



Structural Design Report
335' S3TL Series HD1 Self-Supporting Tower
located at: Senoia, GA

prepared for: MUNICIPAL COMMUNICATIONS LLC
by: Sabre Towers & Poles™

Job Number: 39163

January 13, 2011

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Tower by

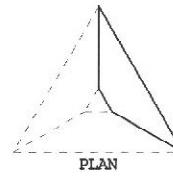
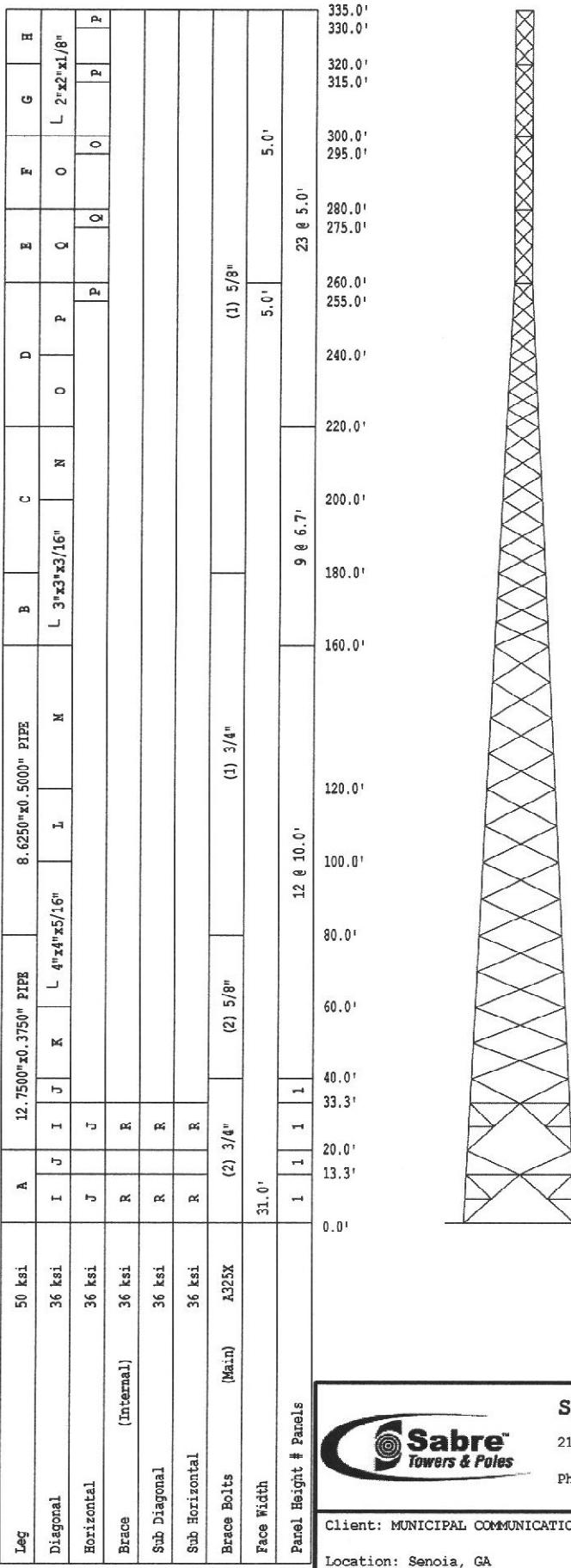
TRJ
RFB
KJT

Foundation by

Approved by



1/13/11

**NOTES:**

- The tower model is S3TL Series HD1.
- Transmission lines are to be attached to standard 12 hole waveguide ladders with stackable hangers.
- Azimuths are relative (not based on true north).
- Foundation loads shown are maximums.
- (6) 1 3/4" dia. F1554 grade 105 anchor bolts per leg. Minimum 65.5" embedment from top of concrete to top of nut.
- All unequal angles are oriented with the short leg vertical.
- This tower was designed for Structure Class II, Exposure Category C and Topographic Category 1.
- The foundation loads shown below are factored loads.

ANTENNA LIST

NO	ELEV	ANTENNA	TX-LINE
1	335'	(12) APKV18-2065178-C-A20 + 12' 3TBoom(R	(24) 1 5/8
2	326'	(2) DB224	
3	316'	(1) DB224	
4	315'	(2) 6ft Sidearms	(2) 1 5/8
5	305'	(1) 6ft Sidearm	(1) 1 5/8
6	296'	(1) DB224	
7	285'	(1) 6ft Sidearm	(1) 1 5/8
8	276'	(1) DB224	
9	265'	(1) 6ft Sidearm	(1) 1 5/8
10	240'	(9) WBX065A18Rx50 + 10' 3TBoom(R	(18) 1 5/8
11	230'	(9) 742 266 + 10' 3TBoom(R	(18) 1 5/8
12	220'	(9) APXV18-2065178-C-A20 + 10' 3TBoom(R	(18) 1 5/8

MATERIAL LIST

NO	TYPE
A	12.7500" x 0.5000" PIPE
B	8.6250" x 0.3220" PIPE
C	5.5625" x 0.5000" PIPE
D	5.5625" x 0.3750" PIPE
E	4.5000" x 0.3370" PIPE
F	3.5000" x 0.3000" PIPE
G	2.3750" x 0.2180" PIPE
H	2.3750" x 0.1540" PIPE
I	L 3-1/2" x 3" x 5/16"
J	L 4" x 4" x 5/16"
K	L 4" x 4" x 3/8"
L	L 4" x 4" x 1/4"
M	L 3-1/2" x 3-1/2" x 1/4"
N	L 2-1/2" x 2-1/2" x 3/16"
O	L 2" x 2" x 3/16"
P	L 2" x 2" x 1/8"
Q	L 2" x 2" x 1/4"
R	L 3" x 3" x 1/4"

**TOTAL FOUNDATION LOADS**

H=111.53 k
V=276.08 k
M=17698.93 k-ft
T=104.54 k-ft

INDIVIDUAL FOOTING LOADS

H=67.27 k
V=696.14 k
U=-601.49 k

**Sabre Towers And Poles**

2101 Murray Street (P.O. Box 658), Sioux City, IA 51111

Phone: (712) 258-6690

Fax: (712) 258-8250

Client: MUNICIPAL COMMUNICATIONS LLC

Job No: 39163

Date: 11 jan 2011

Location: Senoia, GA

Total Height: 335.00'

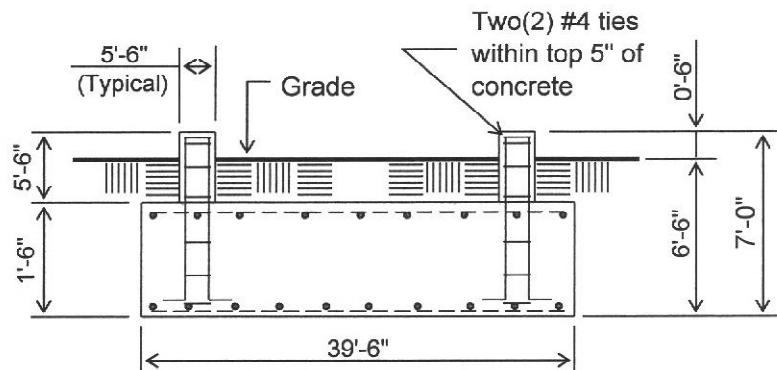
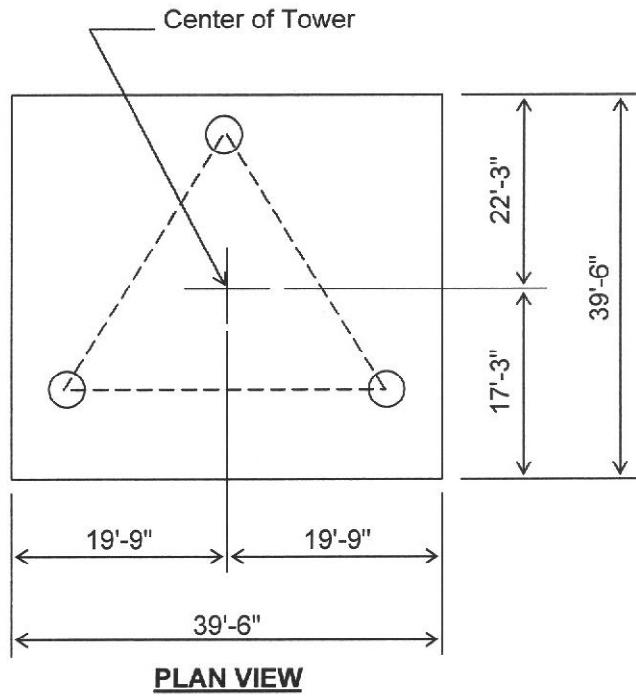
Tower Height: 335.00'

Standard: TIA 222-G-2005

Design Wind & Ice: 90mph 0" ice & 30mph 0.75" ice

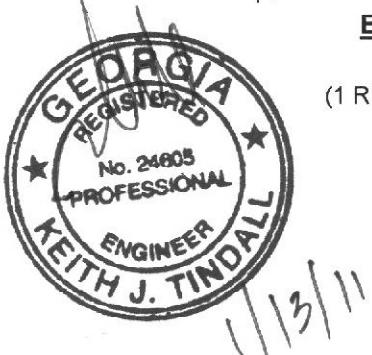
Customer: MUNICIPAL COMMUNICATIONS LLC
Site: Senoia, GA

335 ft. Model S3TL Series HD1 Self Supporting Tower At
90 mph Wind with no ice and 30 mph Wind with 0.75 in. Ice per ANSI/TIA-222-G-2005.
Antenna Loading per Page 1



ELEVATION VIEW
(101.2 Cu. Yds.)
(1 REQD.; NOT TO SCALE)

CAUTION: Center of tower is not in center of slab.



Notes:

- 1). Concrete shall have a minimum 28-day compressive strength of 4500 PSI, in accordance with ACI 318-05.
- 2). Rebar to conform to ASTM specification A615 Grade 60.
- 3). All rebar to have a minimum of 3" concrete cover.
- 4). All exposed concrete corners to be chamfered 3/4".
- 5). The foundation design is based on the geotechnical report by ECA project no. L-568-3, dated: 11/22/10
- 6). See the geotechnical report for compaction requirements, if specified.
- 7). The foundation is based on the following factored loads:
Factored download (kips) = 110.64
Factored overturn (kip-ft) = 17698.93
Factored shear (kips) = 111.53

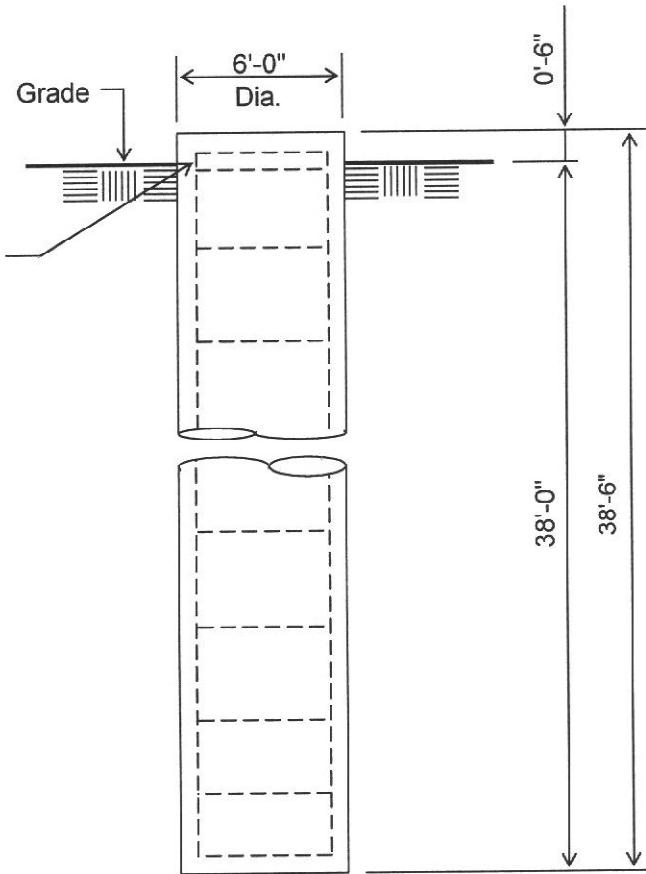
Rebar Schedule per Mat and per Pier	
Pier	(30) #7 vertical rebar w/hooks at bottom w/#4 Rebar ties, two (2) within top 5" of pier then 12" C/C
Mat	(66) #8 horizontal rebar evenly spaced each way top and bottom. (264 total)

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Customer: MUNICIPAL COMMUNICATIONS LLC
Site: Senoia, GA

335 ft. Model S3TL Series HD1 Self Supporting Tower At
 90 mph Wind with no ice and 30 mph Wind with 0.75 in. Ice per ANSI/TIA-222-G-2005.
 Antenna Loading per Page 1

Two (2) #4 ties
 within top 5" of
 concrete



ELEVATION VIEW
 (40.32 Cu. Yds. each)
 (3 REQUIRED; NOT TO SCALE)



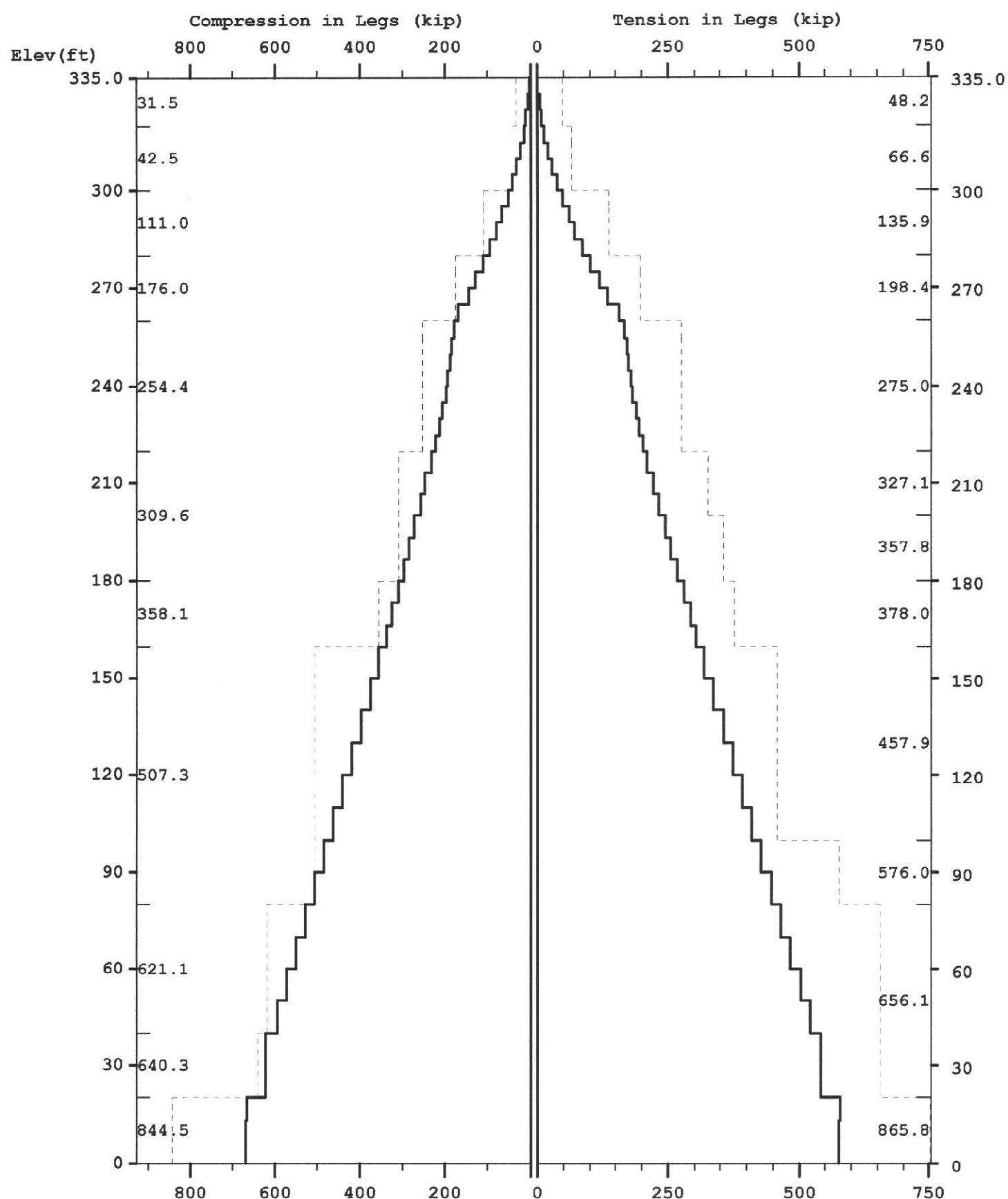
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Notes:

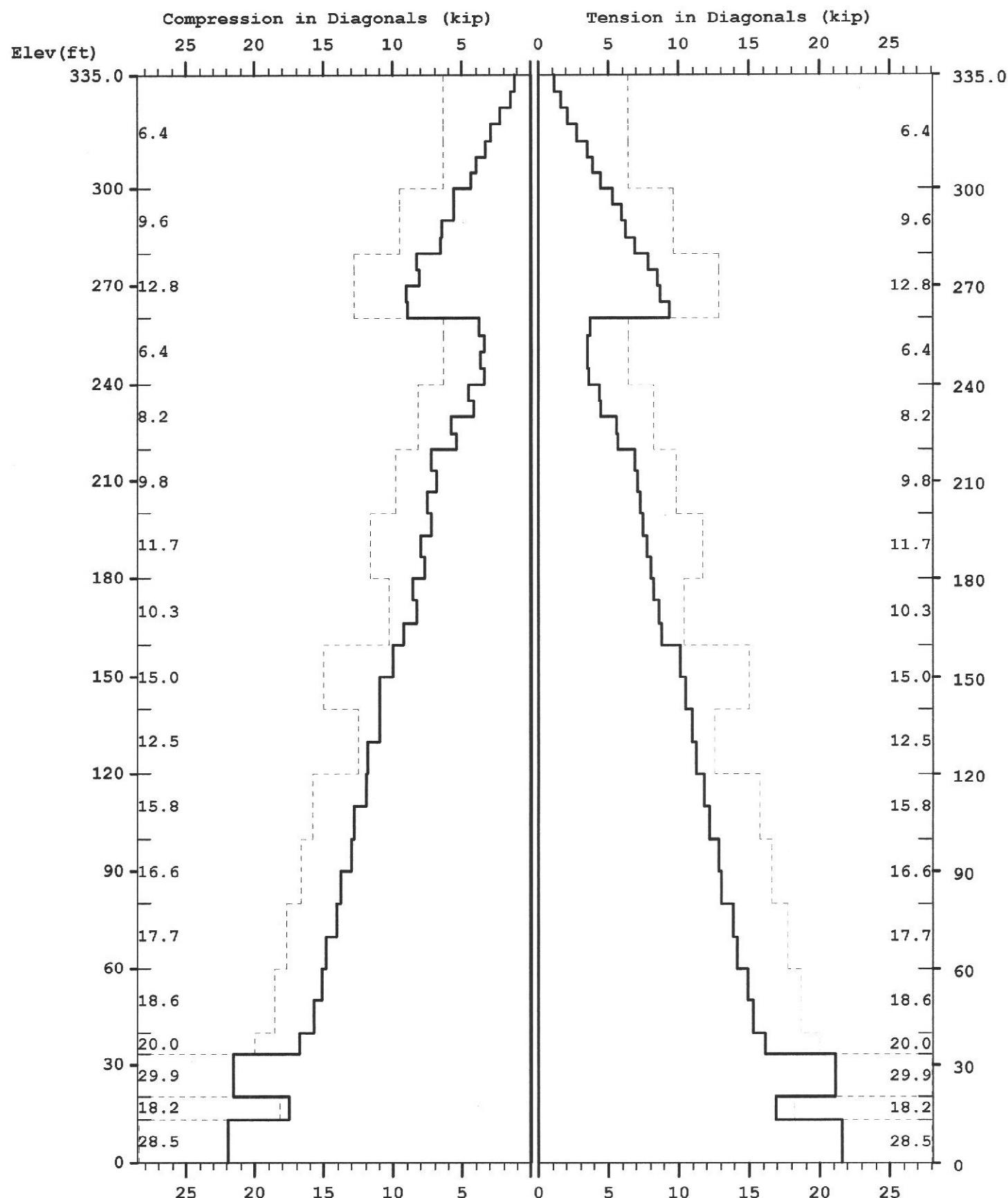
- 1). Concrete shall have a minimum 28-day compressive strength of 4000 PSI, in accordance with ACI 318-05.
- 2). Rebars to conform to ASTM specification A615 Grade 60.
- 3). All rebar to have a minimum of 3" concrete cover.
- 4). All exposed concrete corners to be chamfered 3/4".
- 5). The foundation design is based on the geotechnical report by ECA project no. L-568-3, dated: 11/22/10
- 6). See the geotechnical report for drilled pier installation requirements, if specified.
- 7). The foundation is based on the following factored loads:
 Factored uplift (kips) = 601.5
 Factored download (kips) = 696.14
 Factored shear (kips) = 67.27

Rebar Schedule per Pier	
Pier	(26) #8 vertical rebar w/#4 ties, two (2) within top 5" of pier then 12" C/C

Maximum



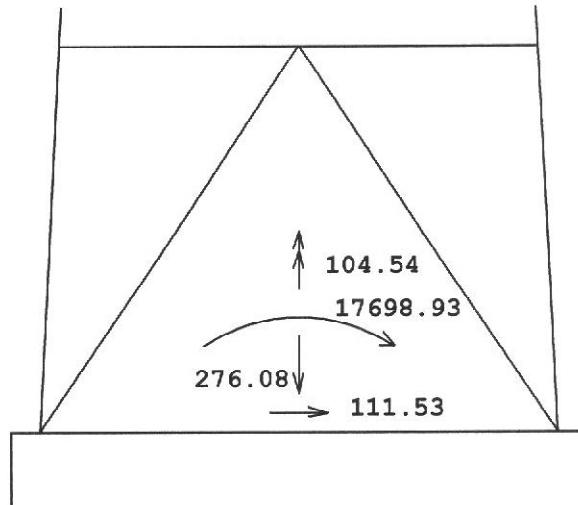
Maximum



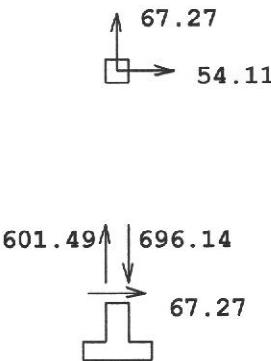
Licensed to: Sabre Towers And Poles

Maximum

TOTAL FOUNDATION LOADS (kip, ft-kip)



INDIVIDUAL FOOTING LOADS (kip)



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MAST G- Latticed Tower Analysis (Unguyed) (c)2005 Guymast Inc. 416-736-7453
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Sabre Towers And Poles

on: 11 jan 2011 at: 9:00:37

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MAST GEOMETRY (ft)

PANEL TYPE	NO. OF LEGS	ELEV. AT BOTTOM	ELEV. AT TOP	F.W.. AT BOTTOM	F.W.. AT TOP	TYPICAL PANEL HEIGHT
X	3	330.00	335.00	5.00	5.00	5.00
X	3	320.00	330.00	5.00	5.00	5.00
X	3	315.00	320.00	5.00	5.00	5.00
X	3	300.00	315.00	5.00	5.00	5.00
X	3	295.00	300.00	5.00	5.00	5.00
X	3	280.00	295.00	5.00	5.00	5.00
X	3	275.00	280.00	5.00	5.00	5.00
X	3	260.00	275.00	5.00	5.00	5.00
X	3	255.00	260.00	5.50	5.00	5.00
X	3	240.00	255.00	7.00	5.50	5.00
X	3	220.00	240.00	9.00	7.00	5.00
X	3	200.00	220.00	11.00	9.00	6.67
X	3	180.00	200.00	13.00	11.00	6.67
X	3	160.00	180.00	15.00	13.00	6.67
X	3	140.00	160.00	17.00	15.00	10.00
X	3	120.00	140.00	19.00	17.00	10.00
X	3	100.00	120.00	21.00	19.00	10.00
X	3	80.00	100.00	23.00	21.00	10.00
X	3	60.00	80.00	25.00	23.00	10.00
X	3	40.00	60.00	27.00	25.00	10.00
V	3	33.33	40.00	27.67	27.00	6.67
A	3	20.00	33.33	29.00	27.67	13.33
V	3	13.33	20.00	29.67	29.00	6.67
A	3	0.00	13.33	31.00	29.67	13.33

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MEMBER PROPERTIES

MEMBER TYPE	BOTTOM ELEV ft	TOP ELEV ft	X-SECTN AREA in.sq	RADIUS OF GYRAT in	ELASTIC MODULUS ksi	THERMAL EXPANSN /deg
LE	320.00	335.00	1.075	0.787	29000.	0.0000116
LE	300.00	320.00	1.477	0.787	29000.	0.0000116
LE	280.00	300.00	3.016	0.787	29000.	0.0000116
LE	260.00	280.00	4.407	0.787	29000.	0.0000116
LE	220.00	260.00	6.111	0.787	29000.	0.0000116
LE	180.00	220.00	7.952	0.787	29000.	0.0000116
LE	160.00	180.00	8.399	0.787	29000.	0.0000116
LE	80.00	160.00	12.763	0.787	29000.	0.0000116
LE	20.00	80.00	14.579	0.787	29000.	0.0000116
LE	0.00	20.00	19.242	0.787	29000.	0.0000116
DI	300.00	335.00	0.484	0.626	29000.	0.0000116
DI	280.00	300.00	0.715	0.626	29000.	0.0000116
DI	260.00	280.00	0.938	0.626	29000.	0.0000116

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DI	240.00	260.00	0.484	0.626	29000.	0.0000116
DI	220.00	240.00	0.715	0.626	29000.	0.0000116
DI	200.00	220.00	0.902	0.626	29000.	0.0000116
DI	160.00	200.00	1.090	0.626	29000.	0.0000116
DI	120.00	160.00	1.688	0.626	29000.	0.0000116
DI	100.00	120.00	1.938	0.626	29000.	0.0000116
DI	60.00	100.00	2.402	0.626	29000.	0.0000116
DI	40.00	60.00	2.859	0.626	29000.	0.0000116
DI	33.33	40.00	2.402	0.626	29000.	0.0000116
DI	20.00	33.33	2.559	0.626	29000.	0.0000116
DI	13.33	20.00	2.402	0.626	29000.	0.0000116
DI	0.00	13.33	2.559	0.626	29000.	0.0000116
HO	330.00	335.00	0.484	0.626	29000.	0.0000116
HO	315.00	320.00	0.484	0.626	29000.	0.0000116
HO	295.00	300.00	0.715	0.626	29000.	0.0000116
HO	275.00	280.00	0.938	0.626	29000.	0.0000116
HO	255.00	260.00	0.484	0.626	29000.	0.0000116
HO	20.00	33.33	2.402	0.626	29000.	0.0000116
HO	0.00	13.33	2.402	0.626	29000.	0.0000116
BR	20.00	33.33	1.438	0.000	29000.	0.0000116
BR	0.00	13.33	1.438	0.000	29000.	0.0000116

FACTORED MEMBER RESISTANCES

BOTTOM ELEV ft	TOP ELEV ft	LEGS		DIAGONALS		HORIZONTALS		INT COMP kip	BRACING TENS kip
		COMP kip	TENS kip	COMP kip	TENS kip	COMP kip	TENS kip		
330.0	335.0	31.48	48.15	6.39	6.39	5.82	5.82	0.00	0.00
320.0	330.0	31.48	48.15	6.39	6.39	0.00	0.00	0.00	0.00
315.0	320.0	42.53	66.60	6.39	6.39	5.82	5.82	0.00	0.00
300.0	315.0	42.53	66.60	6.39	6.39	0.00	0.00	0.00	0.00
295.0	300.0	110.98	135.90	9.58	9.58	8.46	8.46	0.00	0.00
280.0	295.0	110.98	135.90	9.58	9.58	0.00	0.00	0.00	0.00
275.0	280.0	175.98	198.45	12.78	12.78	10.95	10.95	0.00	0.00
260.0	275.0	175.98	198.45	12.78	12.78	0.00	0.00	0.00	0.00
255.0	260.0	254.38	274.95	6.39	6.39	5.82	5.82	0.00	0.00
240.0	255.0	254.38	274.95	6.39	6.39	0.00	0.00	0.00	0.00
220.0	240.0	254.38	274.95	8.19	8.19	0.00	0.00	0.00	0.00
200.0	220.0	309.64	327.10	9.84	9.84	0.00	0.00	0.00	0.00
180.0	200.0	309.64	357.75	11.69	11.69	0.00	0.00	0.00	0.00
160.0	180.0	358.08	378.00	10.34	10.34	0.00	0.00	0.00	0.00
140.0	160.0	507.33	457.90	15.01	15.01	0.00	0.00	0.00	0.00
120.0	140.0	507.33	457.90	12.53	12.53	0.00	0.00	0.00	0.00
100.0	120.0	507.33	457.90	15.77	15.77	0.00	0.00	0.00	0.00
80.0	100.0	507.33	576.00	16.62	16.62	0.00	0.00	0.00	0.00
60.0	80.0	621.06	656.10	17.72	17.72	0.00	0.00	0.00	0.00
40.0	60.0	621.06	656.10	18.63	18.63	0.00	0.00	0.00	0.00
33.3	40.0	640.29	656.10	20.02	20.02	0.00	0.00	0.00	0.00
20.0	33.3	640.29	656.10	29.94	29.94	19.11	19.11	7.41	7.41
13.3	20.0	844.46	865.80	18.24	18.24	0.00	0.00	0.00	0.00
0.0	13.3	844.46	865.80	28.50	28.50	17.13	17.13	6.59	6.59

* Only 3 condition(s) shown in full

* Some wind loads may have been derived from full-scale wind tunnel testing

LOADING CONDITION A

90 mph wind with no ice. Wind Azimuth: 0°

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MAST LOADING

LOAD TYPE	ELEV ft	APPLY.. RADIUS ft	LOAD..AT AZI	LOAD AZI	FORCES.....		MOMENTS.....	
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	335.0	0.00	0.0	0.0	1.88	1.82	0.00	0.00
C	326.0	0.00	0.0	0.0	0.38	0.08	0.00	0.00
C	316.0	0.00	0.0	0.0	0.19	0.04	0.00	0.00
C	315.0	0.00	0.0	0.0	0.80	0.72	0.00	0.00
C	305.0	0.00	0.0	0.0	0.40	0.36	0.00	0.00
C	296.0	0.00	0.0	0.0	0.19	0.04	0.00	0.00
C	285.0	0.00	0.0	0.0	0.39	0.36	0.00	0.00
C	276.0	0.00	0.0	0.0	0.18	0.04	0.00	0.00
C	265.0	0.00	0.0	0.0	0.38	0.36	0.00	0.00
C	240.0	0.00	0.0	0.0	1.60	1.46	0.00	0.00
C	230.0	0.00	0.0	0.0	2.70	1.81	0.00	0.00
C	220.0	0.00	0.0	0.0	1.56	1.62	0.00	0.00
D	335.0	0.00	0.0	0.0	0.16	0.07	0.07	0.12
D	330.0	0.00	0.0	0.0	0.16	0.07	0.07	0.12
D	330.0	0.00	0.0	0.0	0.15	0.07	0.07	0.12
D	320.0	0.00	0.0	0.0	0.15	0.07	0.07	0.12
D	320.0	0.00	0.0	0.0	0.16	0.08	0.07	0.12
D	315.0	0.00	0.0	0.0	0.16	0.08	0.07	0.12
D	315.0	0.00	0.0	0.0	0.17	0.08	0.06	0.13
D	300.0	0.00	0.0	0.0	0.17	0.08	0.06	0.13
D	300.0	0.00	0.0	0.0	0.19	0.12	0.06	0.13
D	295.0	0.00	0.0	0.0	0.19	0.12	0.06	0.13
D	295.0	0.00	0.0	0.0	0.18	0.11	0.06	0.13
D	280.0	0.00	0.0	0.0	0.18	0.11	0.06	0.13
D	280.0	0.00	0.0	0.0	0.19	0.14	0.06	0.13
D	275.0	0.00	0.0	0.0	0.19	0.14	0.06	0.13
D	275.0	0.00	0.0	0.0	0.18	0.13	0.06	0.13
D	260.0	0.00	0.0	0.0	0.18	0.13	0.06	0.13
D	260.0	0.00	0.0	0.0	0.19	0.14	0.06	0.13
D	240.0	0.00	0.0	0.0	0.19	0.14	0.05	0.11
D	240.0	0.00	0.0	0.0	0.21	0.18	0.08	0.15
D	230.0	0.00	0.0	0.0	0.21	0.18	0.08	0.15
D	230.0	0.00	0.0	0.0	0.25	0.21	0.03	0.02
D	220.0	0.00	0.0	0.0	0.26	0.21	0.03	0.02
D	220.0	0.00	0.0	0.0	0.32	0.26	0.09	0.11
D	200.0	0.00	0.0	0.0	0.33	0.26	0.08	0.10
D	200.0	0.00	0.0	0.0	0.33	0.27	0.10	0.10
D	180.0	0.00	0.0	0.0	0.34	0.28	0.09	0.10
D	180.0	0.00	0.0	0.0	0.35	0.29	0.11	0.10
D	160.0	0.00	0.0	0.0	0.36	0.29	0.10	0.10
D	160.0	0.00	0.0	0.0	0.34	0.36	0.12	0.10
D	140.0	0.00	0.0	0.0	0.34	0.36	0.12	0.10
D	140.0	0.00	0.0	0.0	0.34	0.36	0.13	0.10
D	120.0	0.00	0.0	0.0	0.34	0.37	0.13	0.10
D	120.0	0.00	0.0	0.0	0.35	0.38	0.14	0.09
D	100.0	0.00	0.0	0.0	0.35	0.39	0.14	0.09
D	100.0	0.00	0.0	0.0	0.34	0.42	0.15	0.09
D	80.0	0.00	0.0	0.0	0.35	0.43	0.15	0.09
D	80.0	0.00	0.0	0.0	0.35	0.45	0.16	0.09
D	60.0	0.00	0.0	0.0	0.36	0.46	0.16	0.09
D	60.0	0.00	0.0	0.0	0.34	0.49	0.17	0.08
D	40.0	0.00	0.0	0.0	0.35	0.50	0.17	0.08

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D	40.0	0.00	0.0	0.0	0.30	0.44	0.19	0.08
D	33.3	0.00	0.0	0.0	0.30	0.44	0.19	0.08
D	33.3	0.00	0.0	0.0	0.33	0.54	0.18	0.08
D	20.0	0.00	0.0	0.0	0.33	0.54	0.18	0.08
D	20.0	0.00	0.0	0.0	0.26	0.50	0.20	0.06
D	13.3	0.00	0.0	0.0	0.26	0.50	0.20	0.06
D	13.3	0.00	0.0	0.0	0.29	0.61	0.19	0.07
D	0.0	0.00	0.0	0.0	0.29	0.61	0.19	0.07

SUPPRESS PRINTING

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...FOR THIS LOADING..			MAXIMUMS.....			
LOADS INPUT	DISPL FORCES	MEMBER LOADS	FOUNDN	ALL	DISPL FORCES	MEMBER LOADS	FOUNDN LOADS
no	yes	yes	yes	no	no	no	no

LOADING CONDITION k

90 mph wind with no ice. Wind Azimuth: 0°

PL - 0

MAST LOADING

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LOAD TYPE	ELEV ft	APPLY.. RADIUS ft	LOAD.. AT AZI	LOAD AZI FORCES..... MOMENTS.....		
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	335.0	0.00	0.0	0.0	1.88	1.36	0.00	0.00
C	326.0	0.00	0.0	0.0	0.38	0.06	0.00	0.00
C	316.0	0.00	0.0	0.0	0.19	0.03	0.00	0.00
C	315.0	0.00	0.0	0.0	0.80	0.54	0.00	0.00
C	305.0	0.00	0.0	0.0	0.40	0.27	0.00	0.00
C	296.0	0.00	0.0	0.0	0.19	0.03	0.00	0.00
C	285.0	0.00	0.0	0.0	0.39	0.27	0.00	0.00
C	276.0	0.00	0.0	0.0	0.18	0.03	0.00	0.00
C	265.0	0.00	0.0	0.0	0.38	0.27	0.00	0.00
C	240.0	0.00	0.0	0.0	1.60	1.09	0.00	0.00
C	230.0	0.00	0.0	0.0	2.70	1.36	0.00	0.00
C	220.0	0.00	0.0	0.0	1.56	1.21	0.00	0.00
D	335.0	0.00	0.0	0.0	0.16	0.05	0.05	0.12
D	330.0	0.00	0.0	0.0	0.16	0.05	0.05	0.12
D	330.0	0.00	0.0	0.0	0.15	0.05	0.05	0.12
D	320.0	0.00	0.0	0.0	0.15	0.05	0.05	0.12
D	320.0	0.00	0.0	0.0	0.16	0.06	0.05	0.12
D	315.0	0.00	0.0	0.0	0.16	0.06	0.05	0.12
D	315.0	0.00	0.0	0.0	0.17	0.06	0.05	0.13
D	300.0	0.00	0.0	0.0	0.17	0.06	0.05	0.13
D	300.0	0.00	0.0	0.0	0.19	0.09	0.05	0.13
D	295.0	0.00	0.0	0.0	0.19	0.09	0.05	0.13
D	295.0	0.00	0.0	0.0	0.18	0.08	0.05	0.13
D	280.0	0.00	0.0	0.0	0.18	0.08	0.05	0.13
D	280.0	0.00	0.0	0.0	0.19	0.11	0.05	0.13
D	265.0	0.00	0.0	0.0	0.18	0.10	0.05	0.13
D	265.0	0.00	0.0	0.0	0.18	0.10	0.05	0.13

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D	260.0	0.00	0.0	0.0	0.18	0.10	0.05	0.13
D	260.0	0.00	0.0	0.0	0.19	0.11	0.05	0.13
D	240.0	0.00	0.0	0.0	0.19	0.11	0.04	0.11
D	240.0	0.00	0.0	0.0	0.21	0.13	0.06	0.15
D	230.0	0.00	0.0	0.0	0.21	0.13	0.06	0.15
D	230.0	0.00	0.0	0.0	0.25	0.15	0.03	0.02
D	220.0	0.00	0.0	0.0	0.26	0.16	0.02	0.02
D	220.0	0.00	0.0	0.0	0.32	0.19	0.07	0.11
D	200.0	0.00	0.0	0.0	0.33	0.20	0.06	0.10
D	200.0	0.00	0.0	0.0	0.33	0.21	0.08	0.10
D	180.0	0.00	0.0	0.0	0.34	0.21	0.07	0.10
D	180.0	0.00	0.0	0.0	0.35	0.22	0.08	0.10
D	160.0	0.00	0.0	0.0	0.36	0.22	0.08	0.10
D	160.0	0.00	0.0	0.0	0.34	0.27	0.09	0.10
D	140.0	0.00	0.0	0.0	0.34	0.27	0.09	0.10
D	140.0	0.00	0.0	0.0	0.34	0.27	0.10	0.10
D	120.0	0.00	0.0	0.0	0.34	0.28	0.09	0.10
D	120.0	0.00	0.0	0.0	0.35	0.29	0.11	0.09
D	100.0	0.00	0.0	0.0	0.35	0.29	0.10	0.09
D	100.0	0.00	0.0	0.0	0.34	0.31	0.12	0.09
D	80.0	0.00	0.0	0.0	0.35	0.32	0.11	0.09
D	80.0	0.00	0.0	0.0	0.35	0.34	0.12	0.09
D	60.0	0.00	0.0	0.0	0.36	0.34	0.12	0.09
D	60.0	0.00	0.0	0.0	0.34	0.37	0.13	0.08
D	40.0	0.00	0.0	0.0	0.35	0.38	0.13	0.08
D	40.0	0.00	0.0	0.0	0.30	0.33	0.14	0.08
D	33.3	0.00	0.0	0.0	0.30	0.33	0.14	0.08
D	33.3	0.00	0.0	0.0	0.33	0.40	0.14	0.08
D	20.0	0.00	0.0	0.0	0.33	0.40	0.14	0.08
D	20.0	0.00	0.0	0.0	0.26	0.38	0.15	0.06
D	13.3	0.00	0.0	0.0	0.26	0.38	0.15	0.06
D	13.3	0.00	0.0	0.0	0.29	0.45	0.14	0.07
D	0.0	0.00	0.0	0.0	0.29	0.45	0.14	0.07

SUPPRESS PRINTING

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LOADS INPUT	...FOR THIS LOADING..		MAXIMUMS.....			
	DISPL	MEMBER FORCES	FOUNDN LOADS	ALL	DISPL	MEMBER FORCES	FOUNDN LOADS

no	yes	yes	yes	no	no	no	no
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LOADING CONDITION AU =====

30 mph wind with 0.75 ice. Wind Azimuth: 0° PL - 0

MAST LOADING

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LOAD TYPE	ELEV ft	APPLY.. RADIUS ft	LOAD.. AT AZI	LOAD AZIFORCES.....MOMENTS.....		
					HORIZ kip	DOWN kip	VERTICAL ft-kip	TORSNAL ft-kip
C	335.0	0.00	0.0	0.0	0.34	3.66	0.00	0.00
C	326.0	0.00	0.0	0.0	0.14	0.47	0.00	0.00
C	316.0	0.00	0.0	0.0	0.07	0.23	0.00	0.00

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C	315.0	0.00	0.0	0.0	0.11	1.47	0.00	0.00
C	305.0	0.00	0.0	0.0	0.05	0.73	0.00	0.00
C	296.0	0.00	0.0	0.0	0.07	0.23	0.00	0.00
C	285.0	0.00	0.0	0.0	0.05	0.73	0.00	0.00
C	276.0	0.00	0.0	0.0	0.06	0.23	0.00	0.00
C	265.0	0.00	0.0	0.0	0.05	0.73	0.00	0.00
C	240.0	0.00	0.0	0.0	0.25	2.78	0.00	0.00
C	230.0	0.00	0.0	0.0	0.37	3.66	0.00	0.00
C	220.0	0.00	0.0	0.0	0.25	3.17	0.00	0.00
D	335.0	0.00	0.0	0.0	0.02	0.31	0.25	0.01
D	330.0	0.00	0.0	0.0	0.02	0.31	0.25	0.01
D	330.0	0.00	0.0	0.0	0.02	0.27	0.25	0.01
D	320.0	0.00	0.0	0.0	0.02	0.27	0.25	0.01
D	320.0	0.00	0.0	0.0	0.02	0.31	0.25	0.01
D	315.0	0.00	0.0	0.0	0.02	0.31	0.25	0.01
D	315.0	0.00	0.0	0.0	0.02	0.31	0.22	0.01
D	305.0	0.00	0.0	0.0	0.02	0.31	0.22	0.01
D	305.0	0.00	0.0	0.0	0.02	0.31	0.22	0.01
D	300.0	0.00	0.0	0.0	0.02	0.31	0.22	0.01
D	300.0	0.00	0.0	0.0	0.02	0.39	0.22	0.01
D	295.0	0.00	0.0	0.0	0.02	0.39	0.22	0.01
D	295.0	0.00	0.0	0.0	0.02	0.35	0.22	0.01
D	280.0	0.00	0.0	0.0	0.02	0.35	0.22	0.01
D	280.0	0.00	0.0	0.0	0.02	0.42	0.22	0.01
D	275.0	0.00	0.0	0.0	0.02	0.42	0.22	0.01
D	275.0	0.00	0.0	0.0	0.02	0.38	0.22	0.01
D	260.0	0.00	0.0	0.0	0.02	0.38	0.22	0.01
D	260.0	0.00	0.0	0.0	0.02	0.43	0.21	0.01
D	255.0	0.00	0.0	0.0	0.02	0.43	0.21	0.01
D	255.0	0.00	0.0	0.0	0.02	0.40	0.20	0.01
D	250.0	0.00	0.0	0.0	0.02	0.40	0.20	0.01
D	250.0	0.00	0.0	0.0	0.02	0.41	0.19	0.01
D	245.0	0.00	0.0	0.0	0.02	0.41	0.19	0.01
D	245.0	0.00	0.0	0.0	0.02	0.41	0.17	0.01
D	240.0	0.00	0.0	0.0	0.02	0.41	0.17	0.01
D	240.0	0.00	0.0	0.0	0.03	0.50	0.29	0.02
D	235.0	0.00	0.0	0.0	0.03	0.50	0.29	0.02
D	235.0	0.00	0.0	0.0	0.03	0.50	0.28	0.02
D	230.0	0.00	0.0	0.0	0.03	0.50	0.28	0.02
D	230.0	0.00	0.0	0.0	0.03	0.61	0.14	0.00
D	220.0	0.00	0.0	0.0	0.03	0.62	0.14	0.00
D	220.0	0.00	0.0	0.0	0.04	0.74	0.35	0.01
D	200.0	0.00	0.0	0.0	0.04	0.76	0.32	0.01
D	200.0	0.00	0.0	0.0	0.04	0.78	0.40	0.01
D	180.0	0.00	0.0	0.0	0.04	0.80	0.37	0.01
D	180.0	0.00	0.0	0.0	0.04	0.83	0.44	0.01
D	160.0	0.00	0.0	0.0	0.04	0.85	0.41	0.01
D	160.0	0.00	0.0	0.0	0.04	0.88	0.48	0.01
D	140.0	0.00	0.0	0.0	0.04	0.89	0.46	0.01
D	140.0	0.00	0.0	0.0	0.04	0.90	0.52	0.01
D	120.0	0.00	0.0	0.0	0.04	0.91	0.50	0.01
D	120.0	0.00	0.0	0.0	0.04	0.94	0.56	0.01
D	100.0	0.00	0.0	0.0	0.04	0.95	0.54	0.01
D	100.0	0.00	0.0	0.0	0.04	0.98	0.60	0.01
D	80.0	0.00	0.0	0.0	0.04	1.00	0.58	0.01
D	80.0	0.00	0.0	0.0	0.04	1.04	0.63	0.01
D	60.0	0.00	0.0	0.0	0.04	1.05	0.62	0.01
D	60.0	0.00	0.0	0.0	0.04	1.08	0.67	0.01
D	40.0	0.00	0.0	0.0	0.04	1.09	0.65	0.01
D	40.0	0.00	0.0	0.0	0.05	0.97	0.69	0.01
D	33.3	0.00	0.0	0.0	0.05	0.97	0.69	0.01
D	33.3	0.00	0.0	0.0	0.04	1.22	0.69	0.01

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D	20.0	0.00	0.0	0.0	0.04	1.22	0.69	0.01
D	20.0	0.00	0.0	0.0	0.05	1.05	0.78	0.01
D	13.3	0.00	0.0	0.0	0.05	1.05	0.78	0.01
D	13.3	0.00	0.0	0.0	0.03	1.40	1.00	0.01
D	0.0	0.00	0.0	0.0	0.03	1.40	1.00	0.01

SUPPRESS PRINTING

LOADS INPUT	...FOR THIS LOADING..		MAXIMUMS.....			
	DISPL FORCES	MEMBER LOADS	FOUNDN	ALL	DISPL FORCES	MEMBER LOADS	FOUNDN LOADS
	no	yes	yes	no	no	no	no

MAXIMUM MAST DISPLACEMENTS:

ELEV ft	-----DEFLECTIONS (ft)-----			--TILTS (DEG)--		TWIST DEG
	NORTH	EAST	DOWN	NORTH	EAST	
335.0	7.006 S	-5.589 J	0.126 S	3.039 S	-2.390 J	0.670 AR
330.0	6.740 S	-5.380 J	0.119 S	3.035 S	-2.386 J	0.668 AR
325.0	6.475 S	-5.172 J	0.112 S	3.020 S	-2.373 J	0.663 AR
320.0	6.212 S	-4.965 J	0.105 S	2.992 S	-2.349 J	0.654 AR
315.0	5.950 S	-4.760 J	0.098 S	2.959 S	-2.322 J	0.642 AR
310.0	5.694 S	-4.558 J	0.091 S	2.909 S	-2.281 J	0.626 AR
305.0	5.439 S	-4.359 J	0.085 S	2.839 S	-2.225 J	0.608 AR
300.0	5.193 S	-4.166 J	0.079 S	2.746 S	-2.151 J	0.586 AR
295.0	4.954 S	-3.979 J	0.074 S	2.689 S	-2.106 J	0.569 AR
290.0	4.722 S	-3.797 J	0.068 S	2.616 S	-2.050 J	0.549 AR
285.0	4.493 S	-3.618 J	0.063 S	2.529 S	-1.982 J	0.528 AR
280.0	4.276 S	-3.447 J	0.059 S	2.424 S	-1.901 J	0.505 AR
275.0	4.065 S	-3.282 J	0.054 S	2.341 S	-1.838 J	0.485 AR
270.0	3.865 S	-3.125 J	0.050 S	2.242 S	-1.762 J	0.464 AR
265.0	3.669 S	-2.971 J	0.047 S	2.131 S	-1.678 J	0.442 AR
260.0	3.488 S	-2.828 J	0.044 S	2.003 S	-1.580 J	0.418 AR
255.0	3.315 S	-2.692 J	0.041 S	1.909 S	-1.509 J	0.373 AR
250.0	3.154 S	-2.564 J	0.038 S	1.824 S	-1.444 J	0.336 AR
245.0	2.996 S	-2.439 J	0.036 S	1.742 S	-1.382 J	0.303 AR
240.0	2.848 S	-2.322 J	0.034 S	1.666 S	-1.325 J	0.274 AR
235.0	2.703 S	-2.207 J	0.033 BM	1.591 S	-1.268 J	0.256 AR
230.0	2.569 S	-2.099 J	0.032 BM	1.521 S	-1.216 J	0.240 AR
225.0	2.436 S	-1.993 J	0.032 BM	1.452 S	-1.163 J	0.224 AR
220.0	2.312 S	-1.894 J	0.031 BM	1.386 S	-1.113 J	0.210 AR
213.3	2.151 S	-1.763 J	0.030 BM	1.317 S	-1.061 J	0.196 AR
206.7	2.001 S	-1.642 J	0.030 BM	1.252 S	-1.010 J	0.182 AR
200.0	1.855 S	-1.524 J	0.029 BM	1.186 S	-0.959 J	0.169 AR
193.3	1.719 S	-1.414 J	0.028 BM	1.122 S	-0.910 J	0.158 AR
186.7	1.588 S	-1.308 J	0.027 BM	1.058 S	-0.859 J	-0.147 Z
180.0	1.467 S	-1.209 J	0.027 BM	0.995 S	-0.810 J	-0.137 Z
173.3	1.350 S	-1.114 J	0.026 BM	0.936 S	-0.762 J	0.127 AR
166.7	1.243 S	-1.026 J	0.025 BM	0.878 S	-0.716 J	0.116 AR
160.0	1.139 S	-0.941 J	0.024 BM	0.819 S	-0.669 J	0.106 AR
150.0	0.999 S	-0.826 J	0.023 BM	0.762 S	-0.624 J	0.097 AR
140.0	0.866 S	-0.717 J	0.022 BM	0.705 S	-0.578 J	0.088 AR
130.0	0.745 S	-0.617 J	0.021 BM	0.648 S	-0.532 J	0.079 AR
120.0	0.632 S	-0.524 J	0.019 BM	0.592 S	-0.486 J	0.071 AR
110.0	0.529 S	-0.439 J	0.018 BM	0.536 S	-0.441 J	0.063 AR

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100.0	0.436 S	-0.362 J	0.016 BM	0.479 S	-0.395 J	0.055 AR
90.0	0.353 S	-0.294 J	0.015 BM	0.423 S	-0.349 J	0.049 AR
80.0	0.280 S	-0.233 J	0.013 BM	0.367 S	-0.303 J	0.043 AR
70.0	0.216 S	-0.180 J	0.012 BM	0.318 S	-0.263 J	0.037 AR
60.0	0.159 S	-0.132 J	0.010 BM	0.269 S	-0.223 J	0.031 AR
50.0	0.110 S	-0.092 J	0.009 BM	0.220 S	-0.182 J	0.025 AR
40.0	0.064 S	-0.053 J	0.007 BM	0.170 S	-0.141 J	0.020 AR
33.3	0.048 S	-0.041 J	0.006 BL	0.139 S	-0.115 J	0.017 AR
20.0	0.019 S	-0.016 J	0.003 BL	0.073 S	-0.061 J	0.010 AR
13.3	0.009 U	0.008 d	0.002 BL	0.049 S	-0.041 J	0.006 AR
0.0	0.000 A	0.000 A	0.000 A	0.000 A	0.000 A	0.000 A

MAXIMUM TENSION IN MAST MEMBERS (kip)

ELEV ft	LEGS	DIAG	HORIZ	BRACE
335.0	-----		0.30 G	0.00 A
	0.70 k	1.10 k		
330.0	-----		0.01 BG	0.00 A
	3.91 k	1.57 v		
325.0	-----		0.02 A	0.00 A
	7.91 k	2.10 k		
320.0	-----		0.70 B	0.00 A
	12.85 k	2.74 l		
315.0	-----		0.07 B	0.00 A
	19.97 l	3.45 T		
310.0	-----		0.02 AD	0.00 A
	27.84 k	3.83 k		
305.0	-----		0.07 B	0.00 A
	37.36 k	4.42 s		
300.0	-----		0.75 A	0.00 A
	47.25 k	5.31 k		
295.0	-----		0.14 A	0.00 A
	60.28 k	5.92 s		
290.0	-----		0.04 AC	0.00 A
	72.07 k	6.18 k		
285.0	-----		0.12 A	0.00 A
	86.97 k	6.86 s		
280.0	-----		1.05 A	0.00 A
	100.67 k	7.85 k		
275.0	-----		0.25 A	0.00 A
	119.55 k	8.52 s		
270.0	-----		0.09 AC	0.00 A
	135.14 k	8.63 k		
265.0	-----		0.23 A	0.00 A
	155.66 k	9.35 s		
260.0	-----		2.53 AC	0.00 A
	165.93 k	3.69 z		
255.0	-----		0.10 A	0.00 A
	171.19 k	3.53 s		
250.0	-----		0.00 G	0.00 A
	173.92 k	3.50 k		
245.0	-----		0.07 A	0.00 A
	179.08 k	3.56 s		
240.0	-----		0.01 d	0.00 A
	182.63 k	4.31 k		
235.0	-----		0.09 A	0.00 A
	189.29 k	4.40 u		
230.0	-----		0.01 I	0.00 A
	194.29 k	5.56 k		

			39163.txt	
225.0	-----		0.09 A	0.00 A
	203.03 k	5.64 U		
220.0	-----		0.02 I	0.00 A
	210.52 k	6.93 m		
213.3	-----		0.10 A	0.00 A
	223.36 k	7.09 U		
206.7	-----		0.01 B	0.00 A
	233.49 k	7.25 m		
200.0	-----		0.10 A	0.00 A
	246.05 k	7.49 U		
193.3	-----		0.01 A	0.00 A
	256.72 k	7.70 m		
186.7	-----		0.08 A	0.00 A
	269.18 k	8.01 U		
180.0	-----		0.02 A	0.00 A
	280.27 k	8.23 m		
173.3	-----		0.08 A	0.00 A
	292.73 k	8.60 U		
166.7	-----		0.02 A	0.00 A
	304.20 k	8.81 m		
160.0	-----		0.11 A	0.00 A
	319.65 k	10.08 U		
150.0	-----		0.06 A	0.00 A
	337.16 k	10.47 m		
140.0	-----		0.09 A	0.00 A
	355.78 k	10.93 U		
130.0	-----		0.06 A	0.00 A
	373.59 k	11.27 m		
120.0	-----		0.09 A	0.00 A
	392.19 k	11.83 U		
110.0	-----		0.06 A	0.00 A
	410.22 k	12.14 m		
100.0	-----		0.09 A	0.00 A
	428.83 k	12.82 AE		
90.0	-----		0.08 A	0.00 A
	446.98 k	13.03 m		
80.0	-----		0.08 A	0.00 A
	465.57 k	13.82 AE		
70.0	-----		0.06 A	0.00 A
	483.82 k	14.11 AE		
60.0	-----		0.04 k	0.00 A
	502.44 k	14.89 U		
50.0	-----		0.12 AC	0.00 A
	520.75 k	15.23 AE		
40.0	-----		0.39 A	0.00 A
	542.63 k	16.08 AE		
33.3	-----		1.21 k	0.00 AE
	541.38 k	21.15 AE		
20.0	-----		0.13 A	0.00 AE
	579.12 k	16.89 AE		
13.3	-----		1.04 m	0.00 U
0.0	-----		0.00 A	0.00 A

MAXIMUM COMPRESSION IN MAST MEMBERS (kip)

ELEV	LEGS	DIAG	HORIZ Page A9	BRACE
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39163.txt

ft

335.0	-1.78 S	-1.20 S	-0.24 w	0.00 A
330.0	-5.50 S	-1.49 n	0.00 AO	0.00 A
325.0	-9.66 S	-2.24 T	-0.01 AD	0.00 A
320.0	-15.01 S	-2.91 T	-0.59 AD	0.00 A
315.0	-23.29 T	-3.28 l	-0.06 AD	0.00 A
310.0	-31.52 S	-4.02 S	-0.02 B	0.00 A
305.0	-42.03 S	-4.40 AC	-0.06 AD	0.00 A
300.0	-52.36 S	-5.63 S	-0.72 AC	0.00 A
295.0	-66.61 S	-5.62 k	-0.13 AC	0.00 A
290.0	-78.94 S	-6.50 S	-0.04 A	0.00 A
285.0	-95.25 S	-6.56 k	-0.12 AC	0.00 A
280.0	-109.56 S	-8.30 S	-1.02 AC	0.00 A
275.0	-130.11 S	-8.09 k	-0.24 AC	0.00 A
270.0	-146.40 S	-9.06 S	-0.09 A	0.00 A
265.0	-168.71 S	-8.94 k	-0.22 AC	0.00 A
260.0	-179.53 S	-3.81 P	-2.64 A	0.00 A
255.0	-185.73 S	-3.37 k	-0.09 AC	0.00 A
250.0	-188.80 S	-3.69 S	0.00 AI	0.00 A
245.0	-194.80 S	-3.40 k	-0.07 AC	0.00 A
240.0	-199.68 S	-4.53 S	-0.01 AK	0.00 A
235.0	-207.30 S	-4.21 m	-0.09 AC	0.00 A
230.0	-213.93 S	-5.82 u	-0.01 AK	0.00 A
225.0	-223.75 S	-5.42 m	-0.08 AC	0.00 A
220.0	-233.02 S	-7.26 u	-0.02 AK	0.00 A
213.3	-247.55 S	-6.82 m	-0.10 AC	0.00 A
206.7	-258.85 S	-7.58 u	-0.01 AD	0.00 A
200.0	-273.08 S	-7.21 m	-0.09 AC	0.00 A
193.3	-285.09 S	-8.05 u	-0.01 AC	0.00 A
186.7	-299.26 S	-7.70 m	-0.07 AC	0.00 A
180.0	-311.82 S	-8.61 u	-0.01 AC	0.00 A
173.3	-	-	-0.08 AC	0.00 A

39163.txt

166.7	-326.05	S	-8.26	m	-0.02	AC	0.00	A
	-339.09	S	-9.23	U	-0.10	AC	0.00	A
160.0					-0.05	AC	0.00	A
	-356.92	S	-9.99	U	-0.08	AC	0.00	A
150.0					-0.05	AC	0.00	A
	-377.31	S	-11.00	U	-0.05	AC	0.00	A
140.0					-0.08	AC	0.00	A
	-399.03	S	-10.95	U	-0.08	AC	0.00	A
130.0					-0.05	AC	0.00	A
	-419.84	S	-11.86	U	-0.08	AC	0.00	A
120.0					-0.08	AC	0.00	A
	-441.66	S	-11.95	U	-0.06	AC	0.00	A
110.0					-0.08	AC	0.00	A
	-462.89	S	-12.81	U	-0.07	AC	0.00	A
100.0					-0.08	AC	0.00	A
	-484.96	S	-13.00	U	-0.07	AC	0.00	A
90.0					-0.07	AC	0.00	A
	-506.62	S	-13.80	U	-0.07	AC	0.00	A
80.0					-0.07	AC	0.00	A
	-528.93	S	-14.05	U	-0.05	AC	0.00	A
70.0					-0.05	AC	0.00	A
	-550.95	S	-14.83	U	-0.04	AC	0.00	A
60.0					-0.14	A	0.00	A
	-573.56	S	-15.09	U	-0.35	AC	0.00	A
50.0					-1.40	S	0.00	s
	-595.97	S	-15.74	U	-1.24	U	0.00	n
40.0					-0.11	AC	0.00	s
	-621.51	S	-16.75	U	0.00	A		
33.3								
	-623.19	S	-21.59	U				
20.0								
	-666.48	S	-17.51	U				
13.3								
	-668.39	S	-21.98	U				
0.0					0.00	A	0.00	A

MAXIMUM INDIVIDUAL FOUNDATION LOADS: (kip)

LOAD--COMPONENTS-----				TOTAL SHEAR
NORTH	EAST	DOWN	UPLIFT	
67.27	S	54.11	e	696.14 S -601.50 k 67.27 S

MAXIMUM TOTAL LOADS ON FOUNDATION : (kip & kip-ft)

HORIZONTAL-----			DOWN	OVERTURNING-----			TORSION
NORTH	EAST	TOTAL @ 0.0		NORTH	EAST	TOTAL @ 0.0	
111.5	94.5	111.5	276.1	17698.9	-14725.8	17698.9	104.5
S	AL	S	BL	S	J	S	AR

MAT FOUNDATION DESIGN BY SABRE TOWERS & POLES

Tower Description 335' S3TL Series HD1
 Customer MUNICIPAL COMMUNICATIONS LLC
 Project Number 39163
 Date 1/13/2011
 Engineer REB

Overall Loads:

Factored Moment (ft-kips)	17698.93
Factored Axial (kips)	110.64
Factored Shear (kips)	111.53

Anchor Bolt Count (per leg)

6

Individual Leg Loads:

Factored Uplift (kips)	601.5
Factored Download (kips)	696.14
Factored Shear (kips)	67.27

Tower eccentric from mat (ft)= 2.5

Width of Tower (ft)	31
Ultimate Bearing Pressure	8
Bearing Φ_s	0.75
Overturning Φ_s	0.75
Bearing Design Strength (ksf)	6
Water Table Below Grade (ft)	31
Width of Mat (ft)	39.5
Thickness of Mat (ft)	1.5
Depth to Bottom of Slab (ft)	6.5
Bolt Circle Diameter (in)	18
Top of Concrete to Top of Bottom Threads (in)	65.5
Diameter of Pier (ft)	5.5
Ht. of Pier Above Ground (ft)	0.5
Ht. of Pier Below Ground (ft)	5
Quantity of Bars in Mat	66
Bar Diameter in Mat (in)	1
Area of Bars in Mat (in^2)	51.84
Spacing of Bars in Mat (in)	7.18
Quantity of Bars Pier	30
Bar Diameter in Pier (in)	0.875
Tie Bar Diameter in Pier (in)	0.5
Spacing of Ties (in)	12
Area of Bars in Pier (in^2)	18.04
Spacing of Bars in Pier (in)	6.09
f_c (ksi)	4.5
f_y (ksi)	60
Unit Wt. of Soil (kcf)	0.115
Unit Wt. of Concrete (kcf)	0.15
Volume of Concrete (yd^3)	101.20

Max. Factored Net Bearing Pressure (ksf) 3.11

Minimum Mat Width (ft) 38.83

Minimum Pier Diameter (ft) 3.00
 Equivalent Square b (ft) 4.87

Recommended Spacing (in) 6 to 12

Minimum Pier A_s (in^2) 17.11
 Recommended Spacing (in) 6 to 12

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MAT FOUNDATION DESIGN BY SABRE TOWERS & POLES (CONTINUED)

Two-Way Shear:

Average d (in)

14

ϕV_o (kips)

727.0

V_u (kips)

696.1

$$\phi V_c = \phi(2 + 4/\beta_c) f_c^{1/2} b_o d$$

1090.4

$$\phi V_c = \phi(\alpha_s d/b_o + 2) f_c^{1/2} b_o d$$

810.5

$$\phi V_c = \phi 4 f_c^{1/2} b_o d$$

727.0

Shear perimeter, b_o (in)

227.66

β_c

1

Stability:

Resisting moment

26083.36

Overturning Design Strength (ft-k)

19562.5

Factored Overturning Moment (ft-k)

18479.6

One-Way Shear:

ϕV_c (kips)

756.8

V_u (kips)

560.4

Pier Design:

Design Tensile Strength (kips)

974.1

T_u (kips)

601.5

ϕV_n (kips)

257.7

V_u (kips)

67.3

$$\phi V_c = \phi 2(1+N_u/(500A_g)) f_c^{1/2} b_w d$$

257.7

V_s (kips)

0.0

*** V_s max = $4 f_c^{1/2} b_w d$ (kips)

935.1

Maximum Spacing (in)

7.10

(Only if Shear Ties are Required)

Actual Hook Development (in)

13.00

Req'd Hook Development l_{dh} (in)

10.96

*** Ref. ACI 11.5.5 & 11.5.6.3

Anchor Bolt Pull-Out:

$$\phi P_c = \phi \lambda (2/3) f_c^{1/2} (2.8 A_{SLOPE} + 4 A_{FLAT})$$

515.4

P_u (kips)

601.5

Pier Rebar Development Length (in)

42.44

Required Length of Development (in)

24.16

Flexure in Slab:

ϕM_n (ft-kips)

3065.6

M_u (ft-kips)

2945.1

a (in)

1.72

Steel Ratio

0.00781

β_1

0.825

Maximum Steel Ratio (.75 p_b)

0.0233

Minimum Steel Ratio

0.0018

Rebar Development in Pad (in)

234.00

Required Development in Pad (in)

219.04

Condition	1 is OK, 0 Fails
Minimum Mat Width	1
Maximum Soil Bearing Pressure	1
Pier Area of Steel	1
Pier Shear	1
Two-Way Shear	1
Overturning	1
Anchor Bolt Pull-Out	1
Flexure	1
Steel Ratio	1
Length of Development in Pad	1
Interaction Diagram Visual Check	1
One-Way Shear	1
Hook Development	1
Minimum Mat Depth	1

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DRILLED STRAIGHT PIER DESIGN BY SABRE TOWERS & POLES

Tower Description 335' S3TL Series HD1
 Customer Name MUNICIPAL COMMUNICATIONS LLC
 Job Number 39163
 Date 1/13/2011
 Engineer REB

Factored Uplift (kips)
 Factored Download (kips)
 Factored Shear (kips)
 Ultimate Bearing Pressure
 Bearing ϕ_s
 Bearing Design Strength (ksf)
 Water Table Below Grade (ft)
 Bolt Circle Diameter (in)
 Top of Concrete to Top of Bottom Threads (in)
 Pier Diameter (ft)
 Ht. Above Ground (ft)
 Pier Length Below Ground (ft)
 Quantity of Bars
 Bar Diameter (in)
 Tie Bar Diameter (in)
 Spacing of Ties (in)
 Area of Bars (in^2)
 Spacing of Bars (in)
 f_c (ksi)
 f_y (ksi)

601.5
696.14
67.27
8
0.75
6
31
18

Anchor Bolt Count (per leg)

6

Unit Wt. of Concrete (kcf)
 Download Friction ϕ_s
 Uplift Friction ϕ_s
 Volume of Concrete (yd^3)
 Skin Friction Factor for Uplift
 Ignore Bottom Length in Download?

65.5
6
0.5
38
26
1
0.5
12
20.42
7.73
4
60
0.15
0.75
0.75
40.32

Minimum Pier Diameter (ft)

3.00

Minimum Area of Steel (in^2)

20.36

Depth at Bottom of Layer (ft)	Ult. Skin Friction (ksf)	(Ult. Skin Friction)*(Uplift Factor)	γ (kcf)
10	0.50	0.50	0.11
25	0.90	0.90	0.11
40	1.60	1.60	0.11
0	0.00	0.00	0
0	0.00	0.00	0
0	0.00	0.00	0
0	0.00	0.00	0
0	0.00	0.00	0
0	0.00	0.00	0

Download:

Factored Net Weight of Concrete (kips)
 Bearing Design Strength (kips)
 Skin Friction Design Strength (kips)
 Download Design Strength (kips)

2.5
169.6
555.6
725.2

Factored Net Download (kips)

698.7

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DRILLED STRAIGHT PIER DESIGN BY SABRE TOWERS & POLES (CONTINUED)

Uplift:

Nominal Skin Friction (kips)	740.8		
W _c , Weight of Concrete (kips)	150.9		
W _R , Soil Resistance (kips)	2866.0		
Φ _s (W _r +W _c) (kips)	2262.7		
Uplift Design Strength (kips)	668.8	Factored Uplift (kips)	601.5

Pier Design:

Design Tensile Strength (kips)	1102.7	T _u (kips)	601.5
ΦV _n (kips)	314.1	V _u (kips)	67.3
ΦV _c =Φ2(1+N _u /(500A _g))f _c ^{1/2} b _w d (kips)	314.1	*** V _s max = 4 f _c ^{1/2} b _w d (kips)	1049.2
V _s (kips)	0.0	(Only if Shear Ties are Required)	
Maximum Spacing (in)	6.54	*** Ref. ACI 11.5.5 & 11.5.6.3	

Anchor Bolt Pull-Out:

ΦP _c =Φλ(2/3)f _c ^{1/2} (2.8A _{SLOPE} +4A _{FLAT})	578.2	P _u (kips)	601.5
Rebar Development Length (in)	39.50	Required Length of Development (in)	25.87

Condition	1 is OK, 0 Fails
Download	1
Uplift	1
Area of Steel	1
Shear	1
Anchor Bolt Pull-Out	1
Interaction Diagram Visual Check	1