PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street · Suite 600 · Columbus, Ohio 43215

STRUCTURAL ANALYSIS REPORT

PJF Project Number: A39414-0002 R1

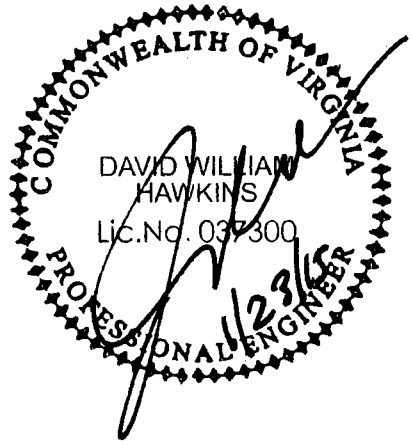
ROOFTOP TOWER AND ANTENNAS SUPPORT
525 TAYLOR STREET
LYNCHBURG, VA

SITE NAME: FILTRATION PLANT

PREPARED FOR:
RCC CONSULTANTS, INC.
4900 COX ROAD, SUITE 235
FOREST, VA 24551

January 22, 2015

ANALYZED BY:
JOHN SCHUELER, P.E.
PROJECT MANAGER
jschueler@pjfweb.com



DESIGN STANDARD:

Paul J. Ford and Company has been requested to establish design criteria for a new rooftop tower, design the tower support base and evaluate the building structure directly supporting the proposed tower loads. The structural analysis is in accordance with the 2012 Virginia Building Code (IBC 2012) and ANSI/TIA-222-G for the following design loads:

90 mph 3-second gust of wind without ice
30 mph 3-Second Gust of Wind with ¾" radial ice
Structure Class III
Topographic Category 1
Exposure Category "C"
Roof Snow Load 20 psf

ANTENNA LOADS:

The existing and proposed antennas will be supported by a new tower on the Penthouse Roof.

TABLE 1 – ANTENNA INFORMATION

ANTENNA CENTERLINE ELEVATION *	STATUS	NUMBER	ANTENNA MODEL
48′	PROPOSED	1	5/8" X 16' LIGHTNING ROD
42′	PROPOSED	1	BMR12 AND (1) 7/8" COAX
23.5′	PROPOSED	1	BMR10 AND (1) 1-5/8" COAX
16′	PROPOSED	1	TTA AND (1) 1/2" COAX
13′	PROPOSED	1	6' STD DISH W/O RADOME AND (1) E65
13′	EXISTING	1	18" HP DISH W/RADOME AND (1) 1-5/8" COAX
11′	EXISTING	1	18" HP DISH W/RADOME AND (1) 1-5/8" COAX
7′	EXISTING	1	4' STD DISH W/O RADOME AND (1) E65

* ELEVATIONS LISTED ARE FROM THE BASE OF THE TOWER. ROOFTOP ELEVATION IS 112′-0"

PROPOSED TOWER:

The existing tower on the Penthouse Roof will be removed. A new self support tower shall be designed and provided by a qualified tower manufacturer in accordance with the Telecommunications Industry Association Standard "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures" ANSI/TIA-222-G.

The proposed tower will be directly supported by new steel framing specified in the attached drawings by Paul J. Ford and Company dated 1/22/2015.

BUILDING FRAMING AT ANTENNA MOUNTS:

The existing penthouse roof framing consists of a 9" thick cast-in-place concrete slab. This slab was originally designed to support a police radio tower and has (3) 12"x21" concrete piers projecting above the slab. Our analysis and modifications are based upon the original structural drawings by Wiley & Wilson Consulting Engineers are dated June 1955.

RESULTS:

Our review and analysis of the existing building and proposed steel base supporting the proposed telecommunications tower has been performed using the following assumptions:

- The attached "Standard Conditions" have been verified and met. See Page 4.
- The proposed self support tower will be designed by the tower manufacturer.
- The tower manufacturer will submit design reactions for all load cases to Paul J. Ford and Company prior to fabrication.
- The building was constructed in accordance with the original structural drawings and has not been modified.

The results of our analysis are summarized below in Table 2.

TABLE 2 – SUMMARY OF STRUCTURAL ANALYSIS RESULTS

AREA	APPURTENANCE	RESULTS
PENTHOUSE ROOF AT TOWER	STEEL SUPPORT FRAME	PASS
	CONCRETE ROOF SLAB	PASS

This report indicates that the existing structure is adequate to support the proposed loading. We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and RCC Consulting, Inc. If you have any questions or need further assistance on this or any other projects, please give us a call.

Sincerely,
PAUL J. FORD AND COMPANY

John Schueler, P.E.
Project Manager

Attachment(s): Standard Conditions – 1 Page Total
Structural Calculations –10 Pages Total

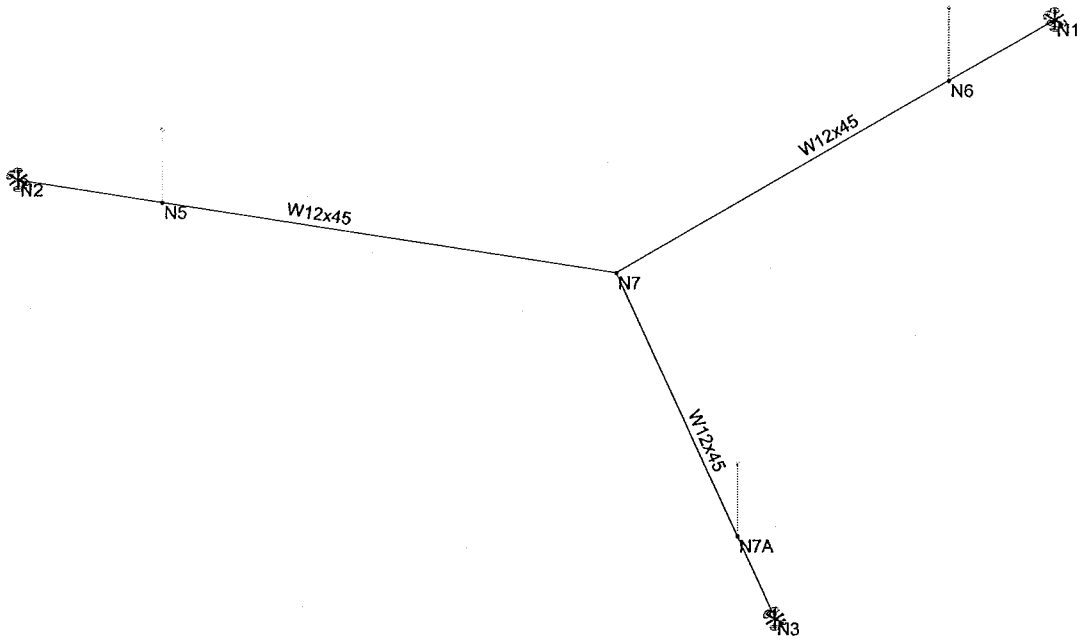
STANDARD CONDITIONS FOR FURNISHING OF PROFESSIONAL ENGINEERING SERVICES ON EXISTING STRUCTURES BY PAUL J. FORD AND COMPANY

1) All existing conditions, dimensions, and elevations shall be field verified before proceeding with the work. Should any discrepancies be encountered, PJF shall be contacted immediately to evaluate the significance of the deviation.

2) At the time of our site visit, no damaged, missing, or rusted members were observed. Therefore, no allowance was made for any damaged, missing, or rusted members. Given this information, our analysis assumes no physical deterioration has occurred in any of the structural components of the structure and that all the members have the same load carrying capacity as the day the structure was erected.

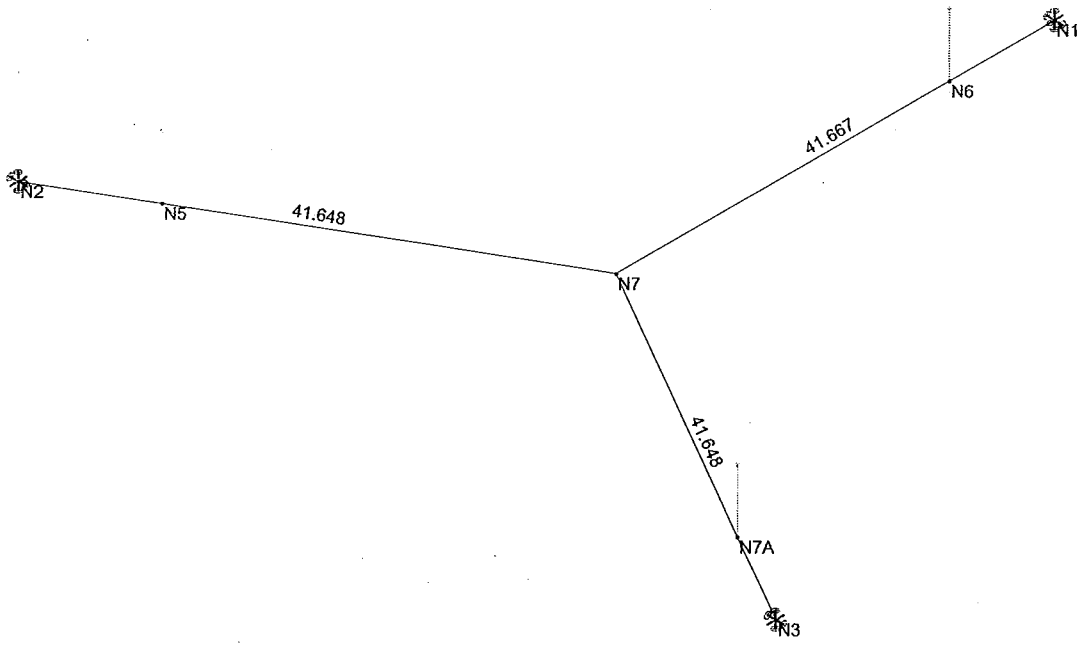
3) Even though a site visit was performed, the evaluation of the existing building structure was limited to those structural components directly supporting the proposed antennas and corresponding appurtenances.

4) The roof top structure under review has been analyzed for the minimum wind and ice loading in accordance with the governing building code as stated herein. Should a higher wind or ice loading need to be considered in the structural analysis, it is the responsibility of the owner to provide.



Results for LC 1, DL + Wind 90 MPH

Paul J Ford and Company	Lynchburg, VA	SK - 1
JMS		Jan 23, 2015 at 11:16 AM
39414-0002 R1		39414-0002 R1.R3D



Member Length (in) Displayed
Results for LC 1, DL + Wind 90 MPH

Paul J Ford and Company	Lynchburg, VA	SK - 2
JMS		Jan 23, 2015 at 11:16 AM
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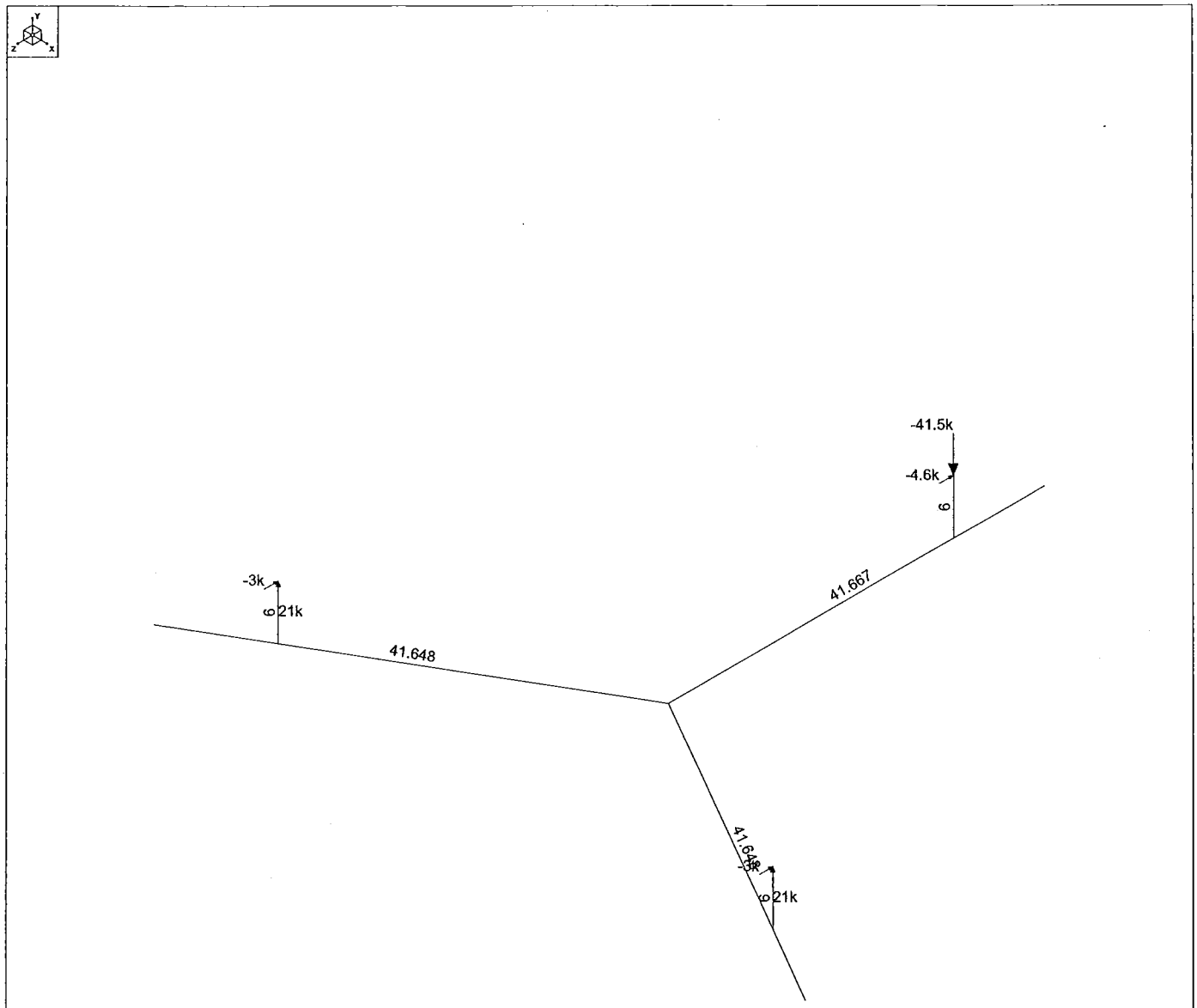
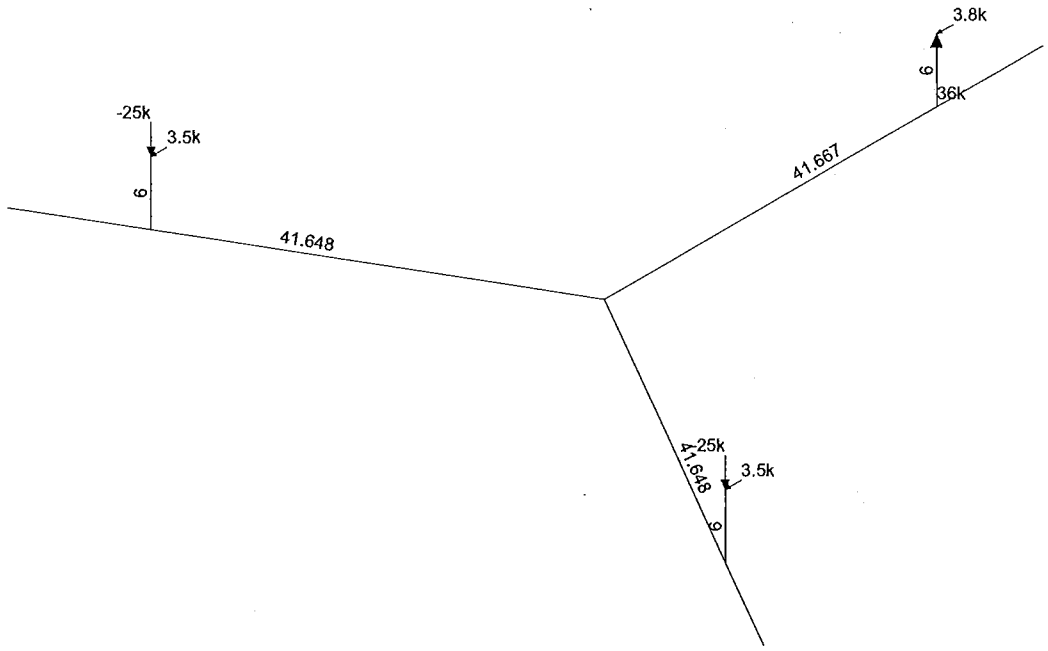


Member Length (in) Displayed
Loads: BLC 2, + Wind 90 MPH (factored)
Results for LC 1, DL + Wind 90 MPH

Paul J Ford and Company	Lynchburg, VA	SK - 3
JMS		Jan 23, 2015 at 12:13 PM
39414-0002 R1		39414-0002 R1.R3D



Member Length (in) Displayed
Loads: BLC 3, - Wind 90 MPH (factored)
Results for LC 1, DL + Wind 90 MPH

Paul J Ford and Company	Lynchburg, VA	SK - 4
JMS		Jan 23, 2015 at 11:17 AM
39414-0002 R1		39414-0002 R1.R3D

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Increase Nailing Capacity for Wind?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automaticly Iterate Stiffness for Walls?	Yes
Maximum Iteration Number for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 13th(360-05): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 13th(360-05): LRFD
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	None
Aluminum Code	None - Building

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

Global, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct Z	.02
Ct X	.02
T Z (sec)	Not Entered
T X (sec)	Not Entered
R Z	3
R X	3
Ct Exp. Z	.75
Ct Exp. X	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Seismic Detailing Code	ASCE 7-05
Om Z	1
Om X	1
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.4	58	1.3
6	A53 Gr. B (35 ksi)	29000	11154	.3	.65	.49	35	1.5	60	1.2

Member Primary Data

	Label	I Joint	J Joi...	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design R...
1	M5	N3	N7			A	None	None	A572 Gr.50	Typical
2	M6	N2	N7			A	None	None	A572 Gr.50	Typical
3	M7	N1	N7			A	None	None	A572 Gr.50	Typical
4	M4	N8	N5			RIGID	None	None	RIGID	Typical
5	M5A	N9	N6			RIGID	None	None	RIGID	Typical
6	M6A	N10	N7A			RIGID	None	None	RIGID	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	TOM	Inactive	Seismic Desig...
1	M5	BenPIN					Yes			None
2	M6	BenPIN					Yes			None
3	M7	BenPIN					Yes			None
4	M4						Yes			None
5	M5A						Yes			None
6	M6A						Yes			None

Basic Load Cases

	BLC Description	Category	X Gr...	Y Gr...	Z Gr...	Joint	Point	Distributed	Area(Me...	Surface(Plate...
1	Dead	None		-1.1						
2	+ Wind 90 MPH (factored)	None				12				
3	- Wind 90 MPH (factored)	None				12				

Load Combinations

	Description	Solve	PDelta	SR...	BLC	Fact...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	DL + Wind 90 MPH	Yes	Y		1	1	2	1														
2	DL - Wind 90 MPH	Yes	Y		1	1	3	1														

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[lb-...	LC	y-y Moment[...	LC	z-z Moment...	LC
1	M5	1	m...	2.382	2	20.938	2	1.98	2	0	1	0	1	0	1
2			min	-2.148	1	-16.288	1	-1.698	1	0	1	0	1	0	1
3		2	m...	.631	2	4.668	1	.899	1	1009.123	1	1614.063	2	12678.539	1
4			min	-.647	1	-4.106	2	-1.051	2	-2290.124	2	-1384.219	1	-16418.392	2
5		3	m...	.631	2	4.626	1	.899	1	1009.123	1	702.318	2	8646.517	1
6			min	-.647	1	-4.149	2	-1.051	2	-2290.124	2	-603.926	1	-12837.058	2
7		4	m...	.631	2	4.583	1	.899	1	1009.123	1	176.366	1	4651.411	1
8			min	-.647	1	-4.191	2	-1.051	2	-2290.124	2	-209.427	2	-9218.806	2
9		5	m...	.631	2	4.541	1	.899	1	1009.123	1	956.659	1	693.214	1
10			min	-.647	1	-4.234	2	-1.051	2	-2290.124	2	-1121.173	2	-5563.646	2
11	M6	1	m...	2.382	2	20.938	2	1.698	1	0	1	0	1	0	1
12			min	-2.148	1	-16.288	1	-1.98	2	0	1	0	1	0	1
13		2	m...	.631	2	4.668	1	1.051	2	2290.124	2	1384.219	1	12678.539	1
14			min	-.647	1	-4.106	2	-.899	1	-1009.123	1	-1614.063	2	-16418.392	2
15		3	m...	.631	2	4.626	1	1.051	2	2290.124	2	603.926	1	8646.517	1
16			min	-.647	1	-4.149	2	-.899	1	-1009.123	1	-702.318	2	-12837.058	2
17		4	m...	.631	2	4.583	1	1.051	2	2290.124	2	209.427	2	4651.411	1
18			min	-.647	1	-4.191	2	-.899	1	-1009.123	1	-176.366	1	-9218.806	2
19		5	m...	.631	2	4.541	1	1.051	2	2290.124	2	1121.173	2	693.214	1
20			min	-.647	1	-4.234	2	-.899	1	-1009.123	1	-956.659	1	-5563.646	2
21	M7	1	m...	5.51	1	32.595	1	0	1	0	1	0	1	0	1
22			min	-4.989	2	-27.358	2	0	1	0	1	0	1	0	1
23		2	m...	.91	1	8.595	2	0	1	0	1	0	1	20616.253	2
24			min	-1.189	2	-8.954	1	0	1	0	1	0	1	-24538.368	1
25		3	m...	.91	1	8.552	2	0	1	0	1	0	1	13173.831	2
26			min	-1.189	2	-8.997	1	0	1	0	1	0	1	-16747.212	1
27		4	m...	.91	1	8.51	2	0	1	0	1	0	1	5768.36	2
28			min	-1.189	2	-9.039	1	0	1	0	1	0	1	-8919.106	1
29		5	m...	.91	1	8.467	2	0	1	0	1	0	1	-1054.057	1
30			min	-1.189	2	-9.082	1	0	1	0	1	0	1	-1600.169	2
31	M4	1	m...	25	2	-.292	1	2.499	1	0	1	0	1	0	2
32			min	-21	1	-.781	2	-4.839	2	0	1	0	2	0	1
33		2	m...	25	2	-.292	1	2.499	1	0	1	312.421	1	97.583	2
34			min	-21	1	-.781	2	-4.839	2	0	1	-604.829	2	36.469	1
35		3	m...	25	2	-.292	1	2.499	1	0	1	624.842	1	195.166	2
36			min	-21	1	-.781	2	-4.839	2	0	1	-1209.657	2	72.937	1
37		4	m...	25	2	-.292	1	2.499	1	0	1	937.263	1	292.75	2
38			min	-21	1	-.781	2	-4.839	2	0	1	-1814.486	2	109.406	1
39		5	m...	25	2	-.292	1	2.499	1	0	1	1249.684	1	390.333	2
40			min	-21	1	-.781	2	-4.839	2	0	1	-2419.315	2	145.875	1
41	M5A	1	m...	41.5	1	0	1	4.592	1	0	1	0	1	0	1
42			min	-36	2	0	1	-3.801	2	0	1	0	1	0	1
43		2	m...	41.5	1	0	1	4.592	1	0	1	574.01	1	0	1
44			min	-36	2	0	1	-3.801	2	0	1	-475.164	2	0	1
45		3	m...	41.5	1	0	1	4.592	1	0	1	1148.021	1	0	1
46			min	-36	2	0	1	-3.801	2	0	1	-950.328	2	0	1
47		4	m...	41.5	1	0	1	4.592	1	0	1	1722.031	1	0	1
48			min	-36	2	0	1	-3.801	2	0	1	-1425.492	2	0	1
49		5	m...	41.5	1	0	1	4.592	1	0	1	2296.042	1	0	1
50			min	-36	2	0	1	-3.801	2	0	1	-1900.655	2	0	1
51	M6A	1	m...	25	2	.781	2	2.499	1	0	1	0	1	0	2
52			min	-21	1	.292	1	-4.839	2	0	1	0	2	0	1
53		2	m...	25	2	.781	2	2.499	1	0	1	312.421	1	-36.469	1
54			min	-21	1	.292	1	-4.839	2	0	1	-604.829	2	-97.583	2
55		3	m...	25	2	.781	2	2.499	1	0	1	624.842	1	-72.937	1
56			min	-21	1	.292	1	-4.839	2	0	1	-1209.657	2	-195.166	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[lb-...	LC	y-y Moment[...	LC	z-z Moment...	LC
57		4	m...	25	2	.781	2	2.499	1	0	1	937.263	1	-109.406	1
58			min	-21	1	.292	1	-4.839	2	0	1	-1814.486	2	-292.749	2
59		5	m...	25	2	.781	2	2.499	1	0	1	1249.684	1	-145.875	1
60			min	-21	1	.292	1	-4.839	2	0	1	-2419.314	2	-390.333	2

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N1	max	0	2	32.589	1	5.51	1	0	1	0	1	0	1
2		min	0	1	-27.362	2	-4.989	2	0	1	0	1	0	1
3	N2	max	1.072	2	20.936	2	2.545	1	0	2	0	1	0	1
4		min	-1.01	1	-16.289	1	-2.906	2	0	1	0	1	0	1
5	N3	max	1.01	1	20.936	2	2.545	1	0	2	0	1	0	1
6		min	-1.072	2	-16.289	1	-2.906	2	0	1	0	1	0	1
7	Totals:	max	0	2	14.511	2	10.6	1						
8		min	0	1	.011	1	-10.8	2						

Envelope AISC 13th(360-05): LRFD Steel Code Checks

	Mem...	Shape	Code Check	Loc[in]	LC	Shear C...	Loc[in]	Dir	LC	phi*Pn...	phi*Pnt...	phi*Mn ...	phi*Mn ...	Cb	Eqn
1	M5	W12x45	.097	9.978	2	.469	10.412	z	2	570.234	589.5	71250	240750	1.266	H1...
2	M6	W12x45	.097	9.978	2	.469	10.412	z	2	570.234	589.5	71250	240750	1.266	H1...
3	M7	W12x45	.117	9.983	1	.268	0	y	1	570.217	589.5	71250	240750	1.441	H1...

Concrete Beam

Description : Existing Penthouse Slab

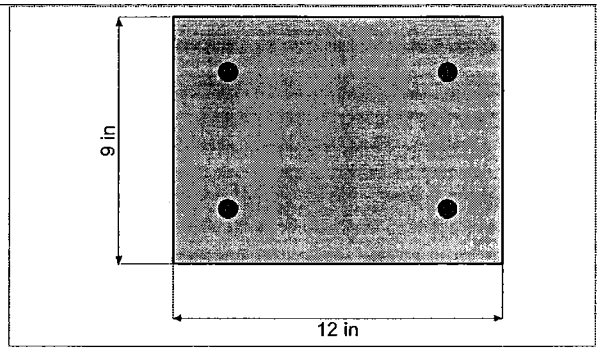
CODE REFERENCES

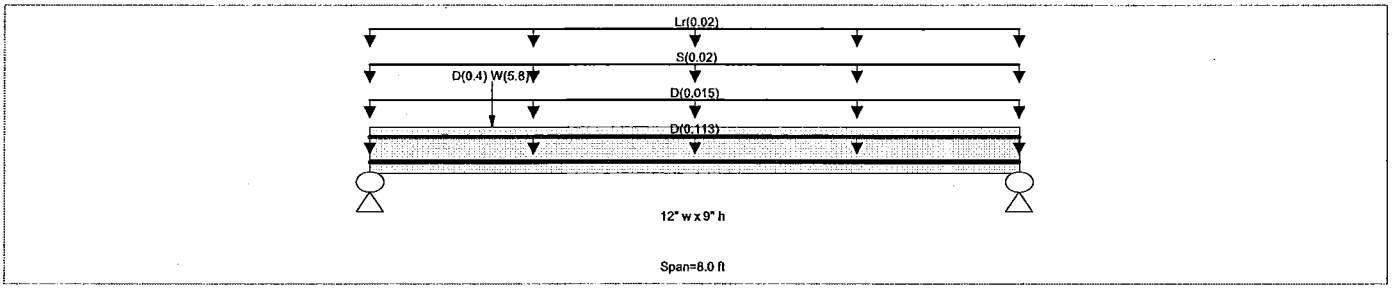
Calculations per ACI 318-08, IBC 2009, ASCE 7-10
Load Combination Set : ASCE 7-05

Material Properties

f'c	= 3.0 ksi	ϕ Phi Values	Flexure :	0.90	
fr = f'c$^{1/2}$ * 7.50	= 410.792 psi		Shear :	0.750	
ψ Density	= 145.0 pcf	β_1	=	0.850	
λ LtWt Factor	= 1.0				
Elastic Modulus	= 3,122.0 ksi	Fy - Stirrups		40.0 ksi	
fy - Main Rebar	= 60.0 ksi	E - Stirrups	=	29,000.0 ksi	
E - Main Rebar	= 29,000.0 ksi	Stirrup Bar Size #	=	# 3	
		Number of Resisting Legs Per Stirrup	=	2	

Load Combination ASCE 7-05





Cross Section & Reinforcing Details

Rectangular Section, Width = 12.0 in, Height = 9.0 in
Span #1 Reinforcing....
2-#6 at 2.0 in from Bottom, from 0.0 to 8.0 ft in this span
2-#6 at 2.0 in from Top, from 0.0 to 8.0 ft in this span

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1
Uniform Load : D = 0.1130 k/ft, Tributary Width = 1.0 ft, (Dead Load - Slab DL)
Uniform Load : D = 0.0150 k/ft, Tributary Width = 1.0 ft, (Dead Load - Roofing, Insul, etc)
Uniform Load : S = 0.020 k/ft, Tributary Width = 1.0 ft, (Snow)
Uniform Load : Lr = 0.020 k/ft, Tributary Width = 1.0 ft, (Roof Live Load)
Point Load : D = 0.40, W = 5.80 k @ 1.50 ft, (Tower Leg)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.522** : 1	Maximum Deflection			
Section used for this span	**Typical Section**	Max Downward L+Lr+S Deflection	0.022 in	Ratio =	4370
Mu : Applied	12.677 k-ft	Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Mn * Phi : Allowable	24.294 k-ft	Max Downward Total Deflection	0.047 in	Ratio =	2051
Load Combination	+1.20D+0.50Lr+0.50L+1.60W	Max Upward Total Deflection	0.000 in	Ratio =	999
Location of maximum on span	1.511ft				
Span # where maximum occurs	Span # 1				

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	5.549	1.675
Overall MINimum	0.080	0.080
+D	0.837	0.587
+D+L+H	0.837	0.587
+D+Lr+H	0.917	0.667
+D+S+H	0.917	0.667
+D+0.750Lr+0.750L+H	0.897	0.647
+D+0.750L+0.750S+H	0.897	0.647
+D+W+H	5.549	1.675
+D+0.70E+H	0.837	0.587
+D+0.750Lr+0.750L+0.750W+H	4.431	1.463

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Reaction on Slab

$P_{y\,MAX} = 33^K$ Factored

$P_{DL} = 0.17^K + \frac{1.9^K}{3}\left(\frac{1}{1.2}\right) = 0.7^K$ use 1^K

$1.2\,P_{DL} + 1.6\,P_{WIND} = 33^K$

$P_{WIND} = 20^K$

Estimate effective slab width @ piers

Pier width = 1.5' Use 3.5'

Loads on 1' STRIP:

$P_{DL} = 1^K / 3.5' = 0.3^K$

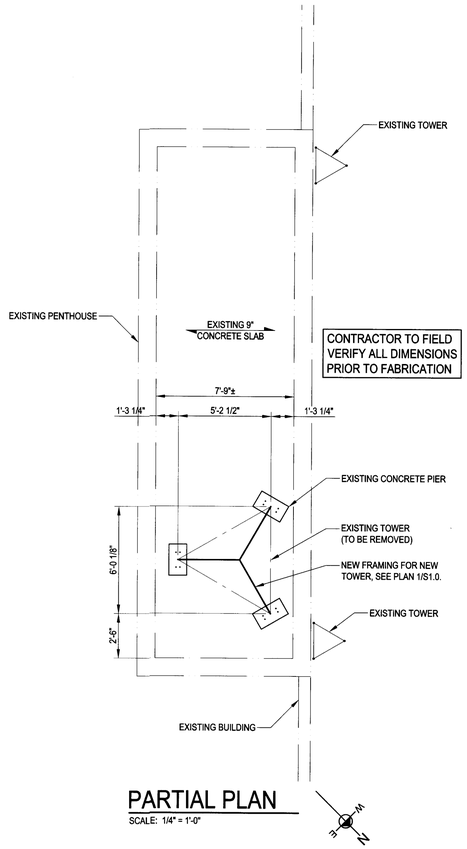
$P_{WIND} = \frac{20^K}{3.5'} = 5.8^K$

Check Slab Shear

$\phi V_c = (.85)(2)(\sqrt{3000})(12)(7.5")(1/1000)$

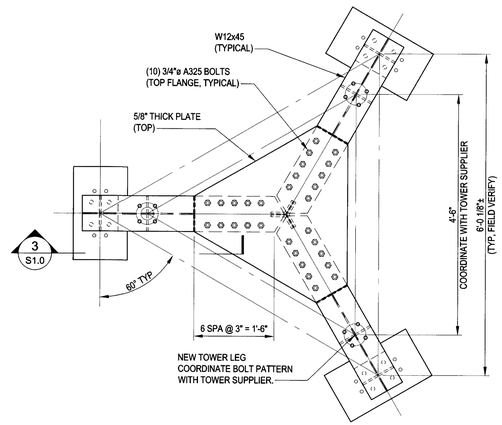
$= 8.4^K$

$V_u = 8.6^K$ $\frac{V_u}{\phi V_c} = 102.4\%$ OK @ 3000psi assumed



PARTIAL PLAN

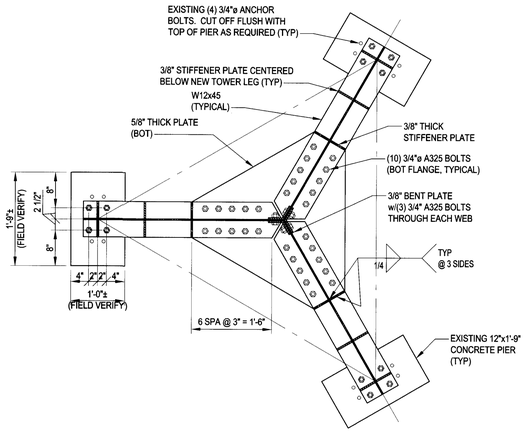
SCALE: 1/4" = 1'-0"



PLAN (TOP PLATE)

SCALE: 3/4" = 1'-0"

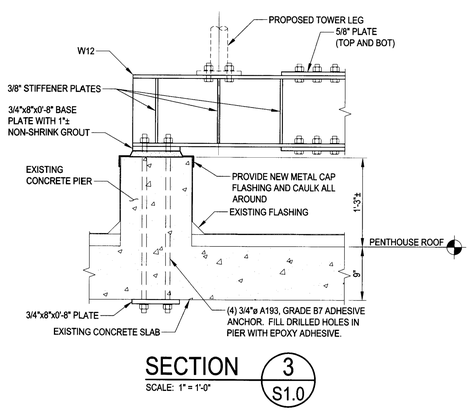
1 S1.0



PLAN (BOTTOM PLATE)

SCALE: 3/4" = 1'-0"

2 S1.0



SECTION

SCALE: 1" = 1'-0"

3 S1.0

GENERAL NOTES:

1. THE TOWER MANUFACTURER SHALL DESIGN A NEW SELF SUPPORT TOWER IN ACCORDANCE WITH THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION STANDARD "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES" ANSI/TIA-222-G AS REQUIRED BY THE VIRGINIA 2012 UNIFORM STATEWIDE CODE (2012 IBC) FOR THE FOLLOWING DESIGN CRITERIA:

   90 MPH NOMINAL 3-SECOND WIND GUST
   30 MPH NOMINAL 3-SECOND WIND GUST WITH 0.75" ICE
   60 MPH 3-SECOND WIND GUST SERVICE WIND
   WIND EXPOSURE CATEGORY "C"
   STRUCTURE CLASS III
   TOPOGRAPHIC CATEGORY 1 WITH A CREST HEIGHT OF 0 FT
   SEISMIC DESIGN PARAMETERS:
   S_S: 0.174 G
   S_1: 0.070 G
   F_A: 1.60
   F_V: 2.40
   ROOF DESIGN LIVE LOAD = 20 PSF
   ROOF SNOW LOAD = 20 PSF

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ANTENNA LIST

ELEV.	QTY	ANTENNA	COAX
48'	1	5/8" x 16' LIGHTNING ROD	
42'	1	BMR12	(1) 7/8"
23'-6"	1	BMR10	(1) 1 5/8"
16'	1	TTA	(1) 1/2"
13'	1	6' STD DISH w/o RADOME	(1) E65
13'	1	18" HP DISH w/RADOME	(1) 1 5/8"
11'	1	18" HP DISH w/RADOME	(1) 1 5/8"
7'	1	4' STD DISH w/o RADOME	(1) E65

NOTE: ELEVATIONS LISTED ARE FROM THE BASE OF TOWER.
OVERALL TOWER HEIGHT = 40'-0"
ROOFTOP ELEVATION = 112'-0"

2. ERECTION TOLERANCES SHALL BE AS SPECIFIED BY THE TIA STANDARD.

3. ALL LEG FLANGE BOLTS, EXCEPT ANCHOR RODS, SHALL BE FULLY PRETENSIONED IN ACCORDANCE WITH AISC'S "TURN-OF-NUT" METHOD. ALL OTHER BOLTS SHALL BE TORQUED TO THE SNUG-TIGHT CONDITION AS DEFINED BY AISC.

4. TOWER LIGHTING, LIGHTNING PROTECTION AND GROUNDING TO BE PROVIDED BY THE CONTRACTOR.

5. THIS DRAWING DOES NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION METHODS, MEANS, TECHNIQUES, SEQUENCES AND PROCEDURES. THE STRUCTURE IS DESIGNED TO BE STABLE AND SELF-SUPPORTING AT THE COMPLETION OF CONSTRUCTION. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE THE ERECTION PROCEDURE AND SEQUENCE TO INSURE THE STABILITY AND SAFETY OF THE BUILDING AND ITS COMPONENT PARTS, AND THE ADEQUACY OF TEMPORARY OR INCOMPLETE CONNECTIONS DURING CONSTRUCTION. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIEDOWNS THAT MAY BE NECESSARY. SUCH MATERIAL IS NOT INDICATED ON THE DRAWINGS AND, IF PROVIDED, SHALL BE REMOVED AND REMAIN THE PROPERTY OF THE CONTRACTOR AS CONDITIONS PERMIT.

6. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PROGRAMS AND PRECAUTIONS IN CONNECTION WITH THE WORK.

7. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND ELEVATIONS BEFORE PROCEEDING WITH THE WORK. ANY DISCREPANCIES BETWEEN THE CONTRACT DOCUMENTS AND THE ACTUAL FIELD CONDITIONS MUST BE REPORTED IMMEDIATELY TO THE OWNER.

8. ALL MATERIALS AND EQUIPMENT FURNISHED WILL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.

1

9. PRIOR TO FABRICATION, TOWER MANUFACTURER SHALL SUBMIT FINAL REACTIONS FOR EACH LOAD CASE TO PAUL J. FORD AND COMPANY FOR COORDINATION OF BASE FRAMING DESIGN. FRAMING WAS DESIGNED TO SUPPORT THE FOLLOWING TOWER BASE REACTIONS (FACTORED):
   OVERTURNING MOMENT = 158 FT-KIPS
   BASE SHEAR = 7.5 KIPS
   MAXIMUM TOWER LEG LOADS AT BASE:
   SHEAR = 4.6 k
   COMPRESSION = 41.5 k
   UPLIFT = 36 k

10. AT OWNERS REQUEST, PROVIDE TUF TUG SAFETY CABLE TYPE SYSTEM.

11. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES, WHICH ARE FURNISHED BY OTHERS. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.

STEEL NOTES:

1. ALL STEEL SHALL CONFORM TO THE FOLLOWING:
   a. SOLID RODS: ASTM A572 GR 50 (50 KSI YIELD POINT MATERIAL)
   b. FLANGE PLATES AND STEEL PLATES: ASTM A572 GR 50 (50 KSI YIELD POINT MATERIAL)
   c. WIDE FLANGE BEAMS: ASTM A992 (50 KSI YIELD POINT MATERIAL)
   d. ALL OTHER STEEL SHAPES: ASTM A36 (36 KSI YIELD POINT MATERIAL)
   e. STRUCTURAL BOLTS: ASTM A325

2. STRUCTURAL STEEL SHALL CONFORM TO THE AISC "SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS", DATED JUNE 22, 2010.

3. BOLTS AND BOLTED CONNECTIONS SHALL CONFORM TO THE REQUIREMENTS OF THE "SPECIFICATIONS FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS" AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS ADOPTED DECEMBER 31, 2009. BOLTS IN BEARING TYPE CONNECTIONS SHALL BE DETAILED WITH THREADS ALLOWED ACROSS THE SHEAR PLANE (A325N, A325 SC OR A490N). BOLTS IN MOMENT CONNECTIONS OF WIDE FLANGE BEAMS MUST BE PRETENSIONED USING AN APPROVED METHOD.

4. ALL BOLTS SHALL BE PROVIDED WITH LOCKING HARDWARE.

5. BOLTS SHALL BE GALVANIZED ACCORDING TO ASTM A153.

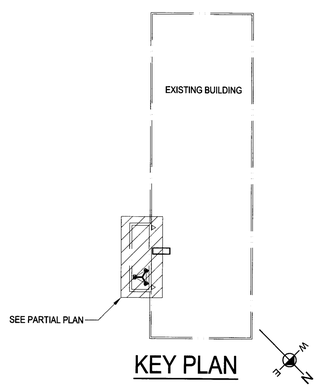
6. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY AWS D1.1 USING E70XX ELECTRODES.

7. ALL NEW STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123.

SPECIAL INSPECTION

PROVIDE SPECIAL INSPECTIONS FOR THE FOLLOWING ITEMS PER CHAPTER 17 OF THE 2012 IBC. THE APPROVED INDEPENDENT TESTING AGENCY'S INDIVIDUAL SPECIAL INSPECTOR SHALL DEMONSTRATE COMPETENCE FOR THE INSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION REQUIRING SPECIAL INSPECTION. THE SPECIAL INSPECTOR SHALL BRING NON-CONFORMING ITEMS TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR AND NOTE ALL SUCH ITEMS IN THE REPORTS. ANY UNRESOLVED ITEM ABOUT TO BE COVERED BY THE WORK SHALL BE BROUGHT TO THE OWNER'S CONSTRUCTION MANAGER'S ATTENTION IMMEDIATELY. THE SPECIAL INSPECTOR SHALL FURNISH REPORTS, TESTS, AND INSPECTIONS DIRECTLY TO THE BUILDING OFFICIAL, ENGINEER OF RECORD, AND THE OWNER'S AND CONTRACTOR'S CONSTRUCTION MANAGER. THE SPECIAL INSPECTOR SHALL SUBMIT A FINAL SIGNED REPORT STATING WHETHER THE WORK REQUIRING SPECIAL INSPECTION WAS, TO THE BEST OF THE INSPECTOR'S KNOWLEDGE, IN CONFORMANCE WITH THE APPROVED PLANS AND SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE SPECIAL INSPECTION AGENCY REGARDING INDIVIDUAL INSPECTIONS FOR ITEMS LISTED ON THE SCHEDULE AND AS NOTED ON THE BUILDING DEPARTMENT APPROVED PLANS. ADEQUATE NOTICE AND ACCESS TO APPROVED PLANS SHALL BE PROVIDED SO THAT THE SPECIAL INSPECTOR HAS TIME TO BECOME FAMILIAR WITH THE PROJECT.

1. STEEL
   a. SHOP FABRICATION OF STEEL MEMBERS SHALL BE INSPECTED IN ACCORDANCE WITH AISC 360-10 "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS" TABLES N5.4-1 THRU N5.4-3 FOR WELDED CONNECTIONS AND TABLES N5.6-1 THRU N5.6-3 FOR BOLTED CONNECTIONS (PER SECTION 1705.2). THE QUALITY ASSURANCE INSPECTOR NEED NOT PERFORM CONTINUOUS INSPECTIONS DURING THE WELDING PROVIDED THE WELDING PROCEDURE SPECIFICATIONS AND MANUFACTURER CERTIFICATIONS FOR WELDING CONSUMABLES ARE VERIFIED PRIOR TO THE START OF WORK. RANDOM OBSERVATIONS AT SUITABLE INTERVALS ARE TO BE MADE OF THE WORK IN PROGRESS. NONDESTRUCTIVE TESTING OF WELDED JOINTS SHALL BE COMPLETED IN ACCORDANCE WITH AISC360-10 SECTION N5.
   b. SPECIAL INSPECTIONS ARE NOT REQUIRED FOR WORK PERFORMED ON THE PREMISES OF A FABRICATOR APPROVED IN ACCORDANCE WITH SECTION 1704.2.5 OF THE IBC.



KEY PLAN

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COMMONWEALTH OF VIRGINIA
DAVID WILLIAM HAWKINS
Lic. No. 027800
PROFESSIONAL ENGINEER

PROPOSED ROOFTOP TOWER
FILTRATION PLANT
LYNCHBURG, VIRGINIA

MARK	DATE	DESCRIPTION
1	1/22/2015	CHANGED ANTENNA LIST; ADDED TOWER REACTIONS

PROJECT No:	39414-0002
DRAWN BY:	K.A.C.
DESIGNED BY:	J.M.S.
CHECKED BY:	B.W.S.
DATE:	1-14-2015

PLAN, DETAILS AND GENERAL NOTES

S1.0

ASM-140021.8.DWG