



Antenna Model: **TFU-25ETT/VP-R C150**

Proposal Number: **C-70470-3**  
Date: **27-Oct-17**  
Customer: **Nexstar**  
Location: **Green Bay, WI**

#### Electrical Specifications

Polarization: **Elliptical**  
Azimuth Pattern: **Directional**  
Antenna Input: **7-3/16"** **75 Ohm** **EIA/DCA**  
VSWR: **Channel** **1.08 : 1**  
Bandwidth: **6 MHz**  
Rated Input Power: **45 kW** **(16.53 dBk)** **Maximum Average Power**

#### Mechanical Specifications

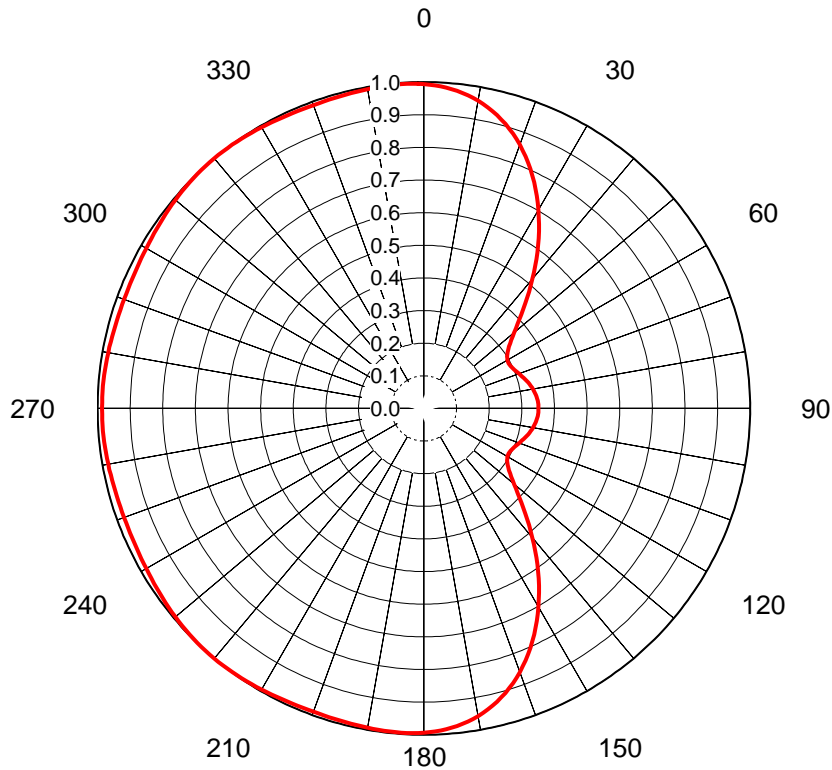
Mounting: **Top Mounted**  
Environmental Protection: **Full Radome**  
Height: **52.9 ft (16.1m)** less Lightning Protector **56.9 ft (17.3m)** with Lightning Protector  
Weight: **10400 lb (4.7t)**  
Effective Projected Area: **64.7 ft² (6m²)** **TIA-222-G** Basic Wind Speed: **90 m/h (144.8 km/h)**

#### 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
WFRV	22	521 MHz	1,000 kW (30.00 dBk)	300 kW (24.77 dBk)	44.7 kW (16.50 dBk)	29.09 (14.64dB)	8.73 (9.41dB)	19.32 (12.86dB)	5.80 (7.63dB)

## AZIMUTH PATTERN Horizontal Polarization

Proposal No. **C-70470-3**  
 Date **27-Oct-17**  
 Call Letters **WFRV**  
 Channel **22**  
 Frequency **521 MHz**  
 Antenna Type **TFU-25ETT/VP-R C150**  
 Gain **1.47 (1.68dB)**  
 Calculated

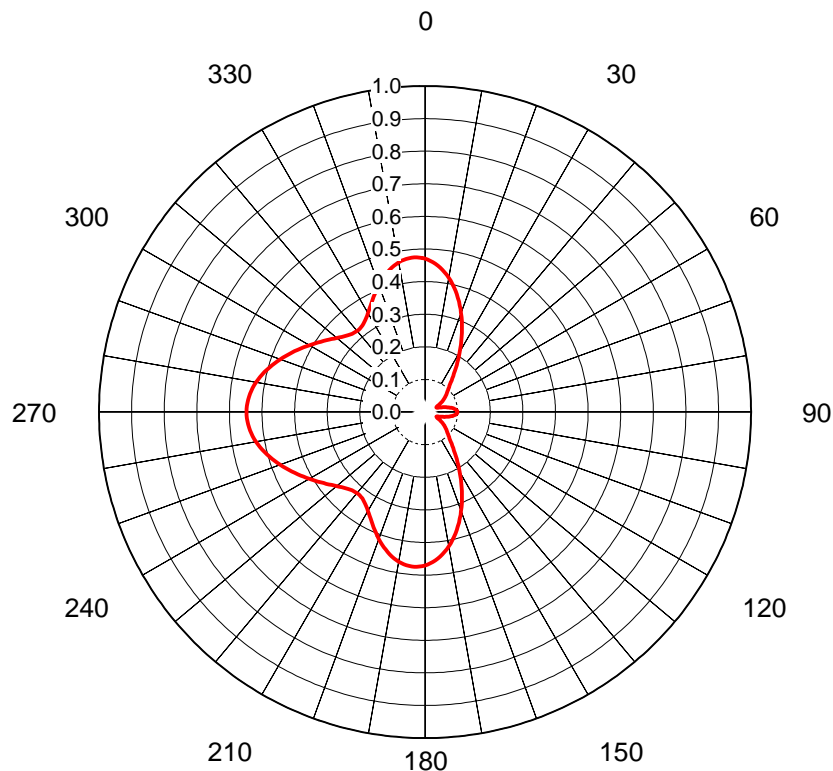


Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.994	36	0.591	72	0.317	108	0.317	144	0.591	180	0.994	216	0.999	252	0.978	288	0.978	324	0.999
1	0.992	37	0.573	73	0.320	109	0.314	145	0.610	181	0.995	217	0.999	253	0.978	289	0.978	325	0.998
2	0.991	38	0.554	74	0.323	110	0.310	146	0.629	182	0.996	218	1.000	254	0.979	290	0.977	326	0.998
3	0.988	39	0.536	75	0.326	111	0.307	147	0.648	183	0.996	219	1.000	255	0.979	291	0.977	327	0.997
4	0.986	40	0.517	76	0.329	112	0.304	148	0.666	184	0.996	220	1.000	256	0.980	292	0.977	328	0.996
5	0.982	41	0.499	77	0.332	113	0.302	149	0.684	185	0.996	221	1.000	257	0.980	293	0.978	329	0.995
6	0.979	42	0.482	78	0.335	114	0.299	150	0.702	186	0.996	222	1.000	258	0.981	294	0.978	330	0.995
7	0.974	43	0.465	79	0.337	115	0.298	151	0.720	187	0.995	223	0.999	259	0.982	295	0.978	331	0.994
8	0.969	44	0.448	80	0.340	116	0.296	152	0.738	188	0.995	224	0.999	260	0.982	296	0.979	332	0.993
9	0.963	45	0.432	81	0.342	117	0.295	153	0.754	189	0.994	225	0.998	261	0.983	297	0.980	333	0.992
10	0.958	46	0.416	82	0.344	118	0.294	154	0.771	190	0.994	226	0.998	262	0.984	298	0.980	334	0.992
11	0.950	47	0.401	83	0.346	119	0.295	155	0.787	191	0.993	227	0.997	263	0.984	299	0.981	335	0.991
12	0.943	48	0.387	84	0.347	120	0.296	156	0.803	192	0.992	228	0.996	264	0.985	300	0.982	336	0.991
13	0.935	49	0.374	85	0.348	121	0.298	157	0.818	193	0.992	229	0.995	265	0.985	301	0.983	337	0.990
14	0.927	50	0.362	86	0.349	122	0.300	158	0.833	194	0.991	230	0.994	266	0.986	302	0.984	338	0.990
15	0.917	51	0.351	87	0.350	123	0.305	159	0.846	195	0.991	231	0.993	267	0.986	303	0.986	339	0.990
16	0.907	52	0.340	88	0.351	124	0.309	160	0.860	196	0.990	232	0.992	268	0.986	304	0.987	340	0.989
17	0.896	53	0.331	89	0.351	125	0.316	161	0.872	197	0.990	233	0.991	269	0.986	305	0.988	341	0.989
18	0.885	54	0.322	90	0.351	126	0.322	162	0.885	198	0.989	234	0.989	270	0.986	306	0.989	342	0.989
19	0.872	55	0.316	91	0.351	127	0.331	163	0.896	199	0.989	235	0.988	271	0.986	307	0.991	343	0.990
20	0.860	56	0.309	92	0.351	128	0.340	164	0.907	200	0.989	236	0.987	272	0.986	308	0.992	344	0.990
21	0.846	57	0.305	93	0.350	129	0.351	165	0.917	201	0.990	237	0.986	273	0.986	309	0.993	345	0.991
22	0.833	58	0.300	94	0.349	130	0.362	166	0.927	202	0.990	238	0.984	274	0.986	310	0.994	346	0.991
23	0.818	59	0.298	95	0.348	131	0.374	167	0.935	203	0.990	239	0.983	275	0.985	311	0.995	347	0.992
24	0.803	60	0.296	96	0.347	132	0.387	168	0.943	204	0.991	240	0.982	276	0.985	312	0.996	348	0.992
25	0.787	61	0.295	97	0.346	133	0.401	169	0.951	205	0.991	241	0.981	277	0.984	313	0.997	349	0.993
26	0.771	62	0.294	98	0.344	134	0.416	170	0.958	206	0.992	242	0.980	278	0.984	314	0.998	350	0.994
27	0.754	63	0.295	99	0.342	135	0.432	171	0.963	207	0.992	243	0.980	279	0.983	315	0.998	351	0.994
28	0.738	64	0.296	100	0.340	136	0.448	172	0.969	208	0.993	244	0.979	280	0.982	316	0.999	352	0.995
29	0.720	65	0.298	101	0.337	137	0.465	173	0.974	209	0.994	245	0.978	281	0.982	317	0.999	353	0.995
30	0.702	66	0.299	102	0.335	138	0.482	174	0.979	210	0.995	246	0.978	282	0.981	318	1.000	354	0.996
31	0.684	67	0.302	103	0.332	139	0.499	175	0.982	211	0.995	247	0.978	283	0.980	319	1.000	355	0.996
32	0.666	68	0.304	104	0.329	140	0.517	176	0.986	212	0.996	248	0.977	284	0.980	320	1.000	356	0.996
33	0.648	69	0.307	105	0.326	141	0.536	177	0.988	213	0.997	249	0.977	285	0.979	321	1.000	357	0.996
34	0.629	70	0.310	106	0.323	142	0.554	178	0.991	214	0.998	250	0.977	286	0.979	322	1.000	358	0.996
35	0.610	71	0.314	107	0.320	143	0.573	179	0.992	215	0.998	251	0.978	287	0.978	323	0.999	359	0.995

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## AZIMUTH PATTERN Vertical Polarization

Proposal No. **C-70470-3**  
 Date **27-Oct-17**  
 Call Letters **WFRV**  
 Channel **22**  
 Frequency **521 MHz**  
 Antenna Type **TFU-25ETT/VP-R C150**  
 Gain **2.52 (4.01dB)**  
 Calculated



Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.470	36	0.156	72	0.045	108	0.045	144	0.156	180	0.470	216	0.328	252	0.485	288	0.485
1	0.468	37	0.148	73	0.049	109	0.042	145	0.164	181	0.472	217	0.326	253	0.491	289	0.479
2	0.464	38	0.140	74	0.053	110	0.040	146	0.173	182	0.474	218	0.325	254	0.497	290	0.473
3	0.460	39	0.133	75	0.057	111	0.038	147	0.183	183	0.475	219	0.324	255	0.502	291	0.467
4	0.456	40	0.127	76	0.061	112	0.037	148	0.192	184	0.475	220	0.324	256	0.507	292	0.460
5	0.451	41	0.121	77	0.066	113	0.038	149	0.203	185	0.475	221	0.325	257	0.512	293	0.454
6	0.445	42	0.115	78	0.070	114	0.039	150	0.213	186	0.475	222	0.327	258	0.517	294	0.448
7	0.439	43	0.110	79	0.074	115	0.041	151	0.224	187	0.473	223	0.328	259	0.522	295	0.441
8	0.433	44	0.106	80	0.078	116	0.043	152	0.234	188	0.471	224	0.331	260	0.526	296	0.435
9	0.426	45	0.102	81	0.082	117	0.046	153	0.245	189	0.469	225	0.334	261	0.530	297	0.429
10	0.418	46	0.098	82	0.085	118	0.049	154	0.256	190	0.466	226	0.337	262	0.534	298	0.422
11	0.410	47	0.095	83	0.088	119	0.053	155	0.268	191	0.463	227	0.341	263	0.537	299	0.416
12	0.402	48	0.091	84	0.091	120	0.056	156	0.279	192	0.459	228	0.345	264	0.540	300	0.410
13	0.393	49	0.088	85	0.094	121	0.059	157	0.290	193	0.455	229	0.349	265	0.542	301	0.404
14	0.384	50	0.086	86	0.095	122	0.063	158	0.301	194	0.450	230	0.354	266	0.544	302	0.398
15	0.375	51	0.083	87	0.097	123	0.066	159	0.312	195	0.445	231	0.358	267	0.546	303	0.392
16	0.365	52	0.080	88	0.098	124	0.069	160	0.323	196	0.439	232	0.364	268	0.547	304	0.386
17	0.355	53	0.078	89	0.099	125	0.072	161	0.334	197	0.433	233	0.369	269	0.547	305	0.380
18	0.344	54	0.075	90	0.099	126	0.075	162	0.344	198	0.427	234	0.374	270	0.548	306	0.374
19	0.334	55	0.072	91	0.099	127	0.078	163	0.355	199	0.421	235	0.380	271	0.547	307	0.369
20	0.323	56	0.069	92	0.098	128	0.080	164	0.365	200	0.414	236	0.386	272	0.547	308	0.364
21	0.312	57	0.066	93	0.097	129	0.083	165	0.375	201	0.408	237	0.392	273	0.546	309	0.358
22	0.301	58	0.063	94	0.095	130	0.086	166	0.384	202	0.401	238	0.398	274	0.544	310	0.354
23	0.290	59	0.059	95	0.094	131	0.088	167	0.393	203	0.394	239	0.404	275	0.542	311	0.349
24	0.279	60	0.056	96	0.091	132	0.091	168	0.402	204	0.387	240	0.410	276	0.540	312	0.345
25	0.268	61	0.053	97	0.088	133	0.095	169	0.410	205	0.381	241	0.416	277	0.537	313	0.341
26	0.256	62	0.049	98	0.085	134	0.098	170	0.418	206	0.374	242	0.422	278	0.534	314	0.337
27	0.245	63	0.046	99	0.082	135	0.102	171	0.426	207	0.368	243	0.429	279	0.530	315	0.334
28	0.234	64	0.043	100	0.078	136	0.106	172	0.433	208	0.361	244	0.435	280	0.526	316	0.331
29	0.224	65	0.041	101	0.074	137	0.110	173	0.439	209	0.356	245	0.441	281	0.522	317	0.328
30	0.213	66	0.039	102	0.070	138	0.115	174	0.445	210	0.350	246	0.448	282	0.517	318	0.327
31	0.203	67	0.038	103	0.066	139	0.121	175	0.451	211	0.345	247	0.454	283	0.512	319	0.325
32	0.192	68	0.037	104	0.061	140	0.127	176	0.456	212	0.340	248	0.460	284	0.507	320	0.324
33	0.183	69	0.038	105	0.057	141	0.133	177	0.460	213	0.336	249	0.467	285	0.502	321	0.324
34	0.173	70	0.040	106	0.053	142	0.140	178	0.464	214	0.333	250	0.473	286	0.497	322	0.325
35	0.164	71	0.042	107	0.049	143	0.148	179	0.468	215	0.330	251	0.479	287	0.491	323	0.326

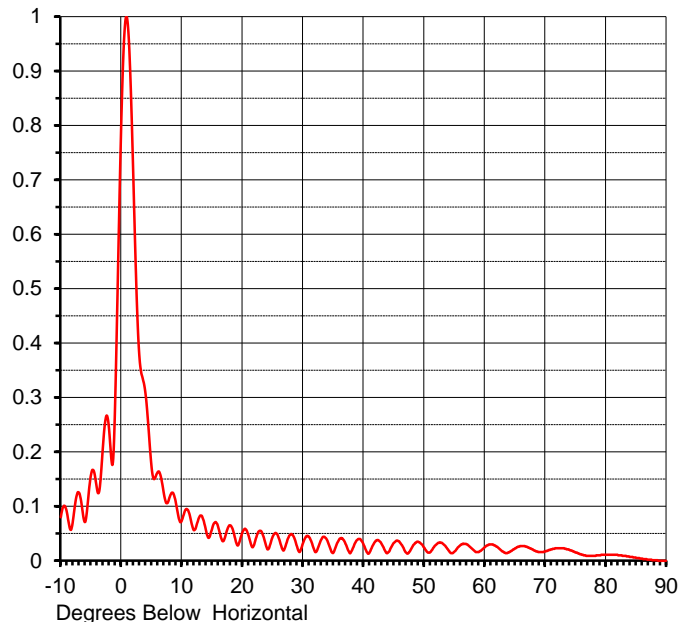
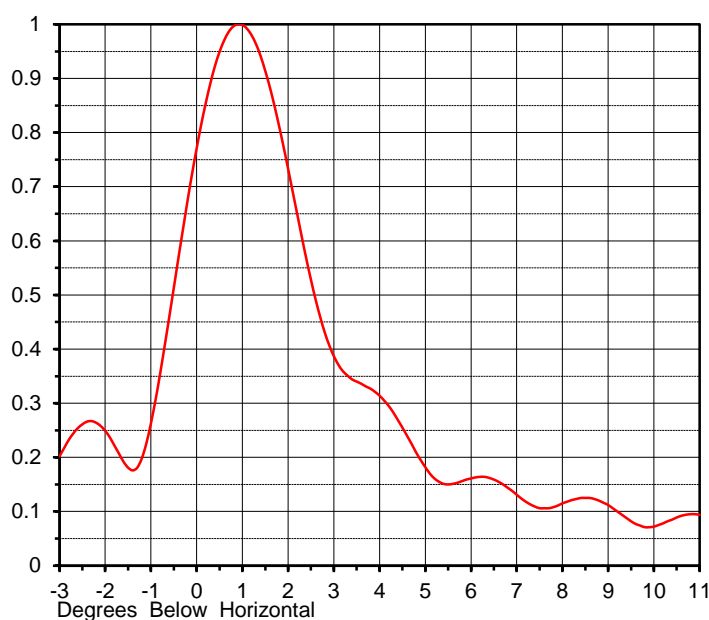
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## ELEVATION PATTERN

Proposal No. **C-70470-3**  
 Date **27-Oct-17**  
 Call Letters **WFRV**  
 Channel **22**  
 Frequency **521 MHz**  
 Antenna Type **TFU-25ETT/VP-R C150**

RMS Directivity at Main Lobe **23.2 ( 13.65 dB )**  
 RMS Directivity at Horizontal **15.4 ( 11.88 dB )**  
**Calculated**

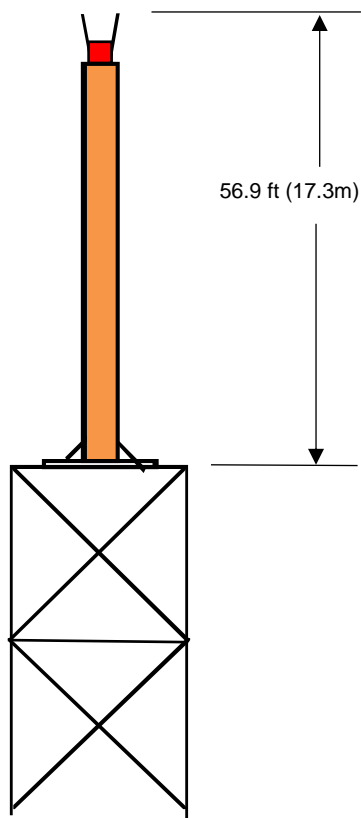
Beam Tilt **0.85 deg**  
 Pattern Number **25E232085**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.080	10.0	0.075	30.0	0.033	50.0	0.024	70.0	0.017
-9.0	0.089	11.0	0.093	31.0	0.043	51.0	0.016	71.0	0.021
-8.0	0.074	12.0	0.056	32.0	0.016	52.0	0.030	72.0	0.023
-7.0	0.125	13.0	0.083	33.0	0.039	53.0	0.032	73.0	0.023
-6.0	0.071	14.0	0.054	34.0	0.037	54.0	0.019	74.0	0.020
-5.0	0.159	15.0	0.060	35.0	0.015	55.0	0.017	75.0	0.015
-4.0	0.130	16.0	0.061	36.0	0.040	56.0	0.029	76.0	0.011
-3.0	0.217	17.0	0.040	37.0	0.031	57.0	0.030	77.0	0.009
-2.0	0.237	18.0	0.065	38.0	0.018	58.0	0.021	78.0	0.009
-1.0	0.306	19.0	0.032	39.0	0.039	59.0	0.016	79.0	0.010
0.0	0.815	20.0	0.053	40.0	0.029	60.0	0.025	80.0	0.011
1.0	0.992	21.0	0.046	41.0	0.016	61.0	0.030	81.0	0.011
2.0	0.691	22.0	0.033	42.0	0.037	62.0	0.026	82.0	0.010
3.0	0.371	23.0	0.055	43.0	0.030	63.0	0.017	83.0	0.009
4.0	0.305	24.0	0.024	44.0	0.015	64.0	0.016	84.0	0.007
5.0	0.170	25.0	0.045	45.0	0.033	65.0	0.023	85.0	0.005
6.0	0.163	26.0	0.041	46.0	0.033	66.0	0.027	86.0	0.004
7.0	0.124	27.0	0.024	47.0	0.015	67.0	0.025	87.0	0.002
8.0	0.118	28.0	0.049	48.0	0.025	68.0	0.020	88.0	0.001
9.0	0.106	29.0	0.026	49.0	0.035	69.0	0.016	89.0	0.000
								90.0	0.000

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## MECHANICAL SPECIFICATIONS



Proposal No. **C-70470-3**  
 Date **27-Oct-17**  
 Call Letters **WFRV**  
 Channel **22**  
 Frequency **521 MHz**  
 Antenna Type **TFU-25ETT/VP-R C150**

### Preliminary Specifications

#### Top Mounted

##### With ice TIA-222-G

Height AGL(z) 1100 ft (335.3 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  $t_{iz} = 1.39$  in  
 Wind Speed w/Ice 40 m/h (64.4 km/h)

#### Mechanical Specifications

		without ice	with ice
Height with Lightning Protector	H4	56.9 ft (17.3m)	
Height less Lightning Protector	H2	52.9 ft (16.1m)	
Height of Center of Radiation	H3	26.45 ft (8.1m)	
Effective Projected Area	(EPA) <sub>S</sub>	64.7 ft² (6m²)	152.6 ft² (14.2m²)
Moment Arm	D1	27.9 ft (8.5m)	28.6 ft (8.7m)
Weight	W	10400 lb (4.7t)	13000 lb (5.9t)

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

Prepared by: JBC  
 Rev. No.3 by: JBC

Date: 27-Oct-17  
 Date: 27-Oct-17

ME: EE:

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## Summary

Proposal No. **C-70470-3**  
Date **27-Oct-17**  
Call Letters **WFRV**  
Channel **22**  
Frequency **521 MHz**  
Antenna Type **TFU-25ETT/VP-R C150**

## Antenna

	Hpol	Vpol
ERP:	<b>1,000 kW ( 30.00 dBk )</b>	<b>300 kW ( 24.77 dBk )</b>
Peak Gain*	29.09 ( 14.64 dB )	8.73 ( 9.41 dB )

**Antenna Input Power** **34.4 kW ( 15.36 dBk )**

## Transmission Line

Type:	<b>Rigid</b>	Attenuation:	<b>( 1.14 dB )</b>
Size:	<b>7-3/16"</b>	Efficiency:	<b>76.9%</b>
Impedance:	<b>75 Ohm</b>		
Length:	<b>1200 ft</b>	<b>365.8 m</b>	

## Transmitter Output

**44.7 kW ( 16.50 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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