Dielectric®

Antenna Model: **TFU-30DSC/VP-R C170**

Proposal Number:	**C-70546-1**
Date:	**21-Mar-17**
Customer:	**Graham Media**
Location:	**Roanoke, VA**

Electrical Specifications

Polarization:	**Elliptical**		
Azimuth Pattern:	**Directional**		
Antenna Input:	**4-1/16"**	**50 Ohm**	**EIA/DCA**
VSWR:	Channel	**1.08 : 1**	
Bandwidth:	**6 MHz**		
Rated Input Power:	**35 kW**	**(15.44 dBk)**	**Maximum Average Power**

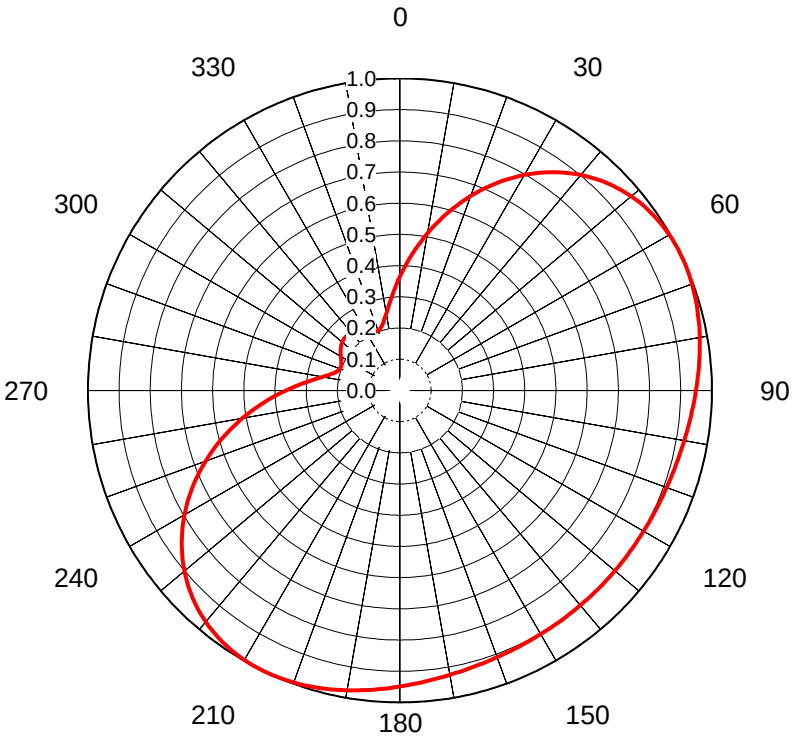
Mechanical Specifications

Mounting:	**Pole Mounted**			
Environmental Protection:	**Full Radome**			
Height:	**67 ft (20.4m)**	less Lightning Protector	**71 ft (21.6m)**	with Lightning Protector
Weight:	**10300 lb (4.7t)**	Includes antenna, mounts, and support pole		
Effective Projected Area:	**105.9 ft² (9.8m²)**	**TIA-222-G**	Basic Wind Speed:	**90 m/h (144.8 km/h)**

Channel Specifications

Call	CH	Freq	Hpol ERP	Vpol ERP	TPO	Peak Main Lobe Hpol Gain	Peak Main Lobe Vpol Gain	Peak at Horizontal Hpol Gain	Peak at Horizontal Vpol Gain
WSLS	34	593 MHz	1000 kW (30.00 dBk)	300 kW (24.77 dBk)	30.6 kW (14.86 dBk)	35.20 (15.47dB)	10.56 (10.24dB)	15.60 (11.93dB)	4.68 (6.70dB)

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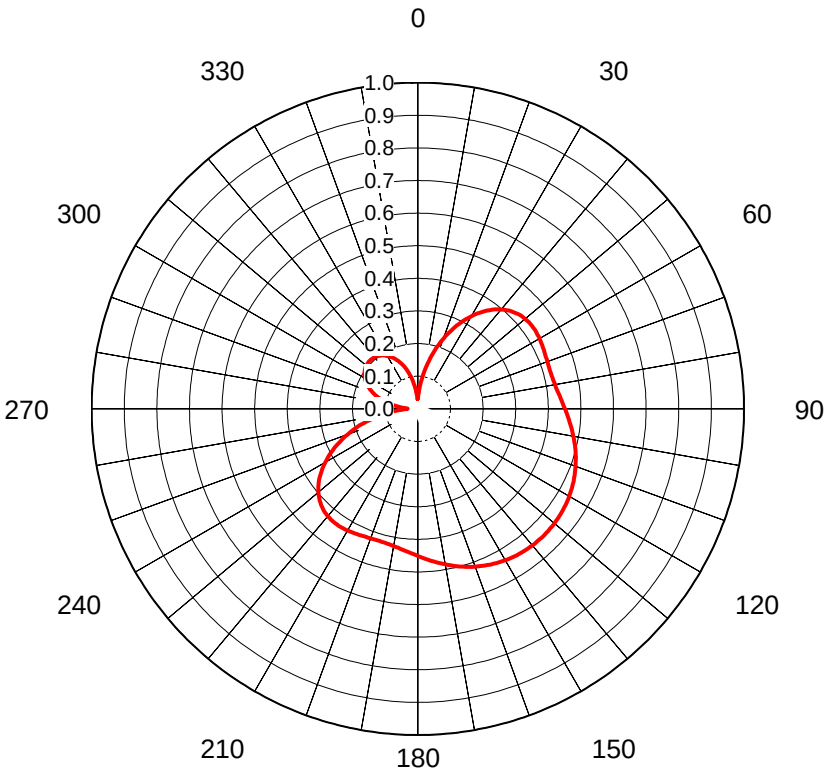
AZIMUTH PATTERN
Horizontal Polarization

Proposal No.	**C-70546-1**
Date	**21-Mar-17**
Call Letters	**WSLS**
Channel	**34**
Frequency	**593 MHz**
Antenna Type	**TFU-30DSC/VP-R C170**
Gain	**1.7 (2.31dB)**
	Calculated

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.365	36	0.864	72	0.993	108	0.912	144	0.900	180	0.949	216	0.984	252	0.634	288	0.207	324	0.234
1	0.379	37	0.874	73	0.992	109	0.911	145	0.900	181	0.952	217	0.981	253	0.619	289	0.206	325	0.232
2	0.393	38	0.883	74	0.990	110	0.910	146	0.901	182	0.954	218	0.977	254	0.604	290	0.204	326	0.229
3	0.407	39	0.893	75	0.988	111	0.909	147	0.901	183	0.957	219	0.973	255	0.588	291	0.204	327	0.227
4	0.422	40	0.901	76	0.986	112	0.908	148	0.901	184	0.960	220	0.968	256	0.573	292	0.204	328	0.224
5	0.437	41	0.910	77	0.983	113	0.907	149	0.902	185	0.963	221	0.963	257	0.558	293	0.205	329	0.222
6	0.451	42	0.918	78	0.981	114	0.906	150	0.902	186	0.965	222	0.958	258	0.543	294	0.206	330	0.219
7	0.466	43	0.925	79	0.978	115	0.905	151	0.903	187	0.968	223	0.952	259	0.527	295	0.207	331	0.216
8	0.482	44	0.933	80	0.976	116	0.905	152	0.903	188	0.971	224	0.946	260	0.512	296	0.209	332	0.214
9	0.497	45	0.940	81	0.973	117	0.904	153	0.904	189	0.973	225	0.940	261	0.497	297	0.211	333	0.211
10	0.512	46	0.946	82	0.971	118	0.903	154	0.905	190	0.976	226	0.933	262	0.482	298	0.214	334	0.209
11	0.527	47	0.952	83	0.968	119	0.903	155	0.905	191	0.978	227	0.925	263	0.466	299	0.216	335	0.207
12	0.543	48	0.958	84	0.965	120	0.902	156	0.906	192	0.981	228	0.918	264	0.451	300	0.219	336	0.206
13	0.558	49	0.963	85	0.963	121	0.902	157	0.907	193	0.983	229	0.910	265	0.437	301	0.222	337	0.205
14	0.573	50	0.968	86	0.960	122	0.901	158	0.908	194	0.986	230	0.901	266	0.422	302	0.224	338	0.204
15	0.588	51	0.973	87	0.957	123	0.901	159	0.909	195	0.988	231	0.893	267	0.407	303	0.227	339	0.204
16	0.604	52	0.977	88	0.954	124	0.901	160	0.910	196	0.990	232	0.883	268	0.393	304	0.229	340	0.204
17	0.619	53	0.981	89	0.952	125	0.900	161	0.911	197	0.992	233	0.874	269	0.379	305	0.232	341	0.206
18	0.634	54	0.984	90	0.949	126	0.900	162	0.912	198	0.993	234	0.864	270	0.365	306	0.234	342	0.207
19	0.648	55	0.987	91	0.946	127	0.900	163	0.914	199	0.995	235	0.854	271	0.352	307	0.236	343	0.210
20	0.663	56	0.990	92	0.944	128	0.900	164	0.915	200	0.996	236	0.843	272	0.338	308	0.238	344	0.214
21	0.677	57	0.992	93	0.941	129	0.900	165	0.917	201	0.997	237	0.832	273	0.326	309	0.240	345	0.218
22	0.692	58	0.994	94	0.939	130	0.900	166	0.918	202	0.998	238	0.821	274	0.313	310	0.241	346	0.223
23	0.706	59	0.996	95	0.936	131	0.899	167	0.920	203	0.999	239	0.809	275	0.302	311	0.242	347	0.229
24	0.720	60	0.997	96	0.934	132	0.899	168	0.922	204	1.000	240	0.797	276	0.290	312	0.243	348	0.235
25	0.733	61	0.998	97	0.932	133	0.899	169	0.924	205	1.000	241	0.785	277	0.280	313	0.244	349	0.243
26	0.747	62	0.999	98	0.930	134	0.899	170	0.926	206	1.000	242	0.773	278	0.269	314	0.244	350	0.251
27	0.760	63	1.000	99	0.928	135	0.899	171	0.928	207	1.000	243	0.760	279	0.260	315	0.245	351	0.260
28	0.773	64	1.000	100	0.926	136	0.899	172	0.930	208	0.999	244	0.747	280	0.251	316	0.244	352	0.269
29	0.785	65	1.000	101	0.924	137	0.899	173	0.932	209	0.998	245	0.733	281	0.243	317	0.244	353	0.280
30	0.797	66	1.000	102	0.922	138	0.899	174	0.934	210	0.997	246	0.720	282	0.235	318	0.243	354	0.290
31	0.809	67	0.999	103	0.920	139	0.899	175	0.936	211	0.996	247	0.706	283	0.229	319	0.242	355	0.302
32	0.821	68	0.998	104	0.918	140	0.900	176	0.939	212	0.994	248	0.692	284	0.223	320	0.241	356	0.313
33	0.832	69	0.997	105	0.917	141	0.900	177	0.941	213	0.992	249	0.677	285	0.218	321	0.240	357	0.326
34	0.843	70	0.996	106	0.915	142	0.900	178	0.944	214	0.990	250	0.663	286	0.214	322	0.238	358	0.338
35	0.854	71	0.995	107	0.914	143	0.900	179	0.946	215	0.987	251	0.648	287	0.210	323	0.236	359	0.352

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AZIMUTH PATTERN
Vertical Polarization

Proposal No.	**C-70546-1**
Date	**21-Mar-17**
Call Letters	**WSLS**
Channel	**34**
Frequency	**593 MHz**
Antenna Type	**TFU-30DSC/VP-R C170**
Gain	**2.2 (3.41dB)**
	Calculated

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.032	36	0.374	72	0.422	108	0.509	144	0.544	180	0.451	216	0.433	252	0.207	288	0.137	324	0.201
1	0.035	37	0.380	73	0.422	109	0.512	145	0.543	181	0.448	217	0.432	253	0.196	289	0.143	325	0.199
2	0.041	38	0.387	74	0.422	110	0.515	146	0.541	182	0.445	218	0.432	254	0.186	290	0.148	326	0.197
3	0.049	39	0.392	75	0.422	111	0.517	147	0.540	183	0.442	219	0.431	255	0.173	291	0.153	327	0.195
4	0.058	40	0.398	76	0.423	112	0.520	148	0.539	184	0.440	220	0.430	256	0.162	292	0.157	328	0.193
5	0.067	41	0.402	77	0.424	113	0.522	149	0.538	185	0.437	221	0.428	257	0.151	293	0.162	329	0.190
6	0.076	42	0.407	78	0.425	114	0.525	150	0.536	186	0.435	222	0.426	258	0.140	294	0.166	330	0.187
7	0.087	43	0.411	79	0.426	115	0.527	151	0.534	187	0.433	223	0.424	259	0.129	295	0.170	331	0.184
8	0.097	44	0.415	80	0.427	116	0.529	152	0.533	188	0.431	224	0.421	260	0.118	296	0.174	332	0.181
9	0.108	45	0.418	81	0.429	117	0.531	153	0.531	189	0.429	225	0.418	261	0.108	297	0.178	333	0.178
10	0.118	46	0.421	82	0.431	118	0.533	154	0.529	190	0.427	226	0.415	262	0.097	298	0.181	334	0.174
11	0.129	47	0.424	83	0.433	119	0.534	155	0.527	191	0.426	227	0.411	263	0.087	299	0.184	335	0.170
12	0.140	48	0.426	84	0.435	120	0.536	156	0.525	192	0.425	228	0.407	264	0.076	300	0.187	336	0.166
13	0.151	49	0.428	85	0.437	121	0.538	157	0.522	193	0.424	229	0.402	265	0.067	301	0.190	337	0.162
14	0.162	50	0.430	86	0.440	122	0.539	158	0.520	194	0.423	230	0.398	266	0.058	302	0.193	338	0.157
15	0.173	51	0.431	87	0.442	123	0.540	159	0.517	195	0.422	231	0.392	267	0.049	303	0.195	339	0.153
16	0.185	52	0.432	88	0.445	124	0.541	160	0.515	196	0.422	232	0.387	268	0.041	304	0.197	340	0.148
17	0.196	53	0.432	89	0.448	125	0.543	161	0.512	197	0.422	233	0.380	269	0.035	305	0.199	341	0.143
18	0.207	54	0.433	90	0.451	126	0.544	162	0.509	198	0.422	234	0.374	270	0.032	306	0.201	342	0.137
19	0.218	55	0.433	91	0.454	127	0.544	163	0.507	199	0.422	235	0.367	271	0.031	307	0.203	343	0.131
20	0.229	56	0.433	92	0.457	128	0.545	164	0.504	200	0.423	236	0.360	272	0.033	308	0.204	344	0.126
21	0.239	57	0.433	93	0.461	129	0.546	165	0.501	201	0.423	237	0.352	273	0.037	309	0.205	345	0.120
22	0.250	58	0.432	94	0.464	130	0.546	166	0.497	202	0.424	238	0.345	274	0.043	310	0.206	346	0.113
23	0.260	59	0.432	95	0.467	131	0.547	167	0.494	203	0.425	239	0.336	275	0.050	311	0.207	347	0.107
24	0.271	60	0.431	96	0.471	132	0.547	168	0.491	204	0.425	240	0.328	276	0.057	312	0.208	348	0.100
25	0.281	61	0.430	97	0.474	133	0.548	169	0.488	205	0.426	241	0.319	277	0.064	313	0.208	349	0.093
26	0.291	62	0.429	98	0.478	134	0.548	170	0.484	206	0.427	242	0.310	278	0.072	314	0.208	350	0.086
27	0.300	63	0.428	99	0.481	135	0.548	171	0.481	207	0.428	243	0.300	279	0.079	315	0.209	351	0.079
28	0.310	64	0.427	100	0.484	136	0.548	172	0.478	208	0.429	244	0.291	280	0.086	316	0.208	352	0.072
29	0.319	65	0.426	101	0.488	137	0.548	173	0.474	209	0.430	245	0.281	281	0.093	317	0.208	353	0.064
30	0.328	66	0.425	102	0.491	138	0.547	174	0.471	210	0.431	246	0.271	282	0.100	318	0.208	354	0.057
31	0.336	67	0.425	103	0.494	139	0.547	175	0.467	211	0.432	247	0.260	283	0.107	319	0.207	355	0.050
32	0.345	68	0.424	104	0.497	140	0.546	176	0.464	212	0.432	248	0.250	284	0.113	320	0.206	356	0.043
33	0.352	69	0.423	105	0.501	141	0.546	177	0.461	213	0.433	249	0.239	285	0.120	321	0.205	357	0.037
34	0.360	70	0.423	106	0.504	142	0.545	178	0.457	214	0.433	250	0.229	286	0.126	322	0.204	358	0.033
35	0.367	71	0.422	107	0.507	143	0.544	179	0.454	215	0.433	251	0.218	287	0.131	323	0.203	359	0.031

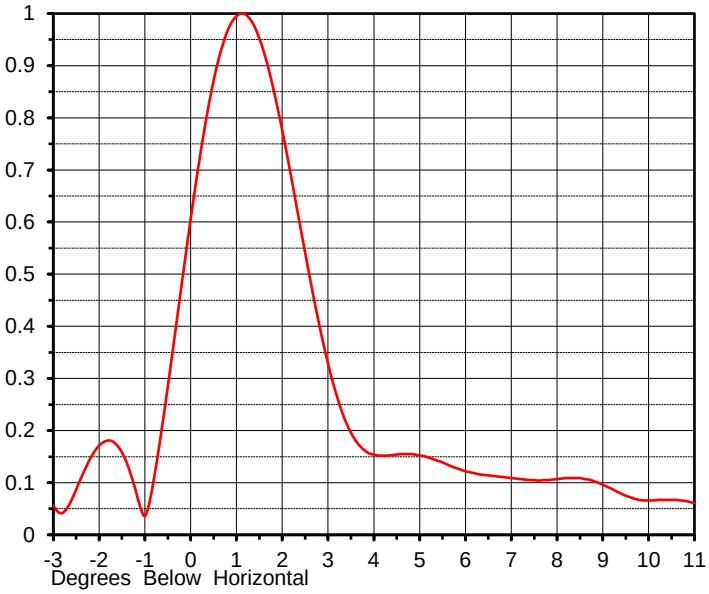
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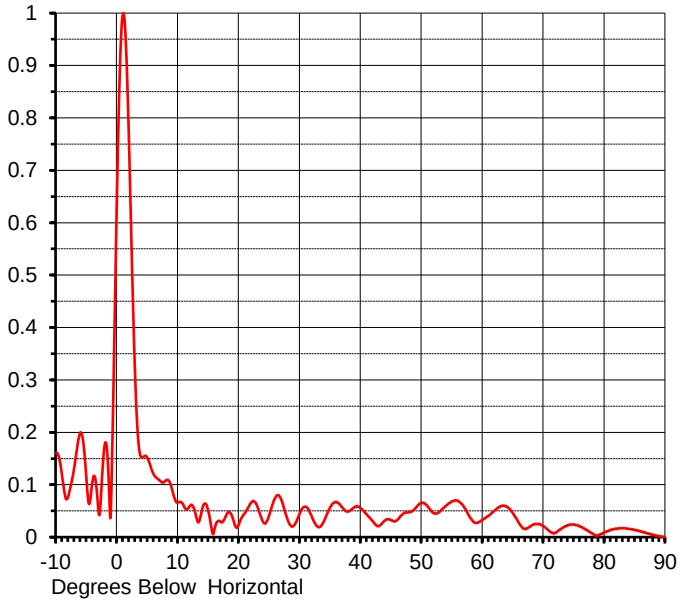
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ELEVATION PATTERN

Proposal No.	**C-70546-1**
Date	**21-Mar-17**
Call Letters	**WSLS**
Channel	**34**
Frequency	**593 MHz**
Antenna Type	**TFU-30DSC/VP-R C170**

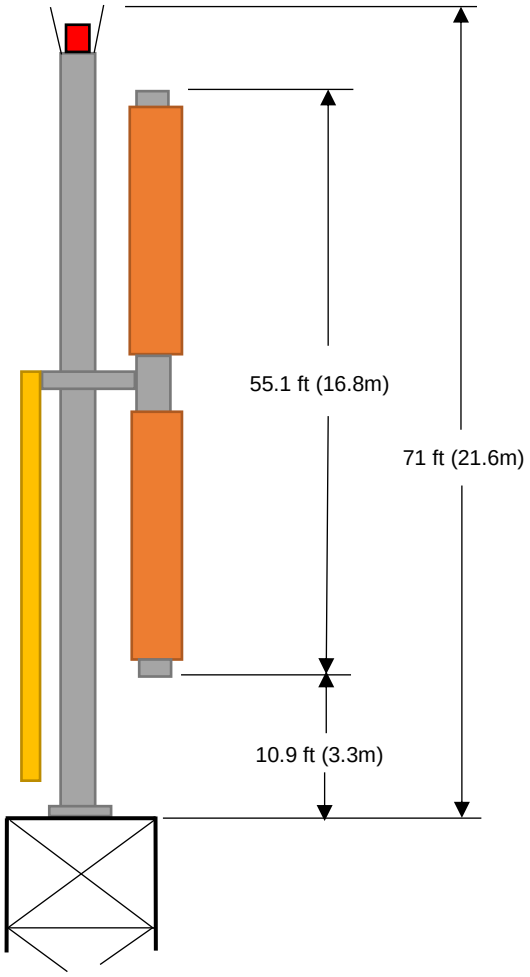
RMS Directivity at Main Lobe	**25.5 (14.07 dB)**	Beam Tilt	**1.00 deg**
RMS Directivity at Horizontal	**11.3 (10.53 dB)**	Pattern Number	**30Q25510**
	Calculated		





Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.161	10.0	0.066	30.0	0.046	50.0	0.065	70.0	0.020
-9.0	0.115	11.0	0.058	31.0	0.058	51.0	0.058	71.0	0.011
-8.0	0.078	12.0	0.060	32.0	0.038	52.0	0.046	72.0	0.009
-7.0	0.135	13.0	0.038	33.0	0.019	53.0	0.049	73.0	0.017
-6.0	0.200	14.0	0.055	34.0	0.032	54.0	0.060	74.0	0.023
-5.0	0.106	15.0	0.048	35.0	0.058	55.0	0.068	75.0	0.024
-4.0	0.109	16.0	0.016	36.0	0.067	56.0	0.069	76.0	0.020
-3.0	0.044	17.0	0.029	37.0	0.056	57.0	0.056	77.0	0.014
-2.0	0.178	18.0	0.044	38.0	0.049	58.0	0.036	78.0	0.007
-1.0	0.062	19.0	0.035	39.0	0.057	59.0	0.027	79.0	0.004
0.0	0.667	20.0	0.025	40.0	0.055	60.0	0.033	80.0	0.009
1.0	1.000	21.0	0.046	41.0	0.043	61.0	0.041	81.0	0.014
2.0	0.731	22.0	0.066	42.0	0.030	62.0	0.051	82.0	0.016
3.0	0.294	23.0	0.059	43.0	0.021	63.0	0.059	83.0	0.017
4.0	0.152	24.0	0.028	44.0	0.032	64.0	0.058	84.0	0.016
5.0	0.151	25.0	0.043	45.0	0.032	65.0	0.045	85.0	0.014
6.0	0.120	26.0	0.076	46.0	0.033	66.0	0.026	86.0	0.011
7.0	0.108	27.0	0.070	47.0	0.045	67.0	0.015	87.0	0.007
8.0	0.108	28.0	0.033	48.0	0.048	68.0	0.022	88.0	0.004
9.0	0.092	29.0	0.022	49.0	0.056	69.0	0.025	89.0	0.002
								90.0	0.000

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MECHANICAL SPECIFICATIONS

Proposal No.	**C-70546-1**
Date	**21-Mar-17**
Call Letters	**WSLS**
Channel	**34**
Frequency	**593 MHz**
Antenna Type	**TFU-30DSC/VP-R C170**

Preliminary Specifications

Pole Mounted

With ice TIA-222-G

Height AGL(z)	136 ft (41.5 m)
Basic Wind Speed	90 m/h (144.8 km/h)
Structure Class	II
Exposure Category	B
Topography Category	5
Design Ice	0.75 in t_{iz} = 2.11 in
Wind Speed w/Ice	30 m/h (48.3 km/h)

Mechanical Specifications		**without ice**	**with ice**	**full stack**	**full stack with ice**
Height with Lightning Protector	H4			71 ft (21.6m)	
Height less Lightning Protector	H2	55.1 ft (16.8m)		67 ft (20.4m)	
Height of Center of Radiation	H3	27.55 ft (8.4m)		38.45 ft (11.7m)	
Effective Projected Area	$(EPA)_S$	38.9 ft² (3.6m²)	100.9 ft² (9.4m²)	105.9 ft² (9.8m²)	314.8 ft² (29.2m²)
Moment Arm	D1			33.3 ft (10.1m)	35.2 ft (10.7m)
Weight	W	850 lb (0.4t)	3700 lb (1.7t)	10300 lb (4.7t)	16500 lb (7.5t)

Antenna designed in accordance with AISC specifications for design of structural steel as prescribed by TIA-222-G

Prepared by: CAB **Date:** 21-Mar-17 **ME:** **EE:**

Rev. No.1 by:

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Summary

Proposal No.	**C-70546-1**
Date	**21-Mar-17**
Call Letters	**WSLS**
Channel	**34**
Frequency	**593 MHz**
Antenna Type	**TFU-30DSC/VP-R C**

Antenna

	Hpol		Vpol	
ERP:	**1000 kW**	**(30.00 dBk)**	**300 kW**	**(24.77 dBk)**
Peak Gain*	35.20	(15.47 dB)	10.56	(10.24 dB)

Antenna Input Power **28.4 kW (14.53 dBk)**

Transmission Line

Type:	**Rigid**	Attenuation:	**(0.33 dB)**
Size:	**4-1/16"**	Efficiency:	**92.7%**
Impedance:	**50 Ohm**		
Length:	**200 ft**	**61.0 m**	

Transmitter Output

30.6 kW (14.86 dBk)

Transmitter filter losses not included

* Directivity and Gain are with respect to half wave dipole. The gain includes feed system losses

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