

**SMITH AND FISHER**

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**ENGINEERING STATEMENT**

The engineering data contained herein have been prepared on behalf of CAROLINA CHRISTIAN BROADCASTING, INC., licensee of digital Television WGGS-DT, Channel 2 in Greenville, South Carolina, in support of this Application for Modification of License to correct the omnidirectional antenna model as well as polarization type from "horizontal" to "elliptical". No other changes in operating parameters (including transmitter power), antenna location, antenna azimuth pattern or antenna height are being specified.

Elevation and azimuth pattern data for the installed antenna are attached hereto.

I declare under penalty of perjury that the foregoing statements and the attached exhibit are true and correct to the best of my knowledge and belief.



KEVIN T. FISHER

October 2, 2019



## Antenna Model: THA-O3-3L/9H-1 VP (SP)

Proposal Number: C-70175-2

Date: 11-Apr-18

Customer: Carolina Christian

Location: Greenville, SC

### Electrical Specifications

Polarization:	Elliptical		
Azimuth Pattern:	Directional		
Antenna Input:	3-1/8"	50 Ohm	EIA/DCA
VSWR:	Channel	1.08 : 1	
Bandwidth:	6 MHz		
Rated Input Power:	30 kW	(14.77 dBk)	Maximum Average Power

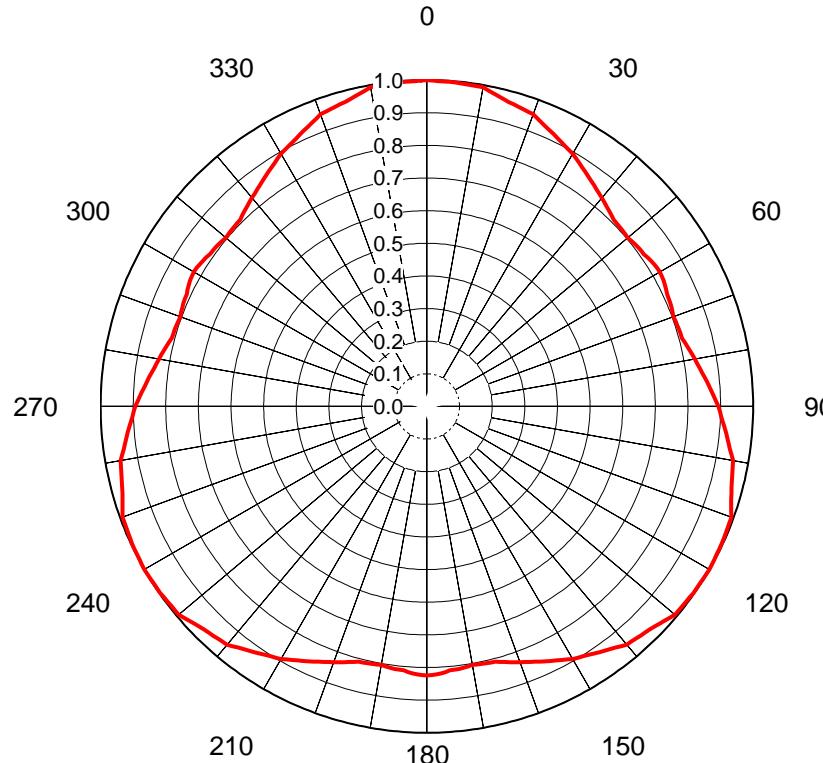
### Mechanical Specifications

Mounting:	Top Mounted		
Environmental Protection:	Feed Point Cover		
Height:	50.7 ft (15.5m)	less Lightning Protector	60.7 ft (18.5m) with Lightning Protector
Weight:		Excludes Mounts	
Effective Projected Area:	TIA/EIA-222-F	Basic Wind Speed:	70 m/h (112.7 km/h)

### Channel Specifications

Call	CH	Freq	Hpol ERP	Vpol ERP	TPO	Peak	Peak	Peak	Peak
						Main Lobe Hpol Gain	Main Lobe Vpol Gain	at Horizontal Hpol Gain	at Horizontal Vpol Gain
WGGS	2	57 MHz	33.0 kW (15.19 dBk)	4.80 kW (6.81 dBk)	11.5 kW (10.62 dBk)	2.96 (4.71dB)	0.43 (-3.66dB)	2.96 (4.71dB)	0.43 (-3.66dB)

# Dielectric®

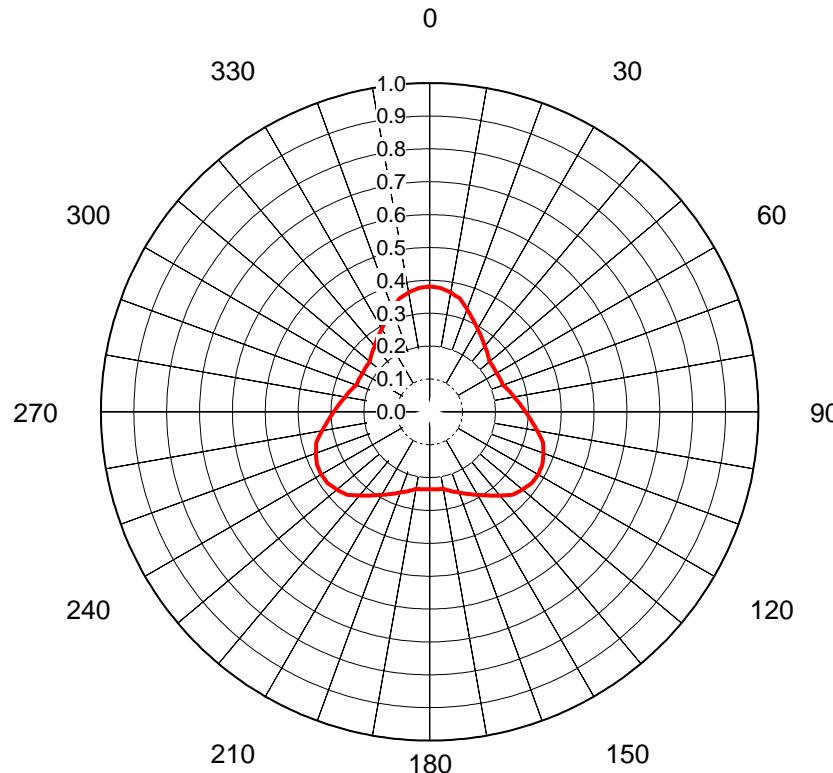


## AZIMUTH PATTERN Horizontal Polarization

Proposal No. C-70175-2  
 Date 11-Apr-18  
 Call Letters WGGS  
 Channel 2  
 Frequency 57 MHz  
 Antenna Type THA-O3-3L/9H-1 VP (SP)  
 Gain 1.24 (0.92dB)  
 Calculated

Deg	Value																		
0	1.000	36	0.856	72	0.807	108	0.981	144	0.926	180	0.824	216	0.926	252	0.981	288	0.807	324	0.856
1	0.999	37	0.850	73	0.808	109	0.987	145	0.920	181	0.823	217	0.932	253	0.976	289	0.805	325	0.862
2	0.998	38	0.844	74	0.809	110	0.993	146	0.914	182	0.822	218	0.938	254	0.971	290	0.804	326	0.868
3	0.997	39	0.839	75	0.809	111	0.993	147	0.908	183	0.819	219	0.945	255	0.966	291	0.806	327	0.874
4	0.997	40	0.834	76	0.814	112	0.994	148	0.903	184	0.816	220	0.953	256	0.963	292	0.809	328	0.880
5	0.997	41	0.829	77	0.819	113	0.995	149	0.898	185	0.812	221	0.955	257	0.960	293	0.810	329	0.887
6	0.996	42	0.824	78	0.824	114	0.996	150	0.894	186	0.812	222	0.957	258	0.957	294	0.812	330	0.894
7	0.995	43	0.819	79	0.829	115	0.997	151	0.887	187	0.810	223	0.960	259	0.955	295	0.812	331	0.898
8	0.994	44	0.814	80	0.834	116	0.997	152	0.880	188	0.809	224	0.963	260	0.953	296	0.816	332	0.903
9	0.993	45	0.809	81	0.839	117	0.997	153	0.874	189	0.806	225	0.966	261	0.945	297	0.819	333	0.908
10	0.993	46	0.809	82	0.844	118	0.998	154	0.868	190	0.804	226	0.971	262	0.938	298	0.822	334	0.914
11	0.987	47	0.808	83	0.850	119	0.999	155	0.862	191	0.805	227	0.976	263	0.932	299	0.823	335	0.920
12	0.981	48	0.807	84	0.856	120	1.000	156	0.856	192	0.807	228	0.981	264	0.926	300	0.824	336	0.926
13	0.976	49	0.805	85	0.862	121	0.999	157	0.850	193	0.808	229	0.987	265	0.920	301	0.823	337	0.932
14	0.971	50	0.804	86	0.868	122	0.998	158	0.844	194	0.809	230	0.993	266	0.914	302	0.822	338	0.938
15	0.966	51	0.806	87	0.874	123	0.997	159	0.839	195	0.809	231	0.993	267	0.908	303	0.819	339	0.945
16	0.963	52	0.809	88	0.880	124	0.997	160	0.834	196	0.814	232	0.994	268	0.903	304	0.816	340	0.953
17	0.960	53	0.810	89	0.887	125	0.997	161	0.829	197	0.819	233	0.995	269	0.898	305	0.812	341	0.955
18	0.957	54	0.812	90	0.894	126	0.996	162	0.824	198	0.824	234	0.996	270	0.894	306	0.812	342	0.957
19	0.955	55	0.812	91	0.898	127	0.995	163	0.819	199	0.829	235	0.997	271	0.887	307	0.810	343	0.960
20	0.953	56	0.816	92	0.903	128	0.994	164	0.814	200	0.834	236	0.997	272	0.880	308	0.809	344	0.963
21	0.945	57	0.819	93	0.908	129	0.993	165	0.809	201	0.839	237	0.997	273	0.874	309	0.806	345	0.966
22	0.938	58	0.822	94	0.914	130	0.993	166	0.809	202	0.844	238	0.998	274	0.868	310	0.804	346	0.971
23	0.932	59	0.823	95	0.920	131	0.987	167	0.808	203	0.850	239	0.999	275	0.862	311	0.805	347	0.976
24	0.926	60	0.824	96	0.926	132	0.981	168	0.807	204	0.856	240	1.000	276	0.856	312	0.807	348	0.981
25	0.920	61	0.823	97	0.932	133	0.976	169	0.805	205	0.862	241	0.999	277	0.850	313	0.808	349	0.987
26	0.914	62	0.822	98	0.938	134	0.971	170	0.804	206	0.868	242	0.998	278	0.844	314	0.809	350	0.993
27	0.908	63	0.819	99	0.945	135	0.966	171	0.806	207	0.874	243	0.997	279	0.839	315	0.809	351	0.993
28	0.903	64	0.816	100	0.953	136	0.963	172	0.809	208	0.880	244	0.997	280	0.834	316	0.814	352	0.994
29	0.898	65	0.812	101	0.955	137	0.960	173	0.810	209	0.887	245	0.997	281	0.829	317	0.819	353	0.995
30	0.894	66	0.812	102	0.957	138	0.957	174	0.812	210	0.894	246	0.996	282	0.824	318	0.824	354	0.996
31	0.887	67	0.810	103	0.960	139	0.955	175	0.812	211	0.898	247	0.995	283	0.819	319	0.829	355	0.997
32	0.880	68	0.809	104	0.963	140	0.953	176	0.816	212	0.903	248	0.994	284	0.814	320	0.834	356	0.997
33	0.874	69	0.806	105	0.966	141	0.945	177	0.819	213	0.908	249	0.993	285	0.809	321	0.839	357	0.997
34	0.868	70	0.804	106	0.971	142	0.938	178	0.822	214	0.914	250	0.993	286	0.809	322	0.844	358	0.998
35	0.862	71	0.805	107	0.976	143	0.932	179	0.823	215	0.920	251	0.987	287	0.808	323	0.850	359	0.999

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## AZIMUTH PATTERN Vertical Polarization

Proposal No. **C-70175-2**  
 Date **11-Apr-18**  
 Call Letters **WGGS**  
 Channel **2**  
 Frequency **57 MHz**  
 Antenna Type **THA-O3-3L/9H-1 VP (SP)**  
 Gain **1.56 (1.94dB)**  
 Calculated

Deg	Value																		
0	0.381	36	0.273	72	0.242	108	0.363	144	0.315	180	0.235	216	0.315	252	0.363	288	0.242	324	0.273
1	0.381	37	0.270	73	0.245	109	0.366	145	0.311	181	0.235	217	0.319	253	0.361	289	0.240	325	0.276
2	0.380	38	0.267	74	0.247	110	0.368	146	0.307	182	0.236	218	0.323	254	0.359	290	0.237	326	0.279
3	0.379	39	0.264	75	0.250	111	0.370	147	0.303	183	0.236	219	0.328	255	0.357	291	0.237	327	0.282
4	0.379	40	0.261	76	0.252	112	0.372	148	0.299	184	0.237	220	0.332	256	0.352	292	0.237	328	0.285
5	0.379	41	0.259	77	0.254	113	0.374	149	0.295	185	0.237	221	0.337	257	0.347	293	0.237	329	0.288
6	0.376	42	0.256	78	0.256	114	0.376	150	0.292	186	0.237	222	0.342	258	0.342	294	0.237	330	0.292
7	0.374	43	0.254	79	0.259	115	0.379	151	0.288	187	0.237	223	0.347	259	0.337	295	0.237	331	0.295
8	0.372	44	0.252	80	0.261	116	0.379	152	0.285	188	0.237	224	0.352	260	0.332	296	0.237	332	0.299
9	0.370	45	0.250	81	0.264	117	0.379	153	0.282	189	0.237	225	0.357	261	0.328	297	0.236	333	0.303
10	0.368	46	0.247	82	0.267	118	0.380	154	0.279	190	0.237	226	0.359	262	0.323	298	0.236	334	0.307
11	0.366	47	0.245	83	0.270	119	0.381	155	0.276	191	0.240	227	0.361	263	0.319	299	0.235	335	0.311
12	0.363	48	0.242	84	0.273	120	0.381	156	0.273	192	0.242	228	0.363	264	0.315	300	0.235	336	0.315
13	0.361	49	0.240	85	0.276	121	0.381	157	0.270	193	0.245	229	0.366	265	0.311	301	0.235	337	0.319
14	0.359	50	0.237	86	0.279	122	0.380	158	0.267	194	0.247	230	0.368	266	0.307	302	0.236	338	0.323
15	0.357	51	0.237	87	0.282	123	0.379	159	0.264	195	0.250	231	0.370	267	0.303	303	0.236	339	0.328
16	0.352	52	0.237	88	0.285	124	0.379	160	0.261	196	0.252	232	0.372	268	0.299	304	0.237	340	0.332
17	0.347	53	0.237	89	0.288	125	0.379	161	0.259	197	0.254	233	0.374	269	0.295	305	0.237	341	0.337
18	0.342	54	0.237	90	0.292	126	0.376	162	0.256	198	0.256	234	0.376	270	0.292	306	0.237	342	0.342
19	0.337	55	0.237	91	0.295	127	0.374	163	0.254	199	0.259	235	0.379	271	0.288	307	0.237	343	0.347
20	0.332	56	0.237	92	0.299	128	0.372	164	0.252	200	0.261	236	0.379	272	0.285	308	0.237	344	0.352
21	0.328	57	0.236	93	0.303	129	0.370	165	0.250	201	0.264	237	0.379	273	0.282	309	0.237	345	0.357
22	0.323	58	0.236	94	0.307	130	0.368	166	0.247	202	0.267	238	0.380	274	0.279	310	0.237	346	0.359
23	0.319	59	0.235	95	0.311	131	0.366	167	0.245	203	0.270	239	0.381	275	0.276	311	0.240	347	0.361
24	0.315	60	0.235	96	0.315	132	0.363	168	0.242	204	0.273	240	0.381	276	0.273	312	0.242	348	0.363
25	0.311	61	0.235	97	0.319	133	0.361	169	0.240	205	0.276	241	0.381	277	0.270	313	0.245	349	0.366
26	0.307	62	0.236	98	0.323	134	0.359	170	0.237	206	0.279	242	0.380	278	0.267	314	0.247	350	0.368
27	0.303	63	0.236	99	0.328	135	0.357	171	0.237	207	0.282	243	0.379	279	0.264	315	0.250	351	0.370
28	0.299	64	0.237	100	0.332	136	0.352	172	0.237	208	0.285	244	0.379	280	0.261	316	0.252	352	0.372
29	0.295	65	0.237	101	0.337	137	0.347	173	0.237	209	0.288	245	0.379	281	0.259	317	0.254	353	0.374
30	0.292	66	0.237	102	0.342	138	0.342	174	0.237	210	0.292	246	0.376	282	0.256	318	0.256	354	0.376
31	0.288	67	0.237	103	0.347	139	0.337	175	0.237	211	0.295	247	0.374	283	0.254	319	0.259	355	0.379
32	0.285	68	0.237	104	0.352	140	0.332	176	0.237	212	0.299	248	0.372	284	0.252	320	0.261	356	0.379
33	0.282	69	0.237	105	0.357	141	0.328	177	0.236	213	0.303	249	0.370	285	0.250	321	0.264	357	0.379
34	0.279	70	0.237	106	0.359	142	0.323	178	0.236	214	0.307	250	0.368	286	0.247	322	0.267	358	0.380
35	0.276	71	0.240	107	0.361	143	0.319	179	0.235	215	0.311	251	0.366	287	0.245	323	0.270	359	0.381

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## ELEVATION PATTERN

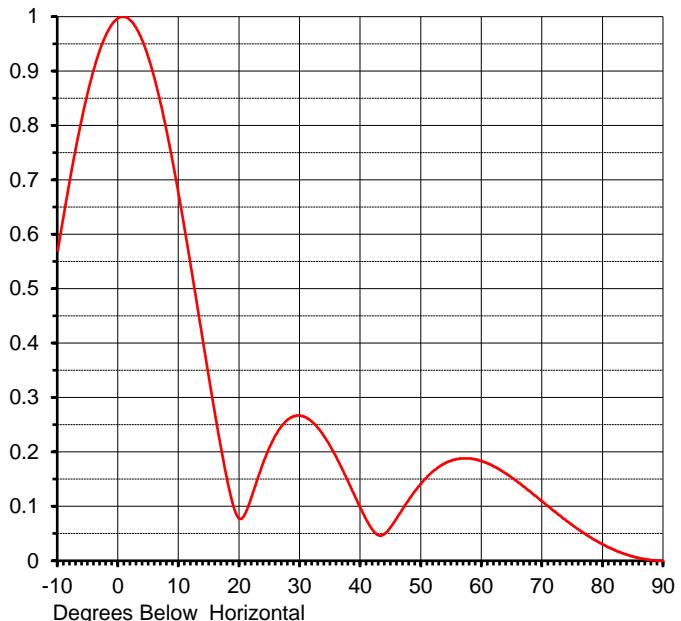
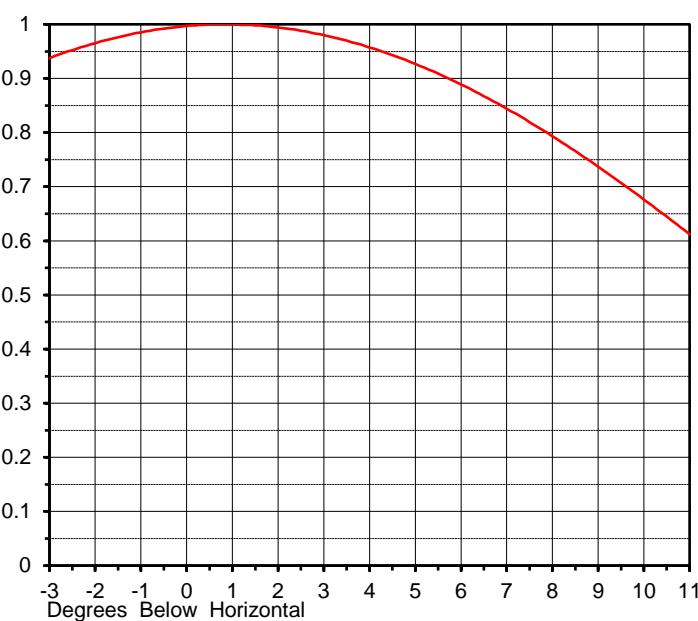
Proposal No. C-70175-2  
 Date 11-Apr-18  
 Call Letters WGGS  
 Channel 2  
 Frequency 57 MHz  
 Antenna Type THA-O3-3L/9H-1 VP (SP)

Horizontal elevation pattern

RMS Directivity at Main Lobe  
RMS Directivity at Horizontal

**3.3 ( 5.19 dB )**  
**3.3 ( 5.19 dB )**  
Calculated

Beam Tilt 0.75 deg  
Pattern Number 03H033075



Angle	Field								
-10.0	0.570	10.0	0.670	30.0	0.267	50.0	0.142	70.0	0.109
-9.0	0.637	11.0	0.605	31.0	0.263	51.0	0.155	71.0	0.100
-8.0	0.700	12.0	0.538	32.0	0.255	52.0	0.165	72.0	0.091
-7.0	0.760	13.0	0.470	33.0	0.243	53.0	0.173	73.0	0.082
-6.0	0.814	14.0	0.401	34.0	0.228	54.0	0.180	74.0	0.073
-5.0	0.863	15.0	0.333	35.0	0.210	55.0	0.184	75.0	0.065
-4.0	0.905	16.0	0.266	36.0	0.190	56.0	0.187	76.0	0.057
-3.0	0.941	17.0	0.204	37.0	0.167	57.0	0.188	77.0	0.050
-2.0	0.968	18.0	0.146	38.0	0.144	58.0	0.188	78.0	0.043
-1.0	0.987	19.0	0.100	39.0	0.120	59.0	0.186	79.0	0.036
0.0	0.998	20.0	0.077	40.0	0.096	60.0	0.183	80.0	0.030
1.0	1.000	21.0	0.088	41.0	0.074	61.0	0.179	81.0	0.024
2.0	0.993	22.0	0.118	42.0	0.056	62.0	0.173	82.0	0.019
3.0	0.978	23.0	0.151	43.0	0.047	63.0	0.167	83.0	0.015
4.0	0.955	24.0	0.183	44.0	0.050	64.0	0.160	84.0	0.011
5.0	0.923	25.0	0.210	45.0	0.063	65.0	0.152	85.0	0.008
6.0	0.885	26.0	0.232	46.0	0.079	66.0	0.144	86.0	0.005
7.0	0.839	27.0	0.248	47.0	0.096	67.0	0.136	87.0	0.003
8.0	0.788	28.0	0.260	48.0	0.113	68.0	0.127	88.0	0.001
9.0	0.731	29.0	0.266	49.0	0.129	69.0	0.118	89.0	0.000
						90.0	0.000		

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## ELEVATION PATTERN

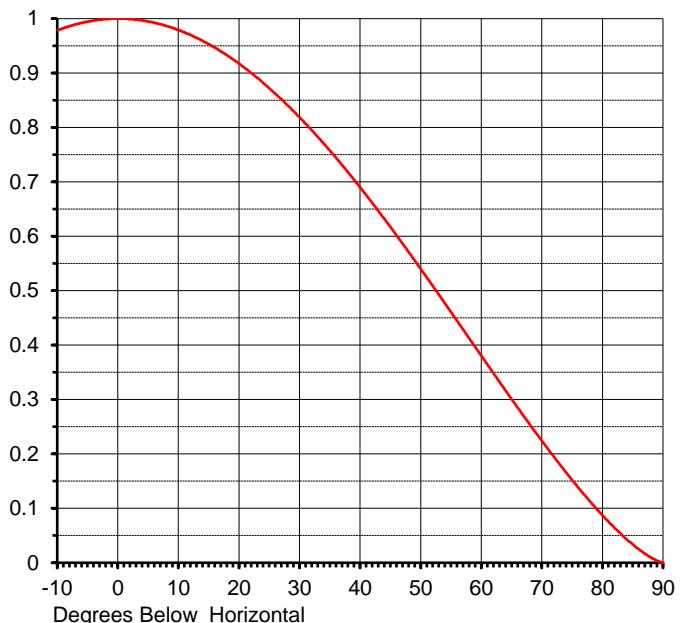
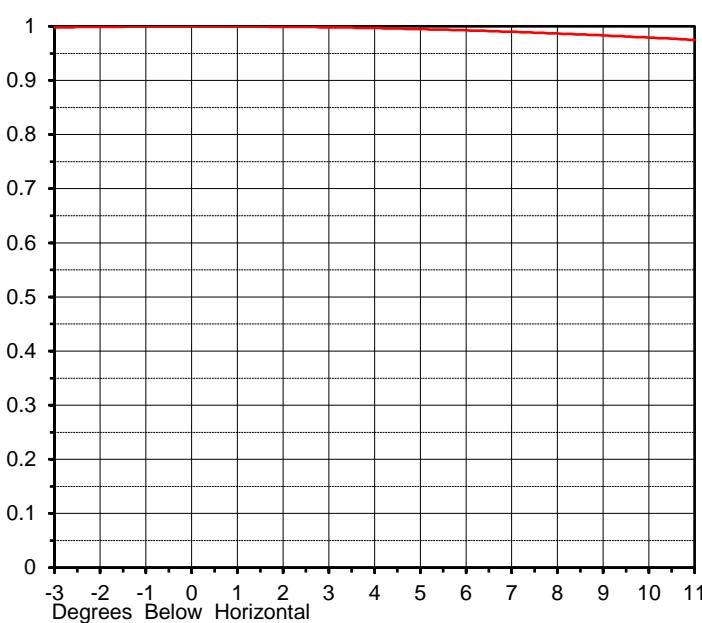
Proposal No. C-70175-2  
 Date 11-Apr-18  
 Call Letters WGGS  
 Channel 2  
 Frequency 57 MHz  
 Antenna Type THA-O3-3L/9H-1 VP (SP)

Vertical elevation pattern

RMS Directivity at Main Lobe  
RMS Directivity at Horizontal

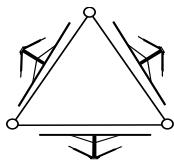
**1.00 ( 0.00 dB )**  
**1.00 ( 0.00 dB )**  
Calculated

Beam Tilt 0.00 deg  
Pattern Number 01H010000



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## MECHANICAL SPECIFICATIONS

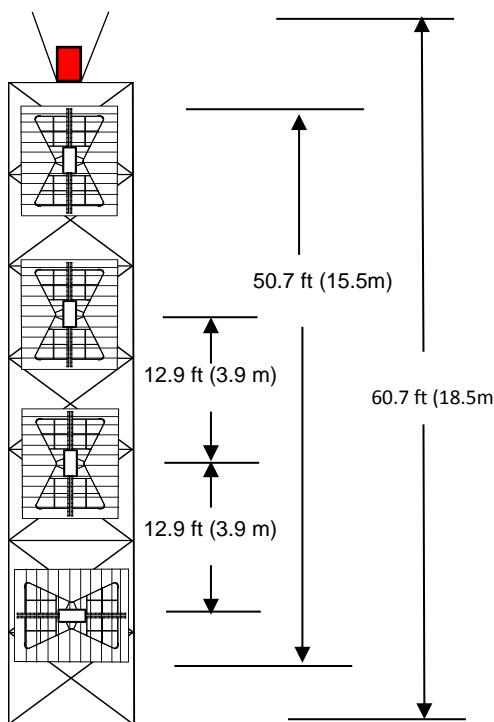


13 ft face

Spacing 8 in from face to back panel

Proposal No.	<b>C-70175-2</b>
Date	<b>11-Apr-18</b>
Call Letters	<b>WGGS</b>
Channel	<b>2</b>
Frequency	<b>57 MHz</b>
Antenna Type	<b>THA-O3-3L/9H-1 VP (SP)</b>

### Preliminary Specifications



Panels 149 in x 140 in

### Top Mounted

#### Without ice TIA/EIA-222-F

Height AGL	115 ft (35.1 m)
Basic Wind Speed	70 m/h (112.7 km/h)

### Mechanical Specifications

Height with Lightning Protector	H4	60.7 ft (18.5m)
Height less Lightning Protector	H2	50.7 ft (15.5m)
Height of Center of Radiation	H3	29.4 ft (9m)
Force Coeff. x Projected Area	CaAc	ft <sup>2</sup> ( m <sup>2</sup> )
Moment Arm	D1	ft ( m)

Weight	W	lb ( t )
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Antenna designed in accordance with AISC specifications for design of structural steel as prescribed by TIA/EIA-222-F

Prepared by: JBC  
Rev. No.2 by: JBC

Date: 11-Apr-18  
Date: 11-Apr-18

ME:

EE:

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## Summary

Proposal No.	C-70175-2
Date	11-Apr-18
Call Letters	WGGS
Channel	2
Frequency	57 MHz
Antenna Type	THA-O3-3L/9H-1 VP (SP)

## Antenna

	Hpol	Vpol
ERP:	33.0 kW ( 15.19 dBk )	4.80 kW ( 6.81 dBk )
Peak Gain*	2.96 ( 4.71 dB )	0.43 -( 3.66 dB )

**Antenna Input Power**                           **11.2 kW ( 10.47 dBk )**

## Transmission Line

Type:	Flexline Air	Attenuation:	( 0.15 dB )
Size:	4"	Efficiency:	96.6%
Impedance:	50 Ohm		
Length:	180 ft	54.9 m	

## **Transmitter Output**

**11.5 kW ( 10.62 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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