T-Mobile

15 Commerce Way
Suite B
Norton, MA 02766

STRUCTURAL ANALYSIS
CT11090A – GREENWICH / PUTNAM AVE 2

Address:
411 WEST PUTNAM AVENUE
GREENWICH, CT 06830

Date:
FEBRUARY 10, 2023

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil • Structural • Land Surveying

R.K. Executive Centre ■ 201 Boston Post Road West ■ Suite 101 ■ Marlborough, MA 01752
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CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil • Structural • Land Surveying

February 10, 2023

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15 Commerce Way
Suite B
Norton, MA 02766

Structural Analysis of Antenna and Equipment Loads

RE:

Site Number	CT11090A
Site Name	Greenwich / Putnam Ave 2
Site Address	411 West Putnam Avenue, Greenwich, CT 06830

To whom it may concern:

Chappell Engineering Associates, LLC has performed a structural analysis of the existing roof mounted ballast antenna frames at the above-referenced location. The analysis has been performed in accordance with the 2022 Connecticut State Building Code (International Building Code) with Connecticut Amendments. Based upon the site walk completed on 06-12-2020, the existing 3-sector site consists of a single elevated steel frame with equipment cabinets and three (3) roof mounted ballast antenna frames.

T-Mobile currently proposes to install one (1) Ericsson B160 Battery Cabinet and one (1) Ericsson 6160 Equipment Cabinet on the existing elevated steel equipment frame. The proposed cabinets will be located in the space reserved for future equipment as indicated in the table below. The total weight of the equipment cabinets being installed is 2,451lbs. The net change (-549lbs.) is a net decrease in the overall load to the frame as compared to the original (existing) design condition. A sketch of the proposed changes is included in on our construction drawings, and the table below summarizes the existing and proposed configurations:

Existing Equipment Configuration		**Proposed Equipment Configuration**	
Cabinet Type	Weight	Cabinet Type	Weight
PPC	150 lbs	PPC	150 lbs
Transformer	410 lbs.	Transformer	410 lbs.
Ericsson RBS 6102	1219 lbs.	Ericsson RBS 6102	1219 lbs.
Ericsson RS8000 (future)	1500 lbs.	Ericsson 6160	680 lbs.
Ericsson RS8000 (future)	1500 lbs.	Ericsson B160	1771 lbs.
Total	**4779 lbs.**		**4230 lbs.**

Additionally, T-Mobile proposes to install three (3) total 2500 MHz antennas, three (3) total 600/700MHz antennas, three (3) total 1900MHz antennas. Ancillary equipment serving to supplement the proposed antennas will include three (3) total Ericsson 4460 B25+B66 remote radios and three (3) total Ericsson 4480 B71+ B85 remote radios at the *alpha*, *beta* and *gamma* sectors to replace the existing three (3) in-service antennas and related transmitting equipment at these locations. Additionally, three (3) total DC/Hybrid cables will be run to service the proposed antenna (1 per sector, total of 3 sectors receiving the new antenna).

The existing *alpha*, *beta* and *gamma* sector antenna frames do not have the required capacity to support the proposed antennas, and will be reinforced to provide sufficient capacity to support the proposed antenna loads. The existing rear ballast will be re-located to the new larger footprint frames. Our calculations are enclosed and are summarized below for the respective member capacities of the reinforced ballast frames.

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Norton, MA 02766
October 04, 2020

Beam	Section	Co	Defl L/	Slen	CAPACITY Axial	Dir	Shea	Mom	LTB	Combined Axial+Mom
3	L 2.5x2.5x3/16	1	7285	176	0.00	MJ	0.00	0.02	0.03	0.03
4	L 2.5x2.5x3/16	1	7285	176	0.00	MJ	0.00	0.02	0.03	0.03
5	L 2.5x2.5x3/16	1	4482	207	0.00	MJ	0.00	0.03	0.04	0.04
6	L 2.5x2.5x3/16	1	1984	206	-0.08	MJ	0.00	0.08	0.09	0.11
13	L 2.5x2.5x3/16	1	1992	190	-0.08	MJ	0.04	0.31	0.35	0.41
19	L 2.5x2.5x3/16	1	1608	190	-0.09	MJ	0.04	0.35	0.39	0.45
21	L 4x4x1/4	1	9582	128	0.00	MJ	0.02	0.15	0.17	0.28
22	L 4x4x1/4	2	486	189	0.00	MJ	0.01	0.13	0.82	0.97
23	L 2.5x2.5x3/16	1	1463	116	-0.10	MJ	0.01	0.07	0.26	0.41
24	L 2.5x2.5x3/16	1	1984	206	-0.07	MJ	0.00	0.08	0.09	0.11
25	L 2.5x2.5x3/16	1	1499	116	-0.09	MJ	0.01	0.07	0.28	0.38
26	PIPE 2-1/2	2	9999	4	-0.01	MJ	0.06	0.08	0.08	0.09
27	PIPE 2-1/2	1	9999	4	0.00	MJ	0.06	0.08	0.08	0.09
28	PIPE 2-1/2	2	9999	4	-0.01	MJ	0.06	0.09	0.09	0.09
29	PIPE 2-1/2	1	9999	4	0.00	MJ	0.06	0.08	0.08	0.09
31	PIPE 2-1/2	2	9999	4	0.02	MJ	0.03	0.04	0.04	0.05
37	PIPE 2-1/2	1	633	88	-0.03	MJ	0.00	0.02	0.02	0.20
43	PIPE 2-1/2	2	92	92	-0.01	MI	0.04	0.44	0.00	0.46
47	PIPE 2-1/2	1	488	91	-0.03	MJ	0.00	0.02	0.02	0.22
63	L 2.5x2.5x3/16	1	1569	205	0.00	MJ	0.00	0.00	0.16	0.16
65	L 2.5x2.5x3/16	1	9999	8	-0.01	MJ	0.05	0.13	0.13	0.13
69	L 4x4x1/4	2	5940	86	-0.01	MJ	0.01	0.05	0.22	0.25
71	L 4x4x1/4	2	9999	86	-0.01	MJ	0.01	0.06	0.13	0.16
73	L 4x4x1/4	2	5312	118	0.00	MJ	0.01	0.12	0.12	0.13
74	L 4x4x1/4	2	5404	84	-0.01	MJ	0.04	0.22	0.22	0.23
75	L 4x4x1/4	2	3604	118	0.00	MJ	0.01	0.21	0.21	0.21
76	L 4x4x1/4	2	2345	84	-0.01	MJ	0.03	0.21	0.21	0.22
77	L 4x4x1/4	1	3646	189	0.00	MJ	0.00	0.05	0.06	0.06
78	L 4x4x1/4	1	3646	189	0.00	MJ	0.00	0.05	0.06	0.06
79	L 4x4x1/4	2	3441	200	-0.07	MJ	0.00	0.05	0.06	0.10
80	L 4x4x1/4	2	3441	200	-0.07	MJ	0.00	0.05	0.06	0.10
81	L 4x4x1/4	2	980	189	0.00	MJ	0.01	0.16	0.19	0.19
84	L 4x4x1/4	1	8495	189	0.00	MJ	0.00	0.05	0.05	0.06

Photos of the existing ballast frames and the existing antenna mounting locations are included in this report. The appropriate antenna mounting plans and details have been included in our drawings which are also enclosed for your convenience.

If you have any questions regarding this matter, please do not hesitate to call.

Very truly yours,
CHAPPELL ENGINEERING ASSOCIATES, LLC

STATE OF CONNECTICUT CLEMENT J SALEK No. 26376 LICENSED PROFESSIONAL ENGINEER

Clement J Salek, P.E.
CJS/cjs

Existing T-Mobile Equipment Frame

Existing T-Mobile Equipment Frame

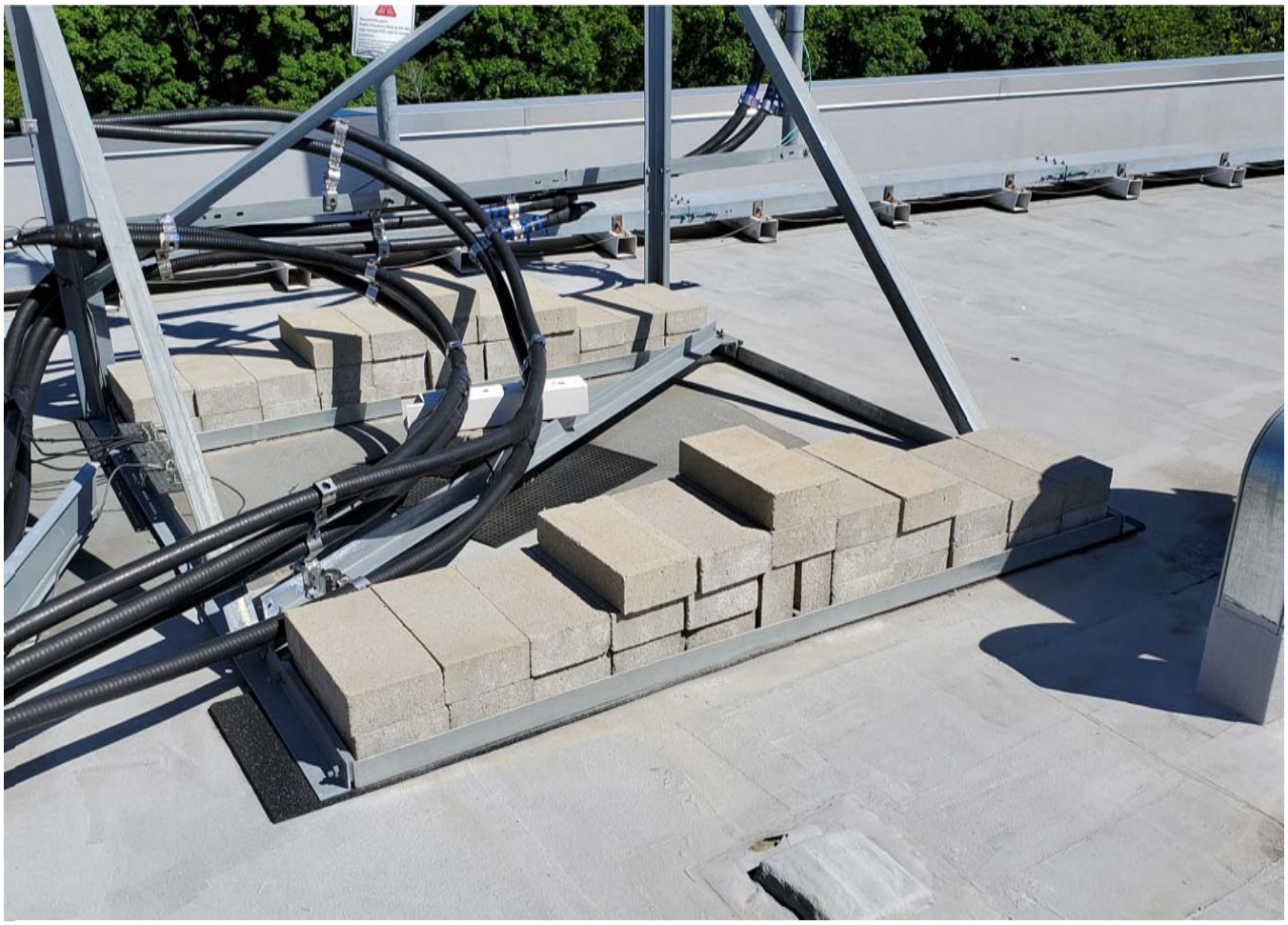
Existing T-Mobile Alpha Sector Antennas

Existing T-Mobile Alpha Sector Ballast

Existing T-Mobile Beta Sector Antennas

Existing T-Mobile Beta Sector Ballast

Existing T-Mobile Gamma Sector Antennas



Existing T-Mobile Gamma Sector Ballast

Site Name/Number:	**CT11090A Greenwich / Putnam Ave 2**
Site Address:	**411 West Putnam Avenue, Greenwich, CT 06830**
CEA Job Number:	**1815.141**
Date:	**February 10, 2023**

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Appurtenances Attached to Ballast Frame:

	Commscope W-65A-R1 Antenna		RFS APXVAALL24_43-U-NA20	Ericsson 4460 B25+B66	Ericsson 4480 B71+B85	Ericsson M-MIMO AIR6419				
Depth, d =	4.6 in	in	8.5 in	11.9 in	7.5 in	9.0 in	in			
Width, w =	12.1 in	in	24.0 in	15.1 in	15.1 in	20.9 in	in			
Height, h =	54.7 in	in	96.0 in	17.0 in	19.2 in	36.3 in	in			
Height ARL =	10.6 ft	ft	8.6 ft	5 ft	5 ft	10.6 ft	ft			
Weight =	24 lbs	lbs	128 lbs	104 lbs	93 lbs	84 lbs	lbs			

Design Code: ASCE 7

Z (Above Ground Level) =	60 ft	60 ft	60 ft	60 ft	60 ft	60 ft	60 ft	60 ft	60 ft	60 ft	
Height of Projection Area =	4.6 ft	0.0 ft	8.0 ft	1.4 ft	1.6 ft	3.0 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	
Width of Projection Area =	1.0 ft	0.0 ft	2.0 ft	1.3 ft	1.3 ft	1.7 ft	0.0 ft	0.0 ft	0.0 ft	0.0 ft	
Af (Projected Area of Gross) =	4.6 s.f.	0.0 s.f.	16.0 s.f.	1.8 s.f.	2.0 s.f.	5.3 s.f.	0.0 s.f.	0.0 s.f.	0.0 s.f.	0.0 s.f.	
Reference Wind Velocity, V =	116 mph	116 mph	116 mph	116 mph	116 mph	116 mph	116 mph	116 mph	116 mph	116 mph	
Exposure =	B	B	B	B	B	B	B	B	B	B	Section 6.5.6.3
G (Gust effect factor) =	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	Section 6.5.8
Cf (Force Coeficient) =	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	Fig 6-20 to 6-23
K_z (Exposure Coefficients) =	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	6.5.6.6, Table 6-3
K_1 (Multiplier) =	0	0	0	0	0	0	0	0	0	0	Figure 6-2
K_2 (Multiplier) =	0	0	0	0	0	0	0	0	0	0	Figure 6-2
K_3 (Multiplier) =	0	0	0	0	0	0	0	0	0	0	Figure 6-2
K_{zt} (Topographic Factor) : $(1+K_1*K_2*K_3)^2$ =	1	1	1	1	1	1	1	1	1	1	Section 6.5.7.2
Kd =	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	Table 6-4
I (Importance Factor) =	1	1	1	1	1	1	1	1	1	1	Table 6-2
$q_z = .00256*K_z*K_{zt}*K_d*V^2*I$ (psf) =	24.9 psf	24.9 psf	24.9 psf	24.9 psf	24.9 psf	24.9 psf	24.9 psf	24.9 psf	24.9 psf	24.9 psf	psf, Section 6.5.10
Reference Wind Pressure, p =	29.6 psf	29.6 psf	29.6 psf	29.6 psf	29.6 psf	29.6 psf	29.6 psf	29.6 psf	29.6 psf	29.6 psf	
F, lbs =	**136**	**0**	**474**	**53**	**60**	**156**	**0**	**0**	**0**	**0**	

Required Minimum Ballast:

Ballast Frame Geometry

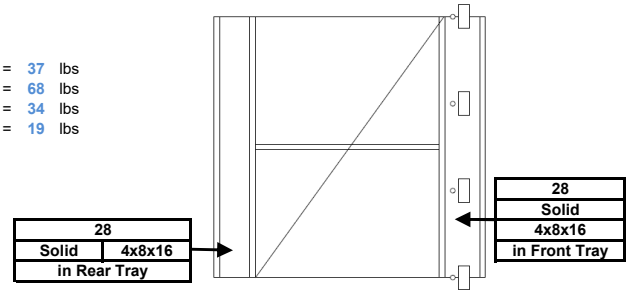
Frame width =	10 ft
Frame depth =	14.00 ft
Centroid of front ballast to toe, d_f =	0.67 ft
Centroid of rear ballast to toe, d_r =	13.33 ft
Frame Footprint Area =	140.00 ft^2
Weight of steel frame =	1550 lbs

Common 8x8x16 Block Wgt =	37 lbs
Solid 8x8x16 Block Wgt =	68 lbs
Solid 4x8x16 Block Wgt =	34 lbs
Common 8x4x16 Block Wgt =	19 lbs

Safety Factor for Overturning = 1.8

Total Appurtenance Wgt = 433 lbs

Let W_t = total ballast required, lbs
Let W_f = 0.5 W_t
Let W_r = 0.5 W_t



For Stability;

$M_{causing} <= M_{resisting}$

$M_{causing} <= M_{frame\ wgt} + M_{rear\ ballast} + M_{front\ ballast}$

$M_{causing} <= M_{frame\ wgt} + 0.5\ (W_t)(d_r) + 0.5\ (W_t)(d_f)$

Solving for Wt;

$$\frac{M_{causing} - M_{frame\ wgt}}{0.50\ d_r + 0.50\ d_f} <= W_t$$

(min total ballast req'd)

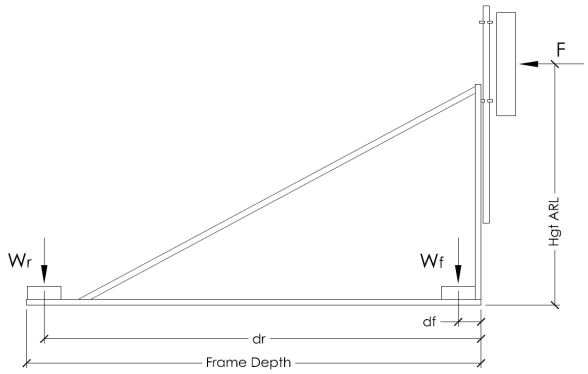
$$\frac{12888.58}{7.00} <= W_t$$

$M_{causing}$ = 13921.9 ft-lbs
$M_{frame\ wgt}$ = 1033.3 ft-lbs
0.5 d_r = 6.67 ft
0.5 d_f = 0.33 ft

Min. Total Ballast Req'd (W_t) = 1841 lbs < = W_t

Min. Front Ballast Req'd (W_f) =	**921 lbs**	=	28	Solid 4x8x16	**Blocks in Front Tray**
Min. Rear Ballast Req'd (W_r) =	**921 lbs**	=	28	Solid 4x8x16	**Blocks in Rear Tray**
Total Loaded Frame Weight =	**3824 lbs**		56	**Total per Ballast Mount**	

Frame Surcharge = 27.3 psf

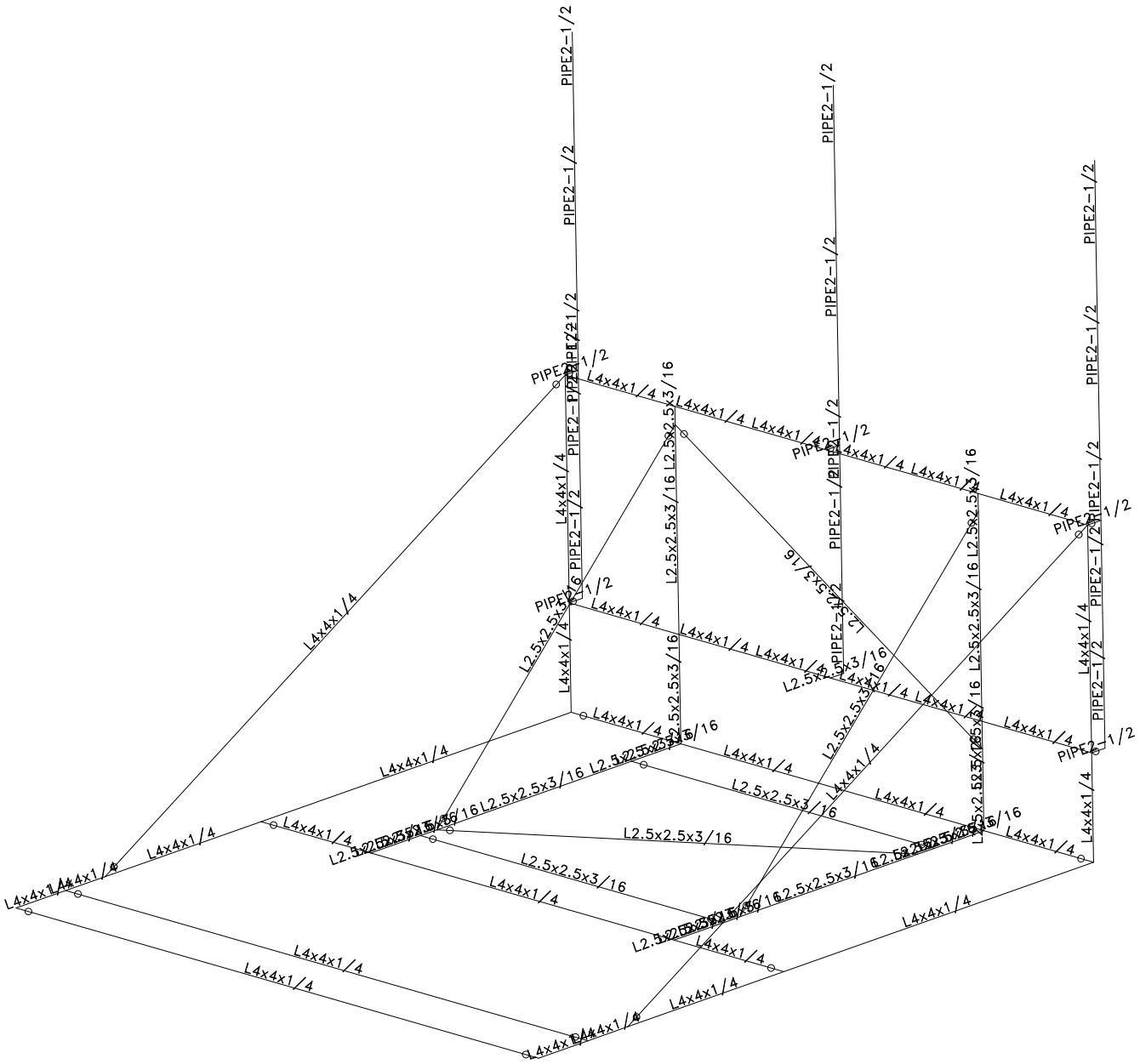


Frame Geometry

CT11090A Greenwich Putnam Av (1815.141)

SCALE = 1:34

DATE: 2/10/23



CT11090A Greenwich Putnam Av (1815.141)

Prepared by:

Load no. 1: X2 Antenna Loads (units - kips ft.)

```
/ JOINT LOADS
/ JOINT LOADS
/ JOINT LOADS
/ JOINT LOADS
/ JOINT LOADS
```

```
FX2 0.06 FX3 -0.012 N 39 53
FX2 0.065 FX3 -0.042 N 56 46
FX2 0.065 FX3 -0.1 N 54
FX3 -0.1 N 51
/ JOINT LOADS
```

```
FX2 0.19 FX3 -0.062 N 55 67
/ END
```

F O R C E S U M M A T I O N

FX1=0. kip
FX2=0.695 kip
FX3=-0.432 kip

Load no. 2: X2 Wind on Frame (units - kips ft.)

```
/ BEAM LOADS
/ BEAM LOADS
DIST GL FX2 0.009 B 63
/ BEAM LOADS
/ BEAM LOADS
```

```
/ BEAM LOADS
DIST GL FX2 0.005 B 67
DIST GL FX2 0.007 B 6 21 22 TO 25 49 TO 62 66
DIST GL FX2 0.005 B 34 42 44 89
DIST GL FX2 0.005 B 46 45 43 36
```

```
/ END
```

F O R C E S U M M A T I O N

FX1=0. kip
FX2=0.528 kip
FX3=0. kip

Load no. 3: Selfweight (units - kips ft.)

```
/ BEAM LOADS
SELF  X3 -1. B 1 TO 19 21 TO 29 31 34 TO 39 42 TO 62 64 66 TO 68 89
/ BEAM LOADS
SELF  X3 -1. B 70 72 TO 88
/ END
```

F O R C E S U M M A T I O N

FX1=0. kip
FX2=0. kip
FX3=-1.2843 kip

Load no. 4: -X2 Antenna Loads (units - kips ft.)

/ JOINT LOADS
/ JOINT LOADS
/ JOINT LOADS
/ JOINT LOADS
/ JOINT LOADS

/ JOINT LOADS
FX2 -0.06 FX3 -0.012 N 39 54
FX2 -0.19 FX3 -0.06 N 55 67
FX2 -0.065 FX3 -0.042 N 56 46
FX2 -0.065 FX3 -0.1 N 53

FX3 -0.1 N 51
/ END

F O R C E S U M M A T I O N

FX1=0. kip
FX2=-0.695 kip
FX3=-0.428 kip

Load no. 5: -X2 Wind on Frame (units - kips ft.)

/ BEAM LOADS
/ BEAM LOADS
DIST GL FX2 0.009 B 63
/ BEAM LOADS
/ BEAM LOADS

/ BEAM LOADS
/ BEAM LOADS
DIST GL FX2 -0.007 B 6 21 22 TO 25 49 TO 62 66
DIST GL FX2 -0.005 B 67
DIST GL FX2 -0.005 B 34 42 44 89

DIST GL FX2 -0.005 B 46 45 43 36
/ END STATIC

F O R C E S U M M A T I O N

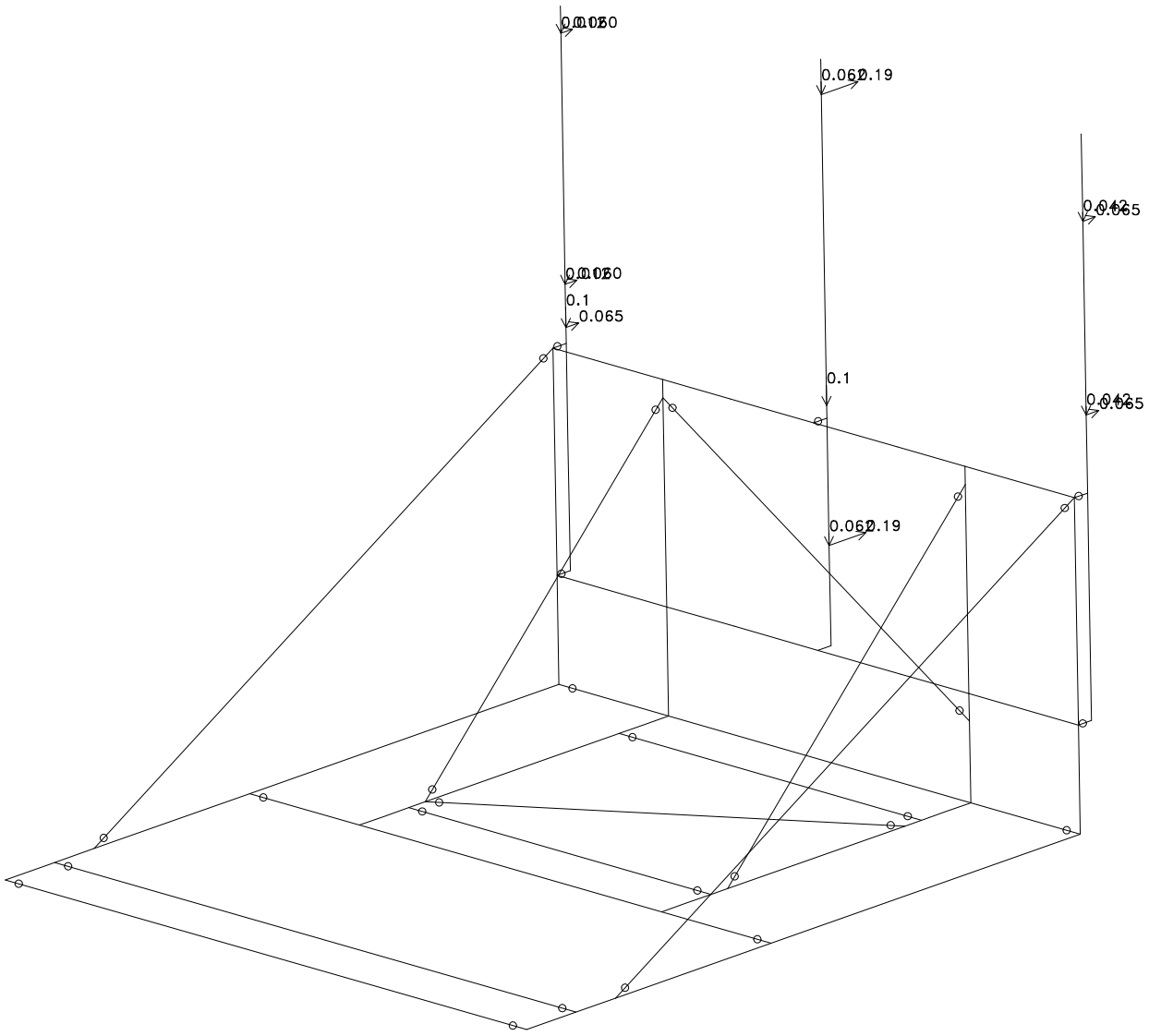
FX1=0. kip
FX2=-0.3759 kip
FX3=0. kip

CT11090A Greenwich Putnam Av (1815.141)

Load 1: X2 Antenna Loads

X3
X2
X1

SCALE = 1:37 | UNITS: kip ft | DATE: 2/10/23

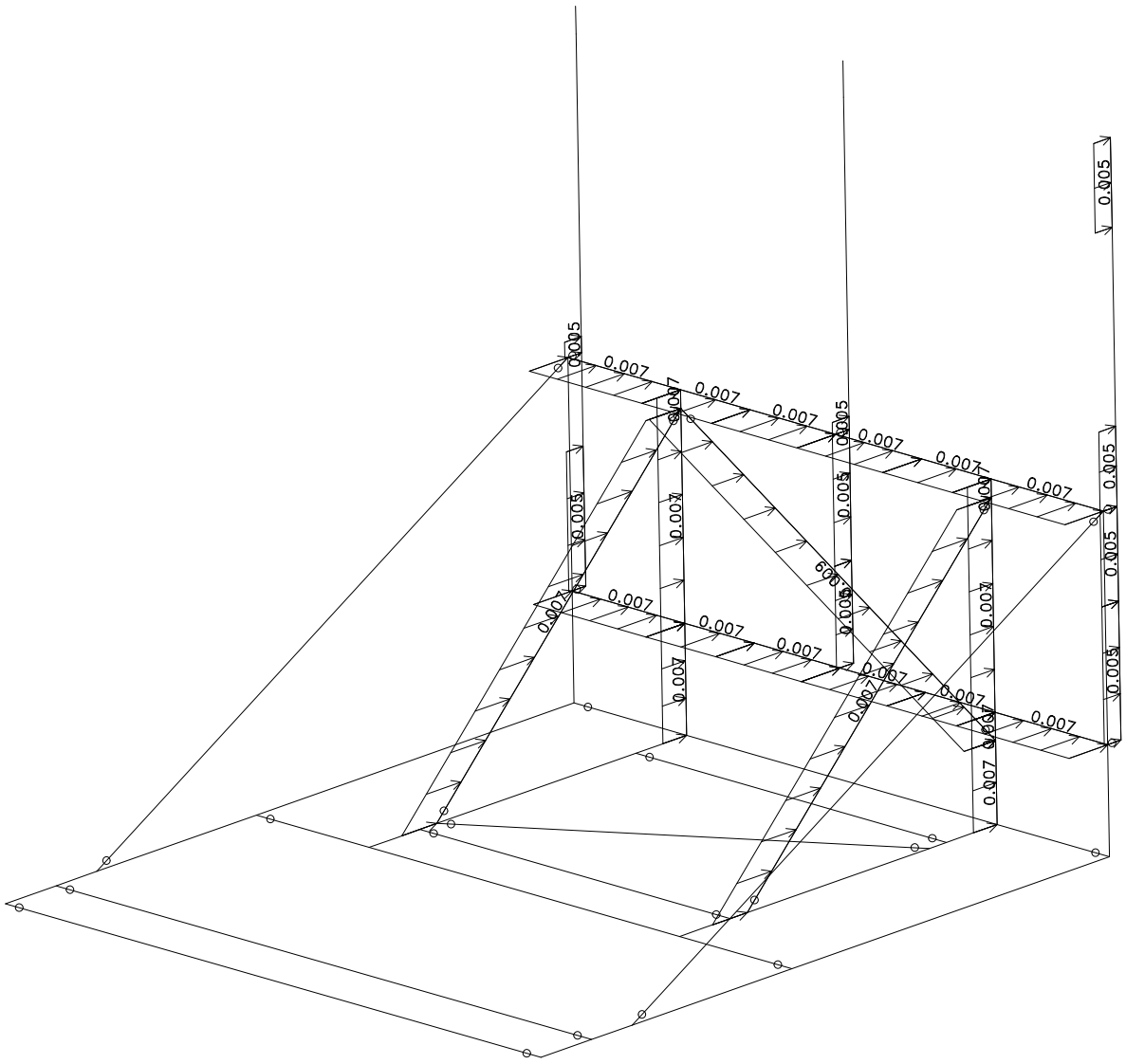


CT11090A Greenwich Putnam Av (1815.141)

Load 2: X2 Wind on Frame

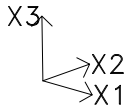
X3
X2
X1

SCALE = 1:37	UNITS: kip ft	DATE: 2/10/23



CT11090A Greenwich Putnam Av (1815.141)

Load 3: Selfweight



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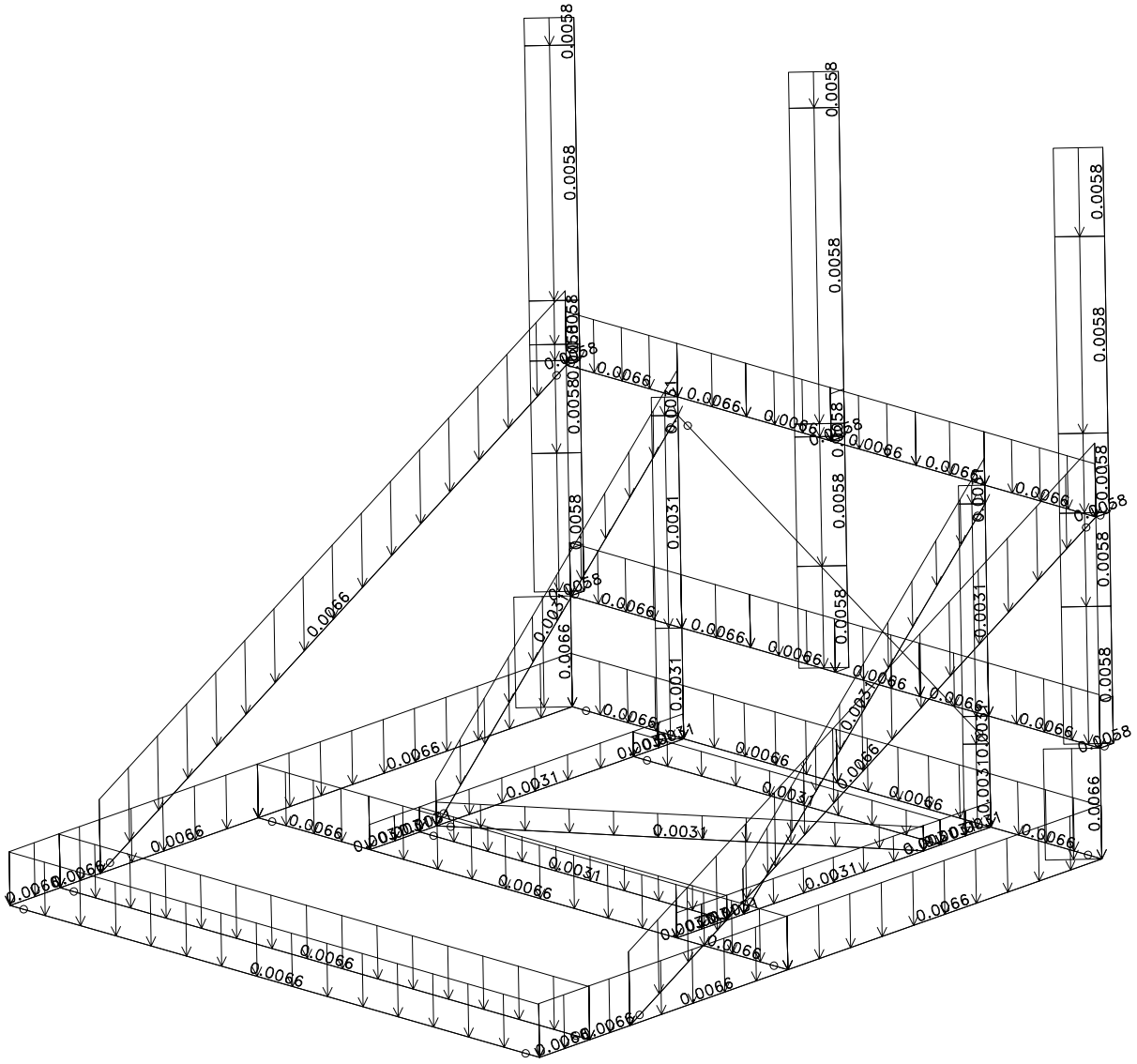
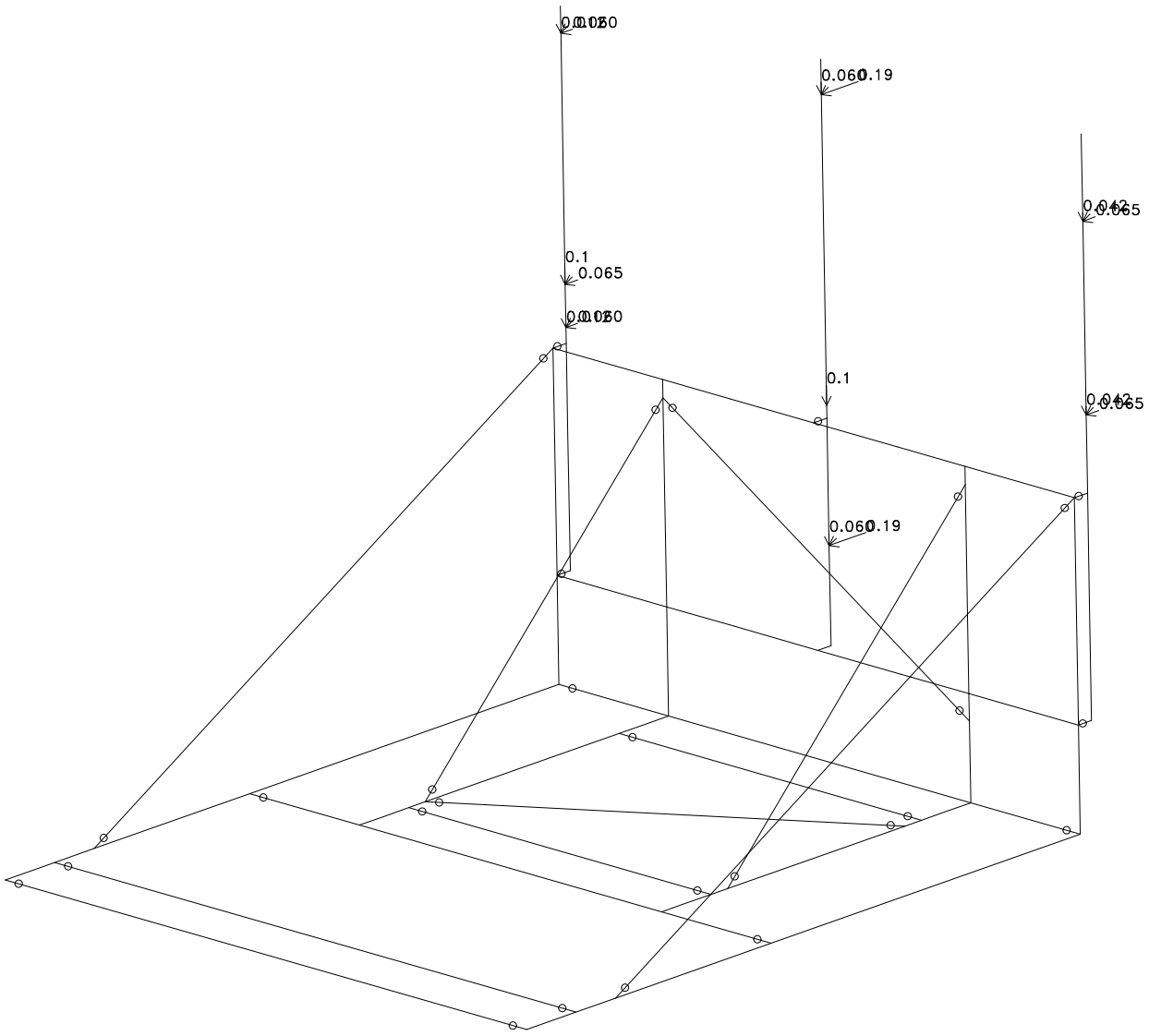


CT11090A Greenwich Putnam Av (1815.141)

Load 4: −X2 Antenna Loads

X3
X2
X1

SCALE = 1:37	UNITS: kip ft	DATE: 2/10/23

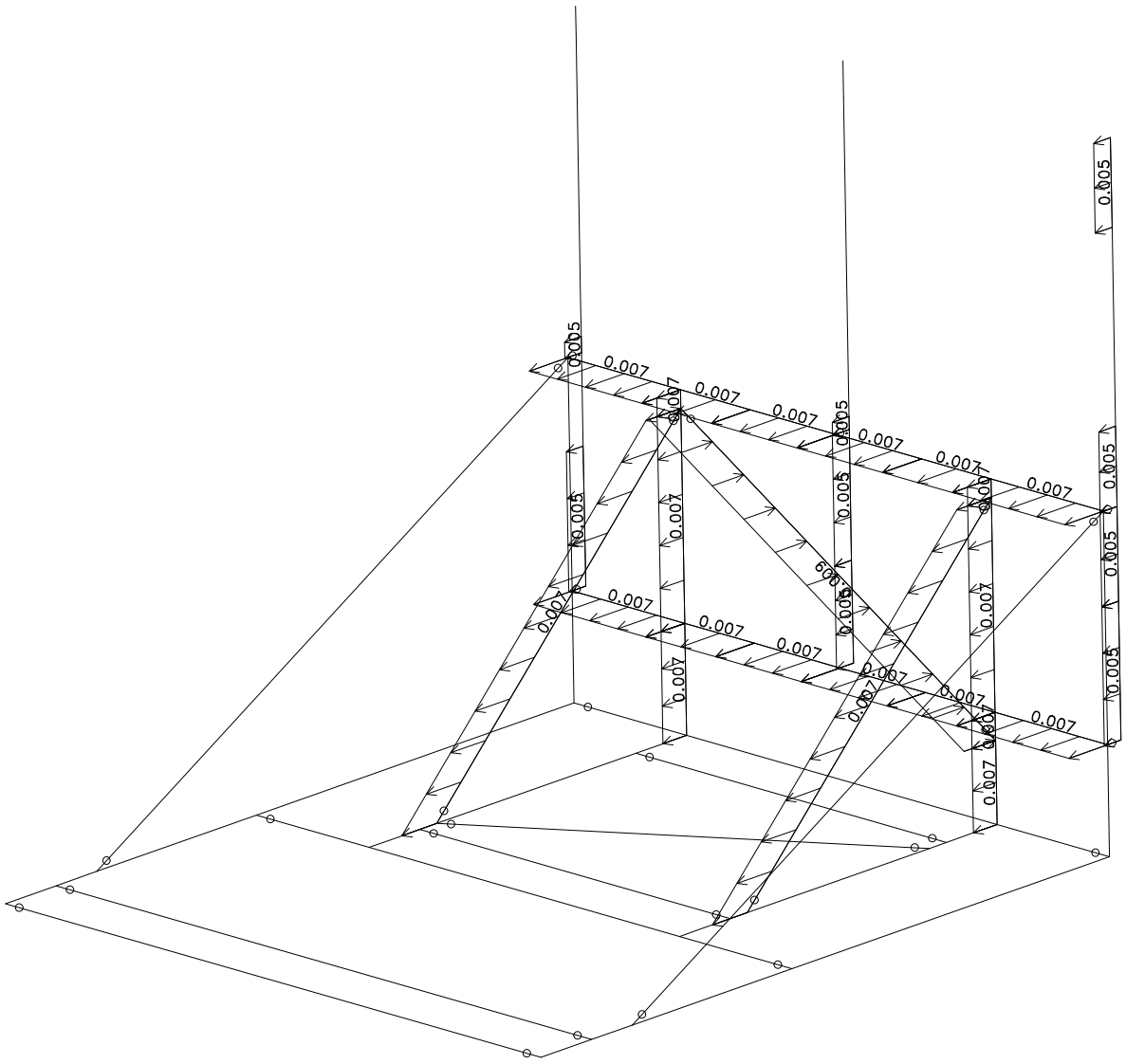


CT11090A Greenwich Putnam Av (1815.141)

Load 5: −X2 Wind on Frame

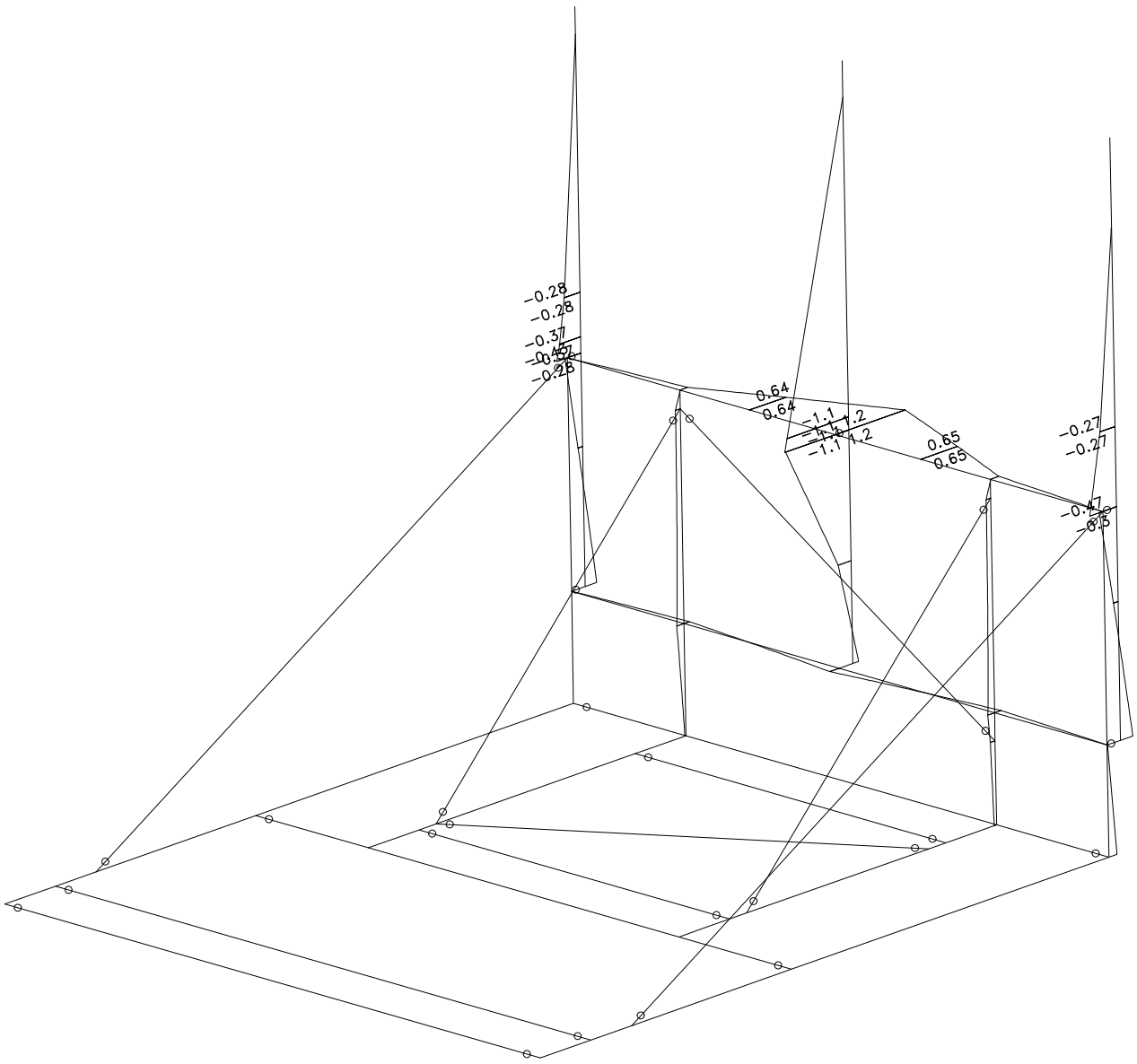
X3
X2
X1

SCALE = 1:37	UNITS: kip ft	DATE: 2/10/23



CT11090A Greenwich Putnam Av (1815.141)

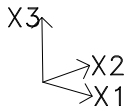
SCALE = 1:35	UNITS: kip*ft	DATE: 2/10/23

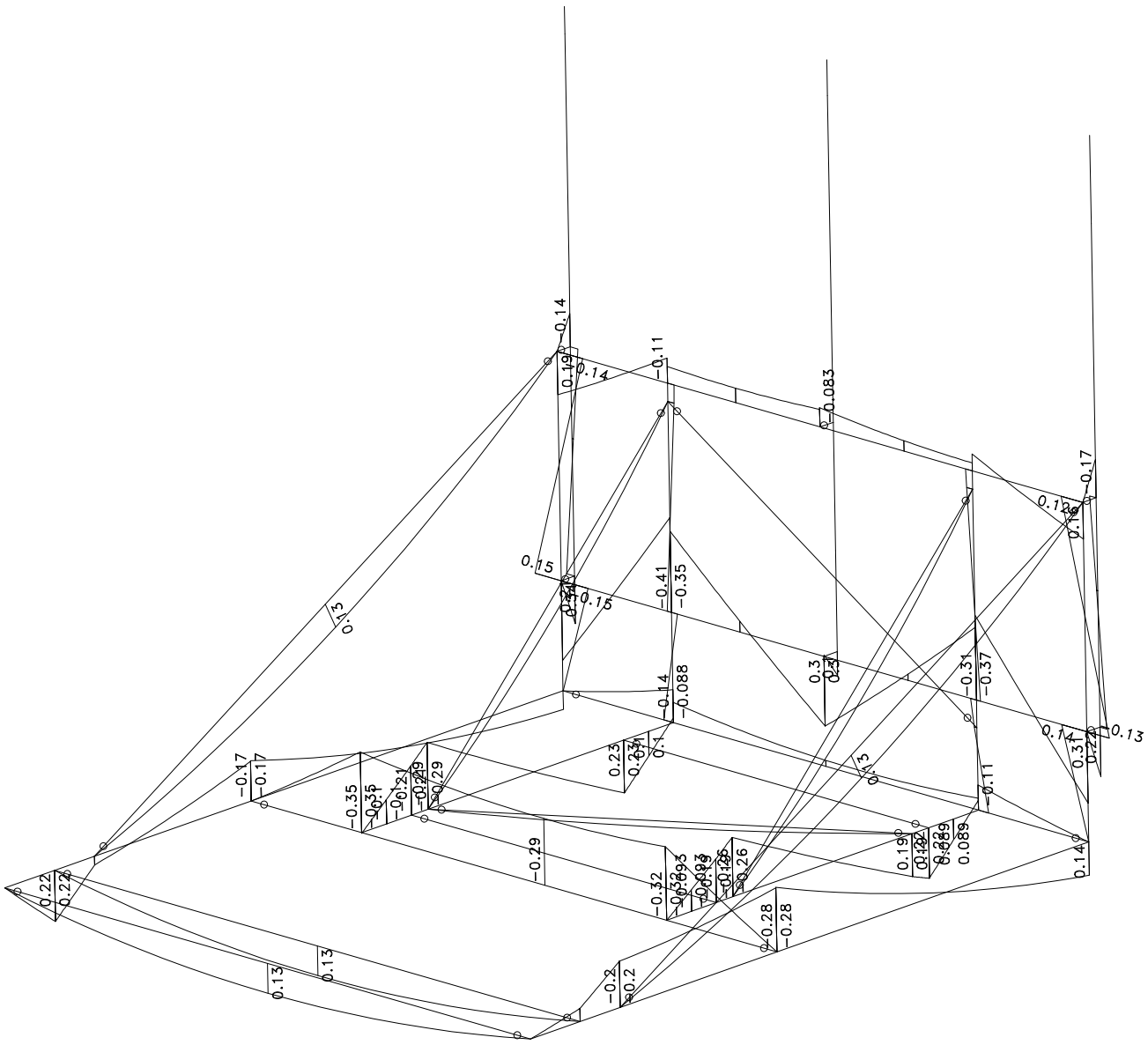


M3 MOMENT COMB. NO. 1 X2 Wind

CT11090A Greenwich Putnam Av (1815.141)

SCALE = 1:35	UNITS: kip*ft	DATE: 2/10/23

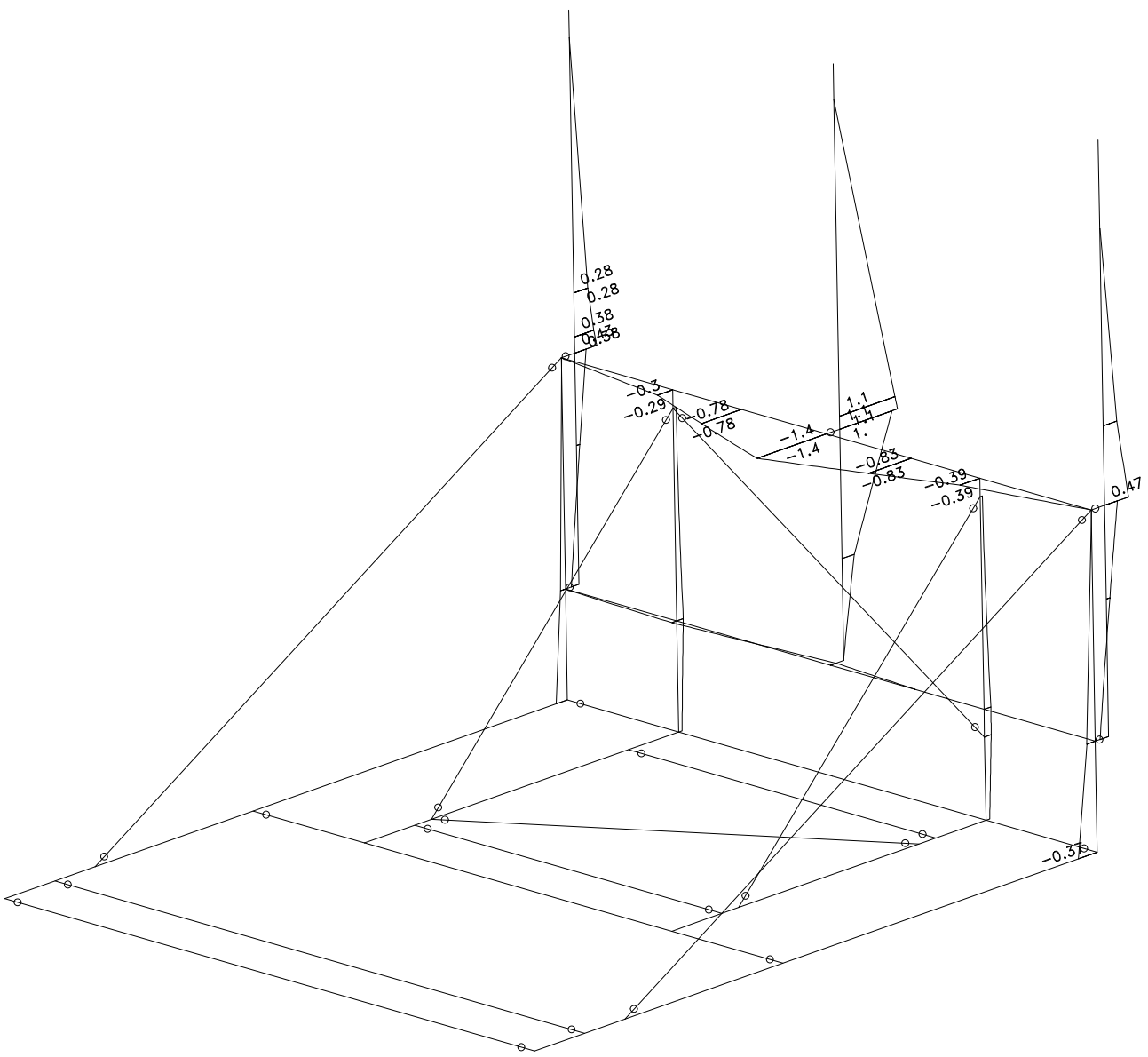




M2 MOMENT COMB. NO. 1 X2 Wind

CT11090A Greenwich Putnam Av (1815.141)

SCALE = 1:35 | UNITS: kip*ft | DATE: 2/10/23



M3 MOMENT COMB. NO. 2 -X2 Wind

CT11090A Greenwich Putnam Av (1815.141)

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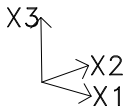
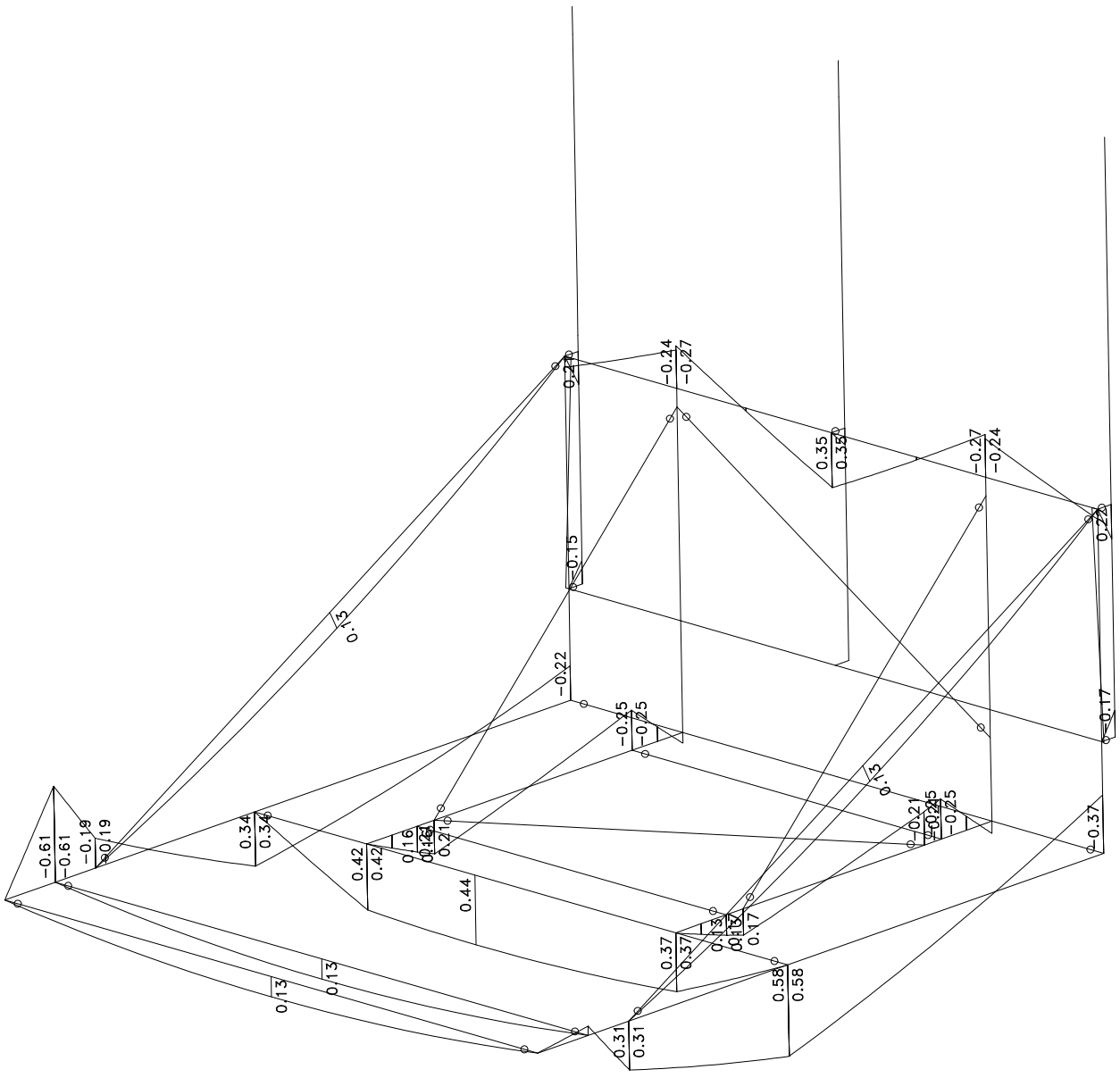
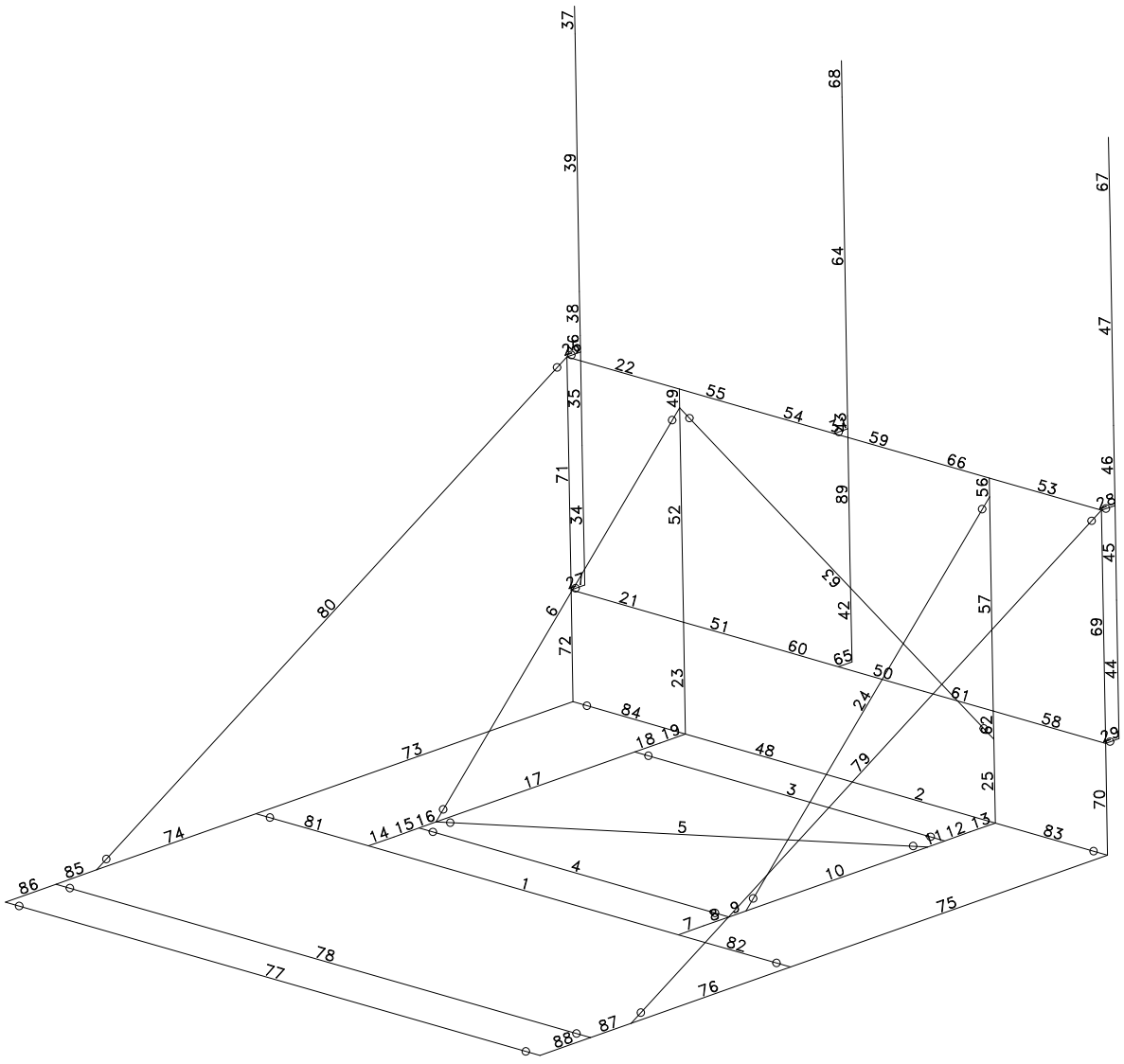




M2 MOMENT COMB. NO. 2 −X2 Wind

CT11090A Greenwich Putnam Av (1815.141)

SCALE = 1:37	UNITS: kip ft	DATE: 2/10/23



CT11090A Greenwich Putnam Av (1815.141)

Prepared by:

Code: AISC-ASD
Page: 1
Date: 2/10/23

Results Summary Table

Beam	Section	Com	Defl L/	Slen	CAPACITY						
					Axial	Dir	Shear	Mom	LTB	Combined Axial+Mom	
3	L 2.5x2.5x3/16	1	7285	176	0.00	MJ	0.00	0.02	0.03	0.03	
4	L 2.5x2.5x3/16	1	7285	176	0.00	MJ	0.00	0.02	0.03	0.03	
5	L 2.5x2.5x3/16	1	4482	207	0.00	MJ	0.00	0.03	0.04	0.04	
6	L 2.5x2.5x3/16	1	1984	206	-0.08	MJ	0.00	0.08	0.09	0.11	***
13	L 2.5x2.5x3/16	1	1992	190	-0.08	MJ	0.04	0.31	0.35	0.41	
						MI	0.00	0.01	0.00		
19	L 2.5x2.5x3/16	1	1608	190	-0.09	MJ	0.04	0.35	0.39	0.45	
21	L 4x4x1/4	1	9582	128	0.00	MJ	0.02	0.15	0.17	0.28	
						MI	0.01	0.06	0.00		
22	L 4x4x1/4	2	486	189	0.00	MJ	0.01	0.13	0.82	0.97	
						MI	0.02	0.49	0.00		
23	L 2.5x2.5x3/16	1	1463	116	-0.10	MJ	0.01	0.07	0.26	0.41	
						MI	0.04	0.16	0.00		
24	L 2.5x2.5x3/16	1	1984	206	-0.07	MJ	0.00	0.08	0.09	0.11	***
25	L 2.5x2.5x3/16	1	1499	116	-0.09	MJ	0.01	0.07	0.28	0.38	
						MI	0.04	0.16	0.00		
26	PIPE 2-1/2	2	9999	4	-0.01	MJ	0.06	0.08	0.08	0.09	
27	PIPE 2-1/2	1	9999	4	0.00	MJ	0.06	0.08	0.08	0.09	
28	PIPE 2-1/2	2	9999	4	-0.01	MJ	0.06	0.09	0.09	0.09	
29	PIPE 2-1/2	1	9999	4	0.00	MJ	0.06	0.08	0.08	0.09	
31	PIPE 2-1/2	2	9999	4	0.02	MJ	0.03	0.04	0.04	0.05	
37	PIPE 2-1/2	1	633	88	-0.03	MJ	0.00	0.02	0.02	0.20	
						MI	0.02	0.17	0.00		
43	PIPE 2-1/2	2	92	92	-0.01	MI	0.04	0.44	0.00	0.46	***
47	PIPE 2-1/2	1	488	91	-0.03	MJ	0.00	0.02	0.02	0.22	
						MI	0.01	0.18	0.00		
63	L 2.5x2.5x3/16	1	1569	205	0.00	MJ	0.00	0.00	0.16	0.16	
						MI	0.01	0.10	0.00		
65	L 2.5x2.5x3/16	1	9999	8	-0.01	MJ	0.05	0.13	0.13	0.13	
69	L 4x4x1/4	2	5940	86	-0.01	MJ	0.01	0.05	0.22	0.25	
						MI	0.01	0.13	0.00		
71	L 4x4x1/4	2	9999	86	-0.01	MJ	0.01	0.06	0.13	0.16	
						MI	0.00	0.08	0.00		
73	L 4x4x1/4	2	5312	118	0.00	MJ	0.01	0.12	0.12	0.13	
74	L 4x4x1/4	2	5404	84	-0.01	MJ	0.04	0.22	0.22	0.23	
75	L 4x4x1/4	2	3604	118	0.00	MJ	0.01	0.21	0.21	0.21	
76	L 4x4x1/4	2	2345	84	-0.01	MJ	0.03	0.21	0.21	0.22	
77	L 4x4x1/4	1	3646	189	0.00	MJ	0.00	0.05	0.06	0.06	
78	L 4x4x1/4	1	3646	189	0.00	MJ	0.00	0.05	0.06	0.06	
79	L 4x4x1/4	2	3441	200	-0.07	MJ	0.00	0.05	0.06	0.10	
80	L 4x4x1/4	2	3441	200	-0.07	MJ	0.00	0.05	0.06	0.10	
81	L 4x4x1/4	2	980	189	0.00	MJ	0.01	0.16	0.19	0.19	
84	L 4x4x1/4	1	8495	189	0.00	MJ	0.00	0.05	0.05	0.06	

CT11090A Greenwich Putnam Av (1815.141)

Prepared by:

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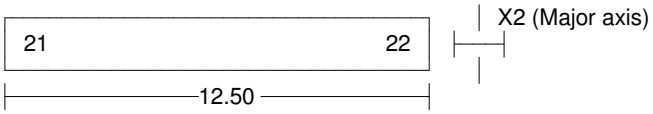
Detailed Results Table for Beam 22 - 53

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam:
22, 55, 54,
59, 66, 53



CONSTRAINTS

- Sections : Check
- Steel Grade: A36

DESIGN DATA

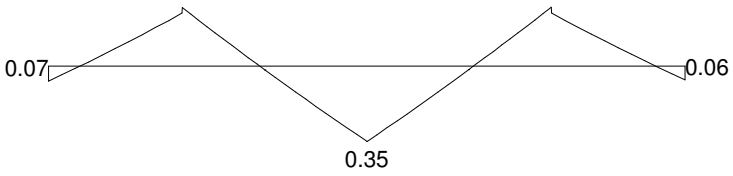
- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: L 4x4x1/4

Ix = 3.04 Iy = 3.04in4 Sx = 1.05 Sy = 1.05in3 Area = 1.94
h = 4.00 b = 4.00in t = 0.25 ey = 2.90in ex = 2.90in
J = 0.04 Cw = 0.00in6 Iv = 1.23 in4

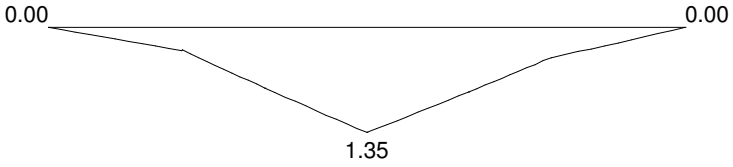
DESIGN COMBINATION = 2

M2 Moment Diagram



Max. AXIAL Force = 0.02 (tens.) Max. SHEAR Force = 0.18

M3 Moment Diagram



Max. AXIAL Force = 0.02 (tens.) Max. SHEAR Force = 0.30

SECTION CLASSIFICATION: *** NON-COMPACT / SLENDER ***

Limiting Ratios:		Compact	Non-Compact	Slender -axial	
d/t= 16.13	<	15.3	25.8	12.8	(Fy= 36.0)
b/t= 16.13	<	15.3	25.8	12.8	

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V2 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.99	Vu = 0.30 Vn = 21.50	0.02
M3 Moment (F10-6) FLB	M / 0.6Mn < 1.00	λ = 16.13 λp = 18.55 λr = 25.83	M = 1.35 Mn = 4.58 Mp = 4.73 Mr = 2.73	0.49

Detailed Results Table for Beam 22 - 53

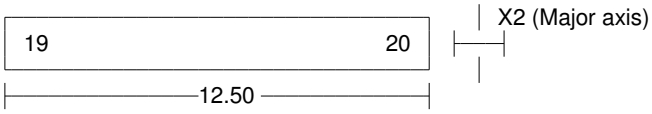
*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V3 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.99	Vu = 0.18 Vn = 21.50	0.01
M2 Moment (F10-6) FLB	M / 0.6Mn < 1.00	λ = 16.13 λp = 18.55 λr = 25.83	M = 0.35 Mn = 4.58 Mp = 4.73 Mr = 2.73	0.13
Deflection	defl. / L / 240 < 1.00		defl = 0.30851	0.49
Axial Force (D2-1)	Pu / 0.6AgFy < 1.00	(kL/r)x =120 (kL/r)y =189	Pu = 0.02 Ag = 1.94 Fy = 36.00	0.00
Lateral Torsional Buckling (F10-2,3)	M / 0.6Mn < 1.00 Critical Segment from 0.00 to 12.50 on +z flange Segment End Moments: 0.00 and 0.00	Lb = 12.50 Cb = 1.44	M = 1.35 Mn = 2.74 Me = -1.00	0.82
Combined Forces (compress.) (H1-1b)	Pr/2ϕPn + Mrx/ϕMnx + Mry/ϕMny < 1.00	Cmx = 1.00 Cmy = 1.00 Pex = 35.19 Pey = 14.19	Mrx = 0.35 Mry = 1.35 B1x = 1.00 B1y = 1.00	0.97

Detailed Results Table for Beam 21 - 58

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam:
21, 51, 60,
50, 61, 58



CONSTRAINTS

- Sections : Check
- Steel Grade: A36

DESIGN DATA

- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: L 4x4x1/4

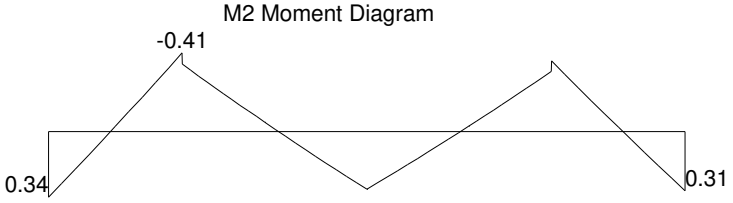
Ix = 3.04 Iy = 3.04in4 Sx = 1.05 Sy = 1.05in3 Area = 1.94
h = 4.00 b = 4.00in t = 0.25 ey = 2.90in ex = 2.90in
J = 0.04 Cw = 0.00in6 Iv = 1.23 in4

DESIGN COMBINATION = 1

Detailed Results Table for Beam 21 - 58

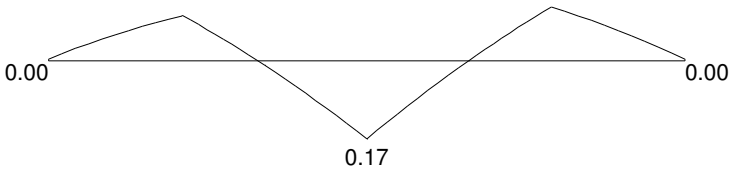
*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

M2 Moment Diagram



Max. AXIAL Force = 0.01 (tens.), -0.02 (compr.) Max. SHEAR Force = 0.30

M3 Moment Diagram



Max. AXIAL Force = 0.01 (tens.), -0.02 (compr.) Max. SHEAR Force = 0.09

SECTION CLASSIFICATION: *** NON-COMPACT / SLENDER ***

Limiting Ratios:		Compact	Non-Compact	Slender	-axial
d/t= 16.13	<	15.3	25.8	12.8	(Fy= 36.0)
b/t= 16.13	<	15.3	25.8	12.8	

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V2 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.99	Vu = 0.09 Vn = 21.50	0.01
M3 Moment (F10-6) FLB	M ——— < 1.00 0.6Mn	λ = 16.13 λp = 18.55 λr = 25.83	M = 0.17 Mn = 4.58 Mp = 4.73 Mr = 2.73	0.06
V3 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.99	Vu = 0.30 Vn = 21.50	0.02
M2 Moment (F10-6) FLB	M ——— < 1.00 0.6Mn	λ = 16.13 λp = 18.55 λr = 25.83	M = 0.41 Mn = 4.58 Mp = 4.73 Mr = 2.73	0.15
Deflection	defl. ——— < 1.00 L / 240		defl = 0.01565	0.03
Axial Force (E7-1)	Pu ——— < 1.00 0.6AeFcr Slender. reduct.	(kL/r)x =48 (kL/r)y =76 Ae = 1.86 x = 0.40	Pu = 0.02 Ag = 1.94 Fcr = 26.59 y = 0.40	0.00
Lateral Torsional Buckling (F10-2,3)	M ——— < 1.00 0.6Mn	Lb = 12.50 Cb = 1.40	M = 0.41 Mn = 3.93 Me = 9.62	0.17
	Critical Segment from 0.00 to 12.50 on +z flange Segment End Moments: 0.34 and 0.31			

Detailed Results Table for Beam 21 - 58

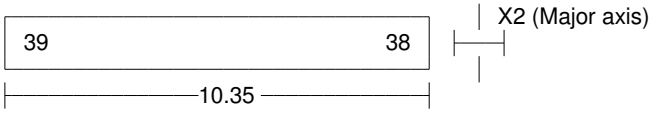
*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

DESIGN	EQUATION	FACTORS	VALUES	RESULT
Combined Forces (compress.) (H1-1b)	$\frac{Pr}{2\phi Pn} + \frac{Mrx}{\phi Mnx} + \frac{Mry}{\phi Mny} < 1.00$	Cmx = 1.00 Cmy = 1.00 Pex = 210.55 Pey = 83.99	Mrx = 0.41 Mry = 0.17 B1x = 1.00 B1y = 1.00	0.28

Detailed Results Table for Beam 37 - 34

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam: 37, 36, 38, 39, 35, 34



CONSTRAINTS

- Sections : Check
- Steel Grade: A53

DESIGN DATA

- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: PIPE 2-1/2

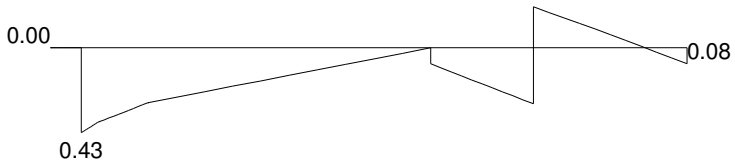
Ix = 1.53 Iy = 1.53in4 Zx = 1.45 Zy = 1.45in3 Area = 1.70
D = 2.87 t = 0.20in
J = 3.06 Cw = 0.00in6

DESIGN COMBINATION = 1

M2 Moment Diagram

Max. AXIAL Force = -0.62 (compr.) Max. SHEAR Force = 0.02

M3 Moment Diagram



Max. AXIAL Force = -0.62 (compr.) Max. SHEAR Force = 0.19

Detailed Results Table for Beam 37 - 34

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

SECTION CLASSIFICATION: *** COMPACT ***

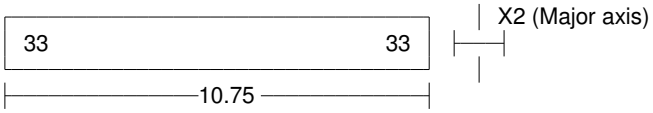
Limiting Ratios: Compact Non-Compact Slender -axial
d/t= 14.04 < 58.0 256.9 91.1 (Fy= 35.0 R = 0.010)

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V2 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.85	Vu = 0.19 Vn = 17.94	0.02
M3 Moment (F8-1) without LTB	M / 0.6Mn < 1.00	Z = 1.45	M = 0.43 Mn = 4.24	0.17
M2 Moment (F8-1) without LTB	M / 0.6Mn < 1.00	Z = 1.45	M = 0.04 Mn = 4.24	0.02
Deflection	defl. / L / 240 < 1.00		defl = 0.19623	0.38
Axial Force (E3-1)	Pu / 0.6AgFcr < 1.00 Slender. reduct.	(kL/r)x =88 (kL/r)y =88 x = 0.67	Pu = 0.62 Ag = 1.70 Fcr = 23.58 y = 0.67	0.03
Combined Forces (compress.) (H1-1b)	Pr/2φPn + Mrx/φMnx + Mry/φMny < 1.00	Cmx = 1.00 Cmy = 1.00 Pex = 63.24 Pey = 63.24	Mrx = 0.05 Mry = 0.43 B1x = 1.02 B1y = 1.02	0.20

Detailed Results Table for Beam 68 - 89

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam:
43, 64, 68,
42, 89



CONSTRAINTS

- Sections : Check
- Steel Grade: A53

DESIGN DATA

- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: PIPE 2-1/2

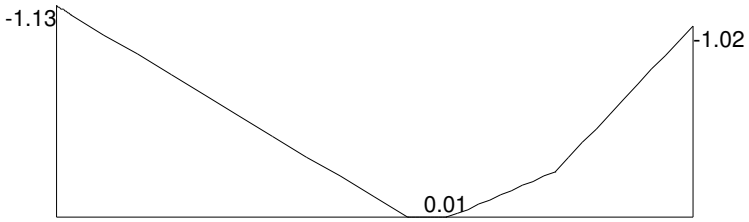
Ix = 1.53 Iy = 1.53in4 Zx = 1.45 Zy = 1.45in3 Area = 1.70
D = 2.87 t = 0.20in
J = 3.06 Cw = 0.00in6

DESIGN COMBINATION = 2

Detailed Results Table for Beam 68 - 89

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

M3 Moment Diagram



Max. AXIAL Force = 0.12 (tens.), -0.20 (compr.) Max. SHEAR Force = 0.34

SECTION CLASSIFICATION: *** COMPACT ***

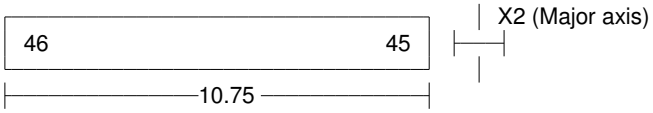
Limiting Ratios:		Compact	Non-Compact	Slender	-axial
d/t= 14.04	<	58.0	256.9	91.1	(Fy= 35.0 R = 0.003)

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V2 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.85	Vu = 0.34 Vn = 17.94	0.03
M3 Moment (F8-1) without LTB	$\frac{M}{0.6Mn} < 1.00$	Z = 1.45	M = 1.13 Mn = 4.24	0.44
Deflection	$\frac{defl.}{L / 240} < 1.00$		defl = 1.40546	2.61
Axial Force (E3-1)	$\frac{Pu}{0.6AgFcr} < 1.00$ Slender. reduct.	(kL/r)x =70 (kL/r)y =70 x = 0.51	Pu = 0.20 Ag = 1.70 Fcr = 27.26 y = 0.51	0.01
Combined Forces (compress.) (H1-1b)	$\frac{Pr}{2\phi Pn} + \frac{Mrx}{\phi Mnx} + \frac{Mry}{\phi Mny} < 1.00$	Cmx = 1.00 Cmy = 1.00 Pex = 99.95 Pey = 99.95	Mrx = 0.00 Mry = 1.13 B1x = 1.00 B1y = 1.00	0.45

Detailed Results Table for Beam 67 - 44

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam: 47, 67, 46, 45, 44



CONSTRAINTS

- Sections : Check
- Steel Grade: A53

DESIGN DATA

- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Detailed Results Table for Beam 67 - 44

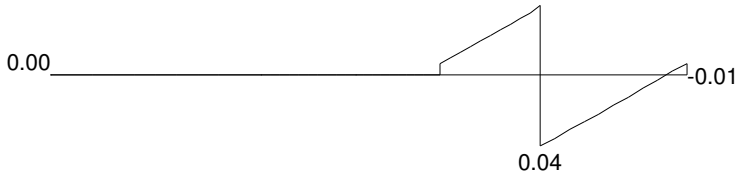
*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Section: PIPE 2-1/2

Ix = 1.53 Iy = 1.53in4 Zx = 1.45 Zy = 1.45in3 Area = 1.70
D = 2.87 t = 0.20in
J = 3.06 Cw = 0.00in6

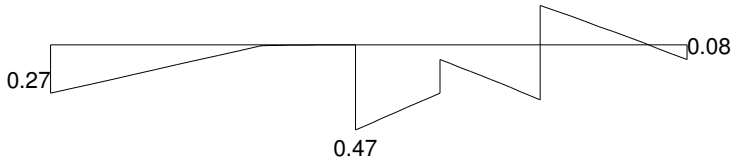
DESIGN COMBINATION = 1

M2 Moment Diagram



Max. AXIAL Force = -0.65 (compr.) Max. SHEAR Force = 0.02

M3 Moment Diagram



Max. AXIAL Force = -0.65 (compr.) Max. SHEAR Force = 0.15

SECTION CLASSIFICATION: *** COMPACT ***

Limiting Ratios: Compact Non-Compact Slender -axial
d/t= 14.04 < 58.0 256.9 91.1 (Fy= 35.0 R = 0.011)

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V2 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.85	Vu = 0.15 Vn = 17.94	0.01
M3 Moment (F8-1) without LTB	$\frac{M}{0.6Mn} < 1.00$	Z = 1.45	M = 0.47 Mn = 4.24	0.18
M2 Moment (F8-1) without LTB	$\frac{M}{0.6Mn} < 1.00$	Z = 1.45	M = 0.04 Mn = 4.24	0.02
Deflection	$\frac{defl.}{L / 240} < 1.00$		defl = 0.26446	0.49
Axial Force (E3-1)	$\frac{Pu}{0.6AgFcr} < 1.00$ Slender. reduct.	(kL/r)x =91 (kL/r)y =91 x = 0.67	Pu = 0.65 Ag = 1.70 Fcr = 22.94 y = 0.67	0.03

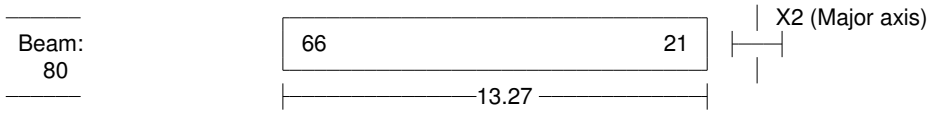
Detailed Results Table for Beam 67 - 44

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

DESIGN	EQUATION	FACTORS	VALUES	RESULT
Combined Forces (compress.) (H1-1b)	$\frac{Pr}{2\phi Pn} + \frac{Mrx}{\phi Mnx} + \frac{Mry}{\phi Mny} < 1.00$	Cmx = 1.00 Cmy = 1.00 Pex = 59.14 Pey = 59.14	Mrx = 0.04 Mry = 0.48 B1x = 1.02 B1y = 1.02	0.22

Detailed Results Table for Beam 80

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*



CONSTRAINTS

- Sections : Check
- Steel Grade: A36

DESIGN DATA

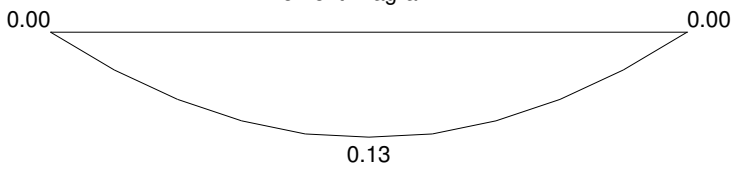
- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: L 4x4x1/4

Ix = 3.04 Iy = 3.04in4 Sx = 1.05 Sy = 1.05in3 Area = 1.94
h = 4.00 b = 4.00in t = 0.25 ey = 2.90in ex = 2.90in
J = 0.04 Cw = 0.00in6 Iv = 1.23 in4

DESIGN COMBINATION = 2

M2 Moment Diagram



Max. AXIAL Force = -0.50 (compr.) Max. SHEAR Force = 0.04

SECTION CLASSIFICATION: *** NON-COMPACT / SLENDER ***

Limiting Ratios:		Compact	Non-Compact	Slender -axial	
d/t= 16.13	<	15.3	25.8	12.8	(Fy= 36.0)
b/t= 16.13	<	15.3	25.8	12.8	

DESIGN	EQUATION	FACTORS	VALUES	RESULT
M2 Moment (F10-6) FLB	$\frac{M}{0.6Mn} < 1.00$	λ = 16.13 λp = 18.55 λr = 25.83	M = 0.13 Mn = 4.58 Mp = 4.73 Mr = 2.73	0.05

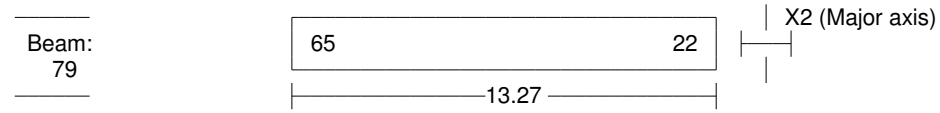
Detailed Results Table for Beam 80

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

DESIGN	EQUATION	FACTORS	VALUES	RESULT
Deflection	defl. / L / 240 < 1.00		defl = 0.04627	0.07
Axial Force (E7-1)	Pu / 0.6AeFcr < 1.00	(kL/r)x =187 (kL/r)y =196 Ae = 1.94	Pu = 0.50 Ag = 1.94 Fcr = 6.56	0.07
Lateral Torsional Buckling (F10-2,3)	M / 0.6Mn < 1.00 Critical Segment from 0.00 to 13.27 on +z flange Segment End Moments: 0.00 and 0.00	Lb = 13.27 Cb = 1.14	M = 0.13 Mn = 3.64 Me = 7.42	0.06
Combined Forces (compress.) (H1-1b)	Pr/2ϕPn + Mrx/ϕMnx + Mry/ϕMny < 1.00	Cmx = 1.00 Cmy = 1.00 Pex = 14.49 Pey = 13.19	Mrx = 0.14 Mry = 0.00 B1x = 1.06 B1y = 1.06	0.10

Detailed Results Table for Beam 79

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*



CONSTRAINTS

- Sections : Check
- Steel Grade: A36

DESIGN DATA

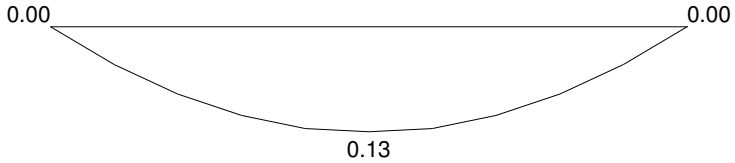
- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: L 4x4x1/4

Ix = 3.04 Iy = 3.04in4 Sx = 1.05 Sy = 1.05in3 Area = 1.94
h = 4.00 b = 4.00in t = 0.25 ey = 2.90in ex = 2.90in
J = 0.04 Cw = 0.00in6 Iv = 1.23 in4

DESIGN COMBINATION = 2

M2 Moment Diagram



Max. AXIAL Force = -0.54 (compr.) Max. SHEAR Force = 0.04

Detailed Results Table for Beam 79

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

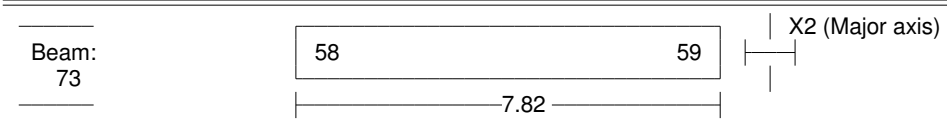
SECTION CLASSIFICATION: *** NON-COMPACT / SLENDER ***

Limiting Ratios:		Compact	Non-Compact	Slender	-axial
d/t= 16.13	<	15.3	25.8	12.8	(Fy= 36.0)
b/t= 16.13	<	15.3	25.8	12.8	

DESIGN	EQUATION	FACTORS	VALUES	RESULT
M2 Moment (F10-6) FLB	$\frac{M}{0.6Mn} < 1.00$	λ = 16.13 λp = 18.55 λr = 25.83	M = 0.13 Mn = 4.58 Mp = 4.73 Mr = 2.73	0.05
Deflection	$\frac{defl.}{L / 240} < 1.00$		defl = 0.04627	0.07
Axial Force (E7-1)	$\frac{Pu}{0.6AeFcr} < 1.00$	(kL/r)x =187 (kL/r)y =196 Ae = 1.94	Pu = 0.54 Ag = 1.94 Fcr = 6.56	0.07
Lateral Torsional Buckling (F10-2,3)	$\frac{M}{0.6Mn} < 1.00$ Critical Segment from 0.00 to 13.27 on +z flange Segment End Moments: 0.00 and 0.00	Lb = 13.27 Cb = 1.14	M = 0.13 Mn = 3.64 Me = 7.42	0.06
Combined Forces (compress.) (H1-1b)	$\frac{Pr}{2\phi Pn} + \frac{Mrx}{\phi Mnx} + \frac{Mry}{\phi Mny} < 1.00$	Cmx = 1.00 Cmy = 1.00 Pex = 14.49 Pey = 13.19	Mrx = 0.14 Mry = 0.00 B1x = 1.06 B1y = 1.07	0.10

Detailed Results Table for Beam 73

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*



CONSTRAINTS

- Sections : Check
- Steel Grade: A36

DESIGN DATA

- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: L 4x4x1/4

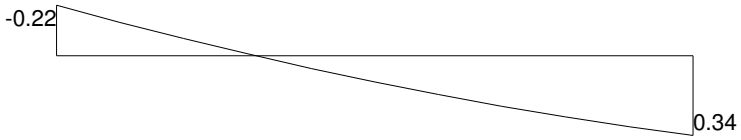
Ix = 3.04 Iy = 3.04in4 Sx = 1.05 Sy = 1.05in3 Area = 1.94
h = 4.00 b = 4.00in t = 0.25 ey = 2.90in ex = 2.90in
J = 0.04 Cw = 0.00in6 Iv = 1.23 in4

DESIGN COMBINATION = 2

Detailed Results Table for Beam 73

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

M2 Moment Diagram



Max. AXIAL Force = 0.06 (tens.) Max. SHEAR Force = 0.10

SECTION CLASSIFICATION: *** NON-COMPACT / SLENDER ***

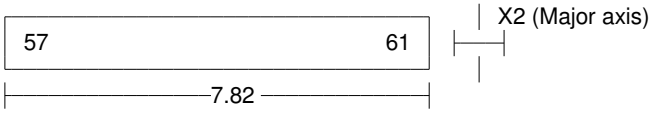
Limiting Ratios:		Compact	Non-Compact	Slender	-axial
d/t= 16.13	<	15.3	25.8	12.8	(Fy= 36.0)
b/t= 16.13	<	15.3	25.8	12.8	

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V3 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.99	Vu = 0.10 Vn = 21.50	0.01
M2 Moment (F10-6) FLB	$\frac{M}{0.6Mn} < 1.00$	λ = 16.13 λp = 18.55 λr = 25.83	M = 0.34 Mn = 4.58 Mp = 4.73 Mr = 2.73	0.12
Deflection	$\frac{defl.}{L / 240} < 1.00$		defl = 0.01766	0.05
Axial Force (D2-1)	$\frac{Pu}{0.6AgFy} < 1.00$	(kL/r)x =75 (kL/r)y =118	Pu = 0.06 Ag = 1.94 Fy = 36.00	0.00
Lateral Torsional Buckling (F10-2,3)	$\frac{M}{0.6Mn} < 1.00$ Critical Segment from 0.00 to 7.82 on +z flange Segment End Moments: -0.22 and 0.34	Lb = 7.82 Cb = 1.99	M = 0.34 Mn = 4.58 Me = 21.98	0.12
Combined Forces (compress.) (H1-1b)	$\frac{Pr}{2\phi Pn} + \frac{Mrx}{\phi Mnx} + \frac{Mry}{\phi Mny} < 1.00$	Cmx = 1.00 Cmy = 1.00 Pex = 90.08 Pey = 36.39	Mrx = 0.34 Mry = 0.00 B1x = 1.00 B1y = 1.00	0.13

Detailed Results Table for Beam 75

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

Beam: 75



CONSTRAINTS

- Sections : Check
- Steel Grade: A36

DESIGN DATA

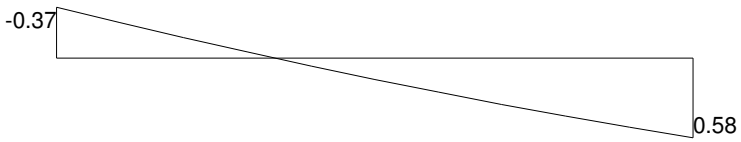
- Kx = 1.00 - Ky = 1.00
- Allow. Slend. : 200 (compr.) 300 (tens.)
- Allowable Deflection : 1/240
- Tension Area Reduction Factor : 1.00
- Building type : Unbraced

Section: L 4x4x1/4

Ix = 3.04 Iy = 3.04in4 Sx = 1.05 Sy = 1.05in3 Area = 1.94
h = 4.00 b = 4.00in t = 0.25 ey = 2.90in ex = 2.90in
J = 0.04 Cw = 0.00in6 Iv = 1.23 in4

DESIGN COMBINATION = 2

M2 Moment Diagram



Max. AXIAL Force = 0.10 (tens.) Max. SHEAR Force = 0.15

SECTION CLASSIFICATION: *** NON-COMPACT / SLENDER ***

Limiting Ratios:		Compact	Non-Compact	Slender -axial	
d/t= 16.13	<	15.3	25.8	12.8	(Fy= 36.0)
b/t= 16.13	<	15.3	25.8	12.8	

DESIGN	EQUATION	FACTORS	VALUES	RESULT
V3 Shear G2.1.b-i	Vu/0.6Vn<1.00 Vn=0.6*Fy*Aw	Aw = 0.99	Vu = 0.15 Vn = 21.50	0.01
M2 Moment (F10-6) FLB	M / 0.6Mn < 1.00	λ = 16.13 λp = 18.55 λr = 25.83	M = 0.58 Mn = 4.58 Mp = 4.73 Mr = 2.73	0.21
Deflection	defl. / L / 240 < 1.00		defl = 0.02603	0.07
Axial Force (D2-1)	Pu / 0.6AgFy < 1.00	(kL/r)x =75 (kL/r)y =118	Pu = 0.10 Ag = 1.94 Fy = 36.00	0.00
Lateral Torsional Buckling (F10-2,3)	M / 0.6Mn < 1.00	Lb = 7.82 Cb = 2.07	M = 0.58 Mn = 4.58 Me = 22.86	0.21
	Critical Segment from 0.00 to 7.82 on +z flange Segment End Moments: -0.37 and 0.58			

Detailed Results Table for Beam 75

*Moments: kips*foot , Forces: kips , Stresses: ksi , Section prop.: inch*

DESIGN	EQUATION	FACTORS	VALUES	RESULT
Combined Forces (compress.) (H1-1b)	$\frac{Pr}{2\phi Pn} + \frac{Mrx}{\phi Mnx} + \frac{Mry}{\phi Mny} < 1.00$	Cmx = 1.00 Cmy = 1.00 Pex = 90.08 Pey = 36.39	Mrx = 0.58 Mry = 0.00 B1x = 1.00 B1y = 1.00	0.21

GREENWICH/PUTNAM AVE 2

411 WEST PUTNAM AVENUE
GREENWICH, CT 06830
FAIRFIELD COUNTY

SITE NO.: CT11090A

SITE TYPE: ROOFTOP

PROJECT: ANCHOR UPGRADE
RF DESIGN GUIDELINE: 67E5A998E HYBRID

APPROVALS

PROJECT MANAGER:	DATE:	ZONING/SITE ACQ.:	DATE:
CONSTRUCTION:	DATE:	OPERATIONS:	DATE:
RF ENGINEERING:	DATE:	TOWER OWNER:	DATE:

T-MOBILE TECHNICIAN SITE SAFETY NOTES

LOCATION	SPECIAL RESTRICTIONS
SECTOR A:	ACCESS BY CERTIFIED CLIMBER
SECTOR B:	ACCESS BY CERTIFIED CLIMBER
SECTOR C:	ACCESS BY CERTIFIED CLIMBER
SECTOR D:	ACCESS BY CERTIFIED CLIMBER
GPS/LMU:	UNRESTRICTED
RADIO CABINETS:	UNRESTRICTED
PPC DISCONNECT:	UNRESTRICTED
MAIN CIRCUIT D/C:	UNRESTRICTED
NIU/T DEMARC:	UNRESTRICTED
OTHER/SPECIAL:	NONE

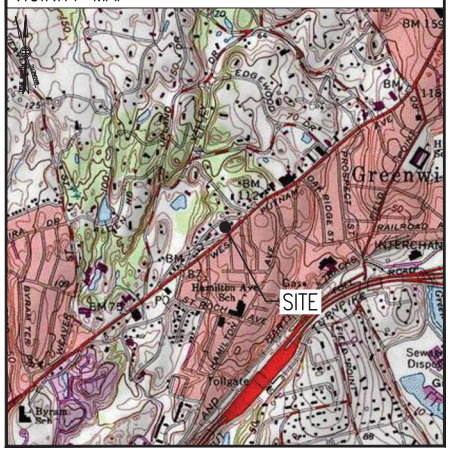
GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.
3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE OMNIPOINT REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.
4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.
5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS/CONTRACT DOCUMENTS.
7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S/VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.
9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.
12. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.
13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.
14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.
15. THE CONTRACTOR SHALL NOTIFY THE PROJECT OWNER'S REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESSEE/LICENSEE REPRESENTATIVE.
16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.
17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK.

AT LEAST 72 HOURS PRIOR TO DIGGING, THE CONTRACTOR IS REQUIRED TO CALL DIG SAFE AT 811

VICINITY MAP

SCALE: 1" = 1000'-0"



DIRECTIONS

MERGE ONTO I-495 NORTH TOWER MANSFIELD/MARLBORO. TAKE EXIT 33B TO MERGE ONTO I-95 SOUTH TOWARD PROVIDENCE RI. ENTER RHODE ISLAND. KEEP LEFT TO CONTINUE TOWARD I-95 SOUTH. CONTINUE ONTO I-95 SOUTH. KEEP RIGHT AT FORK TO STAY ON I-95 SOUTH. ENTER CONNECTICUT. KEEP LEFT TO STAY ON I-95 SOUTH. KEEP RIGHT TO STAY ON I-95 SOUTH. KEEP LEFT TO STAY ON I-95 SOUTH (7x). TAKE EXIT 3 FOR ARCH STREET TOWARD GREENWICH. USE MIDDLE LANE TO TURN RIGHT ONTO ARCH STREET. TURN LEFT ONTO RAILROAD AVENUE. CONTINUE ONTO OLD FIELD POINT ROAD. TURN RIGHT ONTO LIVINGSTON PLACE. LIVINGSTON PLACE TURNS LEFT & BECOMES US-1 SOUTH. SITE IS LOCATED ON THE RIGHT HAND SIDE.

SHEET INDEX

SHEET NO.	DESCRIPTION	REV. NO.
T-1	TITLE SHEET	4
GN-1	GENERAL NOTES	4
A-1	ROOF PLAN	4
A-2	EQUIPMENT PLANS	4
A-3	BUILDING ELEVATION	4
A-4	ANTENNA PLANS	4
A-5	SITE DETAILS	4
RF-1	RF DATA	4
S-1	BALLAST MOUNT REINFORCING DETAILS	4
E-1	ELECTRIC & GROUNDING DETAILS	4

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE PROJECT OWNER'S REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

SCOPE OF WORK

REMOVE:
- 9 ANTENNAS
- 6 TMAS
- 18 COAX CABLES
- 1 100A-2P BREAKER

INSTALL:
- 9 ANTENNAS
- 6 RADIOS
- 3 HYBRID CABLES
- 1 SLACKBOX
- 1 6160 CABINET
- 1 B160 CABINET
- RAN EQUIPMENT (REFER TO SHEET RF-1)
- 2 125A-2P BREAKERS
- 1 25A-1P BREAKER

SITE NOTES

1. THIS IS AN UNMANNED AND RESTRICTED ACCESS TELECOMMUNICATION FACILITY, AND IS NOT FOR HUMAN HABITATION. IT WILL BE USED FOR THE TRANSMISSION OF RADIO SIGNAL FOR THE PURPOSE OF PROVIDING PUBLIC CELLULAR SERVICE.
   - ADA COMPLIANCE NOT REQUIRED.
   - POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   - NO OUTDOOR STORAGE OR ANY SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACE THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. NEW CONSTRUCTION WILL CONFORM TO ALL APPLICABLE CODES AND ORDINANCES.
   - BUILDING CODE: 2022 CONNECTICUT STATE BUILDING CODE
   - ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE
   - STRUCTURAL CODE: TIA/EIA-222-G STRUCTURAL STANDARDS FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.

PROJECT SUMMARY

SITE NUMBER:	CT11090A
SITE NAME:	GREENWICH/PUTNAM AVE 2
SBA SITE NUMBER:	CT95623-M
SBA SITE NAME:	GREENWICH (PUTNAM)
SITE ADDRESS:	411 WEST PUTNAM AVENUE GREENWICH, CT 06830
PROPERTY OWNER:	411 PUTNAM AVE, LLC 411 WEST PUTNAM AVENUE GREENWICH, CT 06830
TOWER OWNER:	MCM ACQUISITION 2017, LLC 8501 CONGRESS AVENUE BOCA RATON, FL 33487 PHONE: 561-226-9523
COUNTY:	FAIRFIELD
ZONING DISTRICT:	GB (GENERAL BUSINESS)
STRUCTURE TYPE:	ROOFTOP
STRUCTURE HEIGHT:	56'±
GROUND ELEVATION:	114'±
APPLICANT:	T-MOBILE NORTHEAST LLC 15 COMMERCE WAY, SUITE B NORTON, MA 02766
ARCHITECT:	CHAPPELL ENGINEERING ASSOCIATES, LLC. 201 BOSTON POST ROAD WEST, SUITE 101 MARLBOROUGH, MA 01752
STRUCTURAL ENGINEER:	CHAPPELL ENGINEERING ASSOCIATES, LLC. 201 BOSTON POST ROAD WEST, SUITE 101 MARLBOROUGH, MA 01752
SITE CONTROL POINT:	LATITUDE: 41.021397° N41°01'17.03" LONGITUDE: -73.641289° W73°38'28.64"

SPECIAL ZONING NOTE:
BASED ON INFORMATION PROVIDED BY T-MOBILE REGULATORY COMPLIANCE PROFESSIONALS AND LEGAL COUNSEL, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS CONSIDERED AN ELIGIBLE FACILITY UNDER THE MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012, 47 USC 1455(A), SECTION 6409(A), AND IS SUBJECT TO AN ELIGIBLE FACILITY REQUEST, EXPEDITED REVIEW, AND LIMITED/PARTIAL ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW, OR ADMINISTRATIVE REVIEW).

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
NORTON, MA 02766
(508) 286-2700

SBA COMMUNICATIONS CORP.
134 FLANDERS ROAD, SUITE 125
WESTBOROUGH, MA 01581
(508) 251-0720

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil Structural Land Surveying
R.K. EXECUTIVE CENTRE
201 BOSTON POST ROAD WEST, SUITE 101
MARLBOROUGH, MA 01752
(508) 481-7400
www.chappellengineering.com

STATE OF CONNECTICUT
JAMES M. FITZGERALD
No. 25997
LICENSED
PROFESSIONAL CIVIL ENGINEER

CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
4	02/01/23	CONSTRUCTION REVISED	CMC
3	05/27/22	CONSTRUCTION REVISED	CMC
2	05/19/22	CONSTRUCTION REVISED	CMC
1	07/28/20	ISSUED FOR CONSTRUCTION	CMC
0	06/17/20	ISSUED FOR REVIEW	CMC

SITE NUMBER:
CT11090A

SITE ADDRESS:
411 WEST PUTNAM AVENUE
GREENWICH, CT 06830

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T-1

1815.141

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWINGS, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – T-MOBILE
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – T-MOBILE
   OEM – ORIGINAL EQUIPMENT MANUFACTURER

2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR.

3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK.

4. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL, STATE AND FEDERAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.

5. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.

6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.

7. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.

8. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR.

9. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER, T1 CABLES AND GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR AND/OR LANDLORD PRIOR TO CONSTRUCTION.

10. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.

11. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY.

12. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION AND RETURN DISTURBED AREAS TO ORIGINAL CONDITIONS.

13. THE SUBCONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE SUBCONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

14. SUBCONTRACTOR SHALL NOTIFY CHAPPELL ENGINEERING ASSOCIATES, LLC 48 HOURS IN ADVANCE OF POURING CONCRETE OR BACKFILLING TRENCHES, SEALING ROOF AND WALL PENETRATIONS AND POST DOWNS, FINISHING NEW WALLS OR FINAL ELECTRICAL CONNECTIONS FOR ENGINEERING REVIEW.

15. CONSTRUCTION SHALL COMPLY WITH ALL T-MOBILE STANDARDS AND SPECIFICATIONS.

16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.

17. THE EXISTING CELL SITES ARE IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK SHOULD BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.

18. IF THE EXISTING CELL SITE IS ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.

SITE WORK GENERAL NOTES:

1. THE SUBCONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION.

2. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE SUBCONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. SUBCONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. THIS WILL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION B) CONFINED SPACE C) ELECTRICAL SAFETY D) TRENCHING AND EXCAVATION.

3. ALL SITE WORK SHALL BE AS INDICATED ON THE DRAWINGS AND PROJECT SPECIFICATIONS.

4. IF NECESSARY, RUBBISH, STUMPS, DEBRIS, STICKS, STONES AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

5. THE SITE SHALL BE GRADED TO CAUSE SURFACE WATER TO FLOW AWAY FROM THE BTS EQUIPMENT AND TOWER AREAS.

6. NO FILL OR EMBANKMENT MATERIAL SHALL BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.

7. THE SUB GRADE SHALL BE COMPACTED AND BROUGHT TO A SMOOTH UNIFORM GRADE PRIOR TO FINISHED SURFACE APPLICATION.

8. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF ENGINEERING, OWNER AND/OR LOCAL UTILITIES.

9. THE AREAS OF THE OWNERS PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE AND STABILIZED TO PREVENT EROSION AS SPECIFIED IN THE PROJECT SPECIFICATIONS.

10. SUBCONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.

11. THE SUBCONTRACTOR SHALL PROVIDE SITE SIGNAGE IN ACCORDANCE WITH THE T-MOBILE SPECIFICATION FOR SITE SIGNAGE.

CONCRETE AND REINFORCING STEEL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318, ACI 336, ASTM A184, ASTM A185 AND THE DESIGN AND CONSTRUCTION SPECIFICATION FOR CAST-IN-PLACE CONCRETE.

2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. A HIGHER STRENGTH (4000PSI) MAY BE USED. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 381 CODE REQUIREMENTS

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.

4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
   CONCRETE CAST AGAINST EARTH.....3 IN.
   CONCRETE EXPOSED TO EARTH OR WEATHER:
   #6 AND LARGER .....2 IN.
   #5 AND SMALLER & WWF .....1½ IN.
   CONCRETE NOT EXPOSED TO EARTH OR WEATHER
   OR NOT CAST AGAINST THE GROUND:
   SLAB AND WALL .....¾ IN.
   BEAMS AND COLUMNS .....1½ IN.

5. A CHAMFER ¾" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.

6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHORS SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO THE MANUFACTURERS RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR CONTRACTOR APPROVAL WHEN DRILLING HOLES IN CONCRETE. SPECIAL INSPECTIONS, REQUIRED BY GOVERNING CODES, SHALL BE PERFORMED IN ORDER TO MAINTAIN MANUFACTURER'S MAXIMUM ALLOWABLE LOADS. ALL EXPANSION/WEDGE ANCHORS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED. EXPANSION BOLTS SHALL BE PROVIDED BY SIMPSON OR APPROVED EQUAL.

7. CONCRETE CYLINDER TIES ARE NOT REQUIRED FOR SLAB ON GRADE WHEN CONCRETE IS LESS THAN 50 CUBIC YARDS (IBC1905.6.2.3) IN THAT EVENT THE FOLLOWING RECORDS SHALL BE PROVIDED BY THE CONCRETE SUPPLIER;
   (A) RESULTS OF CONCRETE CYLINDER TEST PERFORMED AT THE SUPPLIERS PLANT.
   (B) CERTIFICATION OF MINIMUM COMPRESSIVE STRENGTH FOR THE CONCRETE GRADE SUPPLIED.
FOR GREATER THAN 50 CUBIC YARDS THE GC SHALL PERFORM THE CONCRETE CYLINDER TEST.

8. AS AN ALTERNATIVE TO ITEM 7. TEST CYLINDERS SHALL BE TAKEN INITIALLY AND THEREAFTER FOR EVERY 50 YARDS OF CONCRETE FROM EACH DIFFERENT BATCH PLANT.

9. EQUIPMENT SHALL NOT BE PLACED ON NEW PADS FOR SEVEN DAYS AFTER PAD IS POURED, UNLESS IT IS VERIFIED BY CYLINDER TESTS THAT COMPRESSIVE STRENGTH HAS BEEN ATTAINED.

STRUCTURAL STEEL NOTES:

1. ALL STEEL WORK SHALL BE PAINTED OR GALVANIZED IN ACCORDANCE WITH THE DRAWINGS AND T-MOBILE SPECIFICATIONS UNLESS OTHERWISE NOTED. STRUCTURAL STEEL SHALL BE ASTM-A-36 UNLESS OTHERWISE NOTED ON THE SITE SPECIFIC DRAWINGS. STEEL DESIGN, INSTALLATION AND BOLTING SHALL BE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) "MANUAL OF STEEL CONSTRUCTION".

2. ALL WELDING SHALL BE PERFORMED USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND AWS D1.1. WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", 9TH EDITION. PAINTED SURFACES SHALL BE TOUCHED UP.

3. BOLTED CONNECTIONS SHALL USE BEARING TYPE ASTM A325 BOLTS (⅞"ø) AND SHALL HAVE MINIMUM OF TWO BOLTS UNLESS NOTED OTHERWISE. ALL BOLTS SHALL BE GALVANIZED OR STAINLESS STEEL.

4. NON-STRUCTURAL CONNECTIONS FOR STEEL GRATING MAY USE ⅝" DIA. ASTM A 307 BOLTS (GALV) UNLESS NOTED OTHERWISE.

5. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER REVIEW & APPROVAL ON PROJECTS REQUIRING STRUCTURAL STEEL

6. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC SPECIFICATIONS.

SOIL COMPACTION NOTES FOR SLAB ON GRADE:

1. EXCAVATE AS REQUIRED TO REMOVE VEGETATION AND TOPSOIL TO EXPOSE NATURAL SUBGRADE AND PLACE CRUSHED STONE AS REQUIRED.

2. COMPACTION CERTIFICATION: AN INSPECTION AND WRITTEN CERTIFICATION BY A QUALIFIED GEOTECHNICAL TECHNICIAN OR ENGINEER IS ACCEPTABLE.

3. AS AN ALTERNATE TO INSPECTION AND WRITTEN CERTIFICATION, THE "UNDISTURBED SOIL" BASE SHALL BE COMPACTED WITH "COMPACTION EQUIPMENT", LISTED BELOW, TO AT LEAST 90% MODIFIED PROCTOR MAXIMUM DENSITY PER ASTM D 1557 METHOD C.

4. COMPACTED SUBBASE SHALL BE UNIFORM AND LEVELED. PROVIDE 6" MINIMUM CRUSHED STONE OR GRAVEL COMPACTED IN 3" LIFTS ABOVE COMPACTED SOIL. GRAVEL SHALL BE NATURAL OR CRUSHED WITH 100% PASSING #1 SIEVE.

5. AS AN ALTERNATE TO ITEMS 2 AND 3, THE SUBGRADE SOILS WITH 5 PASSES OR A MEDIUM SIZED VIBRATORY PLATE COMPACTOR (SUCH AS BOMAG BPR 30/38) OR HAND-OPERATED SINGLE DRUM VIBRATORY ROLLER (SUCH AS BOMAG BW 55E). AND SOFT AREAS THAT ARE ENCOUNTERED SHOULD BE REMOVED AND REPLACED WITH A WELL-GRADED GRANULAR FILL AND COMPACTED AS STATED ABOVE.

COMPACTION EQUIPMENT:

1. HAND OPERATED DOUBLE DRUN, VIBRATORY ROLLER, VIBRATORY PLATE COMPACTOR OR JUMPING JACK COMPACTOR.

CONSTRUCTION NOTES:

1. FIELD VERIFICATION:
SUBCONTRACTOR SHALL FIELD VERIFY SCOPE OF WORK, T-MOBILE ANTENNA PLATFORM LOCATION AND UTILITY TRENCHWORK.

2. COORDINATION OF WORK:
SUBCONTRACTOR SHALL COORDINATE RF WORK AND PROCEDURES WITH CONTRACTOR.

3. CABLE LADDER RACK:
SUBCONTRACTOR SHALL FURNISH AND INSTALL CABLE LADDER RACK, CABLE TRAY AND/OR ICE BRIDGE, AND CONDUIT AS REQUIRED TO SUPPORT CABLES TO THE NEW BTS LOCATION.

ELECTRICAL INSTALLATION NOTES:

1. WIRING, RACEWAY, AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.

2. SUBCONTRACTOR SHALL MODIFY OR INSTALL CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. SUBCONTRACTOR SHALL SUBMIT MODIFICATIONS TO CONTRACTOR FOR APPROVAL.

3. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.

4. CABLES SHALL NOT BE ROUTED THROUGH LADDER-STYLE CABLE TRAY RUNGS.

5. EACH END OF EVERY POWER, GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA, AND MATCH INSTALLATION REQUIREMENTS.

6. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, ¾ INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC AND OSHA.

7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).

8. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.

9. ALL TIE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES.

10. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (#34 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (#6 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN-2 GREEN INSULATION, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.

12. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR #2 AWG SOLID TINNED COPPER CABLE, UNLESS OTHERWISE SPECIFIED.

13. POWER AND CONTROL WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (#34 AWG OR LARGER), 600 V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90 °C (WET AND DRY) OPERATION; WITH OUTER JACKET; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.

14. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY HARGER (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT NO LESS THAN 75°C (90°C IF AVAILABLE).

15. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

16. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.

17. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.

18. ELECTRICAL METALLIC TUBING (EMT), ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC, SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.

19. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.

20. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40 OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.

21. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.

22. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.

23. CABINETS, BOXES AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.

24. CABINETS, BOXES AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.

25. WIREWAYS SHALL BE EPOXY-COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

26. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.

27. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED, OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

28. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.

29. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.

30. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

31. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, NEC AND ALL APPLICABLE LOCAL CODES.

32. CONDUIT ROUTINGS ARE SCHEMATIC. SUBCONTRACTOR SHALL INSTALL CONDUITS SO THAT ACCESS TO EQUIPMENT IS NOT BLOCKED.

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CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
4	02/01/23	CONSTRUCTION REVISED	CMC
3	05/27/22	CONSTRUCTION REVISED	CMC
2	05/19/22	CONSTRUCTION REVISED	CMC
1	07/28/20	ISSUED FOR CONSTRUCTION	CMC
0	06/17/20	ISSUED FOR REVIEW	CMC

SITE NUMBER:
CT11090A

SITE ADDRESS:
411 WEST PUTNAM AVENUE
GREENWICH, CT 06830

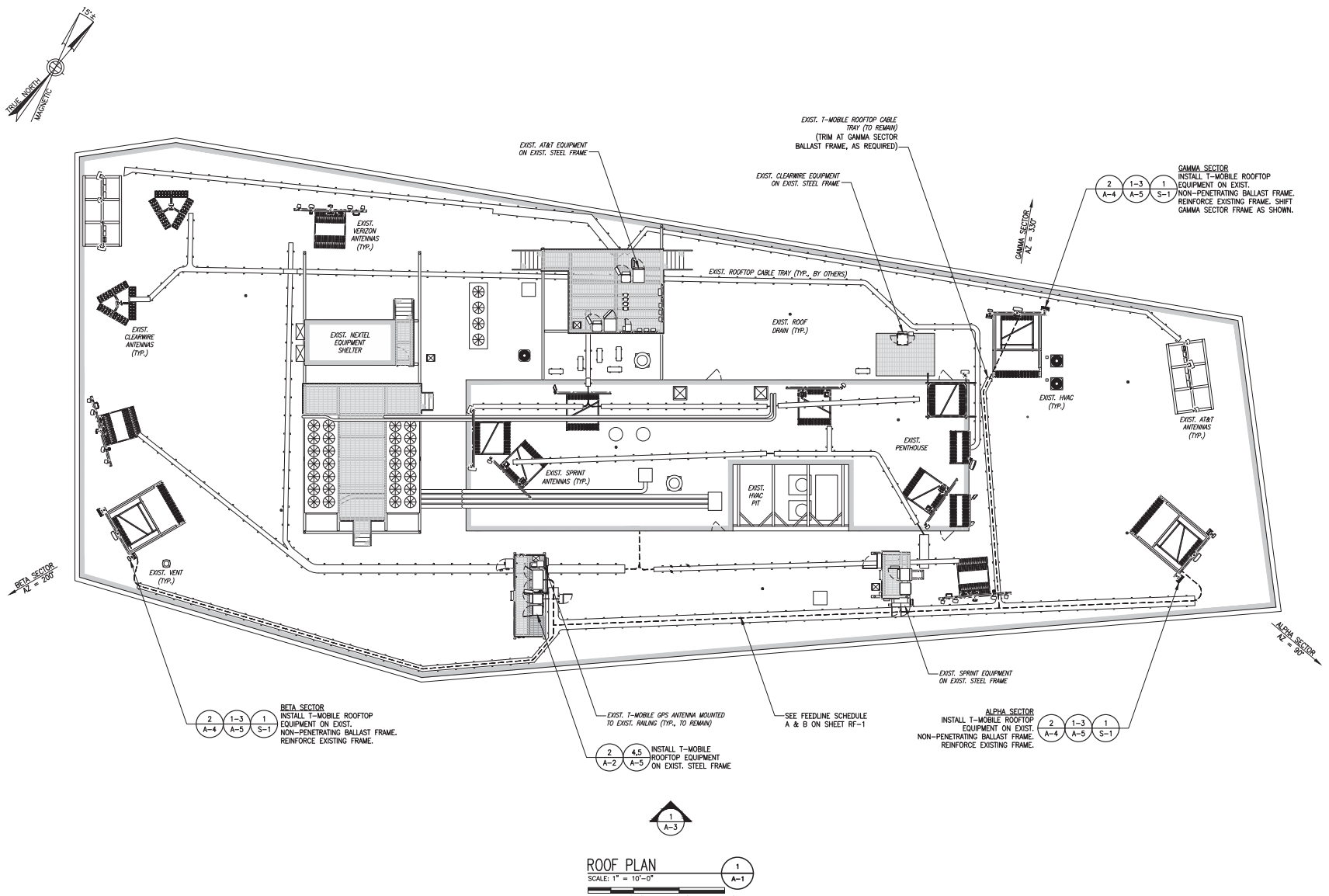
SHEET TITLE
GENERAL NOTES

SHEET NUMBER
GN-1

1815.141

SUPPLEMENTAL GENERAL CONDITIONS WORK NOTE (BUILDING PROTECTION AND RF EME SAFETY SIGNAGE):

1. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ROOF SURFACE AND PARAPET WALL DURING CONSTRUCTION. PROPER ROOF PROTECTING MATERIALS SHALL BE PLACED AROUND ALL WORKING AREAS AND NO TOOLS, LADDERS, MATERIALS, OR EQUIPMENT SHALL BE PLACED DIRECTLY ON THE ROOF SURFACE. ANY DAMAGES TO ROOF SURFACE AND/OR PARAPET WALL DURING CONSTRUCTION SHALL BE REPAIRED TO AS NEW CONDITION.
2. GENERAL CONTRACTOR SHALL USE BUILDING OWNER'S ROOFING CONTRACTOR FOR ALL ROOF PENETRATIONS.
3. GENERAL CONTRACTOR SCOPE OF WORK SHALL INCLUDE THE INSTALLATION OF T-MOBILE RF SAFETY SIGNAGE AND OTHER RF SAFETY IMPROVEMENTS AS SHOWN ON SUPPLEMENTAL PLANS (BY OTHERS) WHICH SHALL BE SLIP-SHEETED BY SBA COMMUNICATIONS INTO THE FINAL CONSTRUCTION DRAWINGS. CHAPPELL ENGINEERING ASSOCIATES, LLC, IS NOT RESPONSIBLE FOR THE DESIGN OF ANY RF SAFETY IMPROVEMENTS.



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SITE NUMBER:
CT11090A

SITE ADDRESS:
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GREENWICH, CT 06830

SHEET TITLE
ROOF PLAN

SHEET NUMBER
A-1

1815.141

SUPPLEMENTAL GENERAL CONDITIONS WORK NOTE (BUILDING PROTECTION AND RF EME SAFETY SIGNAGE):

1. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ROOF SURFACE AND PARAPET WALL DURING CONSTRUCTION. PROPER ROOF PROTECTING MATERIALS SHALL BE PLACED AROUND ALL WORKING AREAS AND NO TOOLS, LADDERS, MATERIALS, OR EQUIPMENT SHALL BE PLACED DIRECTLY ON THE ROOF SURFACE. ANY DAMAGES TO ROOF SURFACE AND/OR PARAPET WALL DURING CONSTRUCTION SHALL BE REPAIRED TO AS NEW CONDITION.
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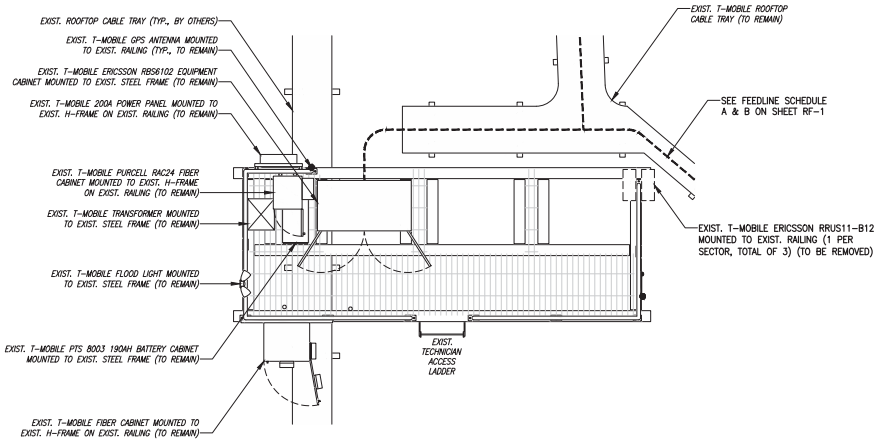
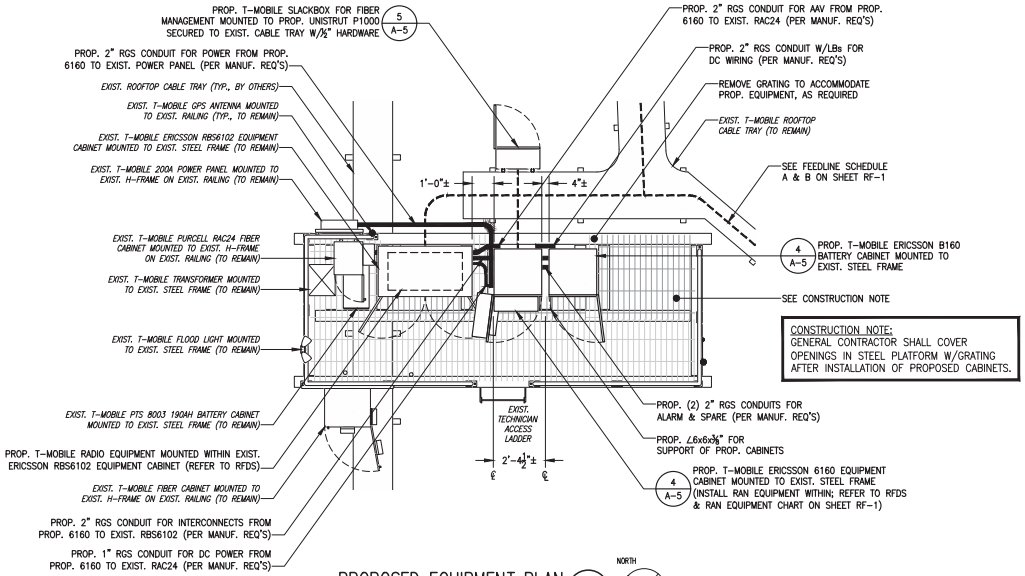
3. GENERAL CONTRACTOR SCOPE OF WORK SHALL INCLUDE THE INSTALLATION OF T-MOBILE RF SAFETY SIGNAGE AND OTHER RF SAFETY IMPROVEMENTS AS SHOWN ON SUPPLEMENTAL PLANS (BY OTHERS) WHICH SHALL BE SLIP-SHEETED BY SBA COMMUNICATIONS INTO THE FINAL CONSTRUCTION DRAWINGS. CHAPPELL ENGINEERING ASSOCIATES, LLC, IS NOT RESPONSIBLE FOR THE DESIGN OF ANY RF SAFETY IMPROVEMENTS.

EXISTING EQUIPMENT PHOTO



EXISTING EQUIPMENT PLAN (1 / A-2)
SCALE: 3/8" = 1'-0"
NORTH
0 2'-8" 5'-4" 8'-0"



PROPOSED EQUIPMENT PLAN (2 / A-2)
SCALE: 3/8" = 1'-0"
NORTH
0 2'-8" 5'-4" 8'-0"

T-MOBILE NORTHEAST LLC
15 COMMERCE WAY, SUITE B
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(508) 286-2700

SBA
SBA COMMUNICATIONS CORP.
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WESTBOROUGH, MA 01581
(508) 251-0720

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(508) 481-7400
www.chappellengineering.com

STATE OF CONNECTICUT
JAMES M. FITZGERALD
No. 25997
LICENSED
PROFESSIONAL CIVIL ENGINEER

CHECKED BY: JMT

APPROVED BY: JMT

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SITE NUMBER:
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SITE ADDRESS:
411 WEST PUTNAM AVENUE
GREENWICH, CT 06830

SHEET TITLE
EQUIPMENT PLANS

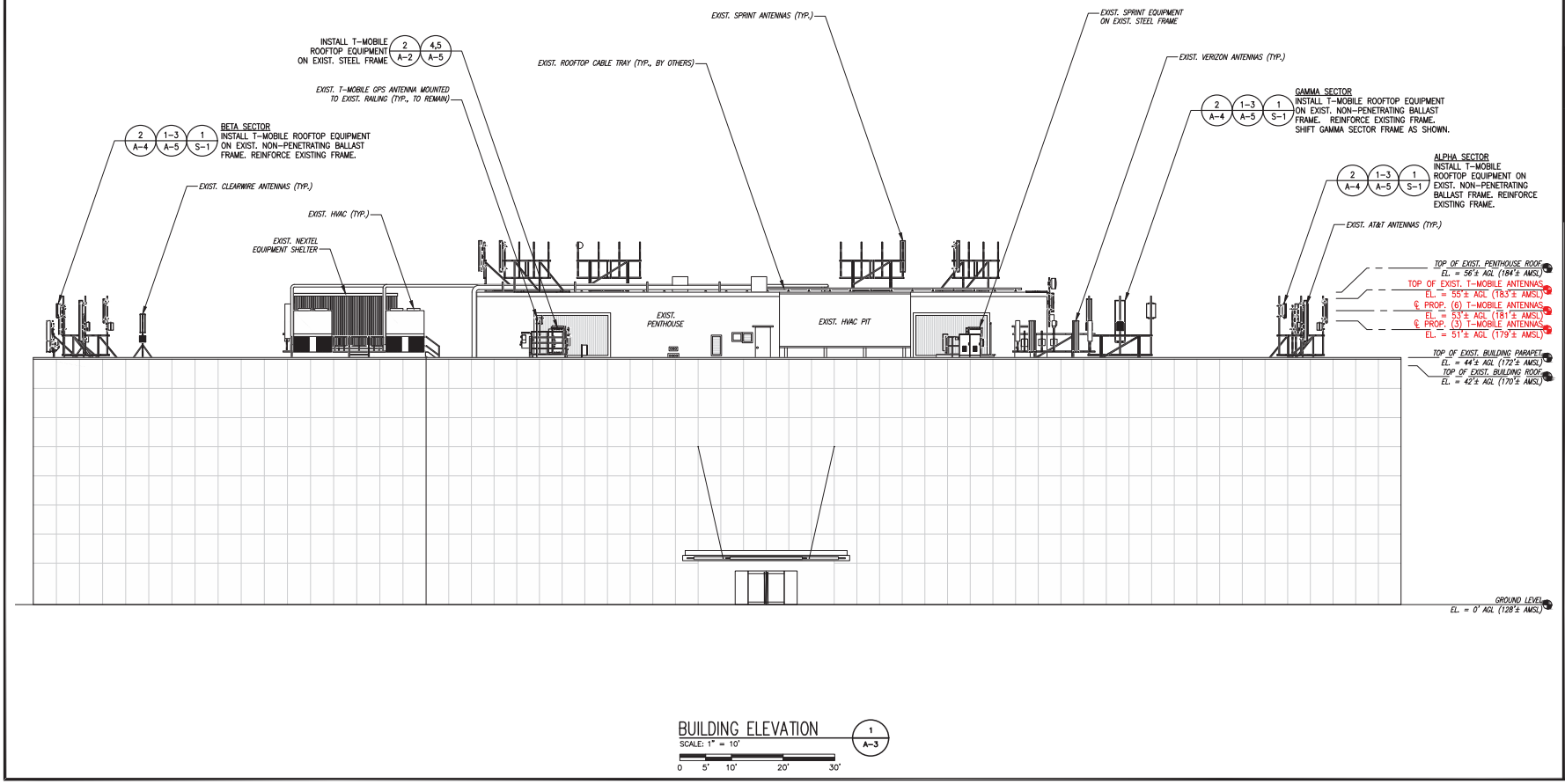
SHEET NUMBER
A-2

1815.141

SUPPLEMENTAL GENERAL CONDITIONS WORK NOTE (BUILDING PROTECTION AND RF EME SAFETY SIGNAGE):
1. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ROOF SURFACE AND PARAPET WALL DURING CONSTRUCTION. PROPER ROOF PROTECTING MATERIALS SHALL BE PLACED AROUND ALL WORKING AREAS AND NO TOOLS, LADDERS, MATERIALS, OR EQUIPMENT SHALL BE PLACED DIRECTLY ON THE ROOF SURFACE. ANY DAMAGES TO ROOF SURFACE AND/OR PARAPET WALL DURING CONSTRUCTION SHALL BE REPAIRED TO AS NEW CONDITION.
2. GENERAL CONTRACTOR SHALL USE BUILDING OWNER'S ROOFING CONTRACTOR FOR ALL ROOF PENETRATIONS.
3. GENERAL CONTRACTOR SCOPE OF WORK SHALL INCLUDE THE INSTALLATION OF T-MOBILE RF SAFETY SIGNAGE AND OTHER RF SAFETY IMPROVEMENTS AS SHOWN ON SUPPLEMENTAL PLANS (BY OTHERS) WHICH SHALL BE SLIP-SHEETED BY SBA COMMUNICATIONS INTO THE FINAL CONSTRUCTION DRAWINGS. CHAPPELL ENGINEERING ASSOCIATES, LLC, IS NOT RESPONSIBLE FOR THE DESIGN OF ANY RF SAFETY IMPROVEMENTS.

RAD CENTER NOTE:
T-MOBILE ANTENNA AND MOUNT RAD CENTER SHOWN IN ELEVATION ARE ACCORDING TO STRUCTURAL ANALYSIS DONE BY OTHERS AND MAY DIFFER FROM RAD CENTER ON RFDS PROVIDED BY T-MOBILE.

GENERAL CONTRACTOR NOTE:
GENERAL CONTRACTOR SHALL REFER TO MOUNT STRUCTURAL ANALYSIS AND ANY MOUNT MODIFICATION DESIGN PROVIDED BY SBA.



BUILDING ELEVATION (1 / A-3)
SCALE: 1" = 10'
0 5' 10' 20' 30'

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SHEET TITLE
BUILDING ELEVATION

SHEET NUMBER
A-3

1815.141

EXISTING ALPHA SECTOR ANTENNA PHOTO

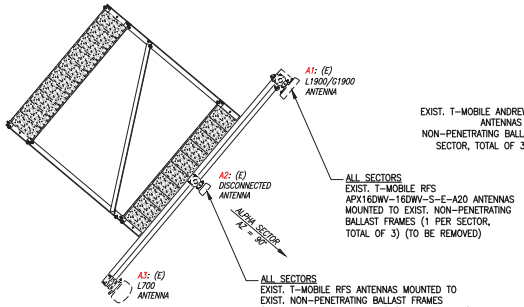
EXISTING BETA SECTOR ANTENNA PHOTO

EXISTING GAMMA SECTOR ANTENNA PHOTO

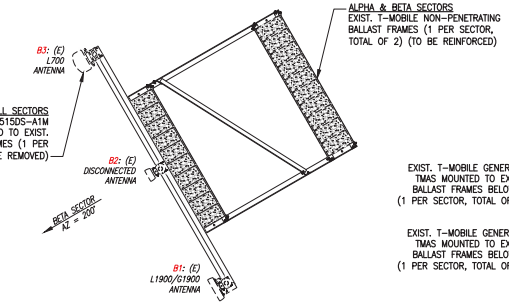
ANTENNA STATUS LEGEND:

EMPTY – EMPTY PIPE

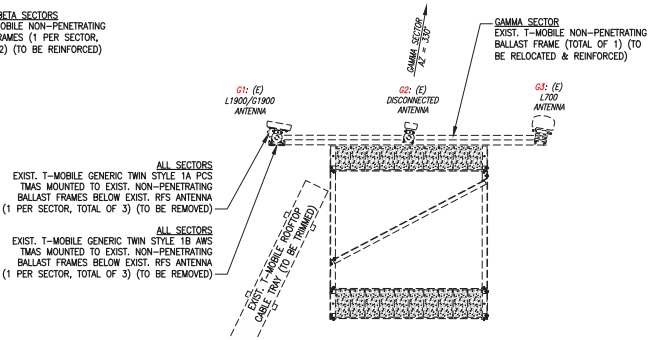
(E) – EXISTING
(P) – INSTALL
(F) – FUTURE



ALPHA SECTOR

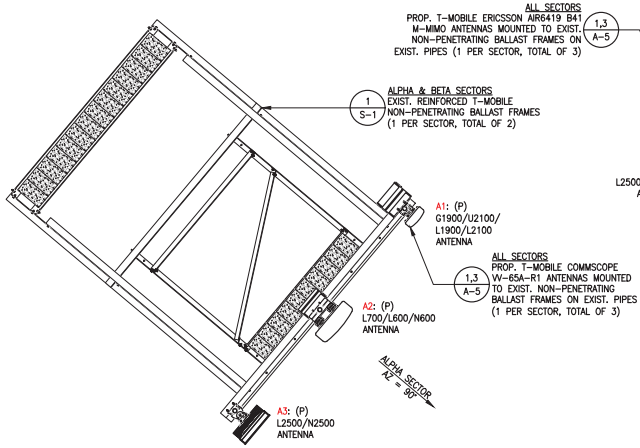


BETA SECTOR

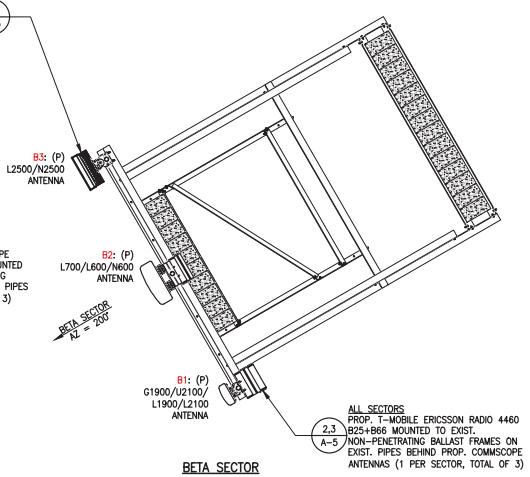


GAMMA SECTOR

EXIST. ANTENNA PLAN
SCALE: 3/8" = 1'-0"
1 A-4
NORTH



ALPHA SECTOR



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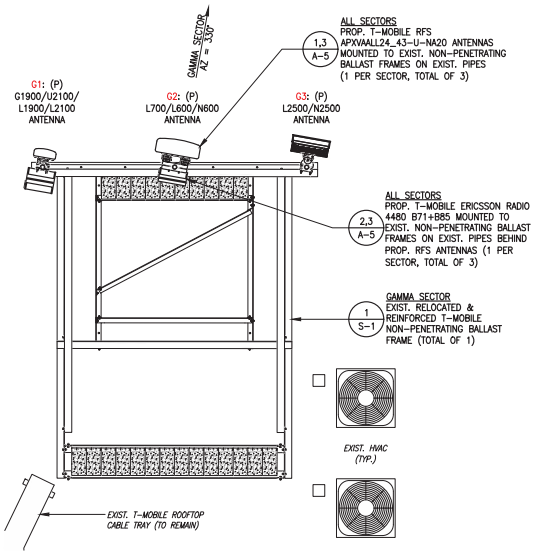

GAMMA SECTOR

PROP. ANTENNA PLAN
SCALE: 3/8" = 1'-0"
2 A-4
NORTH

STRUCTURAL ANALYSIS NOTE:
REFER TO STRUCTURAL ANALYSIS FOR REQUIRED RECONFIGURATION OF THE EXISTING CONCRETE BALLAST.

NOTE:
VERIFY PROPOSED AZIMUTHS WITH RF ENGINEER PRIOR TO INSTALLATION.

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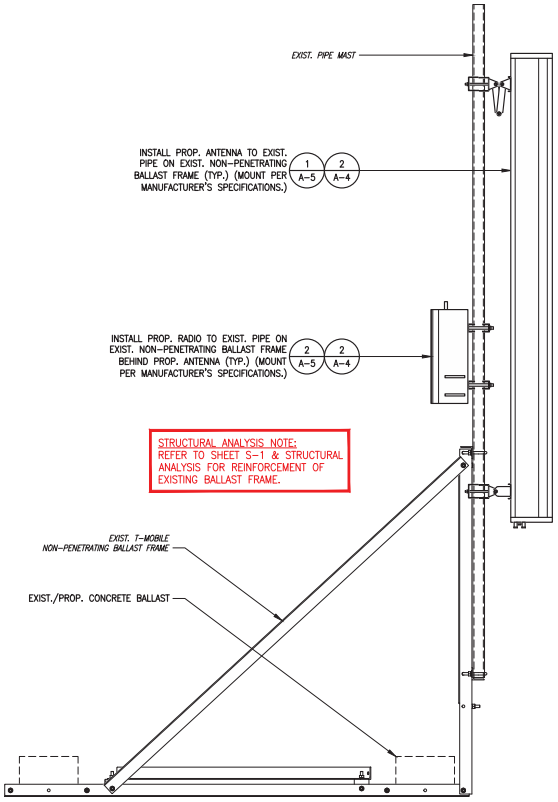
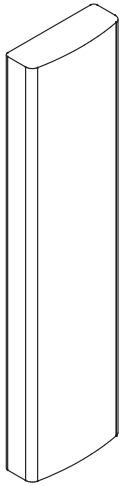
SHEET TITLE
ANTENNA PLANS

SHEET NUMBER
A-4

1815.14

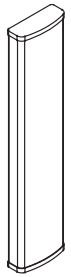


ANTENNA MOUNTING DETAIL 3 A-5
SCALE: N.T.S.



RFS APXVAALL24_43-U-NA20 ANTENNA
DIMENSIONS: 95.9"H x 24.0"W x 8.5"D
WEIGHT: 122.8 lbs
QUANTITY: 1 PER SECTOR, TOTAL OF 3

ERICSSON M-MIMO AIR6419_B41 ANTENNA
DIMENSIONS: 36.3"H x 20.9"W x 9.0"D
WEIGHT: 83.3 lbs
QUANTITY: 1 PER SECTOR, TOTAL OF 3



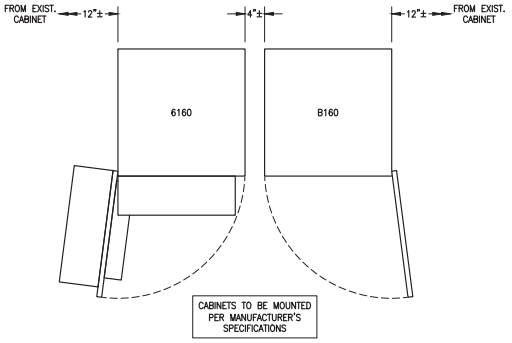
COMMSCOPE VV-65A-R1 ANTENNA
DIMENSIONS: 54.7"H x 12.1"W x 4.6"D
WEIGHT: 23.8 lbs
QUANTITY: 1 PER SECTOR, TOTAL OF 3

ANTENNA DETAILS 1 A-5
SCALE: N.T.S.

ERICSSON RADIO 4460_B25+B66
DIMENSIONS: 17.0"H x 15.1"W x 11.9"D
WEIGHT: 104.0 lbs
QUANTITY: 1 PER SECTOR, TOTAL OF 3

ERICSSON RADIO 4480_B71+B85
DIMENSIONS: 19.2"H x 15.1"W x 7.5"D
WEIGHT: 92.6 lbs
QUANTITY: 1 PER SECTOR, TOTAL OF 3

RADIO DETAIL 2 A-5
SCALE: N.T.S.



ERICSSON 6160 SITE SUPPORT CABINET
DIMENSIONS: 63.25"H x 26.0"W x 34.0"D
QUANTITY: TOTAL OF 1

ERICSSON B160 BATTERY CABINET
DIMENSIONS: 63.25"H x 26.0"W x 26.0"D
QUANTITY: TOTAL OF 1

EQUIPMENT DETAIL 4 A-5
SCALE: N.T.S.

SLACKBOX - HOFFMAN 32FH91 NEMA 3R ENCLOSURE
DIMENSIONS: 24.0"H x 24.0"W x 12.0"D
QUANTITY: TOTAL OF 1

SSC DETAILS 5 A-5
SCALE: N.T.S.

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SHEET TITLE
SITE DETAILS

SHEET NUMBER
A-5

1815.141

FINAL ANTENNA CONFIGURATION

SECTOR		ANTENNA	RAD CENTER	AZIMUTH (TRUE NORTH)	MECHANICAL DOWNTILT	ELECTRICAL DOWNTILT	BAND	TMA/RADIOS	CABLES
ALPHA	A1	COMMSCOPE VV-65A-R1	53'± AGL	90°	0°	4°	G1900/U2100/L1900/L2100	ERICSSON RADIO 4460 B25+B66	*(3) 1-5/8" (6x12) HCS FIBER CABLES* PROP. (3) 2" (6x24) HCS FIBER CABLES (100m±)
	A2	RFS APXVAALL24_43-U-NA20	51'± AGL	90°	0°	2°	L700/L600/N600	ERICSSON RADIO 4480 B71+B85	
	A3	ERICSSON M-MIMO AIR6419 B41	53'± AGL	90°	0°	2°	L2500/N2500	–	
BETA	B1	COMMSCOPE VV-65A-R1	53'± AGL	200°	0°	4°	G1900/U2100/L1900/L2100	ERICSSON RADIO 4460 B25+B66	
	B2	RFS APXVAALL24_43-U-NA20	51'± AGL	200°	0°	2°	L700/L600/N600	ERICSSON RADIO 4480 B71+B85	
	B3	ERICSSON M-MIMO AIR6419 B41	53'± AGL	200°	0°	2°	L2500/N2500	–	
GAMMA	G1	COMMSCOPE VV-65A-R1	53'± AGL	330°	0°	4°	G1900/U2100/L1900/L2100	ERICSSON RADIO 4460 B25+B66	
	G2	RFS APXVAALL24_43-U-NA20	51'± AGL	330°	0°	2°	L700/L600/N600	ERICSSON RADIO 4480 B71+B85	
	G3	ERICSSON M-MIMO AIR6419 B41	53'± AGL	330°	0°	2°	L2500/N2500	–	

CABLE NOTE: EXISTING (18) 1-5/8" COAX CABLES TO BE REMOVED. SEE FEEDLINE SCHEDULE A & B BELOW.

NOTE: RFDS REV6 – 01/28/22

RAD CENTER NOTE:
T-MOBILE ANTENNA RAD CENTER SHOWN IN ABOVE SCHEDULE IS ACCORDING TO RFDS PROVIDED BY T-MOBILE AND MIGHT DIFFER FROM ACTUAL ANTENNA RAD CENTER ON STRUCTURAL ANALYSIS.

FEEDLINE SCHEDULE

SCHEDULE	FEEDLINES		LOCATION
A	*EXISTING TO REMAIN:*	*(1) 1/2" COAX FOR GPS ANTENNA (3) 1-5/8" (6x12) HCS FIBER CABLES*	ROUTED PER STRUCTURAL ANALYSIS
	EXISTING TO BE REMOVED:	*(18) 1-5/8" COAX CABLES*	
B	PROPOSED:	(3) 2" (6x24) HCS FIBER CABLES (100m±)	

NOTE:
EXISTING T-MOBILE EQUIPMENT FEEDLINE INVENTORY BASED ON OBSERVED FIELD CONDITIONS. RFDS AND FEEDLINE LEASING ENTITLEMENTS MAY DIFFER.

RAN EQUIPMENT

CABINET	EXISTING	PROPOSED
ERICSSON RBS 6102	*(1) DUG20 (2) DUW30 (1) BB 6630 (6) RUS01 B2 (6) RUS01 B4*	*(1) DUG20 (1) DUW30 (1) BB 6630* (1) BB 6648
ERICSSON 6160 AC V1	*N/A*	(2) RP 6651 (1) PSU 4813 vR2A (1) CSR IXRe V2 (GEN2)

NOTE:
RAN EQUIPMENT IS BASED ON RFDS REV6 DATED 01/28/22.

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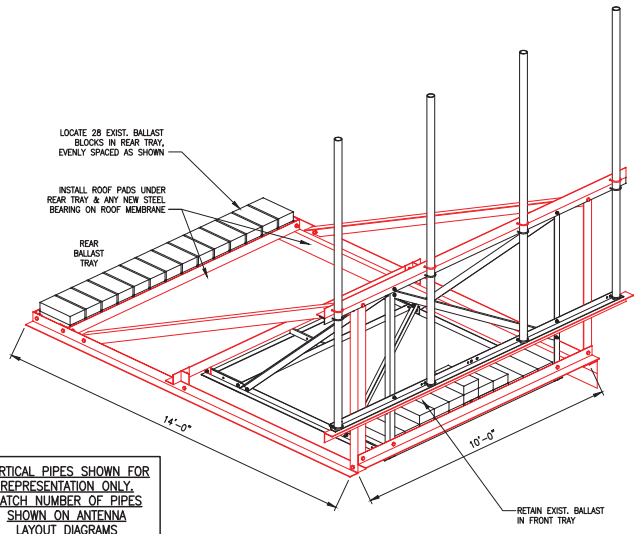
SHEET TITLE
RF DATA

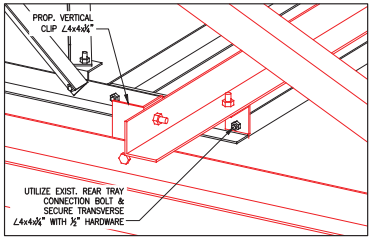
SHEET NUMBER
RF-1

1815.141

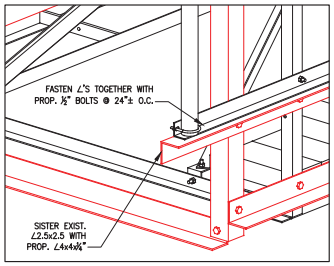


VERTICAL PIPES SHOWN FOR REPRESENTATION ONLY. MATCH NUMBER OF PIPES SHOWN ON ANTENNA LAYOUT DIAGRAMS

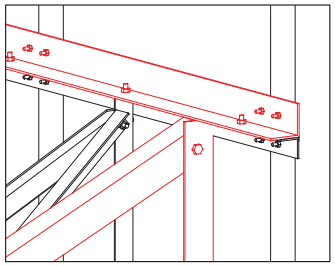
REINFORCED BALLAST FRAME – ISOMETIC VIEW



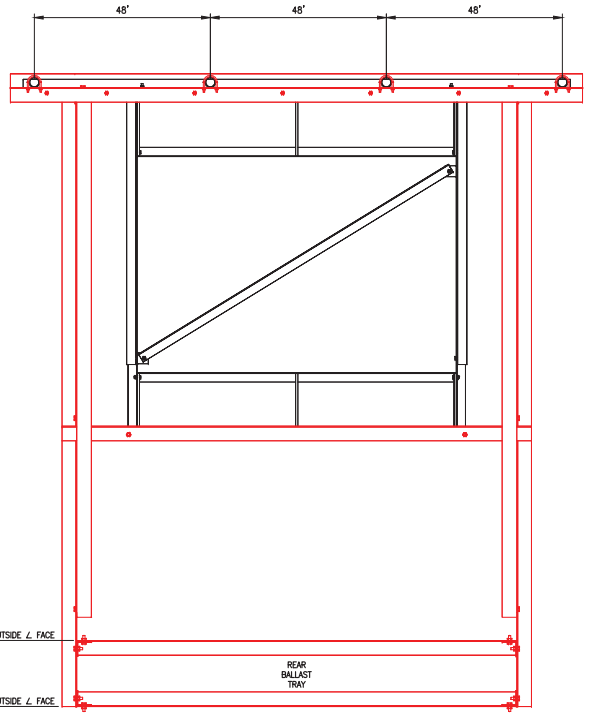
EXISTING REAR TRAY CONNECTION



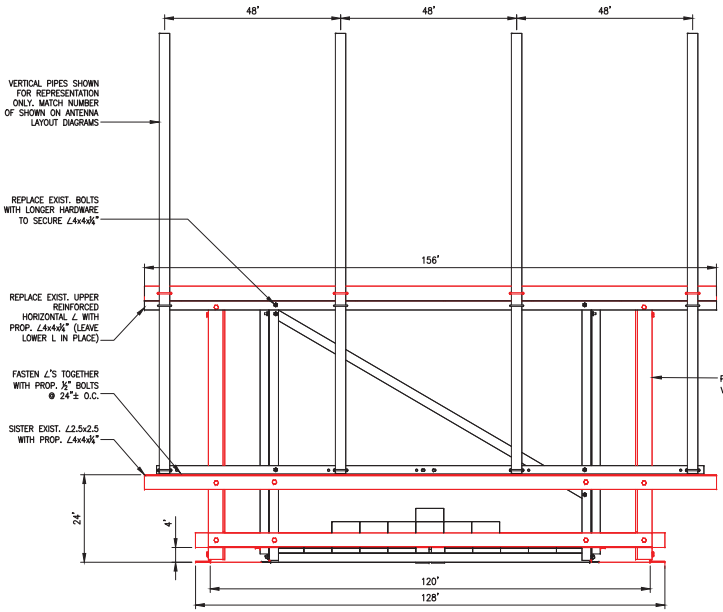
FRONT CORNER DETAIL



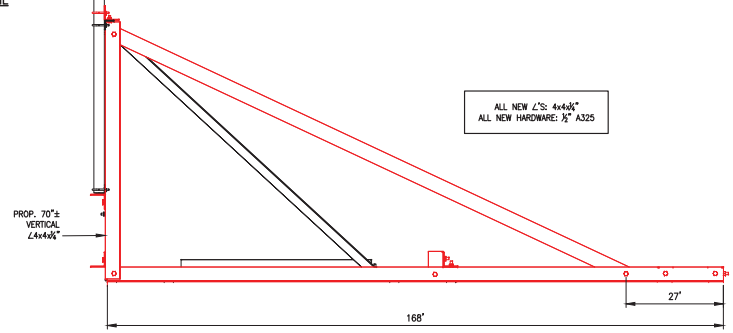
UPPER HORIZONTAL REINF DETAIL



TOP VIEW



FRONT VIEW



SIDE VIEW

PROP. BALLAST ANTENNA FRAMES

SCALE: 3/8" = 1'-0"

1 / S-1

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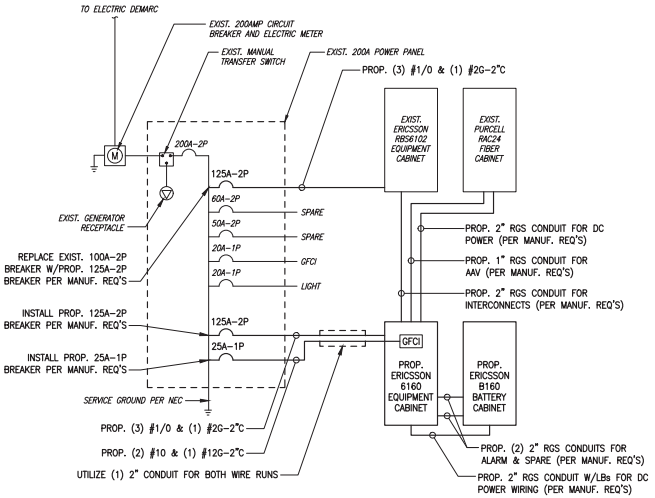
SHEET TITLE
BALLAST MOUNT REINFORCING DETAILS (TYP 3 SECTORS)

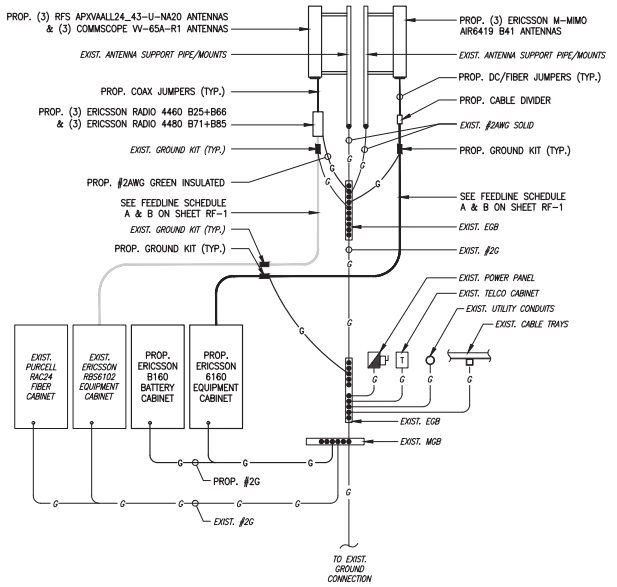
SHEET NUMBER
S-1

1815.141

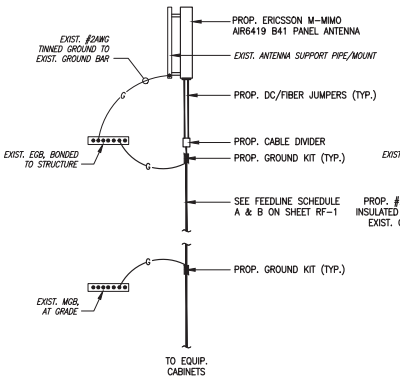
EXISTING POWER PANEL PHOTOS (1 / E-1)
SCALE: NOT TO SCALE



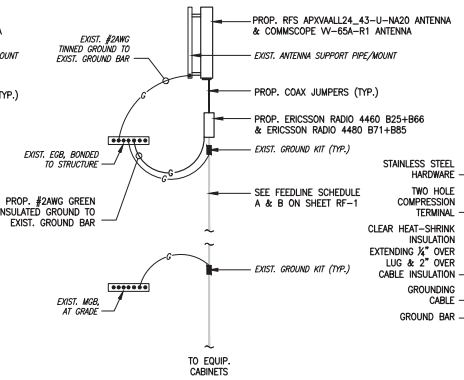
ONE LINE DIAGRAM (2 / E-1)
SCALE: NOT TO SCALE



GROUNDING RISER DIAGRAM (3 / E-1)
SCALE: NOT TO SCALE

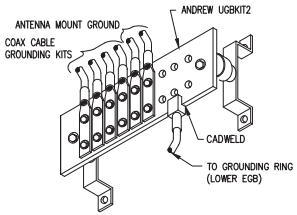


L2500/N2500 ANTENNA

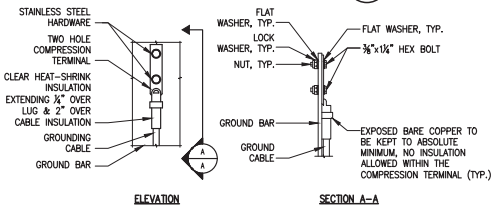


L700/L600/N600 ANTENNA & G1900/U2100/L1900/L2100 ANTENNA

COAX CABLE CONNECTION AND GROUNDING DETAIL (4 / E-1)
SCALE: NOT TO SCALE



GROUND BAR (EGB) (5 / E-1)
SCALE: NOT TO SCALE



NOTES:
1. "DOUBLING UP" OR "STACKING" OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELL DOWNLEADS FROM UPPER EGB, LOWER EGB AND MGB.

TYPICAL GROUND BAR CONNECTIONS DETAIL (6 / E-1)
SCALE: NOT TO SCALE

ELECTRICAL AND GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.
3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.
4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.
5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.
6. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.
7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THHNINSULATION.
8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.
9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING PROVIDE FULL LENGTH PULL ROPE IN INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.
10. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.
11. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.
12. PPC SUPPLIED BY PROJECT OWNER.
13. GROUNDING SHALL COMPLY WITH NEC ART. 250. ADDITIONALLY, GROUNDING, BONDING AND LIGHTNING PROTECTION SHALL BE DONE IN ACCORDANCE WITH "T-MOBILE BTS SITE GROUNDING STANDARDS".
14. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.
15. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.
16. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.
17. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 8" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.
18. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.
19. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.
20. CONTRACTOR SHALL PROVIDE AND INSTALL OMNI DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALLS OVER EACH GROUND ROD AND BONDING POINT BETWEEN EXIST. TOWER/ MONOPOLE GROUNDING RING AND EQUIPMENT GROUNDING RING.
21. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMNS MINIMUM RESISTANCE REQUIRED.
22. CONTRACTOR SHALL CONDUCT ANTENNA, COAX, AND LNA RETURN-LOSS AND DISTANCE- TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.

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CHECKED BY: JMT

APPROVED BY: JMT

SUBMITTALS

REV.	DATE	DESCRIPTION	BY
4	02/01/23	CONSTRUCTION REVISED	CMC
3	05/27/22	CONSTRUCTION REVISED	CMC
2	05/19/22	CONSTRUCTION REVISED	CMC
1	07/28/20	ISSUED FOR CONSTRUCTION	CMC
0	06/17/20	ISSUED FOR REVIEW	CMC

SITE NUMBER:
CT11090A

SITE ADDRESS:
411 WEST PUTNAM AVENUE
GREENWICH, CT 06830

SHEET TITLE
ELECTRIC & GROUNDING DETAILS

SHEET NUMBER
E-1

1815.141