

Technical Report Supporting a Form 349 Minor Change in Licensed Facility Construction Permit Application

Pursuant to 47 C.F.R. Section 74:

for

*W261DG.L - Charleston, SC
(Facility ID: 141216)*

*“Corrections in Antenna Height
& Antenna Make and Model”*

as a

*Commercial, Fill-In
AM Translator for
WSPO(AM) - Charleston, SC*

June, 2019

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EXPLANATION OF PROPOSAL: This Form 349 Filing and accompanying technical report supports a Minor Change in Licensed Facility Construction Permit Application for FM Translator W261DG.L - Charleston, SC (Facility ID: 141216). This FCC Form 349 Filing requests corrections in the antenna COR height and antenna make and model discovered during a recent self-inspection. Continued operation on CH261D (100.1 MHz) with a power of 0.250 kW ERP circular polarization (H&V) is requested. The FM Translator will operate from a corrected COR of 100 meters AMSL at the same site location. A corrected antenna make and model to the proper SWR Model FMEC/2-PLUS-HWS designation is also requested. This Form 349 Filing will continue to specify rebroadcast of Class B, AM Primary Station WSPO(AM) - Charleston, SC, MA (1390 kHz); Facility ID No. 60038. The Translator will remain licensed to the current community of Charleston, SC.

FACILITY COMPLIANCE SHOWINGS: A map of the proposed 60 dB μ service contour in relation to the present 60 dB μ service contour has been included in **Exhibit 1**. The minor change proposed service area will overlap a portion of the present service area as noted in the exhibit. The proposed 60 dB μ contour of the Translator lies wholly inside the larger of the AM primary daytime 2.0 mV/m contour or a 25 mile radius around the AM site. The primary station service contour relationship has been plotted in **Exhibit 2**.

The proposed facility will be located on the tower bearing Antenna Structure Registration Number 1263009. In support of this filing, a copy of the existing ASRN has been included in **Exhibit 3**. A depiction of the tower and antenna configuration has been included in **Exhibit 4**. Further notification to the FAA or ASR governing authorities is not required as this proposal will not increase the overall tower height.

The applicant would like to note use of the NED 03 second terrain database for all allocation, contour and HAAT showings contained herein. A copy of the proposed HAAT calculation has been included in **Exhibit 5**.

ALLOCATION COMPLIANCE SHOWINGS: The proposed Translator remains in compliance with 47 C.F.R. Section 74.1204 toward all allocation protection concerns with the exception of WXST(FM) - Hollywood, SC (CH259C1) and WALC(FM) - Charleston, SC (CH263C3). A general allocation study for this proposal is found in **Exhibit 6**.

The applicant would like to note the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WXST(FM) - Hollywood, SC (CH259C1) and WALC(FM) - Charleston, SC (CH263C3) as noted in **Exhibit 8**. Protection of the worst case calculated 116.6 dB μ F(50:10) Interference Contour, corresponding to the worst case calculated 76.6 dB μ F(50:50) Protected Contour, has been demonstrated through a downward radiation study. Full protection will be afforded each facility as this area will not reach the ground nor a seven meter artificial plane representing a standard two story house when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the manufacturer's antenna specifications has been included in **Exhibit 9**.

There are three additional facilities, existing or proposed, close enough to merit further study. Therefore, a supplemental contour protection study has been provided toward each facility as included in **Exhibit(s) 7(a-c)**.

Regarding protection of international concerns, the facility is, and will remain, more than 320 km from the common border between the United States and Canada or Mexico. As a result, no further international protection showings are believed required.

ENVIRONMENTAL COMPLIANCE SHOWINGS: The proposed facility complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments as set forth under §1.1310 and/or §1.1307(b)(3) of the Commission's rules and the guidelines for RF radiation protection guidelines as set forth in OET Bulletin No. 65 (Edition 97-01), and the accompanying Supplement A, (Edition 97-01). Compliance has been demonstrated in the attached **RF Appendix 1** of this filing. The facility is, or will be, properly marked with signs. Entry is, or will be, restricted by means of fencing, locked doors or gates. In addition, coordination with other users of the site will be secured to reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.

Regarding compliance with the NEPA, Nationwide Programmatic Agreement and NHPA Section 106 for tower co-location, compliance with the Agreement is not required where no new tower construction is being proposed and the tower is not being substantially altered. Specifically, compliance is not necessary where only an antenna and feed-line are being corrected on an existing structure, as here. However, should the Commission determine compliance is necessary, upon notification to the applicant, the applicant will file FCC Form 621.

CERTIFICATION OF TECHNICAL CONSULTANT: *I declare, under penalty of perjury, that the contents of this report are true and accurate to the best of my knowledge and belief. I further certify I have over twenty years of experience as a broadcast technical consultant before the Federal Communications Commission ("the FCC"); and am familiar with the Code of Federal Regulations Title 47 ("the Rules") as pertaining to this report and its contents herein. The underlying data utilized in this report was taken directly from FCC databases or indirectly through third party software vendors securing data directly from FCC databases. This firm cannot be held liable for errors or omissions resulting from the underlying data. The information contained herein is believed accurate to the date reported below.*



Justin W. Asher, Technical Consultant
June 06, 2019

NED 03 SEC Terrain Database
US Census 2010 PL Database

Present 60 dBμ F(50:50) Contour
Proposed 60 dBμ F(50:50) Contour

Exhibit 1

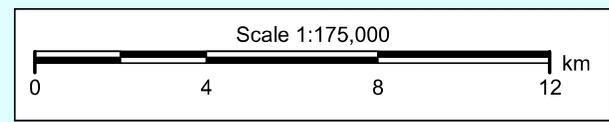
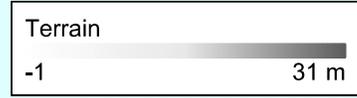
Service Contour Study: Present vs Proposed Operations

W261DG.L
Charleston, SC
BLFT20170131AAW
Facility ID: 141216
Latitude: 32-49-27 N
Longitude: 080-00-10 W
ERP: 0.25 kW
Channel: 261D (100.1 MHz)
AMSL Height: 112.0 m
Horiz. Pattern: Omni

60 dBμ F(50:50) Contour
Total Population: 247,439
Total Area: 555.9 sq. km

W261DG.P
Charleston, SC
Proposed Operation
Facility ID: 141216
Latitude: 32-49-27 N
Longitude: 080-00-10 W
ERP: 0.25 kW
Channel: 261D (100.1 MHz)
AMSL Height: 100.0 m
Horiz. Pattern: Omni

60 dBμ F(50:50) Contour
Total Population: 225,286
Total Area: 494.9 sq. km



Asher Broadcast Consulting LLC
justinasher@consultant.com
1 (202) 875-2986

25 mile Radius from AM Site

Primary 2 mV/m Daytime Contour

Proposed 60 dBu F(50:50) Contour

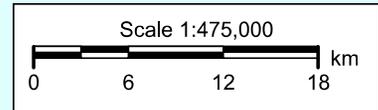
**WSPO(AM)
+
W261DG.P**

Exhibit 2
Service Contour Study:
Proposed vs Primary Operations

WSPO(AM) - 1390 kHz
Charleston, South Carolina
Station Class: B
Region 2 Class: B
Facility ID: 60038
File Number: BL-19981217AG
Fac. Service: AM
32-49-28.0 N 80-00-10.0 W (NAD 27)
32-49-28.6 N 80-00-09.3 W (NAD 83)
Power: 5 kW, Non-Directional
Hours: Daytime
Pattern Type: Theoretical
Towers: 1 Augmentations: 0
Tower Elec Height: 180.1 Deg; 107.9 m
RMS Theoretical: 381.41 mV/m (per kW)
or 852.86 mV/meter at 5 kW

W261DG.P
Charleston, SC
Proposed Operation
Facility ID: 141216
Latitude: 32-49-27 N
Longitude: 080-00-10 W
ERP: 0.25 kW
Channel: 261D (100.1 MHz)
AMSL Height: 100.0 m
Horiz. Pattern: Omni

NED 03 SEC Terrain Database
US Census 2010 PL Database



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Exhibit 3

Copy of Existing Antenna Structure Registration (public record copy)

Registration Detail

Reg Number	1263009	Status	Constructed
File Number	A1137507	Constructed	09/26/2008
EMI	No	Dismantled	
NEPA	No		

Antenna Structure

Structure Type TOWER - Free standing or Guyed Structure used for Commu

Location (in NAD83 Coordinates)

Lat/Long	32-49-27.3 N 080-00-09.6 W	Address	Orange Branch Road & Eton Road
City, State	Charleston , SC		
Zip	29407	County	CHARLESTON
Center of AM Array		Position of Tower in Array	

Heights (meters)

Elevation of Site Above Mean Sea Level	0,6	Overall Height Above Ground (AGL)	113,7
Overall Height Above Mean Sea Level	114,3	Overall Height Above Ground w/o Appurtenances	112,8

Painting and Lighting Specifications

FAA Chapters 3, 4, 5, 12
 Paint and Light in Accordance with FAA Circular Number 70/7460-1K

FAA Notification

FAA Study	2008-ASO-4990-OE	FAA Issue Date	09/23/2008
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Owner & Contact Information

FRN	0009108051	Owner Entity Type	Limited Liability Company
Assignor FRN	0004069225	Assignor ID	L00292260

Owner

Saga South Communications, LLC
 73 Kercheval Avenue
 Suite 201
 Grosse Pointe Farms , MI 48236

P: (313)886-7070
 F: (313)886-7150
 E: FCCLICENSES@SAGACOM.COM

Contact

Bush , Samuel D
 73 Kercheval Avenue
 Suite 201
 Grosse Pointe Farms , MI 48236

P: (313)886-7070
 F: (313)886-7150
 E: FCCLICENSES@SAGACOM.COM

Last Action Status

Status	Constructed	Received	06/07/2019
Purpose	Change Owner	Entered	06/06/2019
Mode	Interactive		

Related Applications

06/07/2019	A1137507 - Change Owner (OC)
08/25/2009	A0648568 - Notification (NT)
09/26/2008	A0610723 - Notification (NT)

Related applications (5)

Comments

Comments

None

History

Date	Event
06/08/2019	Registration Printed
06/08/2019	Change of Ownership Letter Sent
06/07/2019	Change of Ownership Received

All History (10)

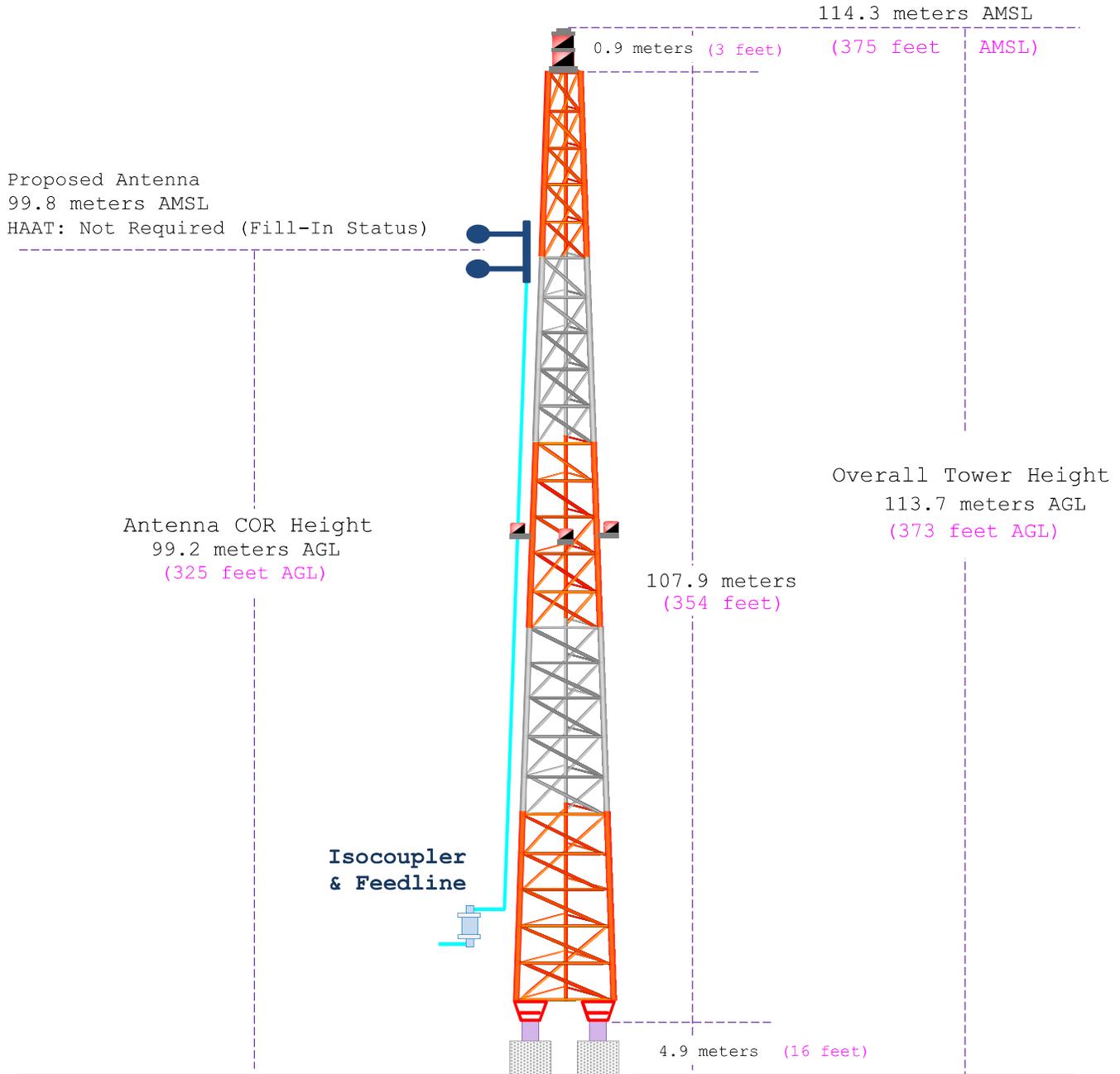
Automated Letters

06/08/2019	Authorization, Reference
06/08/2019	Ownership Change, Reference 1048372
09/27/2008	Authorization, Reference

All letters (5)

Exhibit 4

Vertical Plan of Antenna System



Ground Elevation: 0.6 meters AMSL (2 feet AMSL)		
Address: Orange Branch Road & Eton Road		
City: Charleston	Latitude (D M S)	Longitude (D M S)
County: Charleston	NAD 27 datum values: 32 49 26.66657 80 00 10.27639	
State: South Carolina	NAD 83 datum values: 32 49 27.30000 80 00 9.60000	
Antenna Structure Registration 1263009	Drawing Is Not To Scale	Asher Broadcast Consulting, LLC justinasher@consultant.com 1(202)875-2986

Exhibit 5

HAAT and Miscellaneous Coordinate Information

HAAT Calculation (1927):

N. Lat. = 324927.0 W. Lng. = 800010.0
 HAAT and Distance to Contour,
 FCC, FM 2-10 Mi, 51 pts Method - NED 03 SEC

Azi.	AV EL	HAAT	ERP kW	dBk	Field	60-F5
000	8.0	92.0	0.2500	-6.02	1.000	12.35
030	3.0	97.0	0.2500	-6.02	1.000	12.67
060	1.7	98.3	0.2500	-6.02	1.000	12.76
090	2.7	97.3	0.2500	-6.02	1.000	12.70
120	1.2	98.8	0.2500	-6.02	1.000	12.79
150	2.0	98.0	0.2500	-6.02	1.000	12.74
180	1.7	98.3	0.2500	-6.02	1.000	12.76
210	6.6	93.4	0.2500	-6.02	1.000	12.44
240	4.5	95.5	0.2500	-6.02	1.000	12.58
270	5.8	94.2	0.2500	-6.02	1.000	12.49
300	7.5	92.5	0.2500	-6.02	1.000	12.38
330	11.5	88.5	0.2500	-6.02	1.000	12.13

Ave El= 4.69 M HAAT= 95.31 M AMSL= 100

NAD 1983 to NAD 1927 Conversion:

	<u>Latitude</u>	<u>Longitude</u>
NAD 27 datum values:	32 49 26.66657	80 00 10.27639
NAD 83 datum values:	32 49 27.30000	80 00 9.60000

Various Coordinate Conversion Calculations (NAD 1983):

Position Type	Lat Lon
Degrees Lat Long	32.8242500°, -080.0026667°
Degrees Minutes	32°49.45500', -080°00.16000'
Degrees Minutes Seconds	32°49'27.3000", -080°00'09.6000"
UTM	17S 593352mE 3632244mN
UTM centimeter	17S 593352.95mE 3632244.00mN
MGRS	17SNS9335232244
Grid North	0.5°
GARS	200LF29
Maidenhead	EM92XT97QT36
GEOREF	GJKC59844945

Exhibit 6

Tabulation of Proposed Allocation

Blue Text indicates contour protection studies toward select stations as included in **Exhibit(s) 7(a-c)**.

Yellow Text denotes the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request as included in **Exhibit 8**.

Saga South Communications, Llc											
REFERENCE	CH#	261D - 100.1 MHz, Pwr= 0.25 kW, HAAT= 95.3 M, COR= 100 M							DISPLAY DATES		
32 49 27.0 N.		Average Protected F(50-50)= 12.57 km							DATA 06-05-19		
80 00 10.0 W.		Omni-directional							SEARCH 06-05-19		
CH	CALL	TYPE	ANT	AZI	DIST	LAT	PWR(kW)	INT(km)	PRO(km)	*IN*	*OUT*
CITY	STATE		<--	FILE #	LNG	HAAT (M)	COR (M)	LICENSEE	(Overlap in km)		
261C1	WXYX	RSV-A		228.9	124.20	32 05 11.0	100.000	171.9	72.3	-60.2*<	8.8
Rincon	GA		48.4		80 59 49.0	299	301	Alpha Media Licensee Llc			
One Step Application											
261D	W261DG	LIC_C		0.0	0.00	32 49 27.0	0.250		---Reference---		
Charleston	SC		0.0	BLFT20170131AAW	80 00 10.0		112	Saga South Communications,			
259C1	WXST	LIC NCX		92.6	15.63	32 49 04.0	70.000	8.2	63.7	-5.2<	-49.1*<
Hollywood	SC		272.6	BMLH20081014AAT	79 50 08.0	238	239	Saga South Communications,			
261C1	WXYX	CP NCX		231.6	118.65	32 09 28.0	75.000	145.5	54.4	-39.3*<	21.3
Rincon	GA		51.1	BPH20170306AAN	80 59 28.0	142	143	Alpha Media Licensee Llc			
263C3	WALC	LIC ZCX		93.0	15.60	32 49 00.4	13.500	3.9	38.8	-1.0<	-24.4*<
Charleston	SC		273.1	BMLED20090128ACF	79 50 09.7	137	137	Radio Training Network, In			
261C2	WXYX	LIC_CX		241.9	126.99	32 16 49.0	50.000	138.1	52.6	-23.6*<	31.2
Rincon	GA		61.2	BLH20060419AAG	81 11 40.0	150	157	Alpha Media Licensee Llc			
207C	WSCI	LIC DCY		68.4	30.48	32 55 28.0	100.000	27.6	18.6	28.5R	2.0M
Charleston	SC		248.6	BMLED20161028AAW	79 41 58.0	418	419	South Carolina Educational			
262C3	WORG	LIC_CX		313.4	87.21	33 21 42.0	25.000	61.0	39.8	13.8	29.1
Elloree	SC		133.1	BMLED20170216AAC	80 41 05.0	100	140	Educational Media Foundati			
261A	WWFN-FM	LIC_CX		7.9	129.39	33 58 36.0	3.300	82.9	28.0	34.0	58.4
Lake City	SC		188.0	BMLH20090601AKK	79 48 32.0	132	160	Cumulus Licensing Llc			
264A	WYEZ	LIC NC		38.2	81.73	33 24 03.0	3.100	2.5	27.8	66.6	52.9
Andrews	SC		218.5	BLH20010628ABR	79 27 30.0	136	143	Byrne Acquisition Group, L			
261A	WXBT	LIC_CX		324.7	170.20	34 04 07.0	5.900	89.2	30.3	68.8	98.0
West Columbia	SC		144.1	BMLH20030619AAA	81 04 17.0	100	188	Capstar Tx, Llc			
260D	W260AK	LIC_CN		45.0	96.01	33 25 58.0	0.055	10.0	7.0	73.5	70.6
Georgetown	SC		225.4	BLFT19970115TD	79 16 16.0	63	66	Bible Broadcasting Network			
Translator for WYFHF, N. Charleston, SC											
262C3	WSEA	LIC ZCX		44.1	149.34	33 47 04.0	12.000	54.1	36.1	82.8	95.0
Atlantic Beach	SC		224.7	BMLH20110908AAM	78 52 44.0	145	151	Cumulus Licensing Llc			
260A	WUCC	LIC_CX		296.5	143.75	33 23 34.0	3.100	42.2	27.7	89.3	97.9
Williston	SC		115.7	BLH20130913ABH	81 23 21.0	140	224	Conquering With Christ, Ll			

Terrain database is NED 03 SEC , R= 73.215 qualifying spacings or FCC minimum Spacings in KM, M= Margin in KM
 Contour distances are on direct line to and from reference station. Reference zone= East Zone, Co to 3rd adjacent.
 All separation margins (if shown) include rounding.
 Ant Column: (D= DA Standard, Z= DA 73.215, N= Not DA 73.215, _ = Omni), Polarization (C,H,V,E), Beamtilt(Y,N,X)
 "*"affixed to 'IN' or 'OUT' values = site inside restricted contour.
 << = Station meets FCC minimum distance spacing for its class.
 < = Contour Overlap
 Reference station has protected zone issue: AM tower

Exhibit 7a

Contour Protection Studies Toward Select Allocation Concern(s)

Saga South Communications, LLC

FMCommander Single Allocation Study - 06-05-2019 - NED 03 SEC
W261DG.P's Overlaps (In= -39.31 km, Out= 21.26 km)

W261DG.P CH 261 D
Lat= 32 49 27.0, Lng= 80 00 10.0
0.25 kW 95.3 m HAAT, 100 m COR
Prot.= 60 dBu, Intef.= 40 dBu

WXYY-C CH 261 C1 73.215 N BPH20170306AAN
Lat= 32 09 28.0, Lng= 80 59 28.0
75.0 kW 142 m HAAT, 143.3 m COR
Prot.= 60 dBu, Intef.= 40 dBu

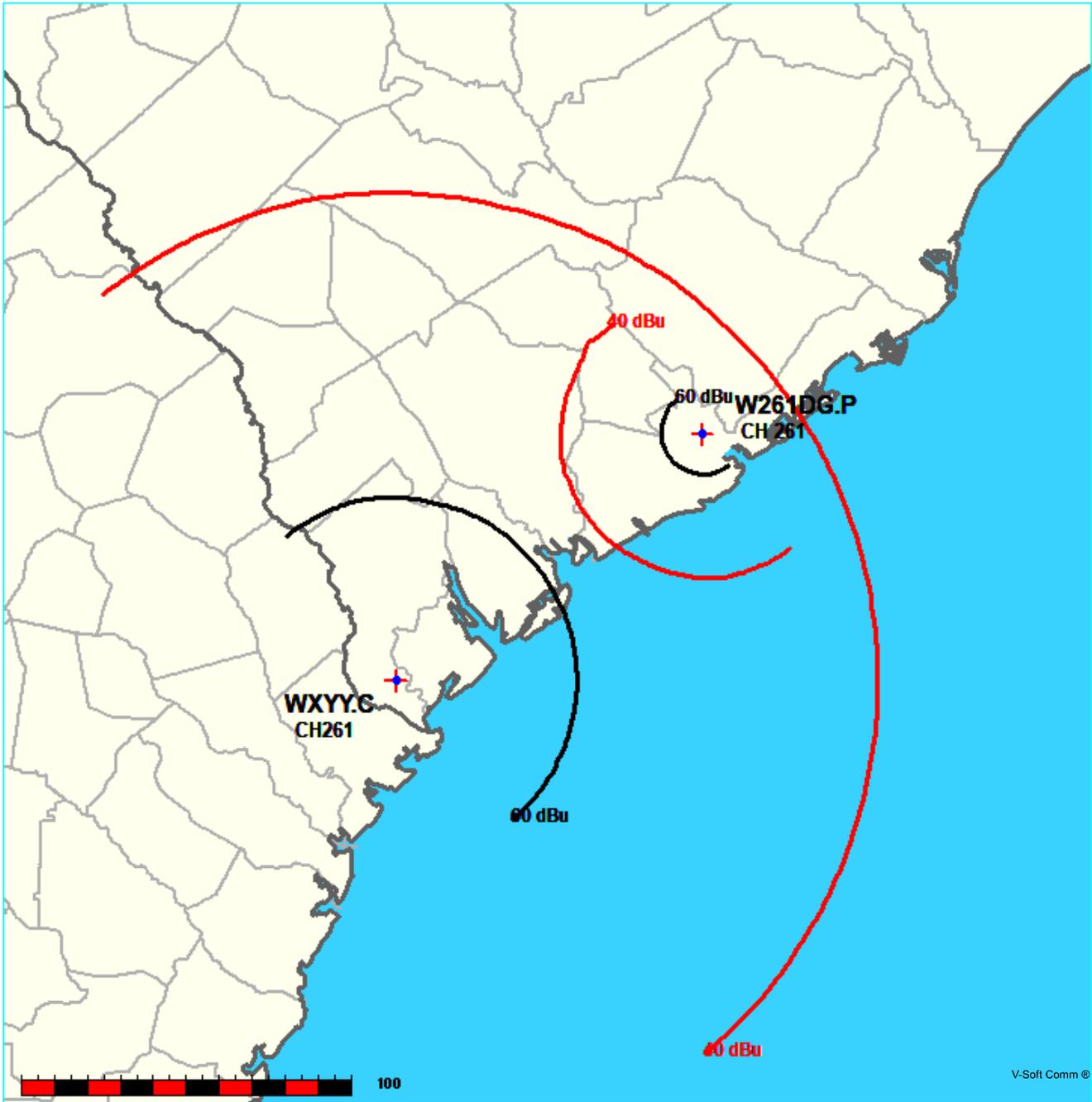


Exhibit 7b

Contour Protection Studies Toward Select Allocation Concern(s)

Saga South Communications, Llc

FMCommander Single Allocation Study - 06-05-2019 - NED 03 SEC
W261DG.P's Overlaps (In= -23.65 km, Out= 31.25 km)

W261DG.P CH 261 D
Lat= 32 49 27.0, Lng= 80 00 10.0
0.25 kW 95.3 m HAAT, 100 m COR
Prot.= 60 dBu, Intef.= 40 dBu

WXYY CH 261 C2 BLH20060419AAG
Lat= 32 16 49.0, Lng= 81 11 40.0
50.0 kW 150 m HAAT, 157 m COR
Prot.= 60 dBu, Intef.= 40 dBu

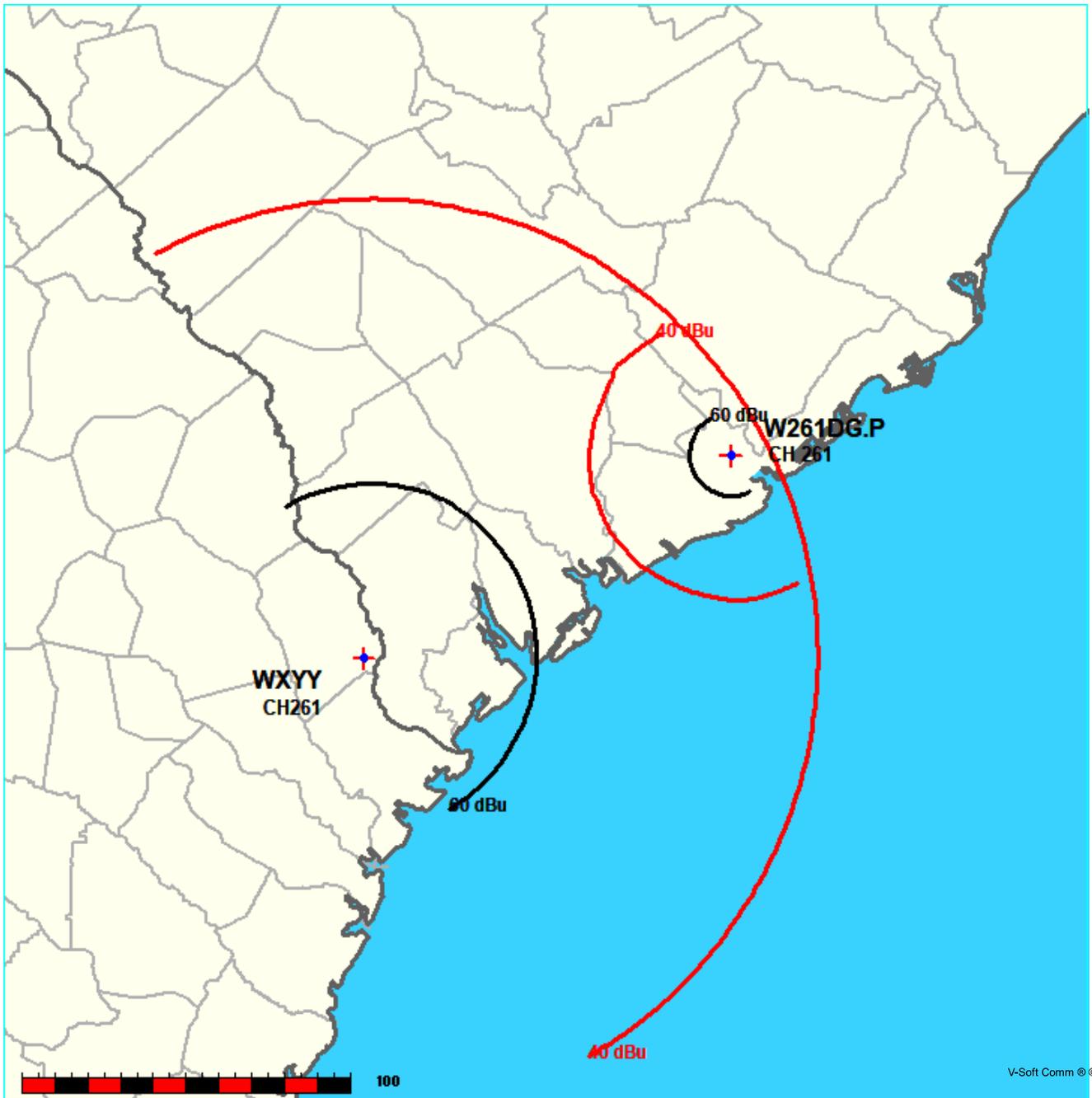


Exhibit 7c

Contour Protection Studies Toward Select Allocation Concern(s)

Saga South Communications, Llc

FMCommander Single Allocation Study - 06-05-2019 - NED 03 SEC
W261DG.P's Overlaps (In= 13.84 km, Out= 29.12 km)

W261DG.P CH 261 D
Lat= 32 49 27.0, Lng= 80 00 10.0
0.25 kW 95.3 m HAAT, 100 m COR
Prot.= 60 dBu, Intef.= 54 dBu

WORC CH 262 C3 BMLED20170216AAC
Lat= 33 21 42.0, Lng= 80 41 05.0
25.0 kW 100 m HAAT, 140 m COR
Prot.= 60 dBu, Intef.= 54 dBu

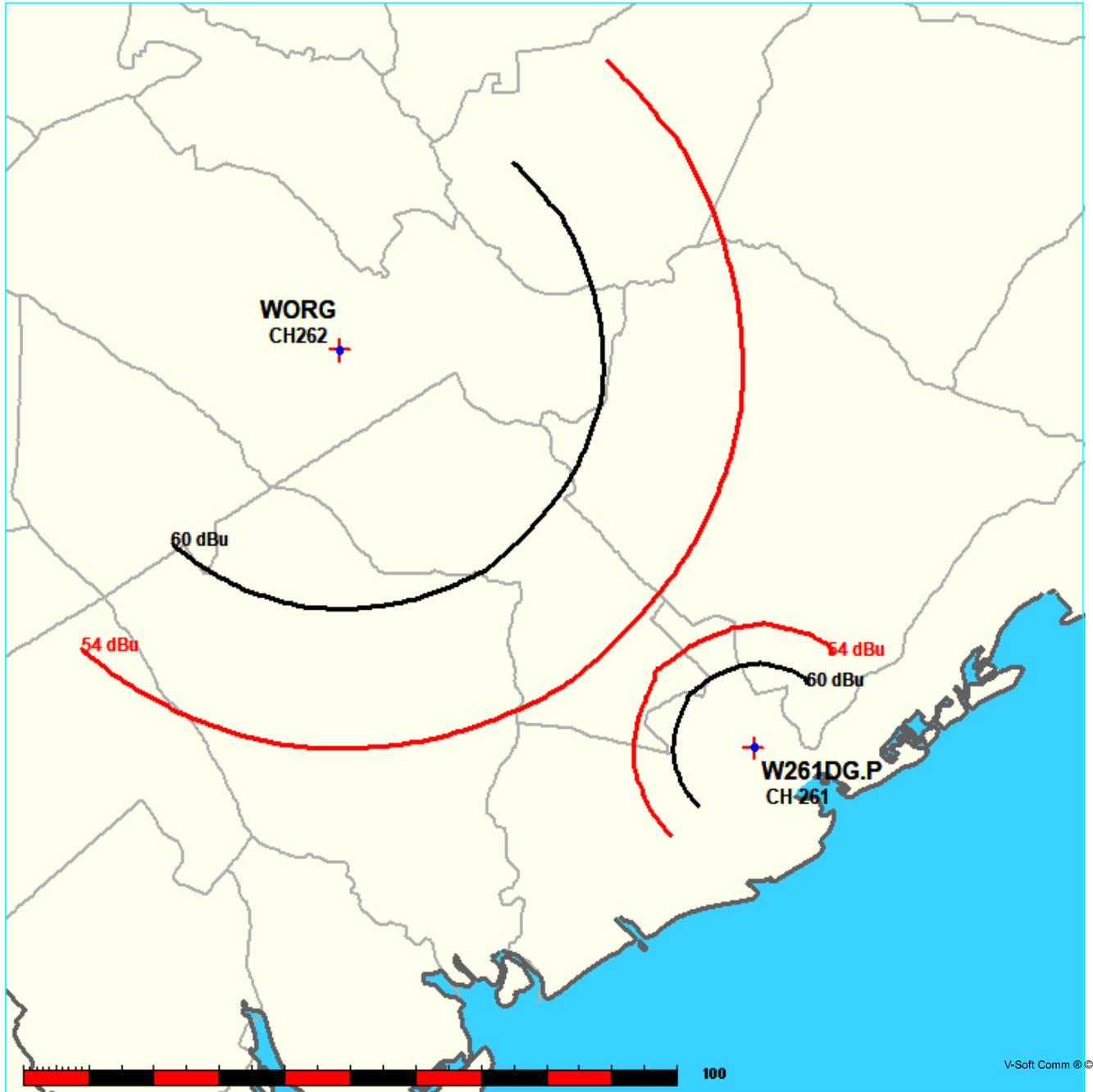


Exhibit 8

47 C.F.R. Section 74.1204(d) Second / Third Adjacent Given Interference Waiver Request

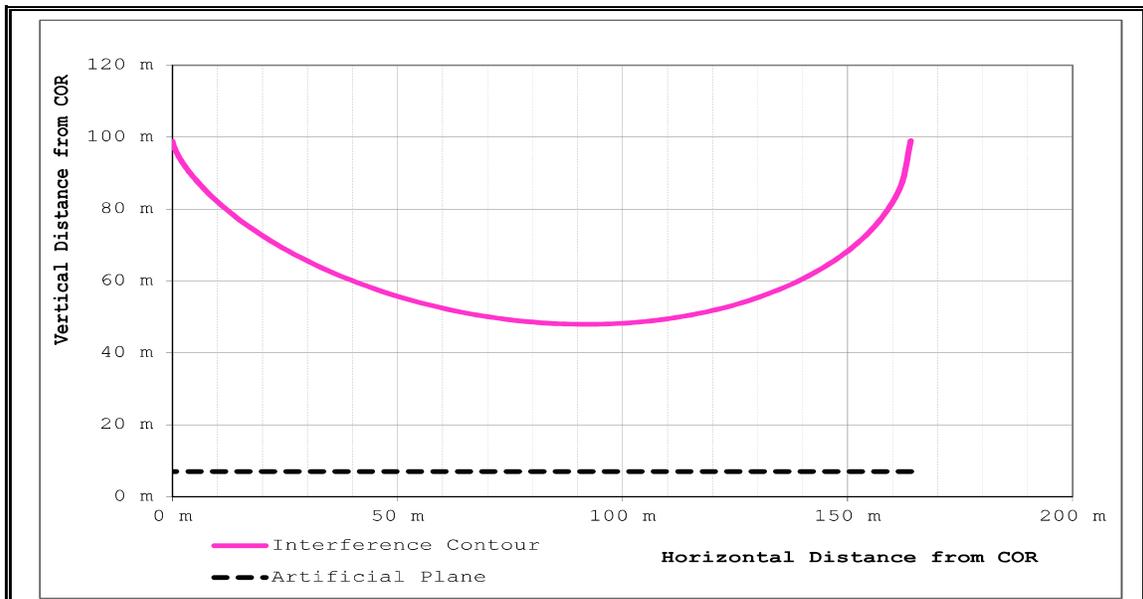
Yellow Highlighted Text denotes the existence of a 47 C.F.R. Section 74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request toward WXST(FM) - Hollywood, SC (CH259C1) and WALC(FM) - Charleston, SC (CH263C3) as noted in **Exhibit 8**. Protection of the worst case calculated 116.6 dBμ F(50:10) Interference Contour, corresponding to the worst case calculated 76.6 dBμ F(50:50) Protected Contour, has been demonstrated through a downward radiation study. Full protection will be afforded each facility as this area will not reach the ground nor a seven meter artificial plane representing a standard two story house when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the manufacturer's antenna specifications has been included in **Exhibit 9**.

Signal Report ✕

WXST Signal value at Reference site = 88.7 dBu. Distance to W257BQ.P interference signal contour = 41.0 m

Signal Report ✕

WALC Signal value at Reference site = 76.6 dBu. Distance to W261DG.P interference signal contour = 163.7 m



Proposed Antenna: SWR FMxx/2-0.50WS (Two Bay)								
Proposed Power: 0.250 kW								
Antenna Height AGL: 99.0 meters					Field Strength (dBu) Equation			
Protection Plane Height: 7.0 meters					$106.92 - (20 * (\log_{10}[\text{DistMeters}/1000])) + [\text{ERP in dBk}]$			
Protected Contour: 76.60 dBμ F(50:50)					Distance (Free Space) Equation:			
Interference Contour: 116.60 dBμ F(50:50)					$(10^{((106.92 - [\text{desired dBu}] + [\text{ERP in dBk}]) / 20)) * 1000}$			
Angle Below Horizon	Vertical Relative Field	ERP in kW	ERP in dBk	Meters from Antenna to Int. Contour	Meters from Antenna to Artificial Plane	Meters from Antenna to Ground Level	Field Strength at Protection Plane (dBμ)	Field Strength at Ground Level (dBμ)
0°	1.000	0.250	-6.02	164.05 m				
-5°	0.987	0.244	-6.13	161.92 m	1055.58 m	1135.90 m	100.32 dBμ	99.68 dBμ
-10°	0.950	0.226	-6.47	155.85 m	529.81 m	570.12 m	105.97 dBμ	105.33 dBμ
-15°	0.890	0.198	-7.03	146.00 m	355.46 m	382.51 m	108.87 dBμ	108.23 dBμ
-20°	0.812	0.165	-7.83	133.21 m	268.99 m	289.46 m	110.50 dBμ	109.86 dBμ
-25°	0.721	0.130	-8.86	118.28 m	217.69 m	234.25 m	111.30 dBμ	110.66 dBμ
-30°	0.622	0.097	-10.14	102.04 m	184.00 m	198.00 m	111.48 dBμ	110.84 dBμ
-35°	0.520	0.068	-11.70	85.30 m	160.40 m	172.60 m	111.12 dBμ	110.48 dBμ
-40°	0.420	0.044	-13.56	68.90 m	143.13 m	154.02 m	110.25 dBμ	109.61 dBμ
-45°	0.327	0.027	-15.73	53.64 m	130.11 m	140.01 m	108.90 dBμ	108.27 dBμ
-50°	0.244	0.015	-18.27	40.03 m	120.10 m	129.24 m	107.06 dBμ	106.42 dBμ
-55°	0.173	0.007	-21.26	28.38 m	112.31 m	120.86 m	104.65 dBμ	104.01 dBμ
-60°	0.115	0.003	-24.81	18.87 m	106.23 m	114.32 m	101.59 dBμ	100.95 dBμ
-65°	0.070	0.001	-29.12	11.48 m	101.51 m	109.23 m	97.67 dBμ	97.03 dBμ
-70°	0.039	0.000	-34.20	6.40 m	97.90 m	105.35 m	92.90 dBμ	92.27 dBμ
-75°	0.018	0.000	-40.92	2.95 m	95.25 m	102.49 m	86.43 dBμ	85.79 dBμ
-80°	0.006	0.000	-50.46	0.98 m	93.42 m	100.53 m	77.05 dBμ	76.42 dBμ
-85°	0.001	0.000	-66.02	0.16 m	92.35 m	99.38 m	61.59 dBμ	60.95 dBμ
-90°	0.001	0.000	-66.02	0.16 m	92.00 m	99.00 m	61.62 dBμ	60.99 dBμ

Exhibit 9

Copy of Manufacturer's Antenna Documentation (public record copy)

FMEC PLUS SERIES CIRCULAR POLARIZED FM ANTENNAS

Product Specifications:

Frequency Range	88 – 108 MHz
Polarization	Circular
Power Rating	1000 Watts per bay
System Input	7/16" DIN Female
VSWR	1.3:1 ± 150 kHz
Bay Dimensions	H 43.50" / W 38.5" / D 19"

Features:

•**POWER RATING.** Each bay is rated at 1000 watts with a maximum power of 5 kW for four bays.

•**RUGGED CONSTRUCTION.** Each bay is constructed from rugged, heavy wall copper and naval brass. All joints are tig-welded.

•**PRESSURIZATION NOT REQUIRED.**

•**CUSTOM DIRECTIONAL PATTERNS.** FM directional antennas designed to the customer's specified mounting structure and FCC filing documentation are available.

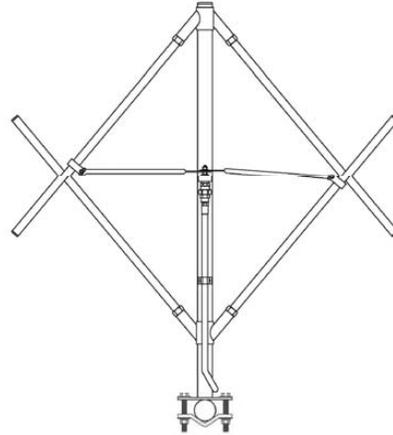
•**WEATHERIZATION (OPTIONAL).** Radomes or electrical deicers available for areas that experience periods of heavy icing and/or snow conditions.

•**STANDARD MOUNTING BRACKETS.** Fits up to 4" tower leg or pipe. Supplied with antenna.

•**WARRANTY.** 2-year limited warranty on defects and workmanship to the original purchaser.

Notes:

1. Power rating is based on 40 degrees C ambient. Degeneration occurs above 2000 ft.
2. Antenna weight, windload, aperture and dimensions are based on mid-band operation (98.1 MHz).
3. Antennas with 3 or more bays come with input power divider.
4. SWR, Inc. maintains a continuous program of product improvement and therefore reserves the right to change specifications without notice.



Full Wave Spaced Electrical and Mechanical Specifications

Bays	Power Rating (watts)	Power Gain	dB Gain	Net. Weight (lbs)	Windload (lbs)
1	1000	0.441	-3.556	15	35
2	2000	0.959	-0.182	35	85
3	3000	1.495	1.746	50	120
4	4000	2.044	3.105	65	155
5	5000	2.590	4.133	80	190
6	5000	3.160	4.997	95	225
8	5000	4.311	6.346	110	260
10	5000	5.456	7.369	130	295

Half Wave Spaced Electrical and Mechanical Specifications

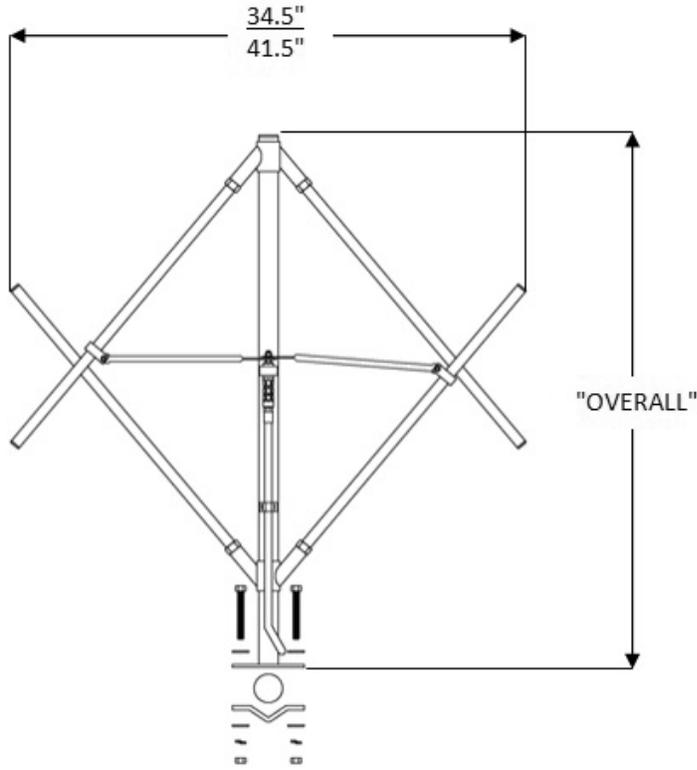
Bays	Power Rating (watts)	Power Gain	dB Gain	Net. Weight (lbs)	Windload (lbs)
1	1000	0.441	-3.556	15	35
2	2000	0.695	-1.580	35	85
3	3000	1.012	0.052	50	120
4	4000	1.313	1.183	65	155
5	5000	1.623	2.103	80	190
6	5000	1.924	2.842	95	225
8	5000	2.528	4.028	110	260
10	5000	3.129	4.954	125	295

3/4 Wave Spaced Electrical and Mechanical Specifications

Bays	Power Rating (watts)	Power Gain	dB Gain	Net. Weight (lbs)	Windload (lbs)
1	1000	0.441	-3.556	15	35
2	2000	0.935	-0.292	35	85
3	3000	1.396	1.449	50	120
4	4000	1.845	2.660	65	155
5	5000	2.301	3.619	80	190
6	5000	2.756	4.403	95	225
8	5000	3.664	5.640	110	260
10	5000	4.590	6.618	125	295

Exhibit 9
Copy of Manufacturer's Antenna Documentation
(public record copy)

Dimensions



"OVERALL"	
88.1-91.9	47.00"
92.1-94.7	45.50"
94.9-97.7	44.50"
97.9-100.9	43.50"
101.1-104.3	42.50"
104.5-107.9	41.25"

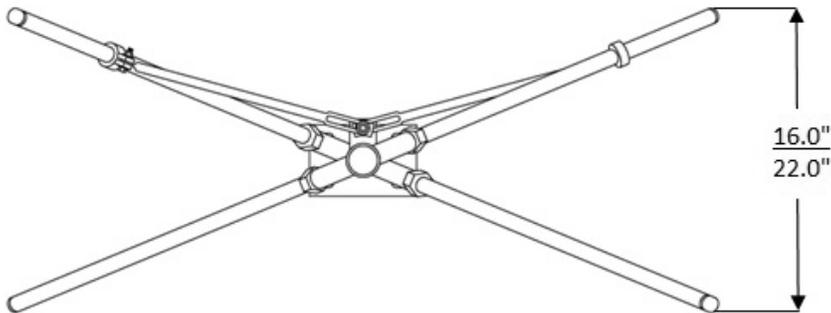


Exhibit 9

Copy of Manufacturer's Antenna Documentation (public record copy)

2 Bay Installation

Considerations:

1. Your FMEC PLUS two bay antenna includes jumpers, tie-wraps, and weatherproofing kit.
2. Your FMEC PLUS two bay antenna may be fed with either a Tee-Splitter or Power Divider.
3. Note the direction and orientation of feed points, feed arms, power divider, hardware, and jumpers.
4. Standard mounting bracket fits from 1" to 4" tower leg or pole.
5. SWR, LP. reserves the right to change product specifications at any time.

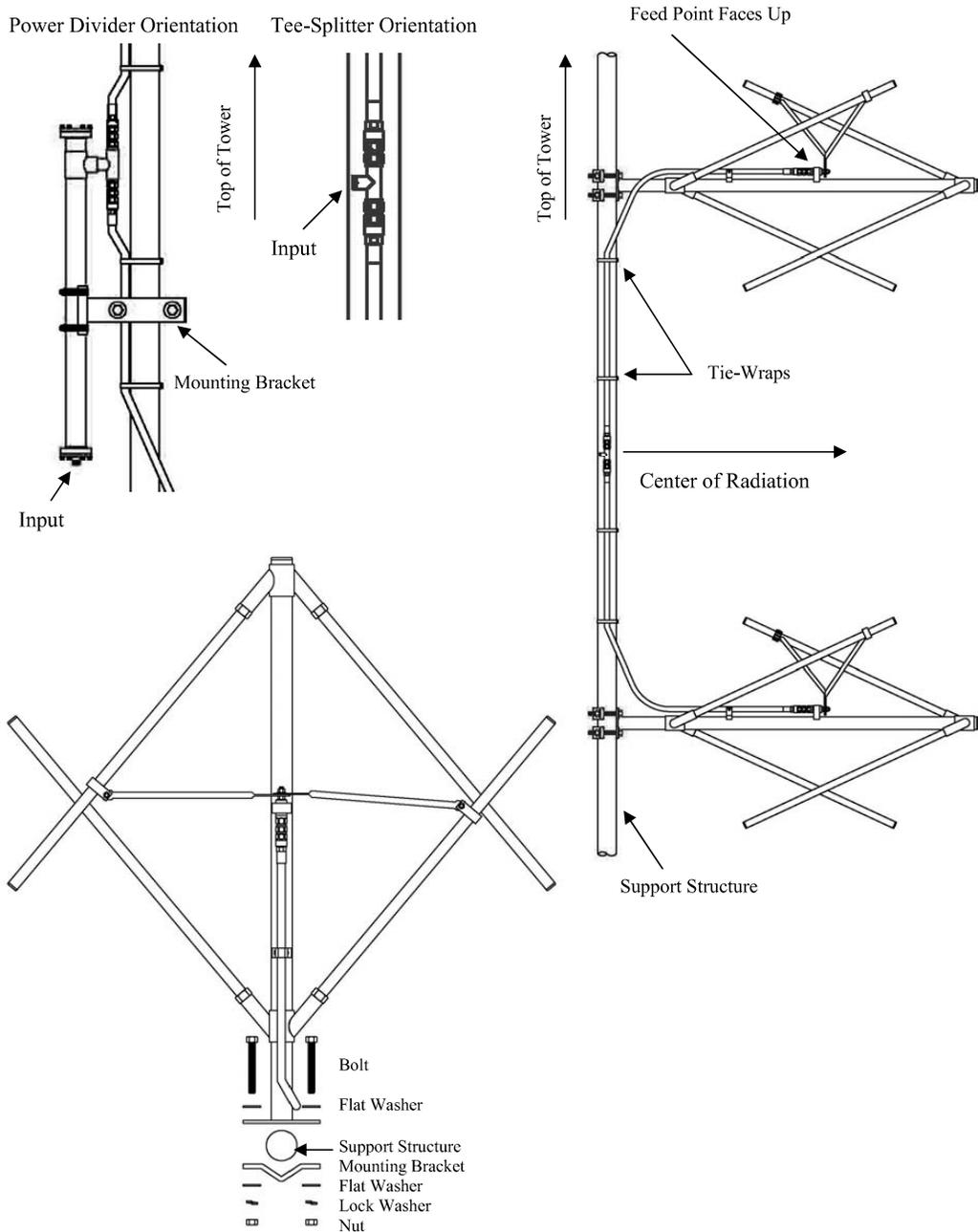
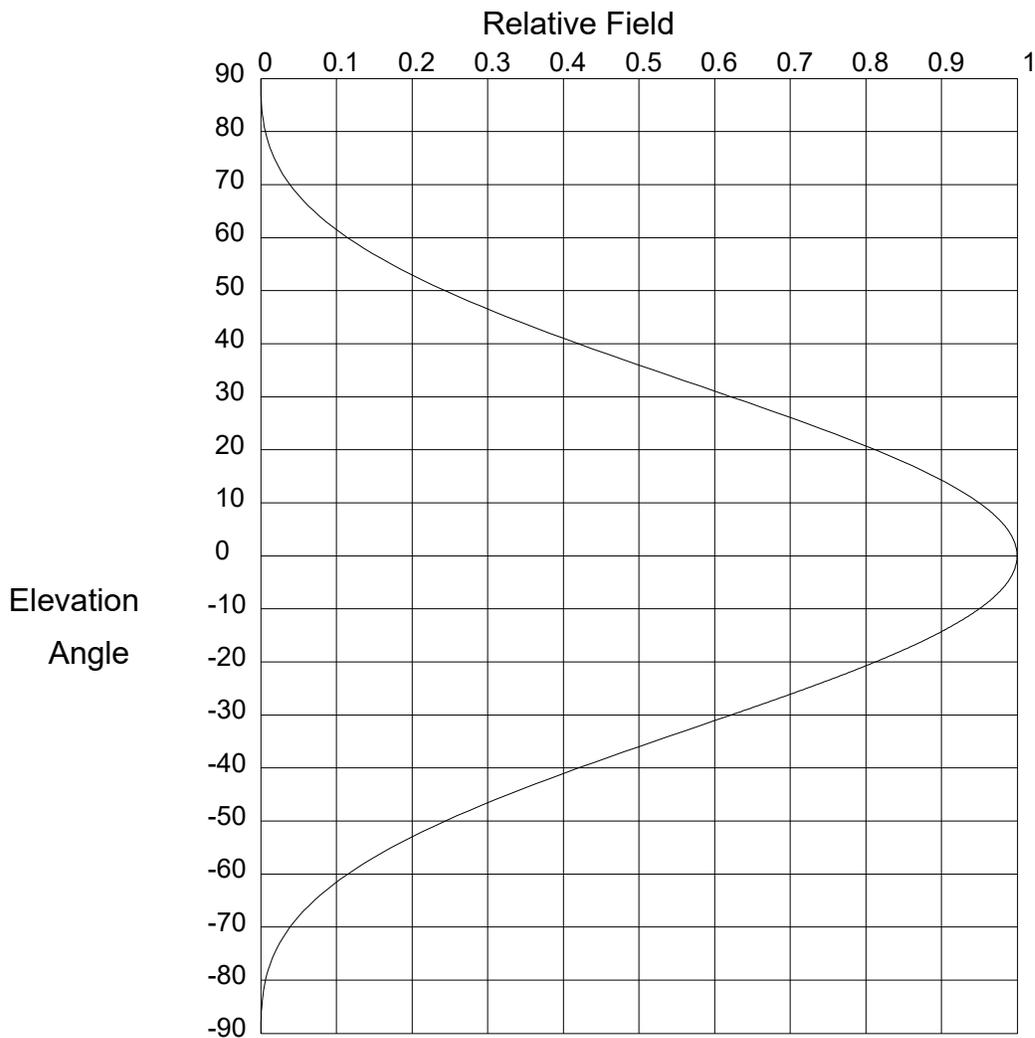


Exhibit 9
Copy of Manufacturer's Antenna Documentation
(public record copy)



Elevation Pattern

Scale: Linear

Units: Field, Relative

Systems With Reliability

CLIENT:	Date: 11/28/2016
ANTENNA TYPE: FMxx/2-0.50WS	
FREQUENCY: 98.1 MHz	
PATTERN POL.: Circular	
DIRECTIVITY(Peak): 1.39/1.43 dBd	Beam Tilt (Deg.) : 0
DIRECTIVITY(Horiz): 1.39/1.43 dBd	Null Fill(s)(%) : 0, 0, 0

Exhibit 9

Copy of Manufacturer's Antenna Documentation (public record copy)

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
90.0	.00 (-50)	52.0	.214 (-13.4)	14.0	.904 (-0.878)
89.0	.00 (-91.156)	51.0	.229 (-12.821)	13.0	.917 (-0.757)
88.0	.00 (-78.01)	50.0	.244 (-12.26)	12.0	.929 (-0.644)
87.0	.00 (-69.988)	49.0	.259 (-11.717)	11.0	.94 (-0.541)
86.0	.001 (-64.112)	48.0	.276 (-11.191)	10.0	.95 (-0.447)
85.0	.001 (-59.44)	47.0	.292 (-10.682)	9.8	.952 (-0.429)
84.0	.002 (-55.546)	46.0	.309 (-10.188)	9.6	.954 (-0.412)
83.0	.002 (-52.199)	45.0	.327 (-9.71)	9.4	.956 (-0.395)
82.0	.003 (-49.26)	44.0	.345 (-9.246)	9.2	.957 (-0.378)
81.0	.005 (-46.639)	43.0	.363 (-8.797)	9.0	.959 (-0.362)
80.0	.006 (-44.272)	42.0	.382 (-8.362)	8.8	.961 (-0.346)
79.0	.008 (-42.113)	41.0	.401 (-7.941)	8.6	.963 (-0.33)
78.0	.01 (-40.128)	40.0	.42 (-7.533)	8.4	.964 (-0.315)
77.0	.012 (-38.292)	39.0	.44 (-7.138)	8.2	.966 (-0.3)
76.0	.015 (-36.583)	38.0	.459 (-6.756)	8.0	.968 (-0.286)
75.0	.018 (-34.986)	37.0	.479 (-6.387)	7.8	.969 (-0.272)
74.0	.021 (-33.487)	36.0	.50 (-6.029)	7.6	.971 (-0.258)
73.0	.025 (-32.074)	35.0	.52 (-5.683)	7.4	.972 (-0.244)
72.0	.029 (-30.74)	34.0	.54 (-5.349)	7.2	.974 (-0.231)
71.0	.034 (-29.475)	33.0	.561 (-5.027)	7.0	.975 (-0.219)
70.0	.039 (-28.274)	32.0	.581 (-4.716)	6.8	.977 (-0.206)
69.0	.044 (-27.13)	31.0	.601 (-4.416)	6.6	.978 (-0.194)
68.0	.05 (-26.039)	30.0	.622 (-4.126)	6.4	.979 (-0.183)
67.0	.056 (-24.997)	29.0	.642 (-3.848)	6.2	.98 (-0.171)
66.0	.063 (-24)	28.0	.662 (-3.58)	6.0	.982 (-0.161)
65.0	.07 (-23.044)	27.0	.682 (-3.323)	5.8	.983 (-0.15)
64.0	.078 (-22.126)	26.0	.702 (-3.076)	5.6	.984 (-0.14)
63.0	.087 (-21.245)	25.0	.721 (-2.839)	5.4	.985 (-0.13)
62.0	.096 (-20.397)	24.0	.74 (-2.612)	5.2	.986 (-0.121)
61.0	.105 (-19.581)	23.0	.759 (-2.395)	5.0	.987 (-0.111)
60.0	.115 (-18.794)	22.0	.777 (-2.188)	4.8	.988 (-0.103)
59.0	.125 (-18.036)	21.0	.795 (-1.991)	4.6	.989 (-0.094)
58.0	.136 (-17.304)	20.0	.812 (-1.804)	4.4	.99 (-0.086)
57.0	.148 (-16.597)	19.0	.829 (-1.626)	4.2	.991 (-0.079)
56.0	.16 (-15.914)	18.0	.846 (-1.457)	4.0	.992 (-0.071)
55.0	.173 (-15.254)	17.0	.861 (-1.299)	3.8	.993 (-0.064)
54.0	.186 (-14.615)	16.0	.876 (-1.149)	3.6	.993 (-0.058)
53.0	.20 (-13.998)	15.0	.89 (-1.009)	3.4	.994 (-0.052)

Systems With Reliability

Page 1 of 3

CLIENT:
ANTENNA TYPE: FMxx/2-0.50WS
FREQUENCY: 98.1 MHz
PATTERN POL.: Circular
DIRECTIVITY(Peak): 1.39/1.43 dBd
DIRECTIVITY(Horiz): 1.39/1.43 dBd

Date: 11/28/2016

Beam Tilt (Deg.) : 0
Null Fill(s)(%) : 0, 0, 0

Exhibit 9

Copy of Manufacturer's Antenna Documentation (public record copy)

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
3.2	.995 (-0.046)	-4.4	.99 (-0.086)	-12.0	.929 (-0.644)
3.0	.995 (-0.04)	-4.6	.989 (-0.094)	-12.2	.926 (-0.666)
2.8	.996 (-0.035)	-4.8	.988 (-0.103)	-12.4	.924 (-0.688)
2.6	.997 (-0.03)	-5.0	.987 (-0.111)	-12.6	.921 (-0.711)
2.4	.997 (-0.026)	-5.2	.986 (-0.121)	-12.8	.919 (-0.733)
2.2	.998 (-0.022)	-5.4	.985 (-0.13)	-13.0	.917 (-0.757)
2.0	.998 (-0.018)	-5.6	.984 (-0.14)	-13.2	.914 (-0.78)
1.8	.998 (-0.014)	-5.8	.983 (-0.15)	-13.4	.912 (-0.804)
1.6	.999 (-0.011)	-6.0	.982 (-0.161)	-13.6	.909 (-0.828)
1.4	.999 (-0.009)	-6.2	.98 (-0.171)	-13.8	.906 (-0.853)
1.2	.999 (-0.006)	-6.4	.979 (-0.183)	-14.0	.904 (-0.878)
1.0	.999 (-0.004)	-6.6	.978 (-0.194)	-14.2	.901 (-0.904)
.8	1.00 (-0.003)	-6.8	.977 (-0.206)	-14.4	.899 (-0.929)
.6	1.00 (-0.002)	-7.0	.975 (-0.219)	-14.6	.896 (-0.956)
.4	1.00 (-0.001)	-7.2	.974 (-0.231)	-14.8	.893 (-0.982)
.2	1.00 (0)	-7.4	.972 (-0.244)	-15.0	.89 (-1.009)
.0	1.00 (0)	-7.6	.971 (-0.258)	-15.2	.888 (-1.036)
-.2	1.00 (0)	-7.8	.969 (-0.272)	-15.4	.885 (-1.064)
-.4	1.00 (-0.001)	-8.0	.968 (-0.286)	-15.6	.882 (-1.092)
-.6	1.00 (-0.002)	-8.2	.966 (-0.3)	-15.8	.879 (-1.12)
-.8	1.00 (-0.003)	-8.4	.964 (-0.315)	-16.0	.876 (-1.149)
-1.0	.999 (-0.004)	-8.6	.963 (-0.33)	-16.2	.873 (-1.178)
-1.2	.999 (-0.006)	-8.8	.961 (-0.346)	-16.4	.87 (-1.208)
-1.4	.999 (-0.009)	-9.0	.959 (-0.362)	-16.6	.867 (-1.238)
-1.6	.999 (-0.011)	-9.2	.957 (-0.378)	-16.8	.864 (-1.268)
-1.8	.998 (-0.014)	-9.4	.956 (-0.395)	-17.0	.861 (-1.299)
-2.0	.998 (-0.018)	-9.6	.954 (-0.412)	-17.2	.858 (-1.33)
-2.2	.998 (-0.022)	-9.8	.952 (-0.429)	-17.4	.855 (-1.361)
-2.4	.997 (-0.026)	-10.0	.95 (-0.447)	-17.6	.852 (-1.393)
-2.6	.997 (-0.03)	-10.2	.948 (-0.465)	-17.8	.849 (-1.425)
-2.8	.996 (-0.035)	-10.4	.946 (-0.483)	-18.0	.846 (-1.457)
-3.0	.995 (-0.04)	-10.6	.944 (-0.502)	-18.2	.842 (-1.49)
-3.2	.995 (-0.046)	-10.8	.942 (-0.521)	-18.4	.839 (-1.524)
-3.4	.994 (-0.052)	-11.0	.94 (-0.541)	-18.6	.836 (-1.557)
-3.6	.993 (-0.058)	-11.2	.937 (-0.561)	-18.8	.833 (-1.591)
-3.8	.993 (-0.064)	-11.4	.935 (-0.581)	-19.0	.829 (-1.626)
-4.0	.992 (-0.071)	-11.6	.933 (-0.602)	-19.2	.826 (-1.661)
-4.2	.991 (-0.079)	-11.8	.931 (-0.623)	-19.4	.823 (-1.696)

Systems With Reliability

Page 2 of 3

CLIENT:
ANTENNA TYPE: FMxx/2-0.50WS
FREQUENCY: 98.1 MHz
PATTERN POL.: Circular
DIRECTIVITY(Peak): 1.39/1.43 dBd
DIRECTIVITY(Horiz): 1.39/1.43 dBd

Date: 11/28/2016

Beam Tilt (Deg.) : 0
Null Fill(s)(%) : 0, 0, 0

Exhibit 9
Copy of Manufacturer's Antenna Documentation
(public record copy)

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
-19.6	.819 (-1.731)	-27.2	.678 (-3.373)	-54.0	.186 (-14.615)
-19.8	.816 (-1.767)	-27.4	.674 (-3.424)	-55.0	.173 (-15.254)
-20.0	.812 (-1.804)	-27.6	.67 (-3.476)	-56.0	.16 (-15.914)
-20.2	.809 (-1.84)	-27.8	.666 (-3.528)	-57.0	.148 (-16.597)
-20.4	.806 (-1.877)	-28.0	.662 (-3.58)	-58.0	.136 (-17.304)
-20.6	.802 (-1.915)	-28.2	.658 (-3.633)	-59.0	.125 (-18.036)
-20.8	.799 (-1.953)	-28.4	.654 (-3.686)	-60.0	.115 (-18.794)
-21.0	.795 (-1.991)	-28.6	.65 (-3.739)	-61.0	.105 (-19.581)
-21.2	.792 (-2.03)	-28.8	.646 (-3.793)	-62.0	.096 (-20.397)
-21.4	.788 (-2.069)	-29.0	.642 (-3.848)	-63.0	.087 (-21.245)
-21.6	.784 (-2.108)	-29.2	.638 (-3.903)	-64.0	.078 (-22.126)
-21.8	.781 (-2.148)	-29.4	.634 (-3.958)	-65.0	.07 (-23.044)
-22.0	.777 (-2.188)	-29.6	.63 (-4.014)	-66.0	.063 (-24)
-22.2	.774 (-2.229)	-29.8	.626 (-4.07)	-67.0	.056 (-24.997)
-22.4	.77 (-2.27)	-30.0	.622 (-4.126)	-68.0	.05 (-26.039)
-22.6	.766 (-2.311)	-31.0	.601 (-4.416)	-69.0	.044 (-27.13)
-22.8	.763 (-2.353)	-32.0	.581 (-4.716)	-70.0	.039 (-28.274)
-23.0	.759 (-2.395)	-33.0	.561 (-5.027)	-71.0	.034 (-29.475)
-23.2	.755 (-2.438)	-34.0	.54 (-5.349)	-72.0	.029 (-30.74)
-23.4	.752 (-2.481)	-35.0	.52 (-5.683)	-73.0	.025 (-32.074)
-23.6	.748 (-2.524)	-36.0	.50 (-6.029)	-74.0	.021 (-33.487)
-23.8	.744 (-2.568)	-37.0	.479 (-6.387)	-75.0	.018 (-34.986)
-24.0	.74 (-2.612)	-38.0	.459 (-6.756)	-76.0	.015 (-36.583)
-24.2	.737 (-2.657)	-39.0	.44 (-7.138)	-77.0	.012 (-38.292)
-24.4	.733 (-2.701)	-40.0	.42 (-7.533)	-78.0	.01 (-40.128)
-24.6	.729 (-2.747)	-41.0	.401 (-7.941)	-79.0	.008 (-42.113)
-24.8	.725 (-2.793)	-42.0	.382 (-8.362)	-80.0	.006 (-44.272)
-25.0	.721 (-2.839)	-43.0	.363 (-8.797)	-81.0	.005 (-46.639)
-25.2	.717 (-2.885)	-44.0	.345 (-9.246)	-82.0	.003 (-49.26)
-25.4	.713 (-2.932)	-45.0	.327 (-9.71)	-83.0	.002 (-52.199)
-25.6	.71 (-2.98)	-46.0	.309 (-10.188)	-84.0	.002 (-55.546)
-25.8	.706 (-3.027)	-47.0	.292 (-10.682)	-85.0	.001 (-59.44)
-26.0	.702 (-3.076)	-48.0	.276 (-11.191)	-86.0	.001 (-64.112)
-26.2	.698 (-3.124)	-49.0	.259 (-11.717)	-87.0	.00 (-69.988)
-26.4	.694 (-3.173)	-50.0	.244 (-12.26)	-88.0	.00 (-78.01)
-26.6	.69 (-3.223)	-51.0	.229 (-12.821)	-89.0	.00 (-91.156)
-26.8	.686 (-3.272)	-52.0	.214 (-13.4)	-90.0	.00 (-50)
-27.0	.682 (-3.323)	-53.0	.20 (-13.998)	90.0	.00 (-50)

Systems With Reliability

CLIENT:
 ANTENNA TYPE: FMxx/2-0.50WS
 FREQUENCY: 98.1 MHz
 PATTERN POL.: Circular
 DIRECTIVITY(Peak): 1.39/1.43 dBd
 DIRECTIVITY(Horiz): 1.39/1.43 dBd

Date: 11/28/2016

Beam Tilt (Deg.) : 0
 Null Fill(s)(%) : 0, 0, 0