

KQDS Acquisition Corporation (KQDS-TV)  
Modification of DTV Station Construction Permit  
February 2020

The instant application for modification of the current KQDS-TV construction permit is to provide for a slight change in the authorized antenna, as described in the attachment. The proposed modification would make no change in the pattern or coverage already granted in the construction permit.



TFU-28GTH/VP-R 04

**Proposal Number:** C-70199-1  
**Date:** 6-Apr-17  
**Customer:** KQDS  
**Location:** Duluth, MN

#### Electrical Specifications

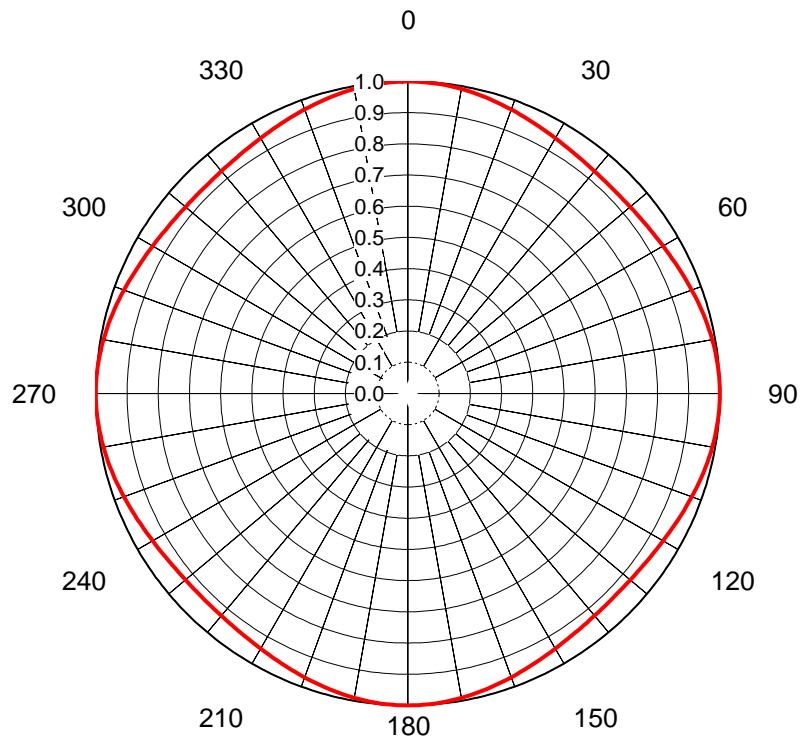
<b>Polarization</b>	Elliptical		
<b>Azimuth Pattern</b>	Omni		
<b>Antenna Input</b>	7-3/16"	75 Ohm	EIA/DCA
<b>VSWR</b>	Channel	1.08 : 1	
<b>Bandwidth</b>	6 MHz		
<b>Rated Input Power</b>	65 kW	(18.13 dBk)	Maximum Average Power

#### Mechanical Specifications

<b>Mounting</b>	Top Mounted		
<b>Environmental Protection</b>	Full Radome		
<b>Height</b>	58.4 ft (17.8m)	less Lightning Protector	62.4 ft (19m) with Lightning Protector
<b>Weight</b>	11800 lb (5.4t)		
<b>Effective Projected Area</b>	68.3 ft² (6.3m²)	TIA-222-G	<b>Basic Wind Speed</b> 90 m/h (144.8 km/h)

#### Channel Specifications

Call	CH	Freq	Hpol ERP	Vpol ERP	TPO	RMS Main Lobe Hpol Gain	RMS Main Lobe Vpol Gain	RMS at Horizontal Hpol Gain	RMS at Horizontal Vpol Gain
KQDS	18	497 MHz	1000.0 kW (30.00 dBk)	428.6 kW (26.32 dBk)	67.5 kW (18.29 dBk)	17.50 (12.43dB)	7.50 (8.75dB)	12.44 (10.95dB)	5.33 (7.27dB)



## AZIMUTH PATTERN Horizontal Polarization

Proposal No. **C-70199-1**  
 Date **6-Apr-17**  
 Call Letters **KQDS 18**  
 Frequency **497 MHz**  
 Antenna Type **TFU-28GTH/VP-R 04**

Gain **1.08 (0.32dB)**  
 Calculated  
 Circularity **+/- 1.0 dB**

Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	1.000	36	0.934	72	0.973	108	0.973	144	0.934	180	1.000	216	0.934	252	0.973	288	0.973
1	1.000	37	0.933	73	0.976	109	0.971	145	0.936	181	1.000	217	0.933	253	0.976	289	0.971
2	1.000	38	0.932	74	0.978	110	0.968	146	0.937	182	1.000	218	0.932	254	0.978	290	0.968
3	0.999	39	0.931	75	0.981	111	0.966	147	0.939	183	0.999	219	0.931	255	0.981	291	0.966
4	0.998	40	0.930	76	0.983	112	0.963	148	0.941	184	0.998	220	0.930	256	0.983	292	0.963
5	0.998	41	0.929	77	0.985	113	0.961	149	0.943	185	0.998	221	0.929	257	0.985	293	0.961
6	0.997	42	0.929	78	0.987	114	0.958	150	0.945	186	0.997	222	0.929	258	0.987	294	0.958
7	0.995	43	0.929	79	0.989	115	0.956	151	0.947	187	0.995	223	0.929	259	0.989	295	0.956
8	0.994	44	0.928	80	0.991	116	0.954	152	0.949	188	0.994	224	0.928	260	0.991	296	0.954
9	0.992	45	0.928	81	0.992	117	0.951	153	0.951	189	0.992	225	0.928	261	0.992	297	0.951
10	0.991	46	0.928	82	0.994	118	0.949	154	0.954	190	0.991	226	0.928	262	0.994	298	0.949
11	0.989	47	0.929	83	0.995	119	0.947	155	0.956	191	0.989	227	0.929	263	0.995	299	0.947
12	0.987	48	0.929	84	0.997	120	0.945	156	0.958	192	0.987	228	0.929	264	0.997	300	0.945
13	0.985	49	0.929	85	0.998	121	0.943	157	0.961	193	0.985	229	0.929	265	0.998	301	0.943
14	0.983	50	0.930	86	0.998	122	0.941	158	0.963	194	0.983	230	0.930	266	0.998	302	0.941
15	0.981	51	0.931	87	0.999	123	0.939	159	0.966	195	0.981	231	0.931	267	0.999	303	0.939
16	0.978	52	0.932	88	1.000	124	0.937	160	0.968	196	0.978	232	0.932	268	1.000	304	0.937
17	0.976	53	0.933	89	1.000	125	0.936	161	0.971	197	0.976	233	0.933	269	1.000	305	0.936
18	0.973	54	0.934	90	1.000	126	0.934	162	0.973	198	0.973	234	0.934	270	1.000	306	0.934
19	0.971	55	0.936	91	1.000	127	0.933	163	0.976	199	0.971	235	0.936	271	1.000	307	0.933
20	0.968	56	0.937	92	1.000	128	0.932	164	0.978	200	0.968	236	0.937	272	1.000	308	0.932
21	0.966	57	0.939	93	0.999	129	0.931	165	0.981	201	0.966	237	0.939	273	0.999	309	0.931
22	0.963	58	0.941	94	0.998	130	0.930	166	0.983	202	0.963	238	0.941	274	0.998	310	0.930
23	0.961	59	0.943	95	0.998	131	0.929	167	0.985	203	0.961	239	0.943	275	0.998	311	0.929
24	0.958	60	0.945	96	0.997	132	0.929	168	0.987	204	0.958	240	0.945	276	0.997	312	0.929
25	0.956	61	0.947	97	0.995	133	0.929	169	0.989	205	0.956	241	0.947	277	0.995	313	0.929
26	0.954	62	0.949	98	0.994	134	0.928	170	0.991	206	0.954	242	0.949	278	0.994	314	0.928
27	0.951	63	0.951	99	0.992	135	0.928	171	0.992	207	0.951	243	0.951	279	0.992	315	0.928
28	0.949	64	0.954	100	0.991	136	0.928	172	0.994	208	0.949	244	0.954	280	0.991	316	0.928
29	0.947	65	0.956	101	0.989	137	0.929	173	0.995	209	0.947	245	0.956	281	0.989	317	0.929
30	0.945	66	0.958	102	0.987	138	0.929	174	0.997	210	0.945	246	0.958	282	0.987	318	0.929
31	0.943	67	0.961	103	0.985	139	0.929	175	0.998	211	0.943	247	0.961	283	0.985	319	0.929
32	0.941	68	0.963	104	0.983	140	0.930	176	0.998	212	0.941	248	0.963	284	0.983	320	0.930
33	0.939	69	0.966	105	0.981	141	0.931	177	0.999	213	0.939	249	0.966	285	0.981	321	0.931
34	0.937	70	0.968	106	0.978	142	0.932	178	1.000	214	0.937	250	0.968	286	0.978	322	0.932
35	0.936	71	0.971	107	0.976	143	0.933	179	1.000	215	0.936	251	0.971	287	0.976	323	0.933

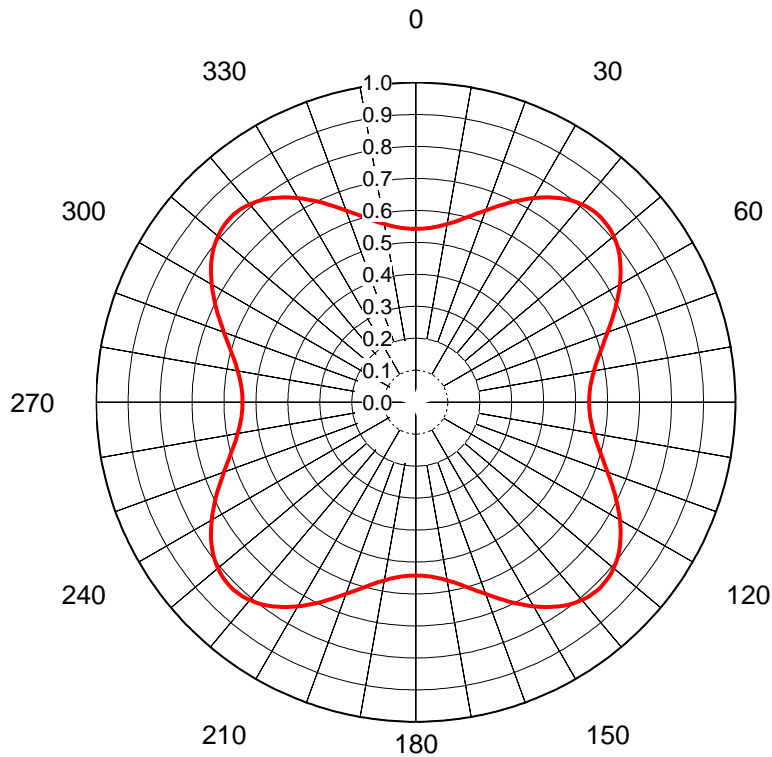
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## AZIMUTH PATTERN Vertical Polarization

Proposal No. **C-70199-1**  
 Date **6-Apr-17**  
 Call Letters **KQDS 18**  
 Frequency **497 MHz**  
 Antenna Type **TFU-28GTH/VP-R 04**

Gain **1.45 (1.63dB)**  
**Calculated**

Circularity **+/- 2.0 dB**



Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value	Deg	Value
0	0.542	36	0.787	72	0.621	108	0.621	144	0.787	180	0.542	216	0.787	252	0.621	288	0.621
1	0.542	37	0.793	73	0.612	109	0.629	145	0.780	181	0.542	217	0.793	253	0.612	289	0.629
2	0.543	38	0.799	74	0.604	110	0.639	146	0.772	182	0.543	218	0.799	254	0.604	290	0.639
3	0.544	39	0.804	75	0.597	111	0.648	147	0.764	183	0.544	219	0.804	255	0.597	291	0.648
4	0.546	40	0.808	76	0.589	112	0.658	148	0.756	184	0.546	220	0.808	256	0.589	292	0.658
5	0.548	41	0.812	77	0.583	113	0.668	149	0.747	185	0.548	221	0.812	257	0.583	293	0.668
6	0.551	42	0.815	78	0.577	114	0.678	150	0.737	186	0.551	222	0.815	258	0.577	294	0.678
7	0.554	43	0.817	79	0.571	115	0.688	151	0.728	187	0.554	223	0.817	259	0.571	295	0.688
8	0.557	44	0.818	80	0.566	116	0.698	152	0.718	188	0.557	224	0.818	260	0.566	296	0.698
9	0.561	45	0.818	81	0.561	117	0.708	153	0.708	189	0.561	225	0.818	261	0.561	297	0.708
10	0.566	46	0.818	82	0.557	118	0.718	154	0.698	190	0.566	226	0.818	262	0.557	298	0.718
11	0.571	47	0.817	83	0.554	119	0.728	155	0.688	191	0.571	227	0.817	263	0.554	299	0.728
12	0.577	48	0.815	84	0.551	120	0.737	156	0.678	192	0.577	228	0.815	264	0.551	300	0.737
13	0.583	49	0.812	85	0.548	121	0.747	157	0.668	193	0.583	229	0.812	265	0.548	301	0.747
14	0.589	50	0.808	86	0.546	122	0.756	158	0.658	194	0.589	230	0.808	266	0.546	302	0.756
15	0.597	51	0.804	87	0.544	123	0.764	159	0.648	195	0.597	231	0.804	267	0.544	303	0.764
16	0.604	52	0.799	88	0.543	124	0.772	160	0.639	196	0.604	232	0.799	268	0.543	304	0.772
17	0.612	53	0.793	89	0.542	125	0.780	161	0.629	197	0.612	233	0.793	269	0.542	305	0.780
18	0.621	54	0.787	90	0.542	126	0.787	162	0.621	198	0.621	234	0.787	270	0.542	306	0.787
19	0.629	55	0.780	91	0.542	127	0.793	163	0.612	199	0.629	235	0.780	271	0.542	307	0.793
20	0.639	56	0.772	92	0.543	128	0.799	164	0.604	200	0.639	236	0.772	272	0.543	308	0.799
21	0.648	57	0.764	93	0.544	129	0.804	165	0.597	201	0.648	237	0.764	273	0.544	309	0.804
22	0.658	58	0.756	94	0.546	130	0.808	166	0.589	202	0.658	238	0.756	274	0.546	310	0.808
23	0.668	59	0.747	95	0.548	131	0.812	167	0.583	203	0.668	239	0.747	275	0.548	311	0.812
24	0.678	60	0.737	96	0.551	132	0.815	168	0.577	204	0.678	240	0.737	276	0.551	312	0.815
25	0.688	61	0.728	97	0.554	133	0.817	169	0.571	205	0.688	241	0.728	277	0.554	313	0.817
26	0.698	62	0.718	98	0.557	134	0.818	170	0.566	206	0.698	242	0.718	278	0.557	314	0.818
27	0.708	63	0.708	99	0.561	135	0.818	171	0.561	207	0.708	243	0.708	279	0.561	315	0.818
28	0.718	64	0.698	100	0.566	136	0.818	172	0.557	208	0.718	244	0.698	280	0.566	316	0.818
29	0.728	65	0.688	101	0.571	137	0.817	173	0.554	209	0.728	245	0.688	281	0.571	317	0.817
30	0.737	66	0.678	102	0.577	138	0.815	174	0.551	210	0.737	246	0.678	282	0.577	318	0.815
31	0.747	67	0.668	103	0.583	139	0.812	175	0.548	211	0.747	247	0.668	283	0.583	319	0.812
32	0.756	68	0.658	104	0.589	140	0.808	176	0.546	212	0.756	248	0.658	284	0.589	320	0.808
33	0.764	69	0.648	105	0.597	141	0.804	177	0.544	213	0.764	249	0.648	285	0.597	321	0.804
34	0.772	70	0.639	106	0.604	142	0.799	178	0.543	214	0.772	250	0.639	286	0.604	322	0.799
35	0.780	71	0.629	107	0.612	143	0.793	179	0.542	215	0.780	251	0.629	287	0.612	323	0.793

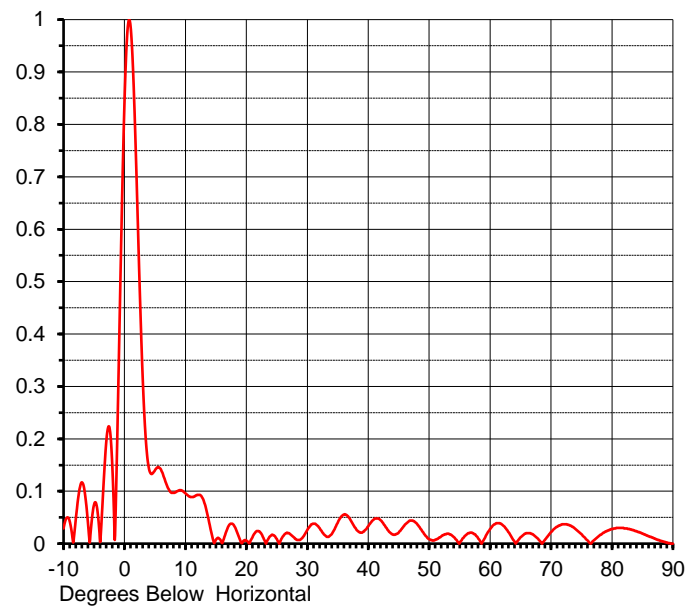
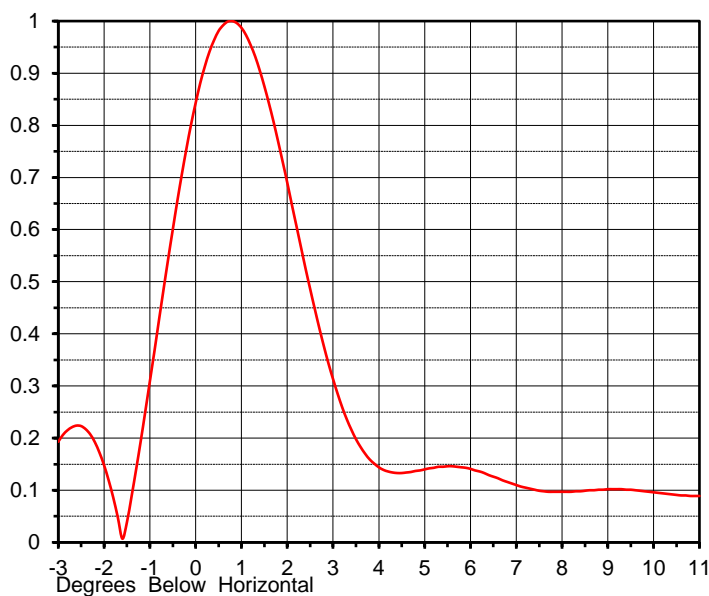
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## ELEVATION PATTERN

Proposal No. **C-70199-1**  
 Date **6-Apr-17**  
 Call Letters **KQDS 18**  
 Frequency **497 MHz**  
 Antenna Type **TFU-28GTH/VP-R 04**

RMS Directivity at Main Lobe **25.00 ( 13.98 dB )**  
 RMS Directivity at Horizontal **17.80 ( 12.50 dB )**  
**Calculated**

Beam Tilt **0.75 deg**  
 Drawing Number **28G250075**



Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.029	10.0	0.096	30.0	0.026	50.0	0.009	70.0	0.022
-9.0	0.043	11.0	0.089	31.0	0.038	51.0	0.007	71.0	0.032
-8.0	0.046	12.0	0.093	32.0	0.030	52.0	0.014	72.0	0.037
-7.0	0.117	13.0	0.082	33.0	0.015	53.0	0.019	73.0	0.035
-6.0	0.040	14.0	0.035	34.0	0.018	54.0	0.013	74.0	0.028
-5.0	0.074	15.0	0.007	35.0	0.040	55.0	0.001	75.0	0.018
-4.0	0.003	16.0	0.001	36.0	0.055	56.0	0.016	76.0	0.006
-3.0	0.193	17.0	0.032	37.0	0.047	57.0	0.021	77.0	0.006
-2.0	0.148	18.0	0.034	38.0	0.028	58.0	0.011	78.0	0.016
-1.0	0.309	19.0	0.006	39.0	0.021	59.0	0.008	79.0	0.023
0.0	0.843	20.0	0.006	40.0	0.033	60.0	0.028	80.0	0.028
1.0	0.987	21.0	0.012	41.0	0.047	61.0	0.039	81.0	0.030
2.0	0.690	22.0	0.024	42.0	0.045	62.0	0.036	82.0	0.029
3.0	0.313	23.0	0.006	43.0	0.030	63.0	0.022	83.0	0.027
4.0	0.144	24.0	0.015	44.0	0.018	64.0	0.004	84.0	0.024
5.0	0.140	25.0	0.009	45.0	0.021	65.0	0.012	85.0	0.019
6.0	0.141	26.0	0.014	46.0	0.036	66.0	0.020	86.0	0.014
7.0	0.110	27.0	0.020	47.0	0.044	67.0	0.018	87.0	0.010
8.0	0.097	28.0	0.009	48.0	0.038	68.0	0.007	88.0	0.005
9.0	0.102	29.0	0.009	49.0	0.022	69.0	0.007	89.0	0.002
								90.0	0.000

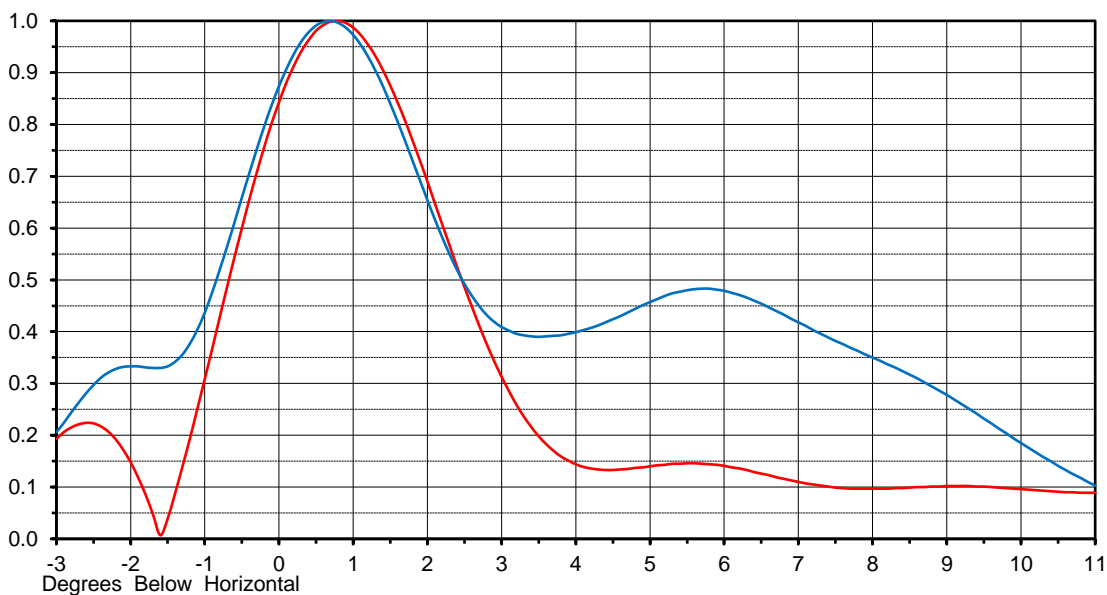
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**FutureFill** refers to the use of predetermined illuminations with broadband panels or limited bandwidth slotted coaxial antennas that can be modified in the field to provide the flexibility to customize the null structure at a future date.

## FutureFill OVERLAY

Proposal No. **C-70199-1**  
 Date **6-Apr-17**  
 Call Letters **KQDS** **18**  
 Frequency **497 MHz**  
 Antenna Type **TFU-28GTH/VP-R 04**

RMS Directivity 25.00 ( 14.0 dB ) Beam Tilt 0.75 Drawing No. 28G250075 Red  
 RMS Directivity 14.44 ( 11.6 dB ) Beam Tilt 0.70 Drawing No. 28G250075-FF Blue  
 Calculated



Tabulations for 28G250075-FF

Angle	Field	Angle	Field	Angle	Field	Angle	Field	Angle	Field
-10.0	0.166	10.0	0.185	30.0	0.065	50.0	0.059	70.0	0.039
-9.0	0.170	11.0	0.103	31.0	0.086	51.0	0.068	71.0	0.035
-8.0	0.287	12.0	0.063	32.0	0.098	52.0	0.078	72.0	0.042
-7.0	0.319	13.0	0.110	33.0	0.090	53.0	0.092	73.0	0.047
-6.0	0.260	14.0	0.132	34.0	0.093	54.0	0.096	74.0	0.047
-5.0	0.386	15.0	0.108	35.0	0.117	55.0	0.085	75.0	0.044
-4.0	0.312	16.0	0.087	36.0	0.124	56.0	0.068	76.0	0.039
-3.0	0.206	17.0	0.108	37.0	0.096	57.0	0.063	77.0	0.036
-2.0	0.333	18.0	0.088	38.0	0.057	58.0	0.077	78.0	0.035
-1.0	0.437	19.0	0.031	39.0	0.036	59.0	0.098	79.0	0.035
0.0	0.874	20.0	0.008	40.0	0.036	60.0	0.113	80.0	0.035
1.0	0.973	21.0	0.028	41.0	0.053	61.0	0.112	81.0	0.035
2.0	0.654	22.0	0.058	42.0	0.055	62.0	0.097	82.0	0.033
3.0	0.409	23.0	0.047	43.0	0.039	63.0	0.081	83.0	0.030
4.0	0.399	24.0	0.041	44.0	0.026	64.0	0.080	84.0	0.025
5.0	0.457	25.0	0.061	45.0	0.027	65.0	0.093	85.0	0.020
6.0	0.479	26.0	0.066	46.0	0.028	66.0	0.102	86.0	0.015
7.0	0.418	27.0	0.058	47.0	0.019	67.0	0.097	87.0	0.010
8.0	0.350	28.0	0.068	48.0	0.005	68.0	0.080	88.0	0.006
9.0	0.278	29.0	0.071	49.0	0.037	69.0	0.057	89.0	0.002
								90.0	0.000

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## MECHANICALS

Proposal No. **C-70199-1**  
 Date **6-Apr-17**  
 Call Letters **KQDS** **18**  
 Frequency **497 MHz**  
 Antenna Type **TFU-28GTH/VP-R 04**

### Preliminary Specifications

#### Top Mounted

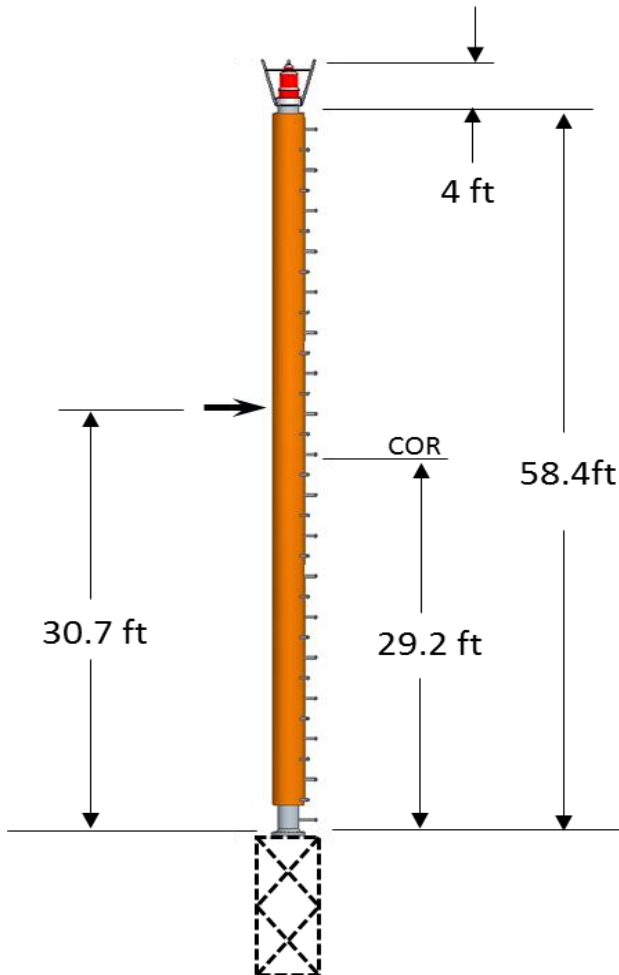
##### Mechanical Specification without ice TIA-222-G

Height AGL(z) 787 ft (239.9 m)  
 Basic Wind Speed 90 m/h (144.8 km/h)

Structure Class II  
 Exposure Category C  
 Topography Category 3  
 Height of Crest 200 ft (61 m)

##### Mechanical Specifications with ice TIA-222-G

Design Ice 1.25 in  $t_{iz} = 3.43$  in  
 Wind Speed w/Ice 60 m/h (96.6 km/h)



#### Mechanical Specifications

		without ice	with ice
Height with Lightning Protector	H4	62.4 ft (19m)	
Height less Lightning Protector	H2	58.4 ft (17.8m)	
Height of Center of Radiation	H3	29.2 ft (8.9m)	
Effective Projected Area	(EPA) <sub>S</sub>	68.3 ft² (6.3m²)	110 ft² (10.2m²)
Moment Arm	D1	30.7 ft (9.4m)	32.2 ft (9.8m)

Weight	W	11800 lb (5.4t)	20300 lb (9.2t)
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Antenna designed in accordance with AISC specifications for design of structural steel as prescribed by TIA-222-G

Prepared by: KLP  
 Rev. No.1 by: JBC

Date: 6-Apr-17  
 Date: 6-Apr-17

ME: JCB

EE:

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## Summary

Proposal No.	<b>C-70199-1</b>	
Date	<b>6-Apr-17</b>	
Call Letters	<b>KQDS</b>	<b>18 DTV</b>
Frequency	<b>497 MHz</b>	
Antenna Type	<b>TFU-28GTH/VP-R 04</b>	

## Antenna

	Hpol	Vpol
ERP:	<b>1000.0 kW ( 30.00 dBk )</b>	<b>428.6 kW ( 26.32 dBk )</b>
RMS Gain*	17.50 ( 12.43 dB )	7.50 ( 8.75 dB )

<b>Antenna Input Power</b>	<b>57.1 kW ( 17.57 dBk )</b>
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## Transmission Line

Type	Rigid	Attenuation	( 0.73 dB )
Size	7-3/16"	Efficiency	84.6%
Impedance	75 Ohm		
Length	783 ft	238.7 m	

## Transmitter Output

<b>67.5 kW ( 18.29 dBk )</b>
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Transmitter filter losses not included

\* Directivity and Gain are with respect to half wave dipole.

\*\*Antenna Gain includes feed system losses

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