

**Antenna Model:****TUA-4P-4/11M-1**

Proposal Number: **C-70983**
Date: **19-Jan-18**
Customer: **NE Pennsylvania ED**
Location: **Claeks Summit, PA**

Electrical Specifications

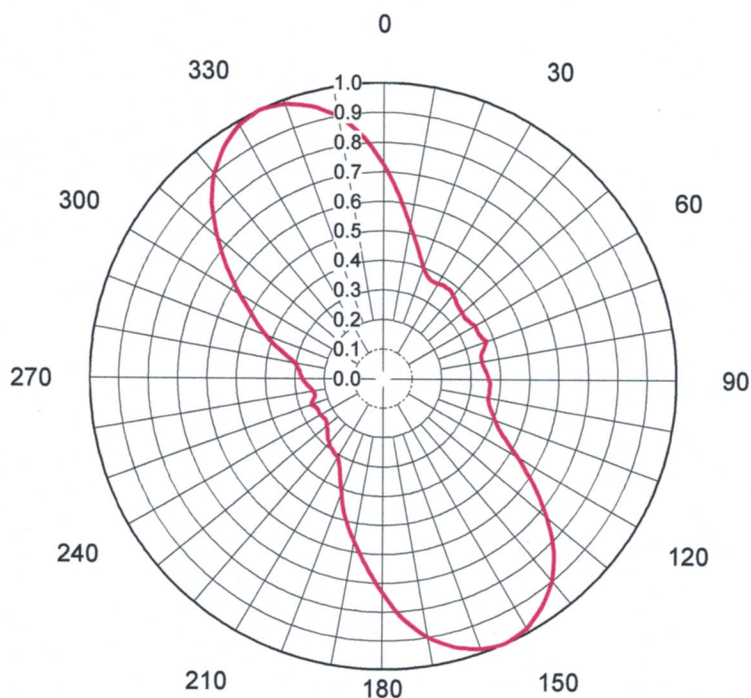
Polarization:	Horizontal				
Azimuth Pattern:	Directional				
Antenna Input:	1-5/8"	50 Ohm	EIA/DCA		
VSWR:	Channel	1.10 : 1		Band	1.10 : 1
Bandwidth:	470 -860 MHz				
Rated Input Power:	5 kW	(6.99 dBk)	Maximum Average Power		

Mechanical Specifications

Mounting:	Side Mounted				
Environmental Protection:	Panel Cover				
Height:	14.6 ft (4.5m)				
Weight:	1525 lb (0.7t)	Excludes Mounts			
Effective Projected Area:	78 ft² (7.2m²)	TIA-222-G	Basic Wind Speed:	90 m/h (144.8 km/h)	

Channel Specifications

Call	CH	Freq	Hpol ERP	TPO	Peak Main Lobe Hpol Gain	Peak at Horizontal Hpol Gain
W47DH	47	671 MHz	0.900 kW -(0.46 dBk)	0.050 kW -(12.99 dBk)	18.84 (12.75dB)	18.84 (12.75dB)



AZIMUTH PATTERN Horizontal Polarization

In Free Space

Proposal No. **C-70983**
Date **19-Jan-18**
Call Letters **W47DH**
Channel **47**
Frequency **671 MHz**
Antenna Type **TUA-4P-4/11M-1**
Gain **2.82 (4.5dB)**
Calculated

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.724	36	0.377	72	0.365	108	0.394	144	0.941	180	0.733	216	0.297	252	0.253	288	0.401
1	0.703	37	0.377	73	0.360	109	0.400	145	0.950	181	0.715	217	0.296	253	0.249	289	0.414
2	0.682	38	0.375	74	0.355	110	0.406	146	0.958	182	0.696	218	0.293	254	0.245	290	0.426
3	0.662	39	0.373	75	0.349	111	0.412	147	0.965	183	0.678	219	0.290	255	0.241	291	0.439
4	0.641	40	0.369	76	0.346	112	0.420	148	0.972	184	0.660	220	0.284	256	0.239	292	0.451
5	0.621	41	0.367	77	0.343	113	0.428	149	0.979	185	0.643	221	0.282	257	0.238	293	0.463
6	0.600	42	0.365	78	0.342	114	0.438	150	0.986	186	0.625	222	0.279	258	0.239	294	0.476
7	0.580	43	0.362	79	0.342	115	0.449	151	0.989	187	0.609	223	0.275	259	0.240	295	0.489
8	0.562	44	0.359	80	0.343	116	0.463	152	0.992	188	0.593	224	0.270	260	0.243	296	0.503
9	0.544	45	0.356	81	0.343	117	0.478	153	0.995	189	0.577	225	0.265	261	0.245	297	0.518
10	0.527	46	0.354	82	0.344	118	0.494	154	0.997	190	0.563	226	0.262	262	0.248	298	0.534
11	0.511	47	0.353	83	0.346	119	0.511	155	1.000	191	0.548	227	0.259	263	0.251	299	0.550
12	0.496	48	0.352	84	0.348	120	0.530	156	0.998	192	0.534	228	0.256	264	0.255	300	0.566
13	0.482	49	0.351	85	0.350	121	0.549	157	0.996	193	0.520	229	0.254	265	0.258	301	0.582
14	0.468	50	0.352	86	0.353	122	0.568	158	0.994	194	0.505	230	0.252	266	0.262	302	0.599
15	0.455	51	0.349	87	0.355	123	0.589	159	0.991	195	0.490	231	0.247	267	0.266	303	0.616
16	0.443	52	0.348	88	0.357	124	0.610	160	0.988	196	0.476	232	0.244	268	0.269	304	0.634
17	0.432	53	0.347	89	0.359	125	0.631	161	0.981	197	0.461	233	0.242	269	0.272	305	0.652
18	0.421	54	0.348	90	0.360	126	0.651	162	0.974	198	0.445	234	0.241	270	0.274	306	0.669
19	0.410	55	0.350	91	0.363	127	0.671	163	0.967	199	0.429	235	0.241	271	0.278	307	0.686
20	0.400	56	0.351	92	0.365	128	0.691	164	0.960	200	0.412	236	0.241	272	0.281	308	0.704
21	0.393	57	0.353	93	0.366	129	0.711	165	0.954	201	0.398	237	0.242	273	0.283	309	0.721
22	0.387	58	0.355	94	0.365	130	0.731	166	0.943	202	0.385	238	0.244	274	0.284	310	0.739
23	0.381	59	0.358	95	0.364	131	0.750	167	0.933	203	0.371	239	0.246	275	0.285	311	0.757
24	0.376	60	0.362	96	0.365	132	0.770	168	0.922	204	0.358	240	0.248	276	0.289	312	0.775
25	0.372	61	0.361	97	0.366	133	0.789	169	0.911	205	0.345	241	0.247	277	0.292	313	0.793
26	0.371	62	0.360	98	0.365	134	0.808	170	0.901	206	0.336	242	0.246	278	0.296	314	0.811
27	0.370	63	0.360	99	0.364	135	0.827	171	0.886	207	0.328	243	0.246	279	0.300	315	0.829
28	0.370	64	0.360	100	0.363	136	0.842	172	0.872	208	0.320	244	0.245	280	0.305	316	0.844
29	0.370	65	0.360	101	0.365	137	0.858	173	0.857	209	0.314	245	0.245	281	0.314	317	0.858
30	0.370	66	0.362	102	0.368	138	0.872	174	0.841	210	0.308	246	0.247	282	0.324	318	0.872
31	0.373	67	0.364	103	0.371	139	0.886	175	0.826	211	0.307	247	0.250	283	0.335	319	0.886
32	0.376	68	0.367	104	0.374	140	0.900	176	0.808	212	0.305	248	0.253	284	0.347	320	0.900
33	0.377	69	0.370	105	0.378	141	0.911	177	0.789	213	0.303	249	0.257	285	0.360	321	0.910
34	0.377	70	0.374	106	0.383	142	0.921	178	0.770	214	0.301	250	0.261	286	0.374	322	0.921
35	0.376	71	0.370	107	0.389	143	0.931	179	0.752	215	0.298	251	0.257	287	0.388	323	0.931

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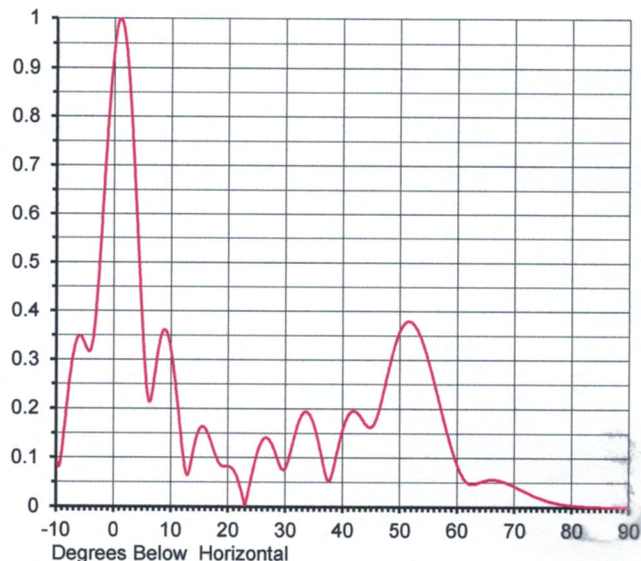
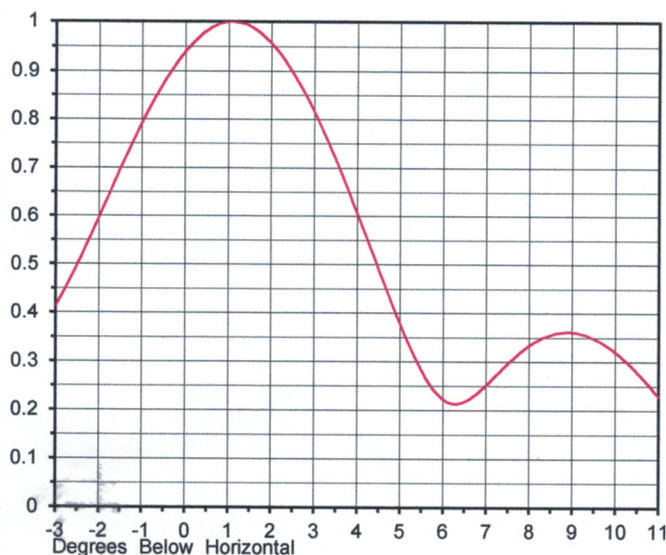
ELEVATION PATTERN

Proposal No. **C-70983**
 Date **19-Jan-18**
 Call Letters **W47DH**
 Channel **47**
 Frequency **671 MHz**
 Antenna Type **TUA-4P-4/11M-1**

Face A and C

RMS Directivity at Main Lobe **7.4 (8.67 dB)**
 RMS Directivity at Horizontal **6.7 (8.26 dB)**
 Calculated

Beam Tilt **1.00 deg**
 Pattern Number **04U074100**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.092	10.0	0.313	30.0	0.081	50.0	0.362	70.0	0.042
-9.0	0.126	11.0	0.218	31.0	0.121	51.0	0.378	71.0	0.036
-8.0	0.238	12.0	0.109	32.0	0.165	52.0	0.377	72.0	0.030
-7.0	0.322	13.0	0.069	33.0	0.190	53.0	0.361	73.0	0.025
-6.0	0.349	14.0	0.124	34.0	0.190	54.0	0.332	74.0	0.020
-5.0	0.328	15.0	0.160	35.0	0.163	55.0	0.293	75.0	0.016
-4.0	0.325	16.0	0.158	36.0	0.115	56.0	0.249	76.0	0.012
-3.0	0.430	17.0	0.129	37.0	0.063	57.0	0.203	77.0	0.009
-2.0	0.618	18.0	0.096	38.0	0.065	58.0	0.157	78.0	0.007
-1.0	0.811	19.0	0.082	39.0	0.115	59.0	0.117	79.0	0.005
0.0	0.950	20.0	0.082	40.0	0.161	60.0	0.083	80.0	0.003
1.0	1.000	21.0	0.072	41.0	0.189	61.0	0.059	81.0	0.002
2.0	0.946	22.0	0.040	42.0	0.195	62.0	0.048	82.0	0.002
3.0	0.796	23.0	0.008	43.0	0.184	63.0	0.047	83.0	0.001
4.0	0.582	24.0	0.063	44.0	0.167	64.0	0.051	84.0	0.001
5.0	0.356	25.0	0.109	45.0	0.164	65.0	0.055	85.0	0.001
6.0	0.217	26.0	0.137	46.0	0.188	66.0	0.056	86.0	0.000
7.0	0.261	27.0	0.138	47.0	0.234	67.0	0.055	87.0	0.000
8.0	0.340	28.0	0.115	48.0	0.285	68.0	0.052	88.0	0.000
9.0	0.360	29.0	0.083	49.0	0.330	69.0	0.047	89.0	0.000
								90.0	0.000

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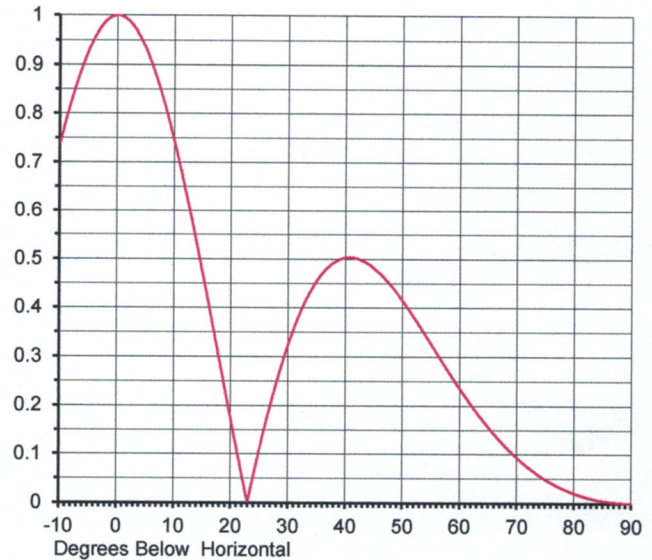
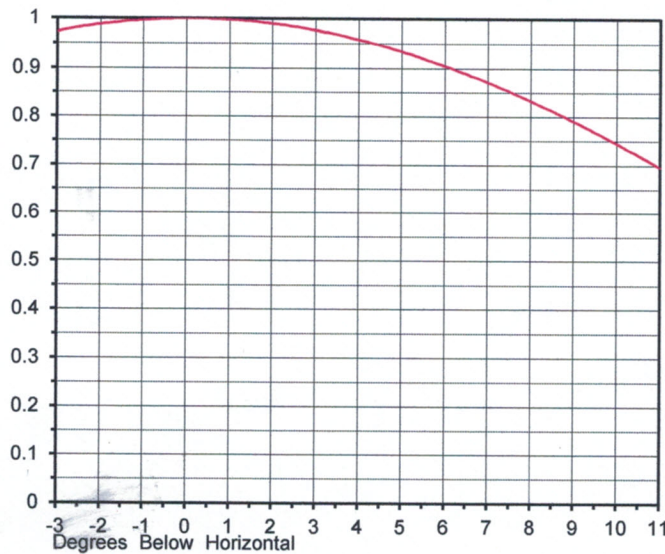
ELEVATION PATTERN

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 Channel **47**
 Frequency **671 MHz**
 Antenna Type **TUA-4P-4/11M-1**

Face B

RMS Directivity at Main Lobe **2.2 (3.42 dB)**
 RMS Directivity at Horizontal **2.2 (3.42 dB)**
 Calculated

Beam Tilt **0.00 deg**
 Pattern Number **01U022000**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.740	10.0	0.740	30.0	0.328	50.0	0.413	70.0	0.092
-9.0	0.787	11.0	0.690	31.0	0.361	51.0	0.396	71.0	0.082
-8.0	0.829	12.0	0.638	32.0	0.390	52.0	0.379	72.0	0.073
-7.0	0.868	13.0	0.583	33.0	0.416	53.0	0.361	73.0	0.064
-6.0	0.902	14.0	0.525	34.0	0.438	54.0	0.342	74.0	0.056
-5.0	0.931	15.0	0.467	35.0	0.457	55.0	0.324	75.0	0.048
-4.0	0.956	16.0	0.407	36.0	0.473	56.0	0.306	76.0	0.041
-3.0	0.975	17.0	0.346	37.0	0.485	57.0	0.287	77.0	0.035
-2.0	0.989	18.0	0.285	38.0	0.494	58.0	0.269	78.0	0.030
-1.0	0.997	19.0	0.224	39.0	0.500	59.0	0.251	79.0	0.025
0.0	1.000	20.0	0.164	40.0	0.503	60.0	0.234	80.0	0.020
1.0	0.997	21.0	0.105	41.0	0.503	61.0	0.217	81.0	0.016
2.0	0.989	22.0	0.047	42.0	0.501	62.0	0.200	82.0	0.013
3.0	0.975	23.0	0.009	43.0	0.496	63.0	0.184	83.0	0.010
4.0	0.956	24.0	0.062	44.0	0.489	64.0	0.169	84.0	0.007
5.0	0.931	25.0	0.114	45.0	0.480	65.0	0.155	85.0	0.005
6.0	0.902	26.0	0.163	46.0	0.470	66.0	0.141	86.0	0.003
7.0	0.868	27.0	0.209	47.0	0.457	67.0	0.127	87.0	0.002
8.0	0.829	28.0	0.252	48.0	0.444	68.0	0.115	88.0	0.001
9.0	0.787	29.0	0.291	49.0	0.429	69.0	0.103	89.0	0.000
						90.0	0.000	90.0	0.000

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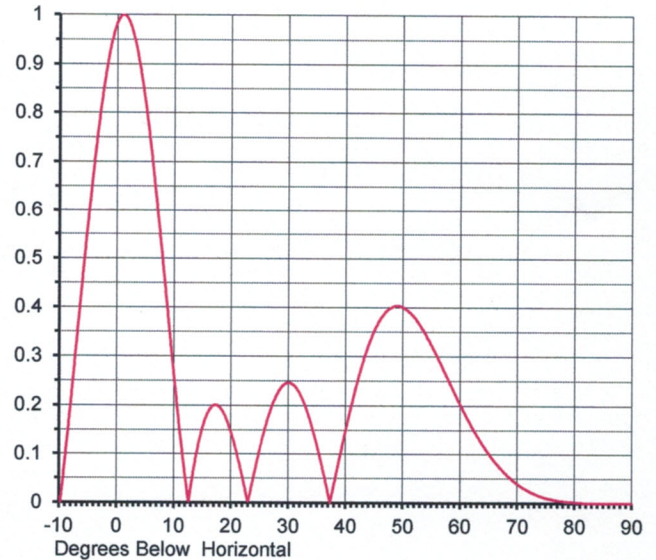
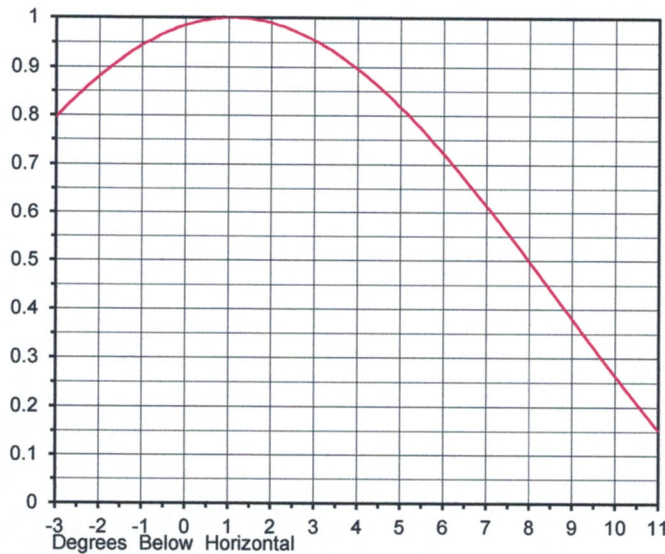
ELEVATION PATTERN

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 Antenna Type **TUA-4P-4/11M-1**

Face D

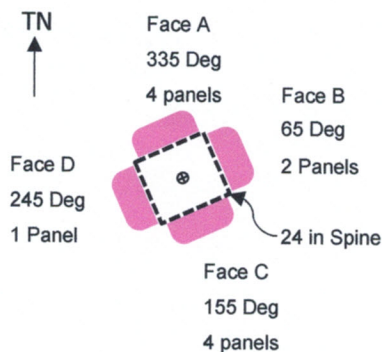
RMS Directivity at Main Lobe **4.4 (6.43 dB)**
 RMS Directivity at Horizontal **4.3 (6.33 dB)**
 Calculated

Beam Tilt **1.00 deg**
 Pattern Number **02U044100**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.011	10.0	0.252	30.0	0.246	50.0	0.400	70.0	0.039
-9.0	0.098	11.0	0.142	31.0	0.240	51.0	0.391	71.0	0.031
-8.0	0.218	12.0	0.044	32.0	0.222	52.0	0.379	72.0	0.024
-7.0	0.343	13.0	0.041	33.0	0.195	53.0	0.362	73.0	0.019
-6.0	0.469	14.0	0.108	34.0	0.158	54.0	0.343	74.0	0.014
-5.0	0.592	15.0	0.158	35.0	0.114	55.0	0.321	75.0	0.010
-4.0	0.706	16.0	0.188	36.0	0.064	56.0	0.298	76.0	0.008
-3.0	0.806	17.0	0.200	37.0	0.011	57.0	0.273	77.0	0.005
-2.0	0.888	18.0	0.195	38.0	0.044	58.0	0.249	78.0	0.004
-1.0	0.950	19.0	0.174	39.0	0.100	59.0	0.224	79.0	0.002
0.0	0.987	20.0	0.140	40.0	0.154	60.0	0.201	80.0	0.001
1.0	1.000	21.0	0.096	41.0	0.204	61.0	0.178	81.0	0.001
2.0	0.987	22.0	0.046	42.0	0.251	62.0	0.156	82.0	0.000
3.0	0.950	23.0	0.009	43.0	0.292	63.0	0.136	83.0	0.000
4.0	0.889	24.0	0.063	44.0	0.327	64.0	0.117	84.0	0.000
5.0	0.809	25.0	0.114	45.0	0.356	65.0	0.100	85.0	0.000
6.0	0.712	26.0	0.159	46.0	0.378	66.0	0.084	86.0	0.000
7.0	0.603	27.0	0.197	47.0	0.393	67.0	0.071	87.0	0.000
8.0	0.487	28.0	0.224	48.0	0.401	68.0	0.058	88.0	0.000
9.0	0.368	29.0	0.241	49.0	0.403	69.0	0.048	89.0	0.000
						90.0	0.000		

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MECHANICAL SPECIFICATIONS

Proposal No. **C-70983**
 Date **19-Jan-18**
 Call Letters **W47DH**
 Channel **47**
 Frequency **671 MHz**
 Antenna Type **TUA-4P-4/11M-1**

Preliminary Specifications

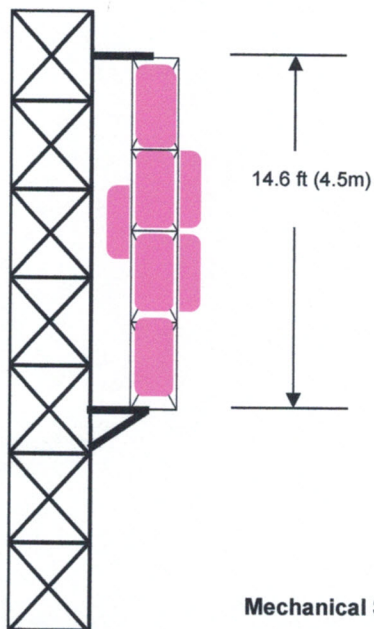
Side Mounted

With ice TIA-222-G

Height AGL(z) 60 ft (18.3 m)
 Basic Wind Speed 90 m/h (144.8 km/h)

Structure Class II
 Exposure Category C
 Topography Category 1

Design Ice 0.5 in $t_{iz} = 1.38$ in
 Wind Speed w/Ice 40 m/h (64.4 km/h)



Mechanical Specifications

		without ice	with ice	
Height	H2	14.6 ft (4.5m)		
Height of Center of Radiation	H3	12.3 ft (3.7m)		
Effective Projected Area	(EPA) _A	78 ft ² (7.2m ²)	125 ft ² (11.6m ²)	Mounts Excluded
Weight	W	1525 lb (0.7t)	3100 lb (1.4t)	Mounts Excluded

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

Prepared by: JBC

Date: 19-Jan-18

ME:

SPJC

EE:

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Summary

Proposal No.	C-70983
Date	19-Jan-18
Call Letters	W47DH
Channel	47
Frequency	671 MHz
Antenna Type	TUA-4P-4/11M-1

Antenna

		Hpol
ERP:	0.900 kW	-(0.46 dBk)
Peak Gain*	18.84	(12.75 dB)

Antenna Input Power	0.048 kW	-(13.21 dBk)
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Transmission Line

Type:	Rigid	Attenuation:	(0.22 dB)
Size:	1-5/8"	Efficiency:	95.1%
Impedance:	50 Ohm		
Length:	80 ft	24.4 m	

Transmitter Output

0.050 kW	-(12.99 dBk)
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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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