65												

Force Totals

Load Case	Vertical Force lb	Sum of Forces X lb	Sum of Forces Y lb	Sum of Forces Z lb	Sum of Overturning Moments lb-ft	Sum of Overturning Moments lb-ft	Sum of Torques lb-ft
Leg Weight	37010.65						
Bracing Weight	0.00						
Total Member Self-Weight	37010.65						
Total Weight	66273.49						
Wind 0 deg - No Ice		64439.48	1.44		-6060734.34	373.14	
Wind 90 deg - No Ice		0.00		64526.67	6070392.42		
Member Ice	10065.16						
Total Weight Ice	108427.42						
Wind 0 deg - Ice		59378.61	1.37		-569902.06	442.17	
Wind 90 deg - Ice		0.00		59320.43	5636683.34		
Total Weight - Ice	66273.49						
Wind 0 deg - Service		36247.21	0.81		-3409174.32	209.89	
Wind 90 deg - Service		0.00		36296.25	3414854.57		
Wind 180 deg - Service							

Load Combinations

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Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	130 - 110	Pole	Max Tension	5	0.00	0.00	0.00
			Max Compression	3	-21855.51	0.00	-0.01
			Max Mx	3	-7166.61	-274005.78	-5.46
			Max My	2	-7166.61	0.00	274016.94
			Max Vx	3	20108.81	-274005.78	-5.46
			Max Vy	2	-20109.72	0.00	274016.94
			Max Torque	7	0.00	0.00	0.12
L2	110 - 56	Pole	Max Tension	1	0.00	0.00	0.00
			Max Compression	5	-68523.15	0.00	-1853.01
			Max Mx	3	-30724.28	-2268992.4	-405.67
			Max My	2	-30716.85	0.00	2275171.67
			Max Vx	3	59413.78	-2268992.4	-405.67
			Max Vy	2	-59563.77	0.00	2275171.67
			Max Torque	7	0.00	0.00	-522.34
L3	56 - 28.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max Compression	5	-83880.38	0.00	-1853.05
			Max Mx	3	-44377.78	-3888862.7	-448.31
			Max My	2	-44373.56	0.00	3899550.89
			Max Vx	3	61677.28	-3888862.7	-448.31
			Max Vy	2	-61826.89	0.00	3899550.89
			Max Torque	7	0.00	0.00	-522.01
L4	28.25 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max Compression	5	-108427.42	0.00	-1853.12
			Max Mx	3	-66234.45	-6129862.0	-500.48
			Max My	2	-66234.35	0.00	6145621.17
			Max Vx	3	64457.59	-6129862.0	-500.48
			Max Vy	2	-64605.66	0.00	6145621.17
			Max Torque	7	0.00	0.00	-521.86

Maximum Reactions

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		Client	Larson Camouflage	Designed by	kwilson

Location	Condition	Gov. Load Comb.	Vertical, lb	Horizontal, X, lb	Horizontal, Z, lb
Pole	Max. Vert	5	108427.42	0.00	-0.00
	Max. Hx	11	66273.48	0.00	-62925.43
	Max. Hz	2	66273.45	0.00	64586.08
	Max. Mx	2	61282.00	0.00	64586.08
	Max. My	3	61282.00	-64388.05	0.00
	Max. Torsion	2	0.00	5375.61	0.00
	Min. Vert	6	66273.45	0.00	64586.08
	Min. Hx	3	66273.45	-64388.05	-1.44
	Min. Hz	4	66273.45	0.00	-64525.24
	Min. Mx	4	-6139596.76	0.00	-64525.24
	Min. My	11	0.00	0.00	-62925.43
	Min. Torsion	7	-5217.79	-59237.04	-1.37

Tower Mast Reaction Summary

Load Combination	Vertical, lb	Shear, lb	Overturning Moment, Mx, lb-ft	Overturning Moment, Mz, lb-ft	Torque, lb-ft
Dead Only	66273.49	0.00	334.48	0.00	0.00
Dead+Wind 0 deg - No Ice	66273.45	0.00	-64586.08	-6145621.17	0.00
Dead+Wind 90 deg - No Ice	66273.45	64438.05	1.44	500.45	387.35
Dead+Wind 180 deg - No Ice	66273.45	0.00	64523.24	6139596.76	0.00
Dead+Ice+Temp	108427.42	0.00	0.00	1853.12	0.00
Dead+Wind 0 deg+Ice+Temp	108427.42	0.00	-59378.61	-5782234.55	0.00
Dead+Wind 90 deg+Ice+Temp	108427.42	59237.04	1.37	2106.25	521.79
Dead+Wind 180 deg+Ice+Temp	108427.42	0.00	59320.42	3779025.93	0.00
Dead+Wind 0 deg - Service	66273.48	36246.39	-36246.39	-3486531.03	218.29
Dead+Wind 90 deg - Service	66273.48	0.00	36292.43	3454005.28	0.00
Dead+Wind 180 deg - Service	66273.48	0.00	0.00	0.00	0.00

Solution Summary

Load Comb.	PX, lb	PY, lb	PZ, lb	Sum of Applied Forces	Sum of Reactions	% Error
1	0.00	0.00	66273.49	0.00	-66273.49	0.000%
2	66439.48	-64438.05	64523.24	66439.48	-64438.05	0.002%
3	0.00	0.00	66273.45	66273.45	-64525.24	0.038%
4	0.00	0.00	108427.42	108427.42	-41.00	0.000%
5	0.00	0.00	108427.42	108427.42	59378.61	0.000%
6	0.00	0.00	108427.42	108427.42	-1.37	0.000%
7	59237.04	-59237.04	59320.42	108427.42	-59237.04	0.000%
8	0.00	0.00	36246.39	36246.39	-0.81	0.001%
9	0.00	0.00	66273.48	66273.48	-0.81	0.001%
10	36247.21	-36246.39	66273.48	36247.21	-36246.39	0.001%
11	0.00	0.00	66273.48	66273.48	-36295.43	0.001%

Non-Linear Convergence Results

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		Client	Larson Camouflage	Designed by	kwilson

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	9	0.00000001	0.00005037
3	Yes	9	0.00000001	0.00005320
4	Yes	9	0.00000001	0.00005035
5	Yes	6	0.00000001	0.00000001
6	Yes	12	0.00000001	0.00003097
7	Yes	12	0.00000001	0.00003094
8	Yes	12	0.00000001	0.00003100
9	Yes	9	0.00000001	0.00003096
10	Yes	9	0.00000001	0.00003091
11	Yes	9	0.00000001	0.00003765

Maximum Tower Deflections - Service Wind

Section No.	Elevation, ft	Horz. Deflection, in	Gov. Load Comb.	Tilt, °	Twist, °	Radius of Curvature, ft
L1	130 - 110	23.074	9	1.5863	0.0005	21012
L2	110 - 56	16.584	9	1.4725	0.0005	21012
L3	63.25 - 28.25	5.111	9	0.7432	0.0001	10506
L4	36.5 - 1	1.748	9	0.4294	0.0000	

Critical Deflections and Radius of Curvature - Service Wind

Elevation, ft	Appearance	Gov. Load Comb.	Deflection, in	Tilt, °	Twist, °	Radius of Curvature, ft
132.50	Top Hat with (3) 6 ft. and (1) 6 ft. branches	9	23.074	1.5863	0.0005	21012
130.00	(4) 96" x 12" x 6" Paired Antennas w/ Mount Pipe	9	23.074	1.5748	0.0005	21012
127.00	(18) 6 ft. branches	9	23.078	1.5437	0.0005	10506
120.00	(4) 96" x 12" x 6" Paired Antennas w/ Mount Pipe	9	19.772	1.5437	0.0005	10506
117.50	(40) 6 ft. branches	9	18.960	1.5297	0.0005	8405
110.00	2-4" Standard	9	16.584	1.4725	0.0005	5422
107.50	(18) 6 ft. branches	9	15.939	1.4514	0.0005	5148
100.00	(4) CCI HPA-65R-BU-18-K w/ Mount Pipe	9	13.610	1.3524	0.0004	4666
97.20	(47) 8 ft. branches	9	12.822	1.3113	0.0004	4525
90.00	(4) 96" x 12" x 6" Paired Antennas w/ Mount Pipe	9	10.893	1.1951	0.0003	4198
82.70	(41) 10 ft. branches	9	9.089	1.0682	0.0003	3910
80.00	(4) 96" x 12" x 6" Paired Antennas w/ Mount Pipe	9	8.462	1.0204	0.0002	3813
75.00	(18) 12 ft. branches	9	6.947	0.8984	0.0002	3584

Maximum Tower Deflections - Design Wind

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		Client	Larson Camouflage	Designed by	kwilson

Section No.	Elevation	Horiz. Deflection	Gov. Load Comb.	Tilt	Twist	Radius of Curvature
	ft	in		°	°	ft
L1	130 - 110	41.003	2	2.8191	0.0011	11871
L2	110 - 56	2.6171	2	2.6171	0.0011	11871
L3	56 - 28.25	9.084	2	1.3210	0.0002	5935
L4	36.5 - 1	3.108	2	0.7653	0.0001	5935

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
132.50	Top Hat with (3) 6 ft. and (1) 6 ft. branches	2	41.003	2.8191	0.0011	11871
130.00	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	2	41.003	2.8191	0.0011	11871
127.00	(18) 6 ft. branches	2	39.234	2.7987	0.0011	11871
120.00	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	2	35.136	2.7435	0.0011	5935
117.50	(40) 6 ft. branches	2	33.693	2.7186	0.0011	4748
110.00	(2) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	2	29.471	2.6171	0.0011	3062
107.90	(18) 6 ft. branches	2	28.326	2.5795	0.0011	2907
100.00	(4) CCI HPA-65R-BU-H8-K w/ Mount Pipe	2	24.187	2.4037	0.0010	2634
97.20	(47) 8 ft. branches	2	22.787	2.3306	0.0009	2553
90.00	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	2	19.539	2.1241	0.0008	2367
82.70	(41) 10 ft. branches	2	16.153	1.8985	0.0006	2204
80.00	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	2	15.040	1.8156	0.0005	2149
73.00	(18) 12 ft. branches	2	12.346	1.5968	0.0004	2019

Compression Checks

Section No.	Elevation	Size	L	K/r	F _n	A	h ²	P	Actual	Allow.	Ratio
	ft		ft		ksi	in ²	in ⁴	lb	lb	lb	P/P
L1	130 - 110 (1)	TP36.5x30.5x0.1875	20.00	0.00	34.119	21.6105	-21018.70	737333.00	0.029	737333.00	0.029
L2	110 - 56 (2)	TP52.7x36.5x0.3125	54.00	0.00	37.813	49.8045	-30716.90	1883230.00	0.016	1883230.00	0.016
L3	56 - 28.25 (3)	TP60.4x49.9x0.625	35.00	0.00	39.000	113.6590	-44373.60	4433090.00	0.010	4433090.00	0.010
L4	28.25 - 1 (4)	TP67.325x56.67x0.625	35.50	0.00	39.000	132.3160	-66254.40	5160330.00	0.013	5160330.00	0.013

Pole Bending Design Data

inxTower		Job	641200	Page	18 of 18
Vector Engineering 9138 S. State St. Ste. 101 Snohomish, WA 98070 Phone: (801) 990-1775 FAX: (801) 990-1776		Project	U1223-277-131	Date	16:07:58 04/04/14
		Client	Larson Camouflage	Designed by	kwilson

Section No.	Elevation	Size	Actual M _x	Actual M _y	Actual F _w	Actual F _{sw}	Actual F _{tw}	Actual F _{swt}	Actual F _{tw}	Actual F _{swt}	Allow. M _x	Allow. M _y	Allow. F _w	Allow. F _{sw}	Allow. F _{tw}	Allow. F _{swt}	Allow. F _{tw}	Allow. F _{swt}	Ratio	Criteria
	ft		lb-ft	lb-ft	ksi	ksi	ksi	ksi	ksi	ksi	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft	
L1	130 - 110 (1)	TP36.5x30.5x0.1875	269175.	00	-16.636	34.119	0.488	0.000	0.000	0.000	34.119	0.000	34.119	0.000	0.000	0.000	0.000	0.000	0.000	HI-3
L2	110 - 56 (2)	TP52.7x36.5x0.3125	2275175	00	-44.171	37.813	1.168	0.000	0.000	0.000	37.813	0.000	37.813	0.000	0.000	0.000	0.000	0.000	0.000	HI-3
L3	56 - 28.25 (3)	TP60.4x49.9x0.625	3899550	00	-29.204	39.000	0.749	0.000	0.000	0.000	39.000	0.000	39.000	0.000	0.000	0.000	0.000	0.000	0.000	HI-3
L4	28.25 - 1 (4)	TP67.325x56.67x0.625	6145624	00	-33.914	39.000	0.870	0.000	0.000	0.000	39.000	0.000	39.000	0.000	0.000	0.000	0.000	0.000	0.000	HI-3

Pole Interaction Design Data

Section No.	Elevation	Size	Ratio P _x	Ratio P _y	Ratio F _w	Ratio F _{sw}	Ratio F _{tw}	Ratio F _{swt}	Ratio F _{tw}	Ratio F _{swt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	130 - 110 (1)	TP36.5x30.5x0.1875	0.029	0.488	0.000	0.516	1.333				1.333	1.333	HI-3
L2	110 - 56 (2)	TP52.7x36.5x0.3125	0.016	1.168	0.000	1.184	1.333				1.333	1.333	HI-3
L3	56 - 28.25 (3)	TP60.4x49.9x0.625	0.010	0.749	0.000	0.759	1.333				1.333	1.333	HI-3
L4	28.25 - 1 (4)	TP67.325x56.67x0.625	0.013	0.870	0.000	0.882	1.333				1.333	1.333	HI-3

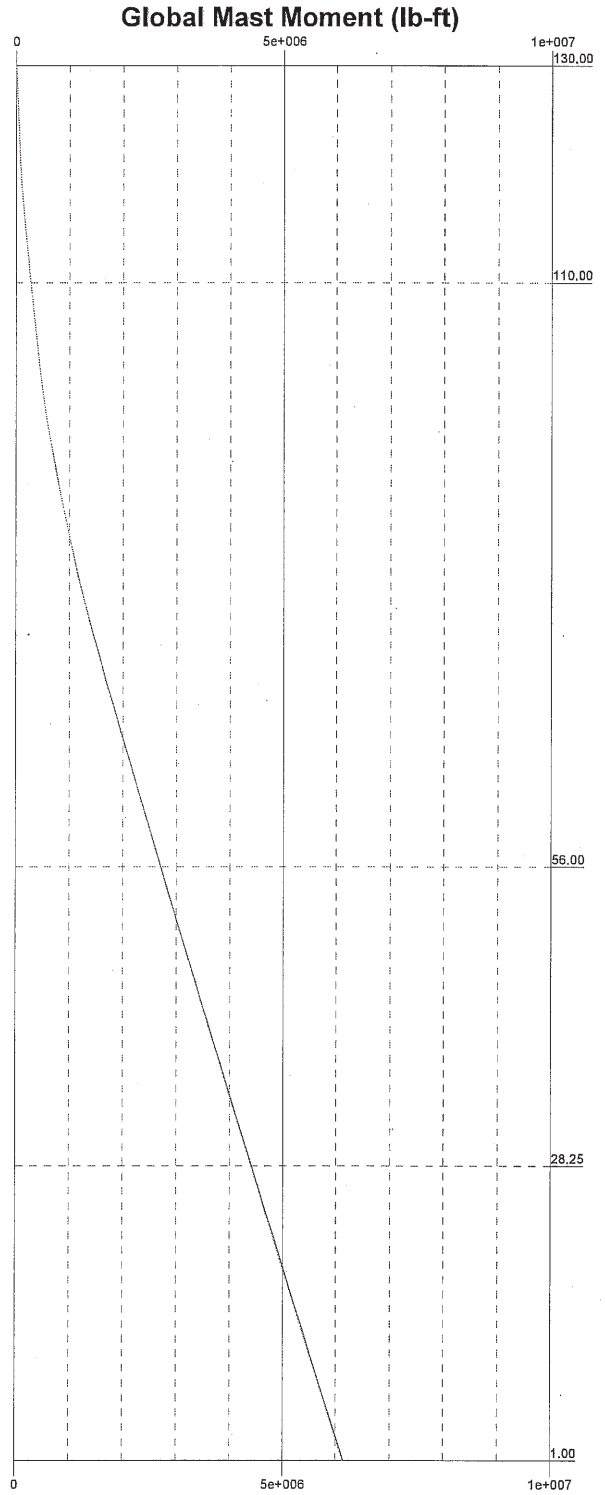
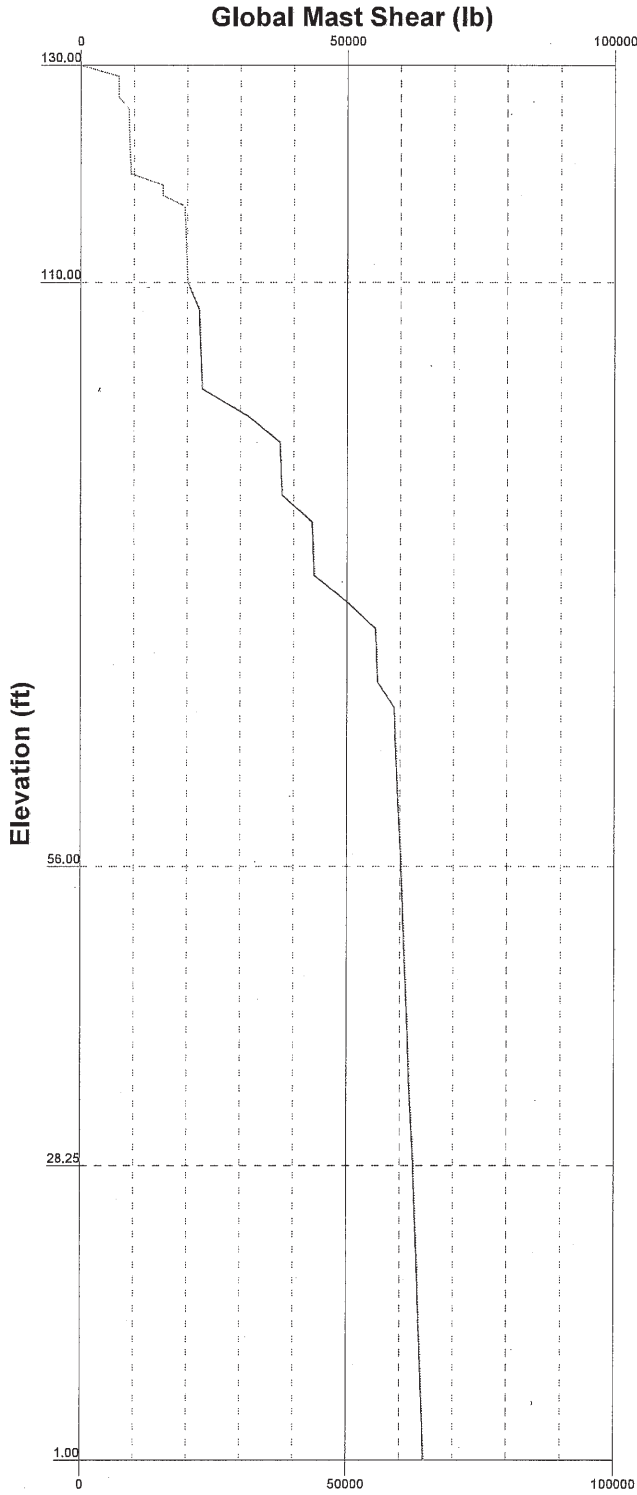
Section Capacity Table


Section No.	Elevation	Component Type	Size	Critical Element	P	SP-y _{allow}	% Capacity	Pass/Fail
L1	130 - 110	Pole	TP36.5x30.5x0.1875	1	-21018.70	98364.85	38.7	Pass
L2	110 - 56	Pole	TP52.7x36.5x0.3125	2	-30716.90	2510345.49	88.9	Pass
L3	56 - 28.25	Pole	TP60.4x49.9x0.625	3	-44373.60	590908.72	56.9	Pass
L4	28.25 - 1	Pole	TP67.325x56.67x0.625	4	-66254.40	687879.60	66.2	Pass

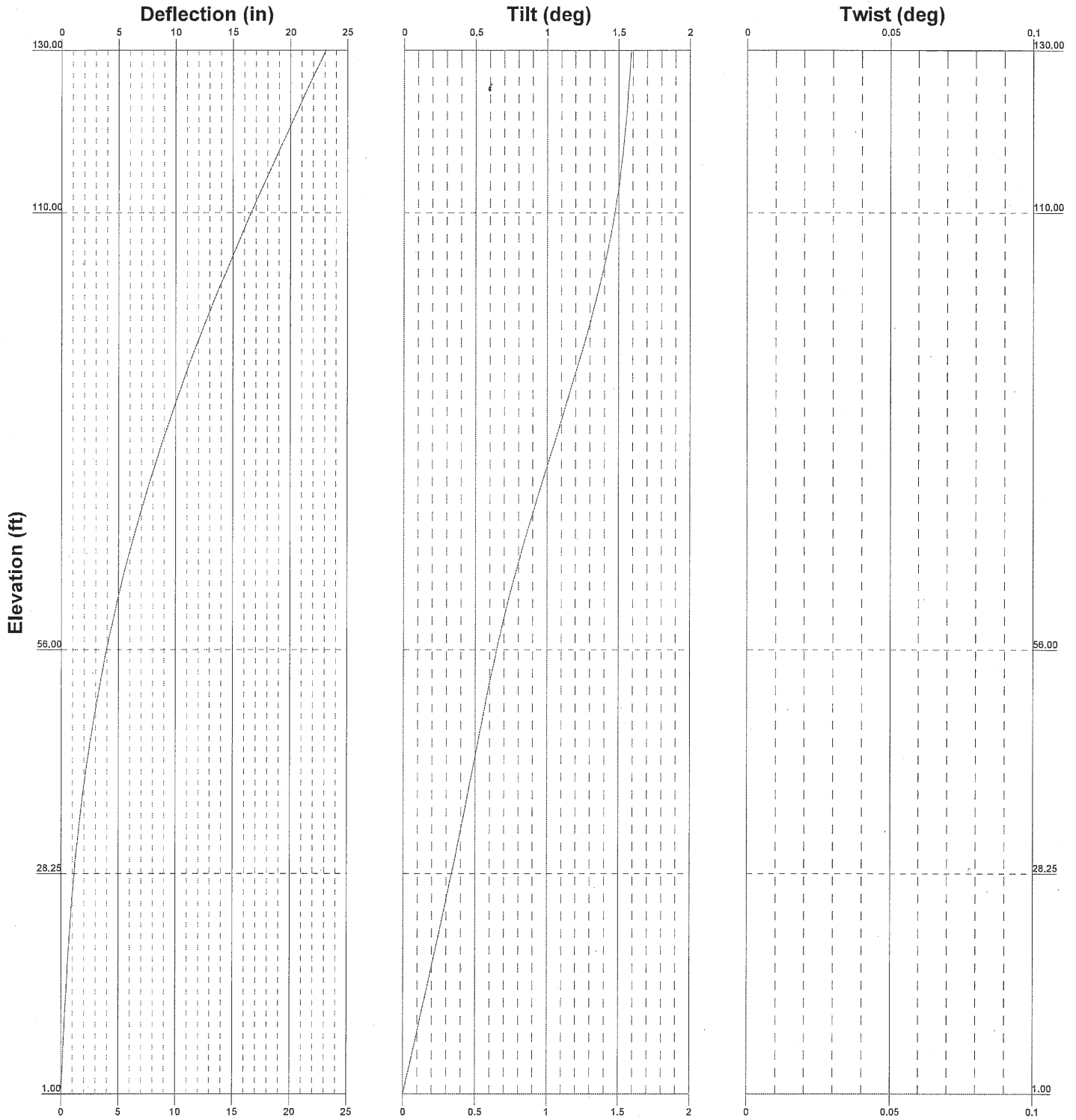
Program Version 6.1.3.1 - 7/25/2013 File:N:\2013 Projects\U1223-277-131 (641200) East Hartford CT\ENG\REV 3 new loading\Tower\641200 REV F.eit


Vx Vz

Mx Mz



 Vector Engineering 9138 S. State St. Ste 101 Sandy UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776	Job: 641200		
	Project: U1223-277-131		
	Client: Larson Camouflage	Drawn by: kwilson	App'd:
	Code: TIA/EIA-222-F	Date: 04/03/14	Scale: NTS
Path:	Dwg No. E-4		



 Vector Engineering 9138 S. State St. Ste 101 Sandy UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776	Job: 641200		
	Project: U1223-277-131		
	Client: Larson Camouflage	Drawn by: kwilson	App'd:
	Code: TIA/EIA-222-F	Date: 04/03/14	Scale: NTS
	Path:		Dwg No. E-5

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev F

Site Data

BU#:	
Site Name:	
App #:	
Pole Manufacturer:	Other

Reactions		
Moment:	6146	ft-kips
Axial:	108.4	kips
Shear:	64.6	kips

Anchor Rod Data

Qty:	30	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	75.5	in

If No stiffeners, Criteria: AISC ASD <-Only Applicable to Unstiffened Cases

Anchor Rod Results

Maximum Rod Tension: 126.6 Kips
 Allowable Tension: 195.0 Kips
 Anchor Rod Stress Ratio: 65.0% Pass

Rigid
Service ASD
Fty*ASIF

Plate Data

Diam:	81.5	in
Thick:	3	in
Grade:	50	ksi
Single-Rod B-eff:	7.12	in

Base Plate Results

Base Plate Stress: 31.3 ksi
 Allowable Plate Stress: 50.0 ksi
 Base Plate Stress Ratio: 62.6% Pass

Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Y.L. Length:
34.17

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:	Both	
Groove Depth:	0.25	in **
Groove Angle:	45	degrees
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	5	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	50	ksi
Weld str.:	70	ksi

n/a

Stiffener Results

Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, fb/Fb+(fv/Fv)^2: n/a
 Plate Tension+Shear, ft/Ft+(fv/Fv)^2: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

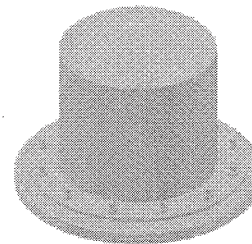
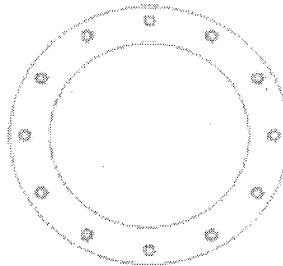
Pole Punching Shear Check: n/a

Pole Data

Diam:	67.325	in
Thick:	5/8	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor

ASIF:	1.333
-------	-------



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes



JOB NO.: U1223-277-131
DATE: 03/18/14

DESIGNED: KAW
CHECKED: MEG

SHEET

OF

PROJECT: 110' MONOPINE

Mast Splice Design

Plate Fy (ksi)	36
Lower Pole Diameter D (in)	36.5
Lower Pole Thickness t ₂ (in)	0.3125
Upper Pole Thickness t ₁ (in)	0.1875
Upper Pole Diameter d (in)	36.5
Moment @ Splice M (kip-ft)	274.0
Axial @ Splice P (kips)	21.9
Shear @ Splice V (kips)	20.1

Bolt Design

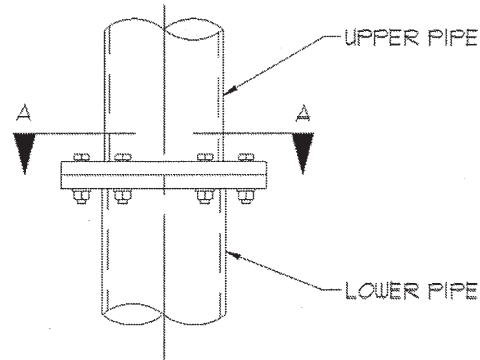
Bolt Circle Diameter BC (in)	40.25
Number of Bolts	9
T/Bolt (kips)	36.3
V/Bolt (kips)	2.2
Bolt Designation	A325
Bolt Diameter (in)	1.250
Allowable Tension (kips)	54.1
Allowable Shear (kips)	20.9
Combined Tension and Shear	0.78

Use (9) 1.25" Diameter A325 Bolts

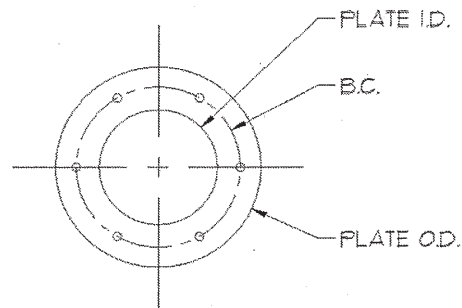
Upper & Lower Plate Design

Plate Hole Radius, r _p (in)	18.3125
Bolt Circle Radius, r _b (in)	20.125
Plate OD (in)	43.75
φ _{plate}	0.9
Required Plate Thickness, t (in)	1.00

Use 1.25" Thick Plate



ELEVATION VIEW



SECTION A-A

$$t = \sqrt{\frac{1.6 M (r_b - r_p)}{\phi F_y r_p r_b}}$$



JOB NO.: U1223-277-131
 DATE: 03/18/14

DESIGNED: KAW
 CHECKED: MEG

SHEET OF

PROJECT: 110' MONOPINE

Access Port Analysis

Reinforced Access Port:

Port Width: inches

Pole Shaft Loading:

Moment: kip-ft
 Axial Load: kips

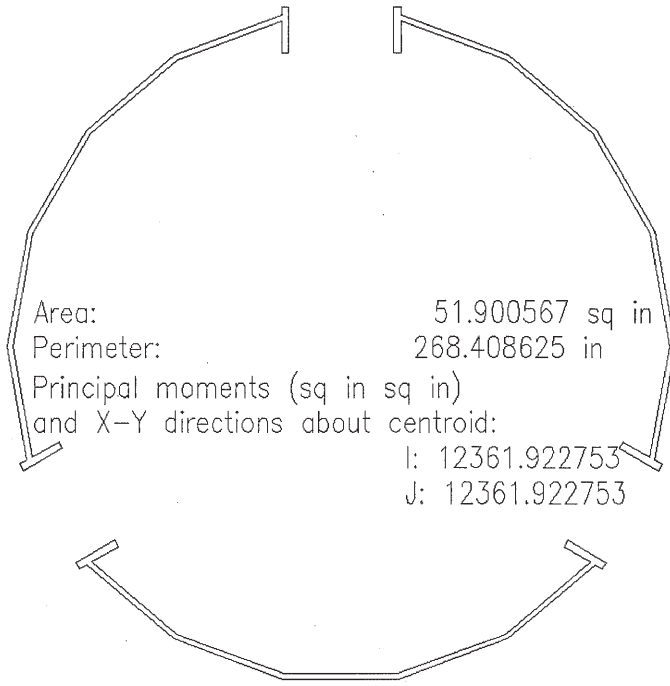
Properties @ Access Port:

Pole Flat-Flat Outer Dia.: in
 Pole Thickness, TK: in
 Fy ksi

A_{PoleNoAccess}: in²
 I_{PoleNoAccess}: in⁴
 S_{PoleNoAccess}: in³
 A_{reinforced}: in²
 I_{reinforced}: in⁴
 S_{reinforced}: in³

F_b = (0.6 x F_y) * 1.33 : ksi
 f_b = M / S + Wt / A : ksi

OK





JOB NO.: U1223-277-131
 DATE: 03/18/14

DESIGNED:
 CHECKED:

SHEET

OF

PROJECT: 110' MONOPINE

Reinforced Access Port Analysis

Reinforced Access Port:

Width, w:	10	inches
Thickness, t ₁ :	1	inches
Depth, d:	6	inches
Projection, p:	0.5	inches

Pole Shaft Loading:

Moment:	6146	kip-ft
Axial Load:	108.4	kips

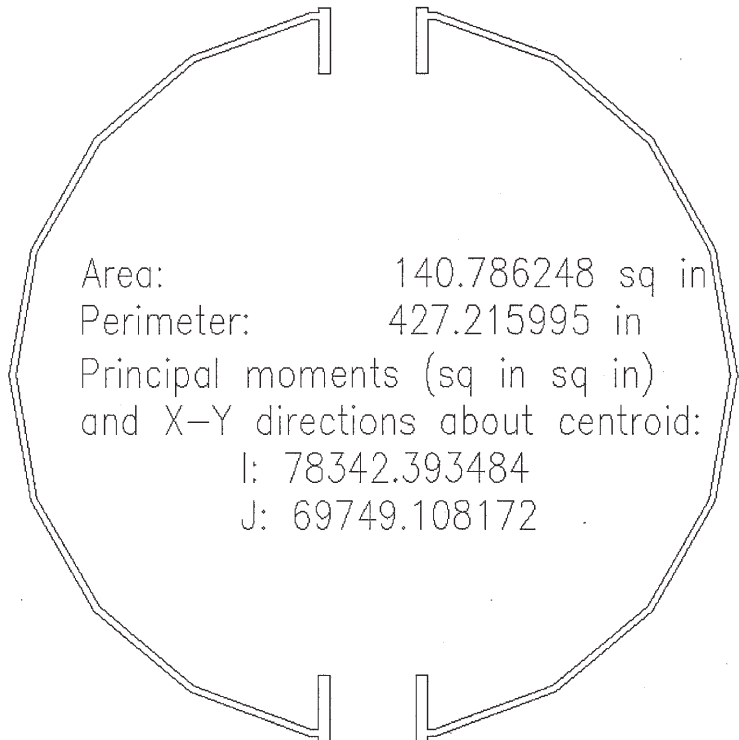
Properties @ Access Port:

Flat-Flat Dia.:	65.8	in
Pole Thickness, t ₂ :	0.625	in

A _{PoleNoAccess} :	128.0	in ²
I _{PoleNoAccess} :	68032.9	in ⁴
S _{PoleNoAccess} :	2067.1	in ³
A _{reinforced} :	140.8	in ²
I _{reinforced} :	69749.0	in ⁴
S _{reinforced} :	2087.5	in ³

F _y :	65	ksi
F _b = (0.6 x F _y) * 1.33:	52.0	ksi
f _b = M / S + Wt / A:	36.1	ksi

69%





JOB NO.: U1223-277-131
DATE: 08/30/13

DESIGNED: KAW
CHECKED: MEG

SHEET

OF

PROJECT:

Structural design based on TIA-222-G.

This analysis was performed to ensure that the structure would be code compliant if the TIA-222-G. standard is adopted prior to the addition of the 20' extension.

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Top Hat with (3) 6 ft, and (1) 6 ft branches	132.5	(4) CCI HPA-65R-BUU-H8-K w/ Mount Pipe	100
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	130	(4) CCI HPA-65R-BUU-H8-K w/ Mount Pipe	100
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	130	(4) CCI HPA-65R-BUU-H8-K w/ Mount Pipe	100
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	130	(2) Ericsson RRUS A2 Module	100
(2) Generic RRU (24x12x12) 100#	130	(2) Ericsson RRUS-12	100
(2) Generic RRU (24x12x12) 100#	130	(3) Ericsson RRU-11	100
(2) Generic RRU (24x12x12) 100#	130	(2) Generic RRU (36"x12"x12")	100
10'-0" T-Arm	130	(2) Ericsson RRUS A2 Module	100
10'-0" T-Arm	130	(2) Ericsson RRUS-12	100
10'-0" T-Arm	130	(47) 8 ft branches	97.2
(18) 6 ft branches	127	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	90
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	120	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	90
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	120	10'-0" T-Arm	90
(2) Generic RRU (24x12x12) 100#	120	10'-0" T-Arm	90
(2) Generic RRU (24x12x12) 100#	120	10'-0" T-Arm	90
(2) Generic RRU (24x12x12) 100#	120	(2) Generic RRU (24x12x12) 100#	90
10'-0" T-Arm	120	(2) Generic RRU (24x12x12) 100#	90
10'-0" T-Arm	120	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	90
10'-0" T-Arm	120	(2) Generic RRU (24x12x12) 100#	90
(40) 6 ft branches	117.5	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	80
6'-0" Standoff Arm	110	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	80
2'-0" Standard	110	10'-0" T-Arm	80
BA6312	110	(2) Generic RRU (24x12x12) 100#	80
(18) 6 ft branches	107.9	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	80
(3) Ericsson RRU-11	100	10'-0" T-Arm	80
(2) Generic RRU (36"x12"x12")	100	10'-0" T-Arm	80
(2) Ericsson RRUS A2 Module	100	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	80
(2) Ericsson RRUS-12	100	(2) Generic RRU (24x12x12) 100#	80
(3) Ericsson RRU-11	100	(18) 12 ft branches	73
(2) Generic RRU (36"x12"x12")	100		
RMV12-496 w/ (1) LWRM (3)	100		
SV197-36	100		
(3) DC6-48-60-18-8F Surge Suppressor (Enclosed)	100		

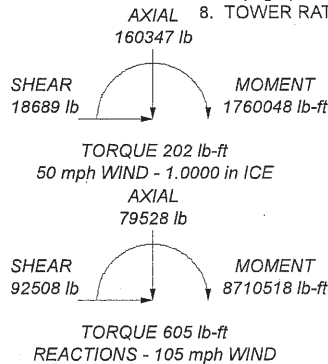
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

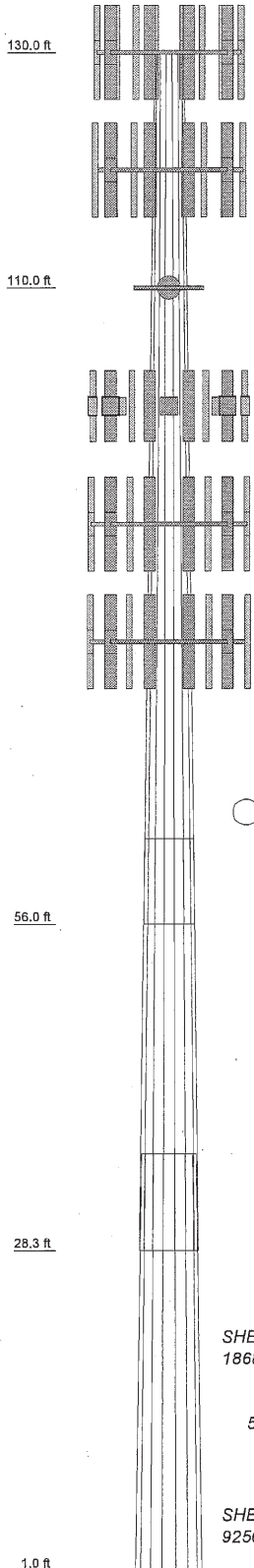
TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 105 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 99.4%

ALL REACTIONS ARE FACTORED



Section	1	2	3	4	
Length (ft)	20.00	54.00	35.00	35.50	37010.7
Number of Slides	18	18	18	18	
Thickness (in)	0.1875	0.3125	0.6250	0.6250	
Socket Length (ft)		7.25	8.25		
Top Dia (in)	30.5000	36.5000	49.9000	56.6750	
Bot Dia (in)	36.5000	52.7000	60.4000	67.3250	
Grade	1349.2	8071.7	12882.1	14707.6	
Weight (lb)					



<p>Vector Engineering 9138 S. State St. Ste 101 Sandy UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776</p>	Job: 641200
	Project: U1223-277-131
	Client: Larson Camouflage
	Code: TIA-222-G
	Path:
Drawn by: kwilson	App'd:
Date: 04/04/14	Scale: NTS
Dwg No. E-1	

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Vector Engineering 9138 S. State St., Ste. 101 South UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776		Project	U1223-277-131	Date	16:06:58 04/04/14
		Client	Larson Camouflage	Designed by	Kwilson

maxTower		Job	641200	Page	2 of 18
Vector Engineering 9138 S. State St., Ste. 101 South UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776		Project	U1223-277-131	Date	16:06:58 04/04/14
		Client	Larson Camouflage	Designed by	Kwilson

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 Hartford County, Connecticut.
Basic wind speed of 105 mph.
Structure Class II
Exposure Category C.
Topographic Category I.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 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 appearance mounts are not considered.

Options

- Consider Moments - Legs
- Consider Moments - Horizontals
- Consider Moments - Diagonals
- Use Moment Magnification
- Use C-Load Stress Ratios
- Escalate Ice
- Always Use Max Kz
- Use Profile
- Use Bolt Area At Top Of Section
- Secondary Horizontal Braces Leg
- Use Diamond Inner Bracing (4 Sides)
- Add IBC 6D+H Combination
- Distribute Leg Loads As Uniform
- Assume Legs Pinned
- Use ASCE 10 X-Brace Lx Rules
- Calculate Redundant Bracing Forces
- Ignore Redundant Members in FEAs
- SR Leg Bolts Resist Compression
- All Leg Panels Have Same Allowable Offset Gir AT Foundation
- Consider Feedline Torque
- Include Angle Block Shear Check
- Include Angle Block Interaction
- Always Use Sub-Critical Flow
- Use Top Mounted Stacks
- Exemption

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Slices	Top Diameter	Bottom Diameter	Wall Thickness	Band Radius	Pole Grade
L1	130.00-110.00	20.00	0.00	18	30.5000	36.5000	0.1875	0.7500	A572-65 (65 ksi)
L2	110.00-56.00	54.00	7.25	18	36.5000	52.7000	0.3125	1.2500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia.	Area	I	r	C	IC	I/C	J	J/C	Wt
L1	30.5705	18.0797	2084.1651	10.7669	15.4940	135.1597	4191.0857	9.0216	5.0380	26.869
L2	37.0631	21.6105	3600.0961	12.8909	18.5420	194.1590	7204.9293	10.8073	6.0940	32.501
L3	53.5130	51.9619	18016.7900	18.5976	26.7716	320.2680	11884.6328	17.9501	8.8740	18.797
L4	61.3318	118.5787	53238.2622	21.2201	30.6832	672.9814	36057.2869	25.9859	8.7252	27.921

Tower Elevation	Gusset Area	Gusset Thickness	Guest Grade	Adjust Factor	Adjust Factor	Weight Multi.	Double Angle Spacing	Double Angle Spacing	Double Angle Spacing
130.00-110.00	111.1892	0.4413	17593	19.8977	28.7909	1532.871	88321.5883	55.6052	8.8748
110.00-56.00	132.3161	0.4413	17593	23.6785	34.2011	2174.5120	148839.266	66.1706	10.7492

Feed Line/Linear Appurtenances - Entered As Area

Description	Face Allow or Shield	Component Type	Placement	Total Number	CMA	Weight
AVAS-50 (1-5/8" LOW DENSL FOAM)	C	No	Inside Pole	110.00 - 1.00	3	No Ice 1" Ice 0.30
AVAS-50 (1-5/8" LOW DENSL FOAM)	C	No	Inside Pole	100.00 - 1.00	24	No Ice 12" Ice 0.72
AVAS-50 (1-5/8" LOW DENSL FOAM)	C	No	Inside Pole	90.00 - 1.00	24	No Ice 12" Ice 0.72
AVAS-50 (1-5/8" LOW DENSL FOAM)	C	No	Inside Pole	80.00 - 1.00	24	No Ice 12" Ice 0.72
AVAS-50 (1-5/8" LOW DENSL FOAM)	C	No	Inside Pole	120.00 - 1.00	24	No Ice 12" Ice 0.72

inxTower		Job	641200	Page	3 of 18
Vector Engineering 9138 S. State St. Ste 101 Sandwich, MA 01906 Phone: (801) 990-1775 Fax: (801) 990-1776		Project	U1223-277-131	Date	16:06:58 04/04/14
		Client	Larson Camouflage	Designed by	Kwilson

Description	Face Allow or Shield	Component Type	Placement	Total Number	C.A.A	Weight
AV17-50 (1-5/8" LOW DENSE FOAM)	C	No	Inside Pole	24	No Ice 1/2" Ice 1" Ice	0.00 0.00 0.72

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face		A _n		A _r		C.A.A		Weight lb
		In Face	Out Face	In Face	Out Face	In Face	Out Face	In Face	Out Face	
L1	130.00-110.00	A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
L2	110.00-56.00	A	0.000	0.000	0.000	0.000	0.000	0.000	518.40	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	0.000	3677.40	0.00
L3	56.00-28.25	A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	0.000	2422.57	0.00
L4	28.25-1.00	A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	0.000	2378.93	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _n	A _r	C.A.A		Weight lb
						In Face	Out Face	
L1	130.00-110.00	A	2.275	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	518.40
L2	110.00-56.00	A	2.190	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	3677.40
L3	56.00-28.25	A	2.048	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	2422.57
L4	28.25-1.00	A	1.840	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.000	2378.93

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice

User Defined Loads

Tower Section	Tower Elevation ft	Face or Leg	Offset Type	Azimuth Adjustment		C.A.A		Weight lb
				Horz Lateral	Vert	Front	Side	
EAG312		C	None	0.0000	0.0000	0.0000	0.0000	3.00
		C	From Face	2.00	0.00	0.00	0.00	7.00
		C	From Face	0.00	0.00	1.73	1.09	7.00
		C	From Face	0.00	0.00	1.83	1.13	7.00
		C	From Face	0.00	0.00	2.26	1.37	218.55
		C	From Face	0.00	0.00	2.26	1.37	374.77
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	192.07
		C	From Face	0.00	0.00	13.37	9.42	97.20
		C	From Face	0.00	0.00	14.10	10.82	

inxTower <i>Vector Engineering</i> 9138 S. Seavey St., Ste. 101 Spokane, WA 99207 Phone: (800) 990-1775 Fax: (800) 990-1776	Job	641200	Page	5 of 18
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	Client	Larson Camouflage	Designed by	kwlison

inxTower <i>Vector Engineering</i> 9138 S. Seavey St., Ste. 101 Spokane, WA 99207 Phone: (800) 990-1775 Fax: (800) 990-1776	Job	641200	Page	6 of 18
	Project	U1223-277-131	Date	16:06:58 04/04/14
	Client	Larson Camouflage	Designed by	kwlison

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C.A.A.		Weight
			Horz	Vert	Lateral			Front	Side	
			ft	ft	ft	°	ft	ft	lb	
(1) Generic RRU (36"x12"x12")	A	From Face	3.00	0.00	0.00	0.0000	100.00	4.20	100.00	
(2) Ericsson RRUS A2 Module	B	From Face	0.00	0.00	0.00	0.0000	100.00	4.84	173.64	
(2) Ericsson RRUS-12	B	From Face	0.00	0.00	0.00	0.0000	100.00	1.87	66.96	
(3) Ericsson RRU-11	B	From Face	0.00	0.00	0.00	0.0000	100.00	2.24	42.19	
(2) Generic RRU (36"x12"x12")	D	From Face	3.00	0.00	0.00	0.0000	100.00	3.95	100.00	
(2) Ericsson RRUS A2 Module	C	From Face	0.00	0.00	0.00	0.0000	100.00	4.21	134.64	
(2) Ericsson RRUS-12	C	From Face	0.00	0.00	0.00	0.0000	100.00	1.87	66.96	
(3) Ericsson RRU-11	C	From Face	0.00	0.00	0.00	0.0000	100.00	2.05	42.19	
(2) Generic RRU (36"x12"x12")	C	From Face	3.00	0.00	0.00	0.0000	100.00	2.24	100.00	
(3) Ericsson RRU-11	C	From Face	0.00	0.00	0.00	0.0000	100.00	3.69	68.57	
(2) Generic RRU (36"x12"x12")	C	From Face	3.00	0.00	0.00	0.0000	100.00	4.21	100.00	
RMV12-406 w/ (1) LWRM & (3) SV197-36 Suppressor (Enclosed)	C	None	0.00	0.00	0.00	0.0000	100.00	2.94	51.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	0.00	0.00	0.00	0.0000	90.00	1.41	70.32	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	0.00	0.00	0.00	0.0000	90.00	3.41	92.56	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	0.00	0.00	0.00	0.0000	90.00	4.20	100.00	
(2) Generic RRU (24kx12kx12) 100#	A	From Face	3.00	0.00	0.00	0.0000	120.00	4.52	134.64	
(2) Generic RRU (24kx12kx12) 100#	B	From Face	0.00	0.00	0.00	0.0000	120.00	4.84	173.37	
(2) Generic RRU (24kx12kx12) 100#	C	From Face	0.00	0.00	0.00	0.0000	120.00	16.00	400.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	0.00	0.00	0.00	0.0000	120.00	18.00	400.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	0.00	0.00	0.00	0.0000	120.00	20.00	400.00	
(2) Generic RRU (24kx12kx12) 100#	A	From Face	3.00	0.00	0.00	0.0000	120.00	0.00	20.00	
(2) Generic RRU (24kx12kx12) 100#	B	From Face	0.00	0.00	0.00	0.0000	120.00	0.00	20.00	
(2) Generic RRU (24kx12kx12) 100#	C	From Face	0.00	0.00	0.00	0.0000	120.00	0.00	20.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	0.00	0.00	0.00	0.0000	120.00	11.47	79.20	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	0.00	0.00	0.00	0.0000	120.00	12.08	162.36	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	0.00	0.00	0.00	0.0000	120.00	11.38	255.18	
(2) Generic RRU (24kx12kx12) 100#	A	From Face	3.00	0.00	0.00	0.0000	120.00	8.70	79.20	
(2) Generic RRU (24kx12kx12) 100#	B	From Face	0.00	0.00	0.00	0.0000	120.00	11.38	255.18	
(2) Generic RRU (24kx12kx12) 100#	C	From Face	0.00	0.00	0.00	0.0000	120.00	8.70	79.20	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	0.00	0.00	0.00	0.0000	120.00	11.38	255.18	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	0.00	0.00	0.00	0.0000	120.00	12.08	162.36	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	0.00	0.00	0.00	0.0000	120.00	11.38	255.18	
(2) Generic RRU (24kx12kx12) 100#	A	From Face	3.00	0.00	0.00	0.0000	120.00	8.70	79.20	
(2) Generic RRU (24kx12kx12) 100#	B	From Face	0.00	0.00	0.00	0.0000	120.00	11.38	255.18	
(2) Generic RRU (24kx12kx12) 100#	C	From Face	0.00	0.00	0.00	0.0000	120.00	8.70	79.20	

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C.A.A.		Weight
			Horz	Vert	Lateral			Front	Side	
			ft	ft	ft	°	ft	ft	lb	
10'-0" T-Arm	C	From Face	3.00	0.00	0.00	0.0000	90.00	2.33	105.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	0.00	0.00	0.00	0.0000	80.00	3.02	499.12	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	0.00	0.00	0.00	0.0000	80.00	3.73	905.79	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	0.00	0.00	0.00	0.0000	80.00	12.08	162.36	
(2) Generic RRU (24kx12kx12) 100#	A	From Face	3.00	0.00	0.00	0.0000	80.00	12.71	255.18	
(2) Generic RRU (24kx12kx12) 100#	B	From Face	0.00	0.00	0.00	0.0000	80.00	11.47	162.36	
(2) Generic RRU (24kx12kx12) 100#	C	From Face	0.00	0.00	0.00	0.0000	80.00	12.71	255.18	
10'-0" T-Arm	A	From Face	3.00	0.00	0.00	0.0000	80.00	11.38	255.18	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	0.00	0.00	0.00	0.0000	80.00	11.47	162.36	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	0.00	0.00	0.00	0.0000	80.00	12.08	162.36	
(2) Generic RRU (24kx12kx12) 100#	A	From Face	3.00	0.00	0.00	0.0000	80.00	12.71	255.18	
(2) Generic RRU (24kx12kx12) 100#	B	From Face	0.00	0.00	0.00	0.0000	80.00	2.80	100.00	
(2) Generic RRU (24kx12kx12) 100#	C	From Face	0.00	0.00	0.00	0.0000	80.00	3.04	124.92	
10'-0" T-Arm	B	From Face	3.00	0.00	0.00	0.0000	120.00	3.28	100.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	0.00	0.00	0.00	0.0000	120.00	3.04	124.92	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	0.00	0.00	0.00	0.0000	120.00	3.04	124.92	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	0.00	0.00	0.00	0.0000	120.00	3.04	124.92	
(2) Generic RRU (24kx12kx12) 100#	A	From Face	3.00	0.00	0.00	0.0000	120.00	3.28	100.00	
(2) Generic RRU (24kx12kx12) 100#	B	From Face	0.00	0.00	0.00	0.0000	120.00	3.04	124.92	
(2) Generic RRU (24kx12kx12) 100#	C	From Face	0.00	0.00	0.00	0.0000	120.00	3.04	124.92	
10'-0" T-Arm	A	From Face	3.00	0.00	0.00	0.0000	120.00	3.28	100.00	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	0.00	0.00	0.00	0.0000	120.00	3.02	499.12	
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	0.00	0.00	0.00	0.0000	120.00	3.73	905.79	
(2) Generic RRU (24kx12kx12) 100#	A	From Face	3.00	0.00	0.00	0.0000	120.00	3.02	499.12	
(2) Generic RRU (24kx12kx12) 100#	B	From Face	0.00	0.00	0.00	0.0000	120.00	3.28	100.00	
(2) Generic RRU (24kx12kx12) 100#	C	From Face	0.00	0.00	0.00	0.0000	120.00	3.02	499.12	

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Vector Engineering 9138 S. Stone St. Ste. 101 Sandp. UT 84070 Phone: (801) 990-1775 Fax: (801) 990-1776		Project	U1223-277-131	Date	16:06:58 04/04/14
Larson Camouflage		Client	Larson Camouflage	Designed by	kwilson

taxTower		Job	641200	Page	8 of 18
Vector Engineering 9138 S. Stone St. Ste. 101 Sandp. UT 84070 Phone: (801) 990-1775 Fax: (801) 990-1776		Project	U1223-277-131	Date	16:06:58 04/04/14
Larson Camouflage		Client	Larson Camouflage	Designed by	kwilson

Description	Face or Leg	Offset Type	Offset	Horz. Lateral	Horz. Adjustment	Placement	Face	Side	Weight
			ft	ft	°	ft	ft	ft	lb
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	A	From Face	3.00	0.0000	0.0000	130.00	No Ice	8.70	79.20
			0.00				12" Ice	11.47	163.36
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	B	From Face	3.00	0.0000	0.0000	130.00	No Ice	12.08	255.18
			0.00				12" Ice	12.71	79.20
(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	C	From Face	3.00	0.0000	0.0000	130.00	No Ice	12.08	163.36
			0.00				12" Ice	12.71	255.18
(2) Generic RRU (24k:12x12) 10#	A	From Face	3.00	0.0000	0.0000	130.00	No Ice	11.38	100.00
			0.00				12" Ice	2.80	124.92
(2) Generic RRU (24k:12x12) 10#	B	From Face	3.00	0.0000	0.0000	130.00	No Ice	3.28	153.15
			0.00				12" Ice	2.80	100.00
(2) Generic RRU (24k:12x12) 10#	C	From Face	3.00	0.0000	0.0000	130.00	No Ice	3.04	124.92
			0.00				12" Ice	2.80	100.00
(2) Generic RRU (24k:12x12) 10#	A	From Face	3.00	0.0000	0.0000	130.00	No Ice	3.04	124.92
			0.00				12" Ice	2.80	100.00
(2) Generic RRU (24k:12x12) 10#	B	From Face	3.00	0.0000	0.0000	130.00	No Ice	3.28	153.15
			0.00				12" Ice	2.80	100.00
(2) Generic RRU (24k:12x12) 10#	C	From Face	3.00	0.0000	0.0000	130.00	No Ice	3.04	124.92
			0.00				12" Ice	2.80	100.00
(2) Generic RRU (24k:12x12) 10#	A	From Face	3.00	0.0000	0.0000	130.00	No Ice	3.28	153.15
			0.00				12" Ice	2.80	100.00
(2) Generic RRU (24k:12x12) 10#	B	From Face	3.00	0.0000	0.0000	130.00	No Ice	3.04	124.92
			0.00				12" Ice	2.80	100.00
(2) Generic RRU (24k:12x12) 10#	C	From Face	3.00	0.0000	0.0000	130.00	No Ice	3.04	124.92
			0.00				12" Ice	2.80	100.00

Description	Face or Leg	Dish Type	Offset Type	Offset	Horz. Lateral	Horz. Adjustment	Placement	Face	Side	Weight
				ft	ft	°	ft	ft	ft	lb
2-6" Standard	C	Paraboloid w/ Reflector	From Face	2.00	0.0000	0.0000	110.00	No Ice	3.14	25.00
				0.00				12" Ice	3.41	42.00
				0.00				1" Ice	3.68	50.00

Dishes

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Tower Pressure - With Ice

GH = 1.100

Section Elevation	z	Kz	gt	A0	F	Af	Ak	Ag	Aleg %	CdA In Face	CdA Out Face	CdA Chr Face
ft	ft		psf	ft	a	d	c	ft	ft	ft	ft	ft
L1 130.00-110.00	119.70	1.314	8	2.2750	64.278	A	0.000	64.278	100.00	0.000	0.000	0.000
						B	0.000	64.278	100.00	0.000	0.000	0.000
						C	0.000	64.278	100.00	0.000	0.000	0.000
L2 110.00-56.00	81.83	1.213	7	2.1901	223.507	A	0.000	223.507	100.00	0.000	0.000	0.000
						B	0.000	223.507	100.00	0.000	0.000	0.000
						C	0.000	223.507	100.00	0.000	0.000	0.000
L3 56.00-28.25	41.78	1.053	6	2.0478	142.185	A	0.000	142.185	100.00	0.000	0.000	0.000
						B	0.000	142.185	100.00	0.000	0.000	0.000
						C	0.000	142.185	100.00	0.000	0.000	0.000
L4 28.25-1.00	14.33	0.85	5	1.8400	155.117	A	0.000	155.117	100.00	0.000	0.000	0.000
						B	0.000	155.117	100.00	0.000	0.000	0.000
						C	0.000	155.117	100.00	0.000	0.000	0.000

Tower Pressure - Service

GH = 1.100

Section Elevation	z	Kz	gt	A0	F	Af	Ak	Ag	Aleg %	CdA In Face	CdA Out Face	CdA Chr Face
ft	ft		psf	ft	a	d	c	ft	ft	ft	ft	ft
L1 130.00-110.00	119.70	1.314	10	56.695	A	0.000	56.695	56.695	100.00	0.000	0.000	0.000
						B	0.000	56.695	100.00	0.000	0.000	0.000
						C	0.000	56.695	100.00	0.000	0.000	0.000
L2 110.00-56.00	81.83	1.213	9	203.796	A	0.000	203.796	203.796	100.00	0.000	0.000	0.000
						B	0.000	203.796	100.00	0.000	0.000	0.000
						C	0.000	203.796	100.00	0.000	0.000	0.000
L3 56.00-28.25	41.78	1.053	8	132.055	A	0.000	132.055	132.055	100.00	0.000	0.000	0.000
						B	0.000	132.055	100.00	0.000	0.000	0.000
						C	0.000	132.055	100.00	0.000	0.000	0.000
L4 28.25-1.00	14.33	0.85	7	145.817	A	0.000	145.817	145.817	100.00	0.000	0.000	0.000
						B	0.000	145.817	100.00	0.000	0.000	0.000
						C	0.000	145.817	100.00	0.000	0.000	0.000

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Section Elevation	β	Add Weight lb	Self Weight lb	F _a	F _c	e	C _z	q _t	D _p	D _k	A _B	F _l	w	Ctrl. Face
L3	56.00-28.25	2422.57	16970.28	A	1.2	1	1.2	6	1	1	142.185	1201.83	43.31	C
L4	28.25-1.00	2378.93	18735.13	A	1.2	1	1.2	5	1	1	142.185	1058.17	38.83	C
Sum Weight:		8997.30	53966.06							OTM	318922.28	5107.01		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	β	Add Weight lb	Self Weight lb	F _a	F _c	e	C _z	q _t	D _p	D _k	A _B	F _l	w	Ctrl. Face
L1	130.00-110.00	518.40	3338.45	A	1.2	1	1.2	8	1	1	64.278	678.09	33.90	C
L2	110.00-56.00	3677.40	14902.20	A	1.2	1	1.2	7	1	1	64.278	2168.92	40.17	C
L3	56.00-28.25	2422.57	16970.28	A	1.2	1	1.2	6	1	1	142.185	1201.83	43.31	C
L4	28.25-1.00	2378.93	18735.13	A	1.2	1	1.2	5	1	1	142.185	1058.17	38.83	C
Sum Weight:		8997.30	53966.06							OTM	318922.28	5107.01		

Tower Forces - Service - Wind Normal To Face

Section Elevation	β	Add Weight lb	Self Weight lb	F _a	F _c	e	C _z	q _t	D _p	D _k	A _B	F _l	w	Ctrl. Face
L1	130.00-110.00	518.40	1349.21	A	0.65	1	0.65	10	1	1	56.695	417.40	20.87	C
L2	110.00-56.00	3677.40	8071.74	A	0.65	1	0.65	9	1	1	56.695	1380.18	25.56	C
L3	56.00-28.25	2422.57	12882.08	A	0.65	1	0.65	8	1	1	203.796	779.00	28.07	C
L4	28.25-1.00	2378.93	14707.61	A	0.65	1	0.65	7	1	1	132.055	694.22	25.48	C
Sum Weight:		8997.30	37010.65							OTM	202129.74	3270.80		

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Section Elevation	β	Add Weight lb	Self Weight lb	F _a	F _c	e	C _z	q _t	D _p	D _k	A _B	F _l	w	Ctrl. Face
L1	130.00-110.00	518.40	1349.21	A	0.65	1	0.65	10	1	1	56.695	417.40	20.87	C
L2	110.00-56.00	3677.40	8071.74	A	0.65	1	0.65	9	1	1	56.695	1380.18	25.56	C
L3	56.00-28.25	2422.57	12882.08	A	0.65	1	0.65	8	1	1	203.796	779.00	28.07	C
L4	28.25-1.00	2378.93	14707.61	A	0.65	1	0.65	7	1	1	132.055	694.22	25.48	C
Sum Weight:		8997.30	37010.65							OTM	202129.74	3270.80		

Tower Forces - Service - Wind 60 To Face

Section Elevation	β	Add Weight lb	Self Weight lb	F _a	F _c	e	C _z	q _t	D _p	D _k	A _B	F _l	w	Ctrl. Face
L1	130.00-110.00	518.40	1349.21	A	0.65	1	0.65	10	1	1	56.695	417.40	20.87	C
L2	110.00-56.00	3677.40	8071.74	A	0.65	1	0.65	9	1	1	56.695	1380.18	25.56	C
L3	56.00-28.25	2422.57	12882.08	A	0.65	1	0.65	8	1	1	203.796	779.00	28.07	C
L4	28.25-1.00	2378.93	14707.61	A	0.65	1	0.65	7	1	1	132.055	694.22	25.48	C
Sum Weight:		8997.30	37010.65							OTM	202129.74	3270.80		

Tower Forces - Service - Wind 90 To Face

Section Elevation	β	Add Weight lb	Self Weight lb	F _a	F _c	e	C _z	q _t	D _p	D _k	A _B	F _l	w	Ctrl. Face
L1	130.00-110.00	518.40	1349.21	A	0.65	1	0.65	10	1	1	56.695	417.40	20.87	C
L2	110.00-56.00	3677.40	8071.74	A	0.65	1	0.65	9	1	1	56.695	1380.18	25.56	C
L3	56.00-28.25	2422.57	12882.08	A	0.65	1	0.65	8	1	1	203.796	779.00	28.07	C
L4	28.25-1.00	2378.93	14707.61	A	0.65	1	0.65	7	1	1	132.055	694.22	25.48	C
Sum Weight:		8997.30	37010.65							OTM	202129.74	3270.80		

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Force Totals

Load Case	Vertical Forces lb	Sum of Forces lb	Sum of Overturning Moments, M _o lb-ft	Sum of Overturning Moments, M _o lb-ft	Sum of Torques lb-ft
Leg Weight	37010.65				
Braze Weight	0.00				
Total Member Self-Weight	37010.65		334.48		
Wind 0 deg - No Ice	66273.49		334.48		
Wind 90 deg - No Ice		57674.11	-537244.94		0.00
Wind 180 deg - No Ice		0.00	487.23		363.85
Member Ice	16955.41		5166547.36		0.00
Total Weight Ice	144804.65		3207.85		0.00
Wind 0 deg - Ice		0.00	-1686297.30		0.00
Wind 90 deg - Ice		18644.18	0.44		159.14
Wind 180 deg - Ice		0.00	1690883.07		0.00
Wind Weight - Service	66273.49		334.48		0.00
Wind 0 deg - Service		0.00	-168921.18		0.00
Wind 90 deg - Service		16850.01	1569379.11		106.31
Wind 180 deg - Service		0.00	1568121.70		0.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 90 deg - No Ice
5	0.9 Dead+1.6 Wind 90 deg - No Ice
6	1.2 Dead+1.6 Wind 180 deg - No Ice
7	0.9 Dead+1.6 Wind 180 deg - No Ice
8	1.2 Dead+1.0 Ice+1.0 Temp
9	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
10	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
11	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
12	Dead+Wind 0 deg - Service
13	Dead+Wind 90 deg - Service
14	Dead+Wind 180 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	130 - 110	Pole	Max. Tension	12	0.00	0.00	-0.06
			Max. Compression	8	-36754.19	0.00	-4.01
			Max. Mx	4	-7954.80	-369336.98	-10.92
			Max. My	2	-7949.28	0.00	369356.57
			Max. Vx	4	27534.55	-369336.98	-10.92
			Max. Vy	2	-27536.14	0.00	369356.57
			Max. Torque	4	0.00	0.00	0.07
			Max. Tension	1	0.00	0.00	0.00
			Max. Compression	8	-108058.32	0.00	-3274.89

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Maximum Reactions

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L3	56 - 28.25	Pole	Max. Mx	4	-35745.30	-3168123.8	-510.18
			Max. My	2	-35729.03	0.00	3178681.02
			Max. Vx	4	84329.03	-3168123.8	-510.18
			Max. Vy	2	-84563.52	0.00	3178681.02
			Max. Torque	4	0.00	0.00	-606.38
			Max. Tension	1	0.00	0.00	0.00
			Max. Compression	8	-128690.46	0.00	-3274.96
			Max. Mx	4	-52574.63	-5476148.3	-578.20
			Max. My	2	-52565.22	0.00	5492973.51
			Max. Vx	4	88163.46	-5476148.3	-578.20
			Max. Vy	2	-88397.35	0.00	5492973.51
			Max. Torque	4	0.00	0.00	-605.10
			Max. Tension	1	0.00	0.00	0.00
			Max. Compression	8	-160346.78	0.00	-3275.10
			Max. Mx	4	-79489.53	-8685426.6	-659.54
			Max. My	2	-79489.33	0.00	8710517.53
			Max. Vx	4	92309.38	-8685426.6	-659.54
			Max. Vy	2	-92540.42	0.00	8710517.53
			Max. Torque	4	0.00	0.00	-604.72

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Y lb	Horizontal, Z lb
Pole	Max. Vert	8	160346.78	0.00	0.00	-0.00
	Max. Hx	14	66273.47	0.00	-16872.98	0.00
	Max. Hy	3	59646.07	0.00	92307.78	0.00
	Max. Mx	2	8710517.53	0.00	92307.11	0.00
	Max. My	4	8685426.63	-92276.17	-2.24	0.00
	Max. Torson	2	0.00	0.00	92307.11	0.00
	Min. Vert	3	59646.07	0.00	92307.78	0.00
	Min. Hx	5	59646.07	-92276.83	-2.24	0.00
	Min. Hy	7	59646.07	0.00	-92412.96	0.00
	Min. Mx	6	-8710868.88	0.00	-92412.19	0.00
	Min. My	14	0.00	0.00	-16872.98	0.00
	Min. Torson	4	0.00	-92276.17	-2.24	0.00

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shears lb	Overturning Moment, M _o lb-ft	Torque lb-ft
Dead Only	6273.49	0.00	334.48	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	79528.09	-92507.11	-8710517.55	0.00
0.9 Dead+1.6 Wind 0 deg - No Ice	59646.07	-92507.78	-8680347.40	0.00

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Ice	Load Combination	Vertical Shear, lb	Shears, lb	Overturning Moment, M _e , lb-ft	Torque, lb-ft
1.2 Dead+1.6 Wind 90 deg - No Ice		79528.09	92276.17	2.24	659.47
1.2 Dead+1.6 Wind 90 deg - No Ice		59646.07	92276.83	2.24	555.54
1.2 Dead+1.6 Wind 180 deg - No Ice		79528.09	0.00	92412.19	870858.88
1.2 Dead+1.6 Wind 180 deg - No Ice		59646.07	0.00	92412.86	8670518.01
1.2 Dead+1.0 Ice+1.0 Temp		160346.78	0.00	0.00	3275.10
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp		160346.78	0.00	-18689.48	-1755028.38
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp		160346.78	18644.17	0.44	3020.65
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp		160346.78	0.00	18670.86	1760048.14
Dead+Wind 0 deg - Service		66273.47	0.00	-16890.31	-1587319.92
Dead+Wind 90 deg - Service		66273.47	16848.15	0.41	387.39
Dead+Wind 180 deg - Service		66273.47	0.00	16872.98	1586091.68

Solution Summary

Load Combination	Sum of Applied Forces	PX, lb	PY, lb	PZ, lb	FX, lb	FY, lb	FZ, lb	Sum of Reactions	PX, lb	PY, lb	PZ, lb	% Error
1	0.00	-66273.49	0.00	0.00	0.00	0.00	0.00	66273.49	-0.00	0.00	0.00	0.000%
2	0.00	-79528.19	-92509.53	0.00	0.00	0.00	0.00	79528.09	92507.78	0.00	0.00	0.002%
3	0.00	-59646.14	-92509.53	0.00	0.00	0.00	0.00	59646.07	92507.78	0.00	0.00	0.002%
4	0.00	-79528.19	0.00	0.00	-92276.83	0.00	0.00	79528.09	-92276.83	0.00	0.00	0.002%
5	0.00	-59646.14	0.00	0.00	-92276.83	0.00	0.00	59646.07	-92276.83	0.00	0.00	0.002%
6	0.00	-79528.19	92414.61	0.00	0.00	0.00	0.00	79528.09	-92412.86	0.00	0.00	0.002%
7	0.00	-59646.14	92414.61	0.00	0.00	0.00	0.00	59646.07	-92412.86	0.00	0.00	0.002%
8	0.00	-160346.78	-18689.49	0.00	0.00	0.00	0.00	160346.78	18689.48	0.00	0.00	0.002%
9	0.00	-160346.78	0.44	0.00	0.00	0.00	0.00	160346.78	-0.44	0.00	0.00	0.000%
10	18644.18	-160346.78	0.00	0.00	-18644.17	0.00	0.00	160346.78	18670.86	-18670.86	0.00	0.000%
11	0.00	-160346.78	18670.87	0.00	0.00	0.00	0.00	160346.78	16890.31	0.00	0.00	0.003%
12	0.00	-66273.49	-16892.18	0.00	0.00	0.00	0.00	66273.47	16890.31	0.00	0.00	0.003%
13	16850.01	-66273.49	0.41	0.00	-16848.15	0.00	0.00	66273.47	-16848.15	0.00	0.00	0.003%
14	0.00	-66273.49	16874.85	0.00	0.00	0.00	0.00	66273.47	-16872.98	0.00	0.00	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	9	0.00000001	0.00000001
3	Yes	9	0.00000001	0.00000001
4	Yes	9	0.00000001	0.00000001
5	Yes	9	0.00000001	0.00000001
6	Yes	9	0.00000001	0.00000001
7	Yes	9	0.00000001	0.00000001
8	Yes	6	0.00000001	0.00000001
9	Yes	11	0.00000001	0.00000001

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Section No.	Elevation	Horz. Deflection, in.	Vert. Load Comb.	Tilt, °	Twist, °
L1	130 - 110	10.470	12	0.7147	0.0002
L2	110 - 56	7.544	12	0.6655	0.0002
L3	63.25 - 28.25	2.338	12	0.3393	0.0000
L4	36.5 - 1	0.801	12	0.1966	0.0000

Maximum Tower Deflections - Service Wind

Section No.	Elevation	Horz. Deflection, in.	Vert. Load Comb.	Tilt, °	Twist, °
L1	130 - 110	10.470	12	0.7147	0.0002
L2	110 - 56	7.544	12	0.6655	0.0002
L3	63.25 - 28.25	2.338	12	0.3393	0.0000
L4	36.5 - 1	0.801	12	0.1966	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appearance	Horz. Deflection, in.	Vert. Load Comb.	Tilt, °	Twist, °	Radius of Curvature, ft
133.50	Top Hat with (3) 6 ft. and (1) 6 ft. branches	10.470	12	0.7147	0.0002	47955
130.00	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	10.470	12	0.7147	0.0002	47955
127.00	(18) 6 ft branches	10.021	12	0.7098	0.0002	23978
120.00	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	8.982	12	0.6965	0.0002	23978
117.50	(40) 6 ft branches	8.616	12	0.6905	0.0002	19182
107.00	(2) 9 ft Standard	7.544	12	0.6655	0.0002	12363
100.00	(4) CCI HPA-6SR-BUL18-K w/ Mount Pipe	7.153	12	0.6501	0.0002	11722
97.20	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	6.199	12	0.6122	0.0002	10549
90.00	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	5.842	12	0.5999	0.0002	10205
82.70	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	4.968	12	0.5420	0.0002	9417
80.00	(4) 96" x 12" x 6" Panel Antenna w/ Mount Pipe	4.149	12	0.4852	0.0001	8734
73.00	(18) 12 ft branches	3.864	12	0.4638	0.0001	8505
		3.175	12	0.4091	0.0001	7965

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection, in.	Vert. Load Comb.	Tilt, °	Twist, °
L1	130 - 110	57.457	2	3.9738	0.0013
L2	110 - 56	41.999	2	3.6531	0.0013
L3	63.25 - 28.25	12.833	2	1.8623	0.0003
L4	36.5 - 1	4.398	2	1.0793	0.0001

inxTower		Job	641200	Page	17 of 18
Vector Engineering 9138 S. State St. Ste. 101 Suite LTR 8-070 Phone: (801) 990-1775 Fax: (801) 990-1776		Project	U1223-277-131	Date	16:06:58 04/04/14
		Client	Larson Camouflage	Designed by	kwilson

inxTower		Job	641200	Page	18 of 18
Vector Engineering 9138 S. State St. Ste. 101 Suite LTR 8-070 Phone: (801) 990-1775 Fax: (801) 990-1776		Project	U1223-277-131	Date	16:06:58 04/04/14
		Client	Larson Camouflage	Designed by	kwilson

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appearance	Gov. Load Comb.	Deflection in	Tilt	Twist	Radius of Curvature ft
132.50	Top Hat with (3) 6 ft. and (1) 6 ft. branches	2	57.457	3.9228	0.0013	8833
130.00	(4) 96" x 12" 6" Panel Antenna w/ Mount Pipe	2	57.457	3.9228	0.0013	8833
127.00	(18) 6 ft. branches	2	54.995	3.8962	0.0013	8833
120.00	(4) 96" x 12" 6" Panel Antenna w/ Mount Pipe	2	49.291	3.8234	0.0014	4416
117.50	(40) 6 ft. branches	2	47.282	3.7902	0.0014	3532
110.00	(18) 6 ft. branches	2	41.399	3.6531	0.0013	2275
107.90	(18) 6 ft. branches	2	39.802	3.6019	0.0013	2157
100.00	(4) CCI HPA-65R-BU-H8-K w/ Mount Pipe	2	34.021	3.3610	0.0012	1937
97.20	(47) 8 ft. branches	2	32.063	3.2604	0.0011	1873
90.00	(4) 96" x 12" 6" Panel Antenna w/ Mount Pipe	2	27.265	2.9758	0.0009	1726
82.70	(41) 10 ft. branches	2	22.770	2.6640	0.0007	1599
80.00	(4) 96" x 12" 6" Panel Antenna w/ Mount Pipe	2	21.208	2.5465	0.0006	1556
73.00	(18) 12 ft. branches	2	17.924	2.2458	0.0005	1456

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L _u	K/Lr	A	P _u	lb	φ _u	Ratio
L1	130 - 110 (1)	TP36 5X30 5X0 1875	20.00	0.00	0.0	21.6105	-7949.28	1228690.00	0.006	0.006
L2	110 - 56 (2)	TP52 7X36 5X0 3125	54.00	0.00	0.0	49.8045	-5729.00	313770.00	0.011	0.011
L3	56 - 28.25 (3)	TP60 4X49 9X0 625	35.00	0.00	0.0	113.669	-52565.20	8445030.00	0.006	0.006
L4	28.25 - 1 (4)	TP67 325X56 675X0 625	35.50	0.00	0.0	132.316	-79489.30	9666300.00	0.008	0.008

Pole Bending Design Data

Section No.	Elevation	Size	M _u	φ _u	Ratio	M _u	φ _u	Ratio
L1	130 - 110 (1)	TP36 5X30 5X0 1875	369356.67	919333.33	0.402	0.00	919333.33	0.000
L2	110 - 56 (2)	TP52 7X36 5X0 3125	3178683.33	3245125.00	0.980	0.00	3245125.00	0.000
L3	56 - 28.25 (3)	TP60 4X49 9X0 625	5492975.00	9220383.33	0.554	0.00	9220383.33	0.000
L4	28.25 - 1 (4)	TP67 325X56 675X0 625	8710300.00	13238166.67	0.658	0.00	13238166.67	0.000

Pole Shear Design Data

Section No.	Elevation	Size	V _u	φ _u	Ratio	Actual	T _u	φ _u	Ratio
L1	130 - 110 (1)	TP36 5X30 5X0 1875	27536.10	612464.00	0.045	0.00	1842108.33	0.000	0.000
L2	110 - 56 (2)	TP52 7X36 5X0 3125	84563.50	155620.00	0.054	0.00	6498183.33	0.000	0.000
L3	56 - 28.25 (3)	TP60 4X49 9X0 625	88397.30	4198570.00	0.021	0.00	19865415.00	0.000	0.000
L4	28.25 - 1 (4)	TP67 325X56 675X0 625	92540.40	4810400.00	0.019	0.00	26508749.33	0.000	0.000

Pole Interaction Design Data

Section No.	Elevation	Ratio	Ratio	Ratio	Ratio	Ratio	Ratio	Ratio	Ratio	Criteria
L1	130 - 110 (1)	0.006	0.402	0.000	0.045	0.000	0.410	1.000	4.8.2	✓
L2	110 - 56 (2)	0.011	0.980	0.000	0.054	0.000	0.994	1.000	4.8.2	✓
L3	56 - 28.25 (3)	0.006	0.554	0.000	0.021	0.000	0.560	1.000	4.8.2	✓
L4	28.25 - 1 (4)	0.008	0.658	0.000	0.019	0.000	0.667	1.000	4.8.2	✓

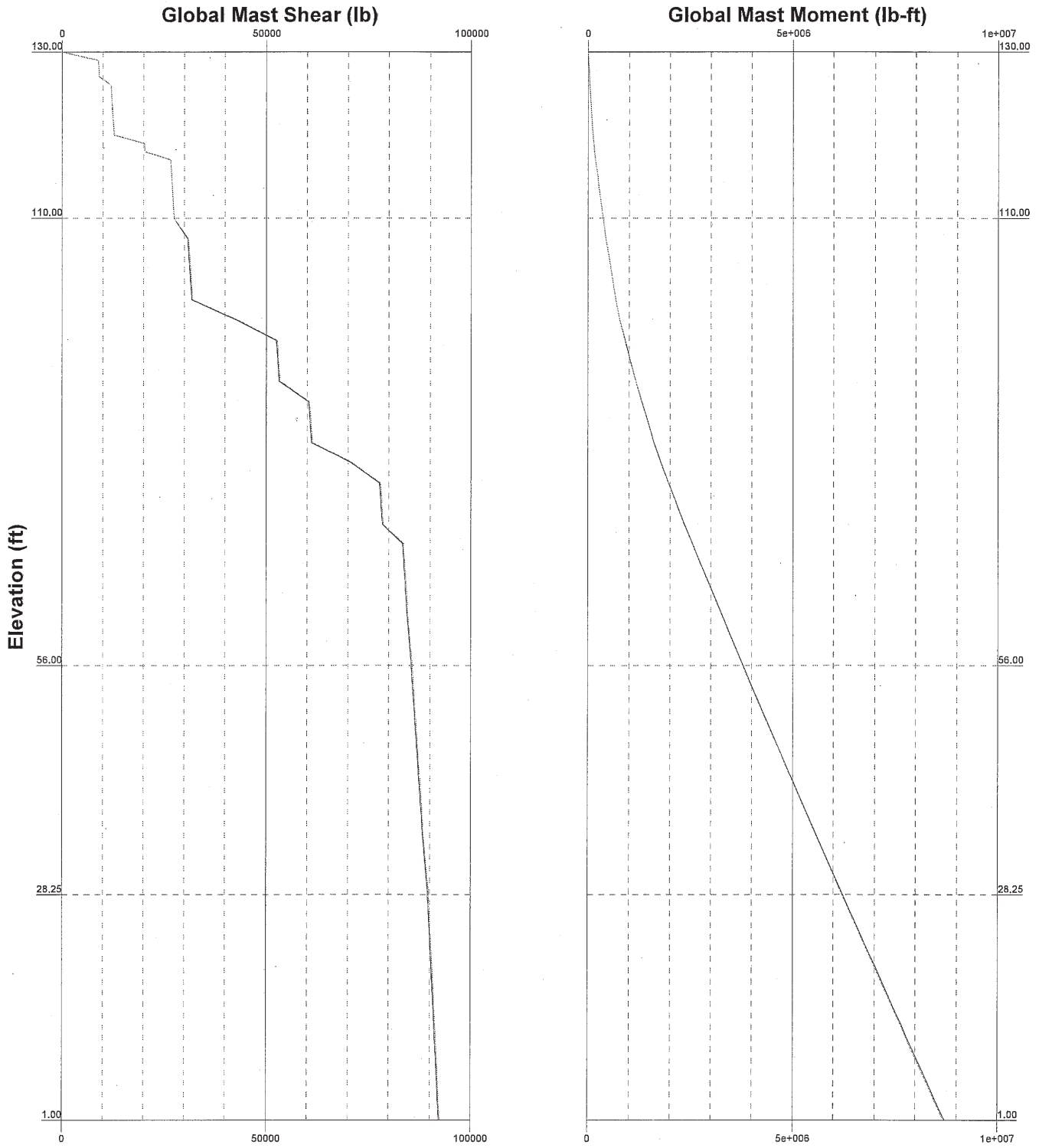
Section Capacity Table


Section No.	Elevation	Component	Type	Size	Critical Element	P	φ _u	Capacity	Pass/Fail
L1	130 - 110	Pole		TP36 5X30 5X0 1875	1	7949.28	1228690.00	91.0	Pass
L2	110 - 56	Pole		TP52 7X36 5X0 3125	2	5729.00	313770.00	56.0	Pass
L3	56 - 28.25	Pole		TP60 4X49 9X0 625	3	52565.20	8445030.00	56.0	Pass
L4	28.25 - 1	Pole		TP67 325X56 675X0 625	4	79489.30	9666300.00	66.7	Pass
Pole (L2) Summary									
RATING = 99.4									

Program Version C.1.3.1 - 7/05/2013 File: N:\2013 Projects\U1223-277-131 (4)1200 East Hardfied CITE\ENG\REV 3 new loading\Tower\641200 REV G.rvt

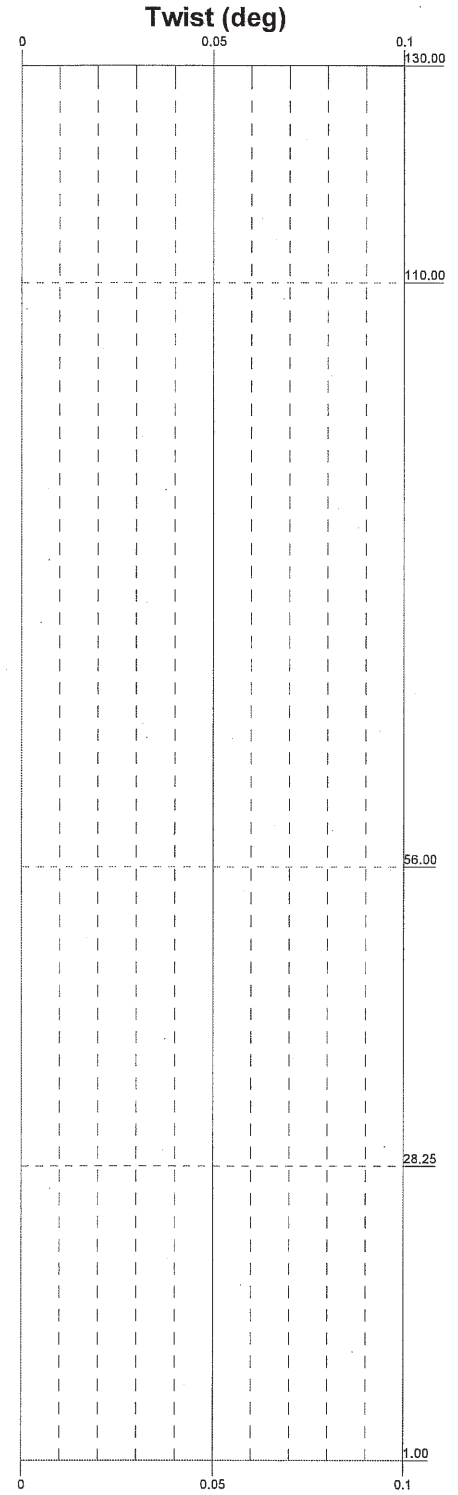
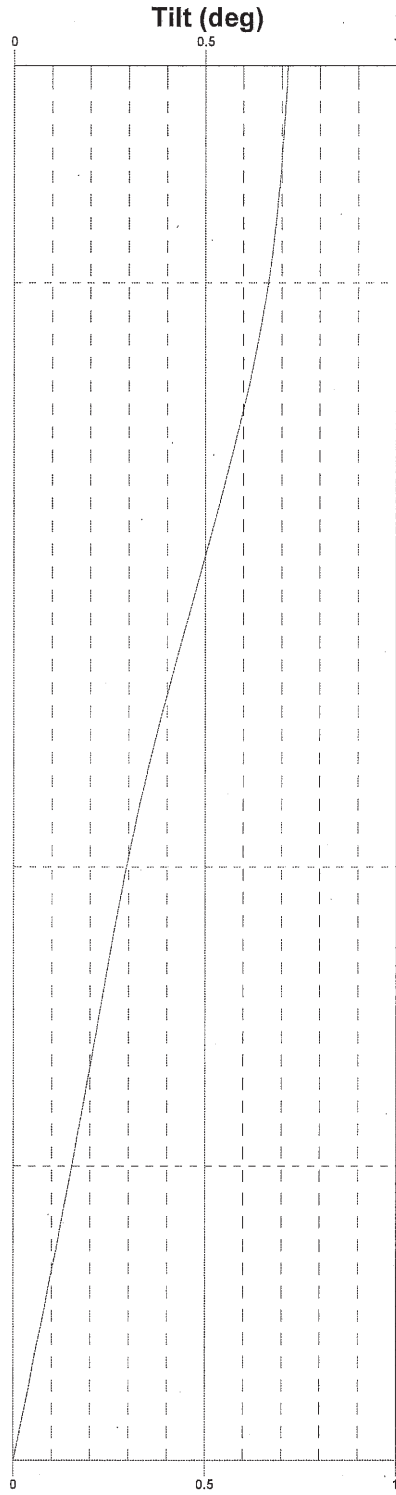
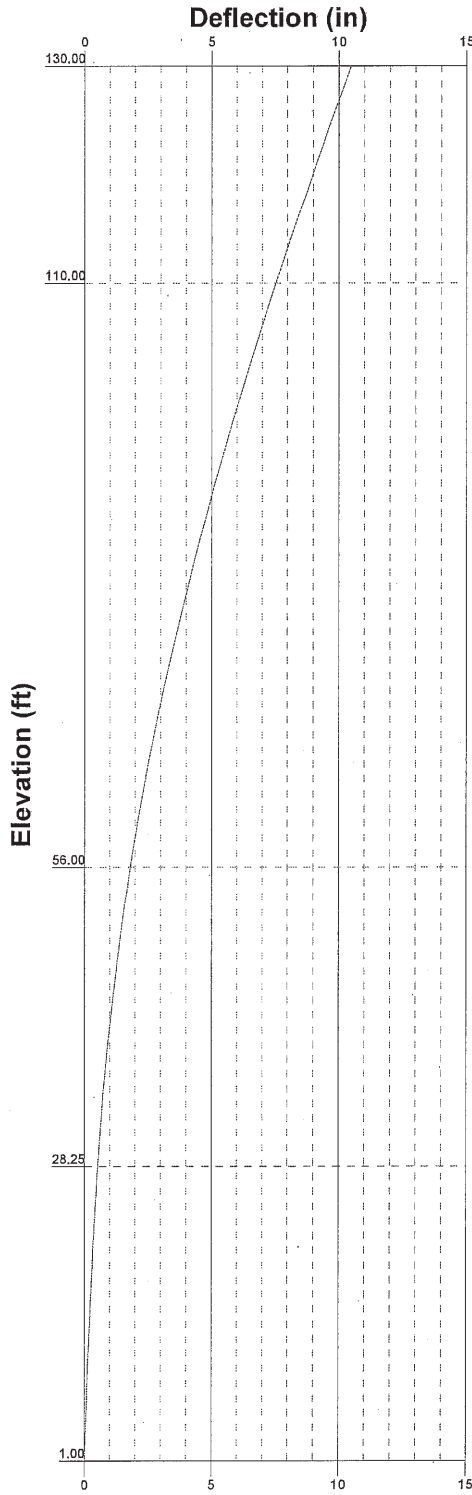
Vx Vz


Mx Mz



 Vector Engineering 9138 S. State St. Ste 101 Sandy UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776	Job: 641200		
	Project: U1223-277-131		
	Client: Larson Camouflage	Drawn by: kwilson	App'd:
	Code: TIA-222-G	Date: 04/03/14	Scale: NTS
	Path:	Dwg No. E-4	

N:\2013 Projects\U1223-277-131 641200 Exp Header CT\DWG\REV 3 new\exp\TIA-222-G REV.dwg



 Vector Engineering 9138 S. State St. Ste 101 Sandy UT 84070 Phone: (801) 990-1775 FAX: (801) 990-1776	Job: 641200		
	Project: U1223-277-131		
	Client: Larson Camouflage	Drawn by: kwilson	App'd:
	Code: TIA-222-G	Date: 04/03/14	Scale: NTS
	Path:		Dwg No. E-5

Stiffened or Unstiffened, UngROUTED, Circular Base Plate - Any Rod Material

TIA Rev G

Site Data

Project #:	U1223-277-131
Site Name:	110' Monopine
Date:	03/18/14
Pole Manufacturer:	Other

Reactions

Mu:	8711	ft-kips
Axial, Pu:	160.4	kips
Shear, Vu:	92.5	kips

Anchor Rod Data

Qty:	30	
Diam:	2.25	in
Rod Material:	A615-J	
Strength (Fu):	100	ksi
Yield (Fy):	75	ksi
Bolt Circle:	75.5	in

If No stiffeners, Criteria: AISC LRFD <-Only Applicable to Unstiffened Cases

Anchor Rod Results

Max Rod (Cu+ Vu/r): 196.1 Kips
 Allowable Axial, Φ^*Fu^*Anet : 260.0 Kips
 Anchor Rod Stress Ratio: 75.4% Pass

Rigid
AISC LRFD
ϕ^*Tn

Plate Data

Diam:	81.5	in
Thick:	3	in
Grade:	50	ksi
Single-Rod B-eff:	7.12	in

Base Plate Results

Base Plate Stress: 29.6 ksi
 Allowable Plate Stress: 45.0 ksi
 Base Plate Stress Ratio: 65.8% Pass

Flexural Check

Rigid
AISC LRFD
ϕ^*Fy
Y.L. Length:
34.17

Stiffener Data (Welding at both sides)

Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.3125	in
Width:	5	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

n/a

Stiffener Results

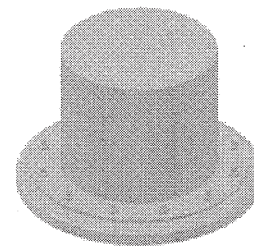
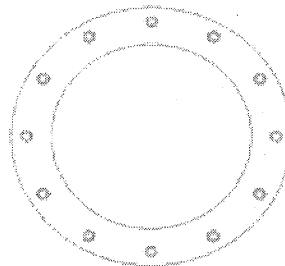
Horizontal Weld : n/a
 Vertical Weld: n/a
 Plate Flex+Shear, $f_b/F_b+(f_v/F_v)^2$: n/a
 Plate Tension+Shear, $f_t/F_t+(f_v/F_v)^2$: n/a
 Plate Comp. (AISC Bracket): n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data

Diam:	67.325	in
Thick:	0.625	in
Grade:	65	ksi
# of Sides:	18	"0" IF Round
Fu	80	ksi
Reinf. Fillet Weld	0.5	"0" if None



* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes



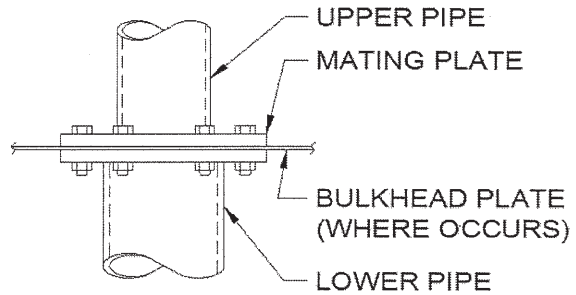
JOB NO.: U1223-277-131
DATE: 03/18/14

DESIGNED: KAW
CHECKED: MEG

PROJECT: 110' MONOPINE

Bolted Annular Plates

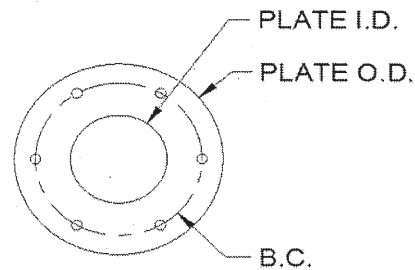
Plate F_y (ksi)	36
Upper Pipe Outer Diameter (in)	36.5
Upper Pipe Thickness t_1 (in)	0.1875
Lower Pipe Thickness t_2 (in)	0.3125
Lower Pipe Outer Diameter (in)	36.5
Moment @ Splice M_u (kip-ft)	369.4
Axial @ Splice P_u (kips)	367.5
Shear @ Splice V_u (kips)	27.5



Bolt Design

Bolt Circle Diameter BC (in)	40.25
Number of Bolts, n	9
T_u / Bolt (kips)	48.9
V_u / Bolt (kips)	3.1
Bolt Designation	A325
Bolt Diameter (in)	1 1/4
ϕT_n (kips)	82.8
ϕV_n (kips)	44.2
Combined Tension and Shear	0.59

59%



$$T_u = \frac{2M_u}{nr_b}$$

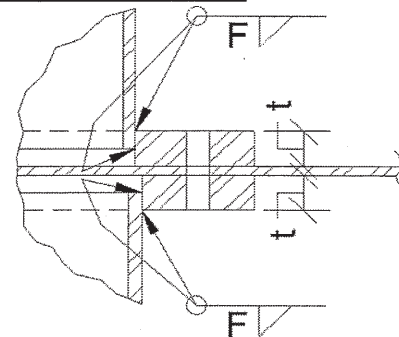
$$t = \sqrt{\frac{M_u(r_b - r_p)}{\phi F_y r_p r_b}}$$

Plate Design

Upper Plate Hole Radius, r_p (in)	18.3125
Lower Plate Hole Radius, r_p (in)	18.3125
Bolt Circle Radius, r_b (in)	20.125
Plate OD (in)	43.75
ϕ_{plate}	0.9
Req'd Upper Plate Thickness, t (in)	1.00
Req'd Lower Plate Thickness, t (in)	1.00

67%

89%



Welds

Fillet Weld Size F (in)	3/16
Weld Strength, ϕR_n (k/in)	6.3
Weld Stress, R_u (k/in)	3.7

59%



JOB NO.: U1223-277-131
 DATE: 03/18/14

DESIGNED: KAW
 CHECKED: MEG

SHEET

OF

PROJECT: 110' MONOPINE

Access Port Analysis

Reinforced Access Port:

Port Width: inches

Pole Shaft Loading:

M_u : kip-ft
 P_u : kips
 V_u : kips

Properties @ Access Port:

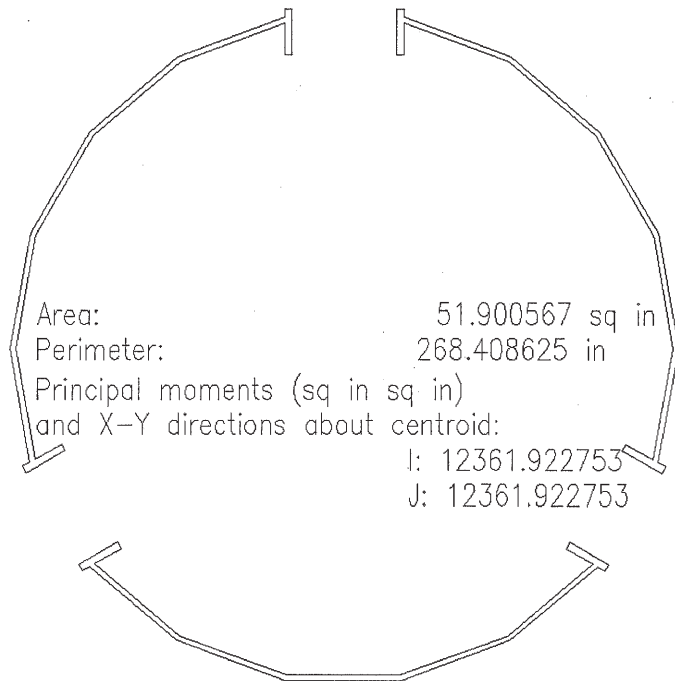
Pole Flat-Flat Outer Dia.: in
 Pole Thickness, TK: in

$A_{PoleNoAccess}$: in²
 $I_{PoleNoAccess}$: in⁴
 $S_{PoleNoAccess}$: in³
 $A_{unreinforced}$: in²
 $I_{unreinforced}$: in⁴
 $S_{unreinforced}$: in³

K:
 L: ft
 r: in
 F_y : ksi
 F'_y : ksi
 KL/r:
 λ_c :
 F_{cr} : ksi

Mn: kip-ft
 Pn: kip
 Vn: kip
 Interaction Check:

Result:



Applicable Section of TIA-222-G Code:

59.0%	4.7.3
3.4%	4.5.4.2
4.2%	4.8.2
62.6%	4.8.2



JOB NO.: U1223-277-131
DATE: 03/18/14

DESIGNED: KAW
CHECKED: MEG

SHEET OF

PROJECT: 110' MONOPINE

Reinforced Access Port Analysis

Reinforced Access Port:

Width, w:	10	inches
Height	30	inches
Thickness, t ₁ :	1	inches
Depth, d:	6	inches
Projection, p:	1	inches

Pole Shaft Loading:

M _u :	8711	kip-ft
P _u :	160.4	kips
V _u :	92.5	kips

Properties @ Access Port:

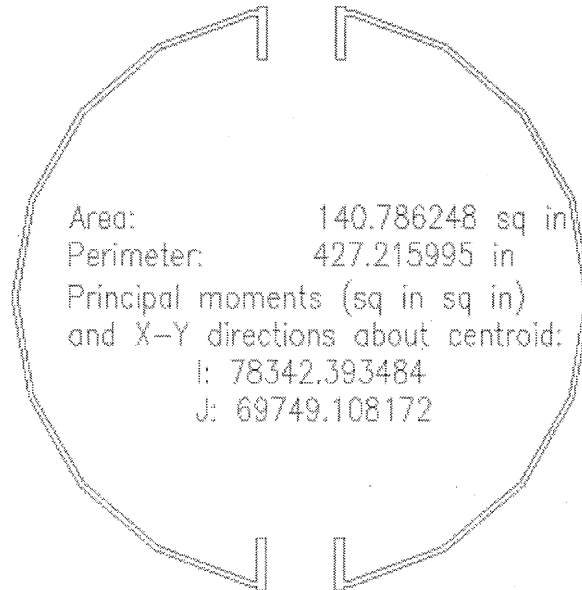
Flat-Flat Dia:	66.8	in
Pole Thickness, t ₂ :	0.625	in

A _{PoleNoAccess} :	129.9	in ²
I _{PoleNoAccess} :	71130.7	in ⁴
S _{PoleNoAccess} :	2129.7	in ³
A _{reinforced} :	140.8	in ²
I _{reinforced} :	69749.0	in ⁴
S _{reinforced} :	2088.3	in ³

K:	1
L:	110 ft
r:	22.26 in
F' _y :	81.3 ksi
KL/r:	59.3
λ _c :	1.0
F _{cr} :	53.5 ksi

M _n :	14149.7	kip-ft
P _n :	7535.5	kip
V _n :	5724.1	kip
Interaction Check:	0.71	OKAY

Added Weight Per Port: 83 lbs



E:	29000	ksi
Rim F _y :	65	ksi
Pole F _y :	65	ksi



JOB NO.: U1223-277-131
DATE: 08/30/13

DESIGNED: KAW
CHECKED: MEG

PROJECT:

THE REMAINING CALCULATIONS WILL BE PERFORMED USING THE WORST CASE LRFD LOADS

LOADS FROM TIA REV G ANALYSIS:

AXIAL= 160.4 KIPS
SHEAR= 92.5 KIPS
MOMENT= 8254.7 KIP-FT

LOADS FROM TIA REV F ANALYSIS:

AXIAL= $108.4(1.2)=130.1$ KIPS
SHEAR= $64.6(1.6)=103$ KIPS
MOMENT= $6146(1.6)= 9833.6$ KIP-FT

LOADS USED:

AXIAL= 160.4 KIPS
SHEAR= 103 KIPS
MOMENT= 9833.6 KIP-FT



JOB NO.: U1223-277-131
DATE: 08/30/13

DESIGNED: KAW
CHECKED: MEG

SHEET

OF

PROJECT:

Foundation Design



JOB NO.: U1223-277-131
DATE: 03/18/14

DESIGNED: KAW
CHECKED: MEG

SHEET

OF

PROJECT: 110' MONOPINE

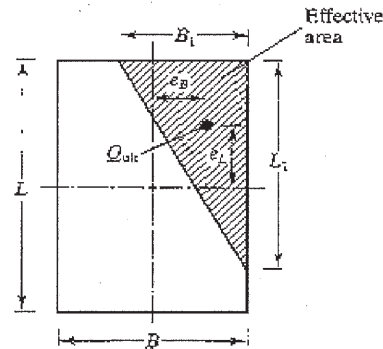
Square Mat Foundation Design (Resultant Lies Outside Footing Kern)

Design Loads (Factored / ϕ_s):

Max. Base Shear, $V_u / 0.75$:	213.9	k
Max. Overturning Moment, $M_u / 0.75$:	13,111.5	k-ft
Max. Down, $P_{u-down} / 0.75$:	137.8	k
Structure Weight:	53.2	k
Moment Components, $M_y = M_x$:	9271.2	k-ft

Mat Properties:

Mat Width, $L = B$:	32.0	ft
Mat Thickness, t :	3.0	ft
Pier Diameter, b :	8.0	ft
Height of Pier:	3.5	ft
Depth of Soil Above Mat:	3.0	ft
Unit Weight of Soil:	120.0	pcf
Number of Legs:	1	



Volume of Concrete:	3248	ft ³
Volume of Concrete:	120.3	yd ³
Weight of Concrete:	487.2	k
Weight of Soil:	350.5	k

Soil Properties:

Allow. Bearing Pressure:	4,000	psf
Factor of Safety:	2	
1/3 increase for short term loads?	no	
Passive Pressure:	0	pcf
Factor of Safety:	2	
Max. Passive Pressure (opt'l):	0	psf
1/3 increase for short term loads?	No	
Top Depth to Ignore:	0.0	ft

Eff. Bearing Pressure:	8000	psf
Coefficient of Friction:	0.33	
Factor of Safety:	1.5	
% Passive for Sliding:	0.00	
% Friction for Sliding:	100.00	

Check Bearing:

Total Moment, $M_y = M_x$:	10,254.2	k-ft
Total Axial Load, Q :	1,478.2	k
Load eccentricity, $e_L = e_B$:	6.94	ft
Effective Mat Brg Width, $B_1 = L_1$:	27.19	ft
Effective Area, $A' = 1/2(B_1)(L_1)$:	369.62	ft ²
Allowable axial load:	2957	k

Bearing Capacity OK.



JOB NO.: U1223-277-131
 DATE: 03/18/14

DESIGNED: KAW
 CHECKED: MEG

SHEET

OF

PROJECT: 110' MONOPINE

Square Mat Foundation Design (cont.)

Check Overturning:

Base Shear (1.6W), V_u :	160.4 k
Overturning Moment (1.6W), M_u :	9,833.6 k-ft
Down (0.9 D), P_u :	47.9 k
OTM about point P (1.6W):	10876.2 k-ft
Resisting Moment (0.9D):	12829.4 k-ft

Overturning OK.

Check Sliding:

Sliding Resistance from Friction:	400.9 k
Sliding Resistance from Passive:	0.0 k
Total Sliding Resistance:	400.9 k

Sliding resistance OK.

