

Exhibit 13.1 - Copy of Existing Antenna Structure Registration



Registration Detail

Reg Number	1033392	Status	Constructed
File Number	A0538494	Constructed	08/03/1998
EMI	No	Dismantled	
NEPA	No		

Antenna Structure

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

Location (in NAD83 Coordinates)

Lat/Long	35-36-04.0 N 082-39-06.0 W	Address	ATOP SPIVEY MOUNTAIN AT END OF SPIVEY MOUNTAIN RD
City, State	ASHEVILLE , NC		
Zip	28806	County	BUNCOMBE
Center of AM Array		Position of Tower in Array	

Heights (meters)

Elevation of Site Above Mean Sea Level	Overall Height Above Ground (AGL)
1010.0	61.0
Overall Height Above Mean Sea Level	Overall Height Above Ground w/o Appurtenances
1071.0	55.0

Painting and Lighting Specifications

None

FAA Notification

FAA Study	97-ASO-4570-OE	FAA Issue Date	09/22/1997
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Owner & Contact Information

FRN	0006156111	Owner Entity Type	
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Owner

Pinnacle Towers LLC
Attention To: Regulatory Department
2000 Corporate Drive
Canonsburg , PA 15317

P: (724)416-2000
F:
E: Regulatory.Department@Crownncastle.com

Contact

Verre , Christine A
2000 Corporate Drive
Canonsburg , PA 15317

P: (336)643-2524
F:
E: Christine.Verre@Crownncastle.com

Last Action Status

Status	Constructed	Received	01/30/2007
Purpose	Admin Update	Entered	01/30/2007
Mode	Interactive		

Related Applications

01/30/2007	A0538494 - Admin Update (AU)
04/16/2004	A0371951 - Admin Update (AU)
10/11/2000	A0143946 - Change Owner (OC)

Related applications (5)

Comments

Comments

None

History

Date	Event
01/31/2007	Registration Printed
01/30/2007	ASR Application receipt email sent: Tower email
01/30/2007	Administrative Update Received

All History (8)

Automated Letters

01/31/2007	Authorization, Reference 549726
04/19/2004	Authorization, Reference 327826
10/12/2000	Ownership Change, Reference 77683

All letters (4)

Exhibit 13.2

Vertical Plan of Antenna System

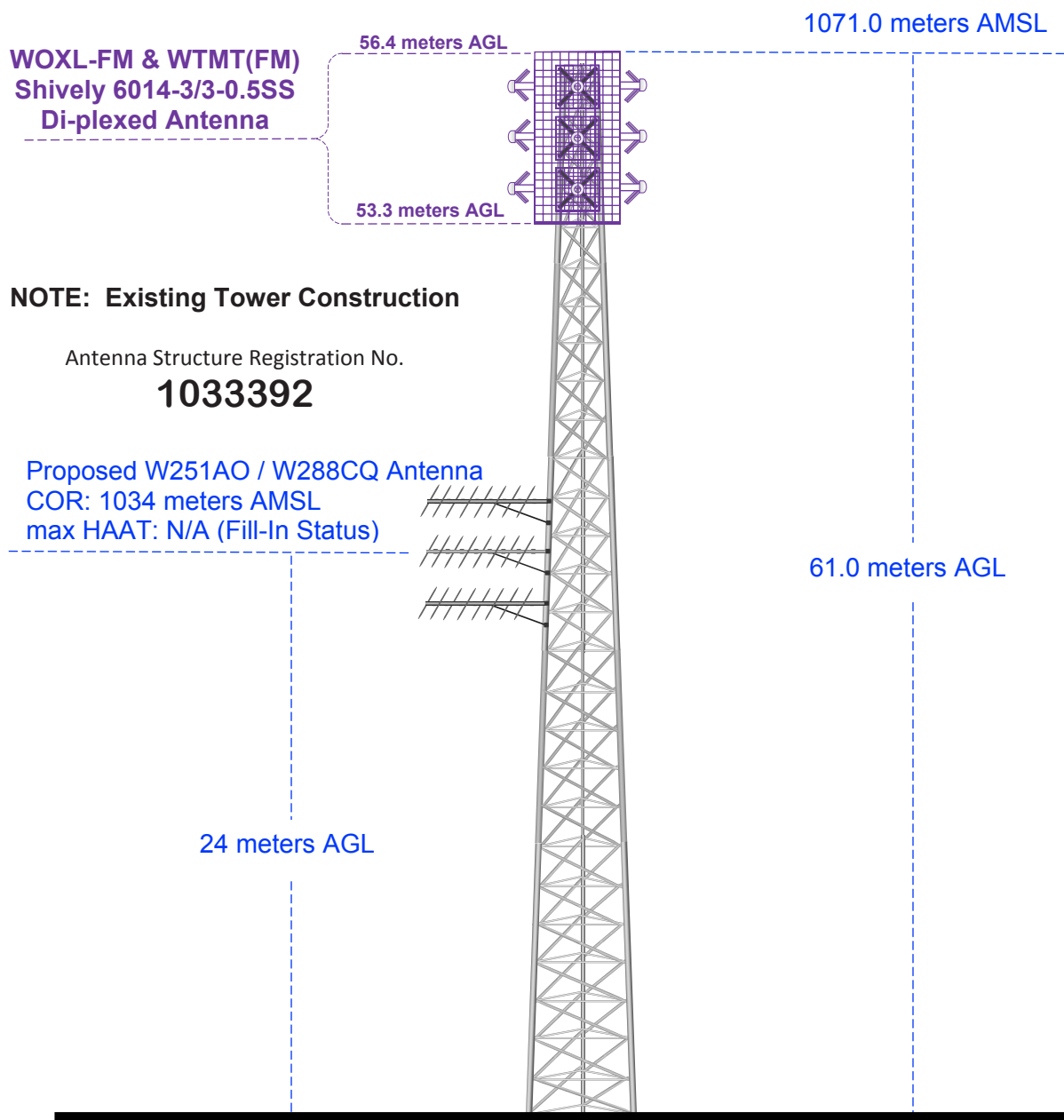
The site is located on top of Spivey Mountain
at the end of Spivey Mountain Road
the city of Asheville, Buncombe County, North Carolina.

Site Location (NAD 27)

NL: 35° 36' 04"

WL: 82° 39' 07"

(35-36-04.0NL; 82-39-06.0WL NAD 1983)



NOTE: Existing Tower Construction

Antenna Structure Registration No.

1033392

Ground Elevation = 1010.0 m AMSL

Drawing is not to Scale

MUNN-REESE, INC.

Broadcast Engineering Consultants
Coldwater, MI 49036

W288CQ.C
Waynesville, NC
BNPFT20130306AAN
Facility ID: 155786
Latitude: 35-26-23 N
Longitude: 083-07-11 W
ERP: 0.05 kW
Channel: 288D
Frequency: 105.5 MHz
AMSL Height: 1437.0 m
Horiz. Pattern: Directional

60 dBμ Contour
Total Population: 24,516
Total Area: 244 sq. km

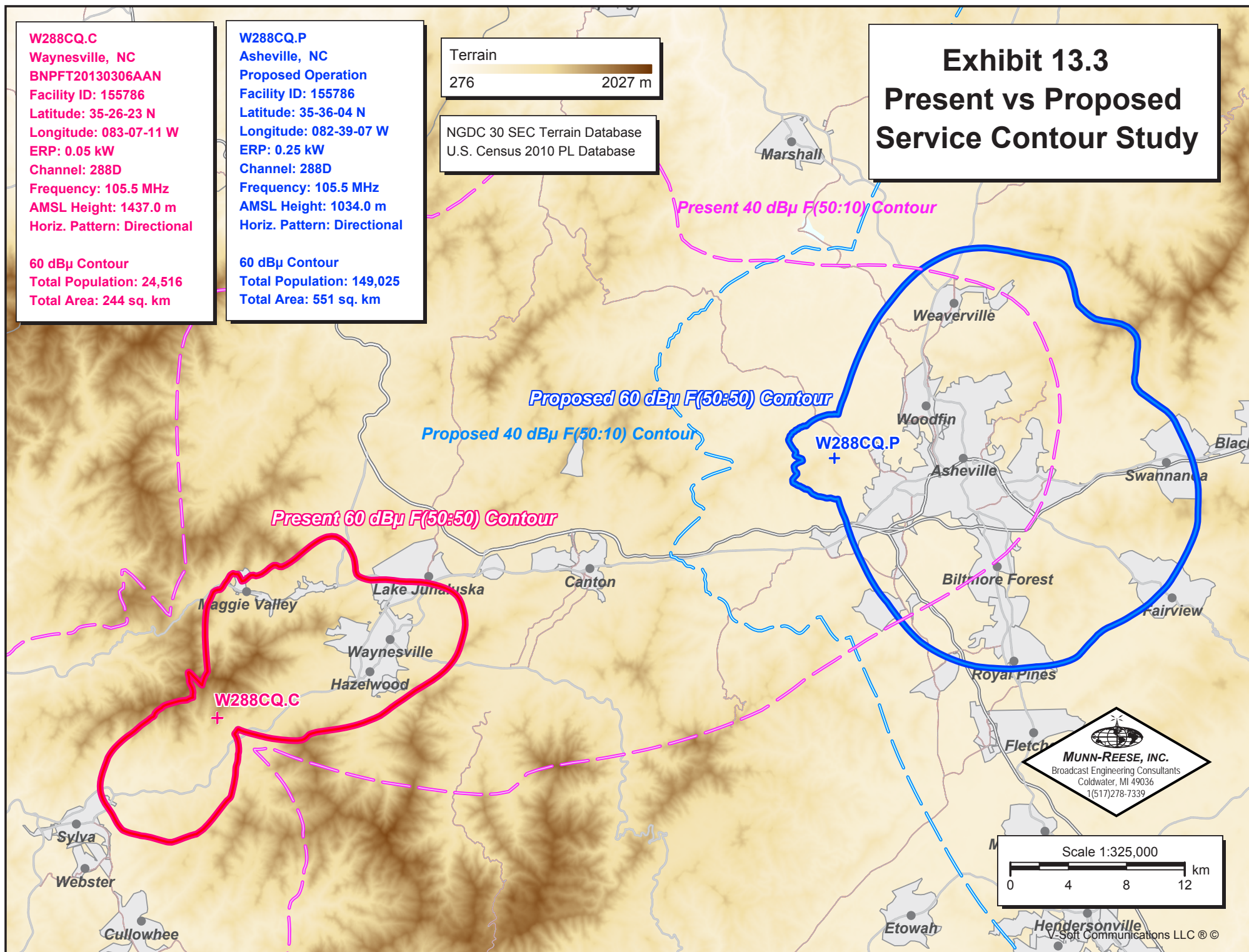
W288CQ.P
Asheville, NC
Proposed Operation
Facility ID: 155786
Latitude: 35-36-04 N
Longitude: 082-39-07 W
ERP: 0.25 kW
Channel: 288D
Frequency: 105.5 MHz
AMSL Height: 1034.0 m
Horiz. Pattern: Directional

60 dBμ Contour
Total Population: 149,025
Total Area: 551 sq. km

Terrain
276 2027 m

NGDC 30 SEC Terrain Database
U.S. Census 2010 PL Database

Exhibit 13.3 Present vs Proposed Service Contour Study



Terrain
183 2029 m

NGDC 30 SEC Terrain Database
U.S. Census 2010 PL Database

25 mile AM Site Radius

Daytime 2 mV/m AM Contour

Proposed 60 dBμ F(50:50) Contour

WISE(AM)
+
W288CQ.P
Asheville

Exhibit 13.4 Proposed vs. Primary Service Contour Study

W288CQ.P
Asheville, NC
Proposed Operation
Facility ID: 155786
Latitude: 35-36-04 N
Longitude: 082-39-07 W
ERP: 0.25 kW
Channel: 288D
Frequency: 105.5 MHz
AMSL Height: 1034.0 m
Horiz. Pattern: Directional

Call: WISE(AM)
ASHEVILLE, NC, US
BL-
Facility ID: 68835
Freq: 1310 kHz
Hours: D
Lat: 35-37-09 N
Lng: 082-34-21 W
Power: 5.0 kW
Theo RMS: 294.51 mV/m
@ 1km @ 1kW

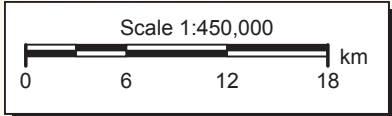


Exhibit 13.5

Tabulation of Proposed Allocation

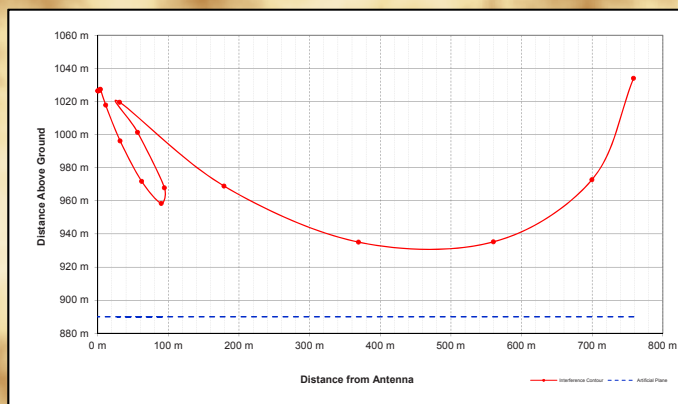
Saga Communications Of North Carolina, Llc											
REFERENCE		CH#	288D	- 105.5 MHz, Pwr= 0.25 kW DA, HAAT= 320.3 M, COR= 1034 M				DISPLAY DATES			
35 36 04.0 N.						Average Protected F(50-50)= 23.29 km				DATA 10-18-13	
82 39 07.0 W.						Standard Directional				SEARCH 10-21-13	
CH	CALL	TYPE	ANT	AZI	DIST	LAT	PWR(kw)	INT(km)	PRO(km)	*IN*	*OUT*
CITY		STATE		<--	FILE #	LNG	HAAT(M)	COR(M)	LICENSEE	(Overlap	in km)
290C2 WTMT	LIC _CX			0.0	0.00	35 36 04.0	9.500	5.5	58.5	-8.5*<	-58.5*<
Weaverville	NC			0.0	BLH20101130AJK	82 39 07.0	339	1064	Saga Communications Of Nor		
288D W288CQ	APP DC_			0.0	0.00	35 36 03.6	0.090	26.8	7.6	-29.8*	-22.0*
Asheville	NC			313.2	BMPFT20130909AAM	82 39 06.5		1038	Georgia-carolina Radiocast		
286A WQNS	CP NCX			95.7	4.20	35 35 50.4	4.900	1.6	14.9	-22.6*<	-11.8*<
Woodfin	NC			275.8	BPH20120807ACK	82 36 20.5	62	766	Clear Channel Broadcasting		
One Step Application											
288D W288CQ	CP DH_			247.2	45.97	35 26 23.0	0.050	62.4	18.4	-19.2*	17.8
Waynesville	NC			66.9	BNPFT20130306AAN	83 07 11.0		1437	Georgia-carolina Radiocast		
285A WQNS	LIC _CN			261.2	23.38	35 34 07.0	0.245	1.1	28.1	19.6	-4.8*<
Waynesville	NC			81.0	BLH19950927KB	82 54 27.0	482	1417	Clear Channel Broadcasting		
288C3 WCCP-FM	CP ZCX			182.8	107.31	34 38 13.1	20.000	106.1	34.8	-1.6<	60.9
Clemson	SC			2.7	BPH20130514AAZ	82 42 29.7	114	352	Byrne Acquisition Group, L		
One Step Application											
287C1 WOSF	LIC _CX			100.8	135.22	35 21 51.0	51.000	105.2	71.6	4.7	24.8
Gaffney	SC			281.7	BLH20100429ADK	81 11 13.0	395	644	Gaffney Broadcasting, Inco		
288A WSEV-FM	LIC _CN			278.1	83.34	35 42 13.0	0.530	64.7	21.2	16.0	53.0
Gatlinburg	TN			97.6	BLH19911206KC	83 33 57.0	322	991	East Tennessee Radio Group		
288D W288CR	CP DH_			218.0	65.69	35 08 06.0	0.050	44.5	13.1	18.3	40.1
Cashiers	NC			37.8	BNPFT20130328ARK	83 05 50.0		1457	Georgia-carolina Radiocast		
288A R15125	RSV-R _			182.8	107.31	34 38 13.0	6.000	81.5	24.2	23.0	71.5
Clemson	SC			2.7		82 42 30.0	100	338			
involuntary channel substitution per BPH-20120807ACG- from channel 285											
235C0 WAEZ	LIC DEX			356.2	52.92	36 04 34.0	100.000	0.0	0.0	24.5R	28.4M
Greeneville	TN			176.2	BMLH20010504AAT	82 41 28.0	332	1042	Bristol Broadcasting Compa		
288A WSWV-FM	LIC NCX			344.6	130.73	36 44 02.0	6.000	97.0	36.3	30.8	80.2
Pennington Gap	VA			164.3	BLH20100601AHK	83 02 34.0	84	659	B C Broadcasting Company,		
286D W286CF	LIC _C_			183.3	47.33	35 10 34.0	0.009	0.2	11.7	44.4	35.6
Brevard	NC			3.3	BLFT20120622AAM	82 40 55.0		1165	Western North Carolina Pub		
289D 1558411	APP DV_			26.5	103.25	36 25 53.0	0.250	42.0	26.9	46.3	53.6
Bristol	TN			206.8	BNPFT20030317LHO	82 08 15.0		1326	Holston Valley Broadcastin		
289D 1567178	APP DV_			26.5	103.25	36 25 53.0	0.250	42.0	26.9	46.3	53.6
Bristol	TN			206.8	BNPFT20130802ADF	82 08 15.0		1326	Holston Valley Broadcastin		

Terrain database is NGDC 30 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 protected contour.
 < = Contour overlap

Green Text denotes the W288CQ (Facility ID: 155786) facility to be modified by this Form 349 Long-Form filing. This facility need not be protected.

Yellow Highlighted Text denotes a §74.1204(d) Second and Third Adjacent Channel Given Interference Waiver Requests toward WTMT(FM) - Weaverville, NC (CH290C2); WQNS(FM).CP - Woodfin, NC (CH286A); and WQNS(FM).L - Waynesville, NC (CH285A). Full protection will be afforded all the facilities as the calculated interference area will not reach the ground nor a 7 meter artificial plane representing a standard two story building when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer and the ground elevation of the mountaintop mounted operation. The §74.1204(d) waiver requests have been included in **Exhibit 13.6**. Copies of the antenna manufacturer's directional antenna pattern and vertical radiation pattern have been included in **Exhibit 13.8**. A USGS Topographic Photo-Map of the interference area (including ground elevations) has been included as **Exhibit 13.7**.

The Interference Contour corresponding to the WTMT(FM) - Weaverville, NC (CH290C2); WQNS(FM).CP - Woodfin, NC (CH286A); or WQNS(FM).L - Waynesville, NC (CH285A) Protected Contour at the proposed Translator site has been calculated to be no less than the 103.3 dBμ F(50:10) Interference Contour corresponding to the worst case WQNS (FM).L 63.3 dBμ F(50:50) Protected Contour. This represents the proposed interference contour which falls wholly within the 40:1 dBu ratio. In this instance, there are eight (8) buildings noted in the 103.3 dBμ F(50:10) Interference Contour as noted in the **Exhibit 13.7** USGS Topographic Photo-Map. Ground elevation for each building has been noted with the highest ground elevation identified as 883 meters AMSL (adjusted to 890 meters to account for a standard two-story house). The proposed W288CQ operational antenna will be located at 1034 meters AMSL (or roughly 144 meters above this plane). Full protection will be afforded this 890 meters AMSL artificial plane when taking into account the downward radiation characteristics of the antenna as supplied by the antenna manufacturer. A copy of the antenna manufacturer's vertical radiation pattern has been included in **Exhibit 13.8**.



Proposed Antenna: CL-FM 3-Bay (0.75 Spaced)
Proposed Power: 0.25 kW
Antenna Height AMSL: 1034 meters AMSL
Interference Contour: 103.3 dBμ F(50:10)
Artificial Ground Plane Height: 890 meters AMSL
Distance (Free Space) Equation: $= (10^{\frac{1}{20}} \cdot (106.92 - \text{[desired dBμ]} + \text{[ERP in dBk]} / 20))^2 \cdot 1000$
Field Strength (dBμ) Equation: $= 106.92 - (20 \cdot (\text{LOG10}(\text{DistMeters} / 1000))) + \text{[ERP in dBk]}$

Depression Angle	Antenna Relative	ERP in kW	ERP in dBk	Distance from Ant. to Interference Contour	Distance from Ant. to Artificial Plane	Field Strength in dBμ @ Artificial Plane	Distance from Ant. to Ground Level	Field Strength in dBμ @ Ground Level
0°	1.000	0.250	-6.02	758.53 m	infinite	—	—	—
-5°	0.926	0.214	-6.69	702.39 m	1652.21 m	95.87 dBμ	11863.82 m	78.75 dBμ
-10°	0.750	0.141	-8.52	568.89 m	829.26 m	100.03 dBμ	5954.57 m	82.90 dBμ
-15°	0.504	0.064	-11.97	382.30 m	556.37 m	100.04 dBμ	3995.07 m	82.92 dBμ
-20°	0.251	0.016	-18.03	190.39 m	421.03 m	96.41 dBμ	3023.21 m	79.28 dBμ
-25°	0.045	0.001	-32.96	34.13 m	340.73 m	83.32 dBμ	2446.65 m	66.19 dBμ
-30°	0.086	0.002	-27.33	65.23 m	288.00 m	90.40 dBμ	2068.00 m	73.28 dBμ
-35°	0.152	0.006	-22.38	115.30 m	251.06 m	96.54 dBμ	1802.72 m	79.42 dBμ
-40°	0.155	0.006	-22.21	117.57 m	224.02 m	97.70 dBμ	1608.62 m	80.58 dBμ
-45°	0.116	0.003	-24.73	87.99 m	203.65 m	96.01 dBμ	1462.30 m	78.89 dBμ
-50°	0.065	0.001	-29.76	49.30 m	187.96 m	91.68 dBμ	1349.79 m	74.55 dBμ
-55°	0.026	0.000	-37.72	19.72 m	175.79 m	84.30 dBμ	1262.28 m	67.18 dBμ
-60°	0.010	0.000	-46.02	7.59 m	166.28 m	76.48 dBμ	1193.96 m	59.36 dBμ
-65°	0.010	0.000	-46.02	7.59 m	158.89 m	76.88 dBμ	1140.89 m	59.75 dBμ
-70°	0.010	0.000	-46.02	7.59 m	153.24 m	77.19 dBμ	1100.36 m	60.07 dBμ
-75°	0.010	0.000	-46.02	7.59 m	149.06 m	77.43 dBμ	1070.48 m	60.31 dBμ
-80°	0.010	0.000	-46.02	7.59 m	146.22 m	77.60 dBμ	1049.95 m	60.48 dBμ
-85°	0.010	0.000	-46.02	7.59 m	144.55 m	77.70 dBμ	1037.95 m	60.58 dBμ
-90°	0.010	0.000	-46.02	7.59 m	144.00 m	77.73 dBμ	1034.00 m	60.61 dBμ

+
WQNS(FM).L



NGDC 30 SEC Terrain Database
U.S. Census 2010 PL Database

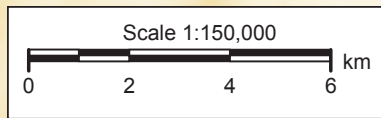


Exhibit 13.6

§74.1204(d) 2nd & 3rd Adjacent Channel Given Interference Waiver Request WTMT(FM) - Weaverville, NC (CH290C2) WQNS(FM).CP - Woodfin, NC (CH286A) WQNS(FM).L - Waynesville, NC (CH285A)

WTMT(FM)
Weaverville, NC
BLH20101130AJK
Facility ID: 72070
Latitude: 35-36-04 N
Longitude: 082-39-07 W
ERP: 9.50 kW
Channel: 290C2
Frequency: 105.9 MHz
AMSL Height: 1064.0 m
Horiz. Pattern: Omni

W288CQ.P
Asheville, NC
Proposed Operation
Facility ID: 155786
Latitude: 35-36-04 N
Longitude: 082-39-07 W
ERP: 0.25 kW
Channel: 288D
Frequency: 105.5 MHz
AMSL Height: 1034.0 m
Horiz. Pattern: Directional

WQNS(FM).L
Waynesville, NC
BLH19950927KB
Facility ID: 41008
Latitude: 35-34-07 N
Longitude: 082-54-27 W
ERP: 0.245 kW
Channel: 285A
Frequency: 104.9 MHz
AMSL Height: 1417.0 m
Horiz. Pattern: Omni

WQNS(FM).C
Woodfin, NC
BPH20120807ACK
Facility ID: 41008
Latitude: 35-35-50.40 N
Longitude: 082-36-20.50 W
ERP: 4.90 kW
Channel: 286A
Frequency: 105.1 MHz
AMSL Height: 766.0 m
Horiz. Pattern: Omni

+
WTMT(FM)
+
W288CQ.P

+
WQNS(FM).C

WQNS(FM).L - 63.3 dBμ F(50:50) Contour

WQNS(FM).C - 82.0 dBμ F(50:50) Contour

Exhibit 13.7 Copy of USGS Topographic Photo-Map of Proposed Site

103.3 dBμ F(50:10) Interference Contour

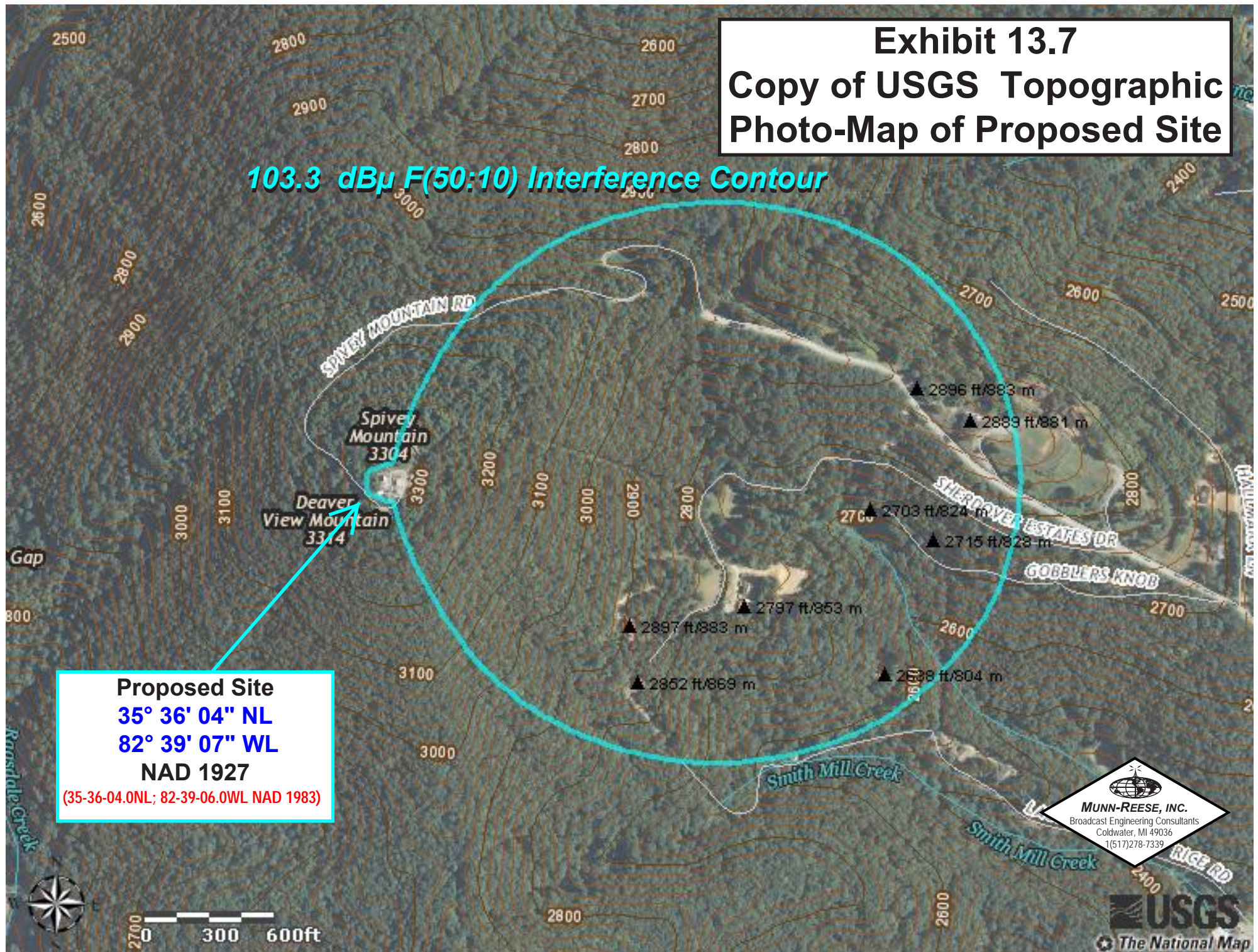
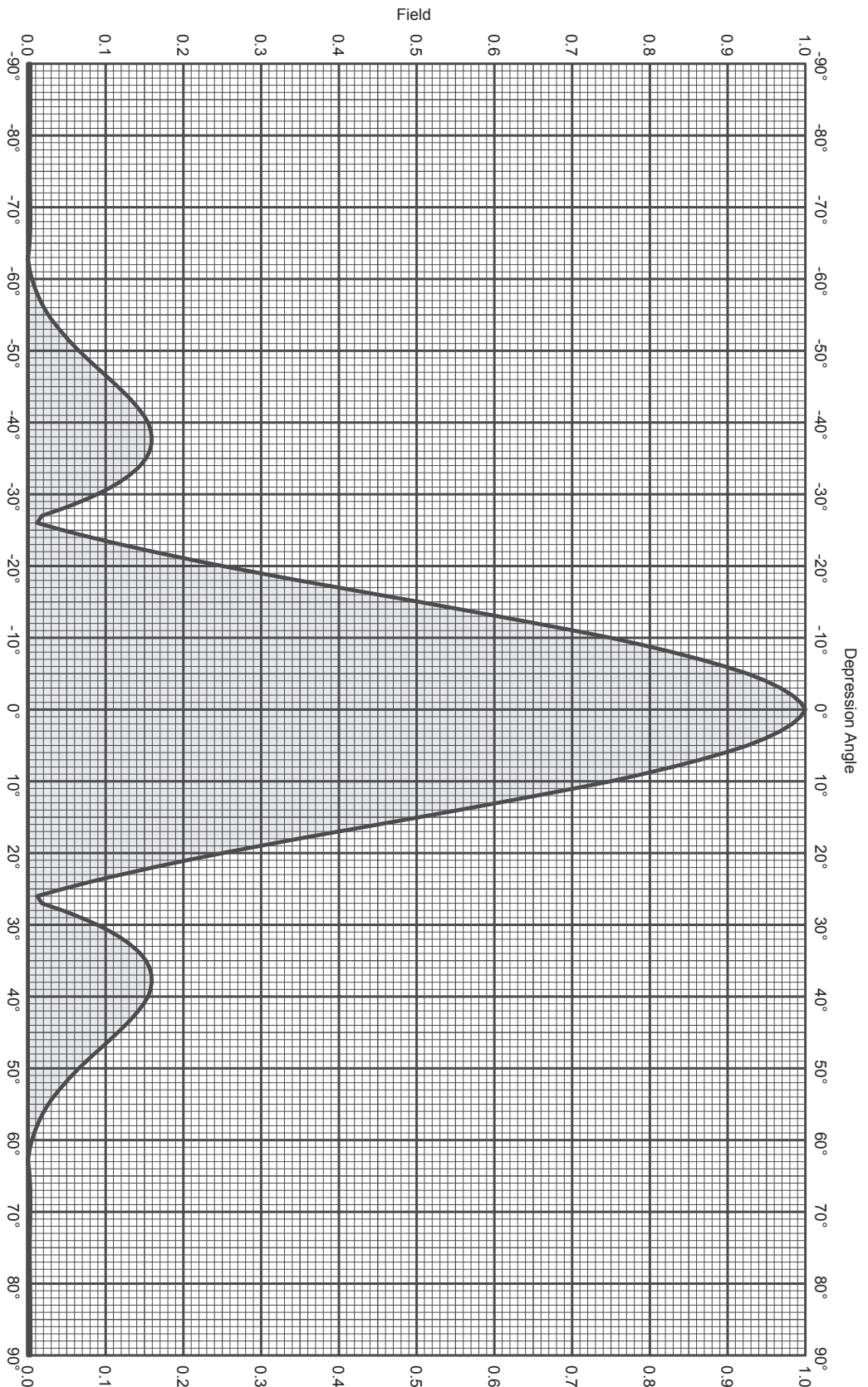


Exhibit 13.8 - Copy of Manufacturer's Vertical Radiation Pattern [CL-FM(Slant-45) - 3-Bay 0.75wl]

(to ensure maximum downward protection, the worst case Vertical Radiation Pattern for the Vertical Component has been assumed.)



KATHREIN
SCALA DIVISION
Post Office Box 4580
Medford, OR 97501 (USA)
Phone: (541) 779-6500
Fax: (541) 779-3991
<http://www.kathrein-scala.com>

Three CL-FM/VRM Log-periodic Antennas
Vertical Polarization
Vertical stacked 0.75 wavelength
Gain: 10.9 dBi

**Exhibit 13.8 - Copy of Manufacturer's Vertical
Radiation Pattern [CL-FM(Slant-45) - 3-Bay 0.75wl]**
(to ensure maximum downward protection, the worst case Vertical
Radiation Pattern for the Vertical Component has been assumed.)



Three CL-FM/VRM Log-periodic Antennas

Vertical plane Pattern

Vertical Polarization

Vertical stacked 0.75 wavelength

Gain: 10.9 dBd

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
-90	0.010	-40.00	-29.10	0.00	-45	0.116	-18.74	-7.84	0.16
-89	0.010	-40.00	-29.10	0.00	-44	0.125	-18.05	-7.15	0.19
-88	0.010	-40.00	-29.10	0.00	-43	0.134	-17.46	-6.56	0.22
-87	0.010	-40.00	-29.10	0.00	-42	0.142	-16.96	-6.06	0.25
-86	0.010	-40.00	-29.10	0.00	-41	0.149	-16.54	-5.64	0.27
-85	0.010	-40.00	-29.10	0.00	-40	0.155	-16.21	-5.31	0.29
-84	0.010	-40.00	-29.10	0.00	-39	0.158	-16.04	-5.14	0.31
-83	0.010	-40.00	-29.10	0.00	-38	0.159	-15.96	-5.06	0.31
-82	0.010	-40.00	-29.10	0.00	-37	0.159	-15.98	-5.08	0.31
-81	0.010	-40.00	-29.10	0.00	-36	0.157	-16.11	-5.21	0.30
-80	0.010	-40.00	-29.10	0.00	-35	0.152	-16.36	-5.46	0.28
-79	0.010	-40.00	-29.10	0.00	-34	0.145	-16.80	-5.90	0.26
-78	0.010	-40.00	-29.10	0.00	-33	0.135	-17.42	-6.52	0.22
-77	0.010	-40.00	-29.10	0.00	-32	0.122	-18.26	-7.36	0.18
-76	0.010	-40.00	-29.10	0.00	-31	0.107	-19.41	-8.51	0.14
-75	0.010	-40.00	-29.10	0.00	-30	0.089	-21.01	-10.11	0.10
-74	0.010	-40.00	-29.10	0.00	-29	0.068	-23.30	-12.40	0.06
-73	0.010	-40.00	-29.10	0.00	-28	0.045	-27.00	-16.10	0.02
-72	0.010	-40.00	-29.10	0.00	-27	0.018	-34.95	-24.05	0.00
-71	0.010	-40.00	-29.10	0.00	-26	0.012	-38.44	-27.54	0.00
-70	0.010	-40.00	-29.10	0.00	-25	0.045	-26.96	-16.06	0.02
-69	0.010	-40.00	-29.10	0.00	-24	0.081	-21.86	-10.96	0.08
-68	0.010	-40.00	-29.10	0.00	-23	0.119	-18.46	-7.56	0.18
-67	0.010	-40.00	-29.10	0.00	-22	0.161	-15.88	-4.98	0.32
-66	0.010	-40.00	-29.10	0.00	-21	0.205	-13.78	-2.88	0.52
-65	0.010	-40.00	-29.10	0.00	-20	0.251	-12.01	-1.11	0.77
-64	0.010	-40.00	-29.10	0.00	-19	0.299	-10.49	0.41	1.10
-63	0.010	-40.00	-29.10	0.00	-18	0.348	-9.16	1.74	1.49
-62	0.010	-40.00	-29.10	0.00	-17	0.399	-7.98	2.92	1.96
-61	0.010	-40.00	-29.10	0.00	-16	0.451	-6.92	3.98	2.50
-60	0.010	-40.00	-29.10	0.00	-15	0.504	-5.96	4.94	3.12
-59	0.010	-40.00	-29.10	0.00	-14	0.554	-5.13	5.77	3.78
-58	0.012	-38.57	-27.67	0.00	-13	0.605	-4.37	6.53	4.50
-57	0.016	-35.91	-25.01	0.00	-12	0.654	-3.69	7.21	5.26
-56	0.021	-33.64	-22.74	0.01	-11	0.703	-3.07	7.83	6.07
-55	0.026	-31.66	-20.76	0.01	-10	0.750	-2.50	8.40	6.91
-54	0.033	-29.66	-18.76	0.01	-9	0.791	-2.04	8.86	7.69
-53	0.040	-27.90	-17.00	0.02	-8	0.829	-1.63	9.27	8.45
-52	0.048	-26.34	-15.44	0.03	-7	0.864	-1.26	9.64	9.19
-51	0.057	-24.94	-14.04	0.04	-6	0.897	-0.95	9.95	9.89
-50	0.065	-23.69	-12.79	0.05	-5	0.926	-0.67	10.23	10.54
-49	0.075	-22.47	-11.57	0.07	-4	0.949	-0.46	10.44	11.08
-48	0.085	-21.37	-10.47	0.09	-3	0.968	-0.28	10.62	11.53
-47	0.096	-20.39	-9.49	0.11	-2	0.983	-0.15	10.75	11.89
-46	0.106	-19.51	-8.61	0.14	-1	0.994	-0.05	10.85	12.15
					0	1.000	0.00	10.90	12.30

**Exhibit 13.8 - Copy of Manufacturer's Vertical
Radiation Pattern [CL-FM(Slant-45) - 3-Bay 0.75wl)**
(to ensure maximum downward protection, the worst case Vertical
Radiation Pattern for the Vertical Component has been assumed.)



Three CL-FM/VRM Log-periodic Antennas

Vertical plane Pattern

Vertical Polarization

Vertical stacked 0.75 wavelength

Gain: 10.9 dBd

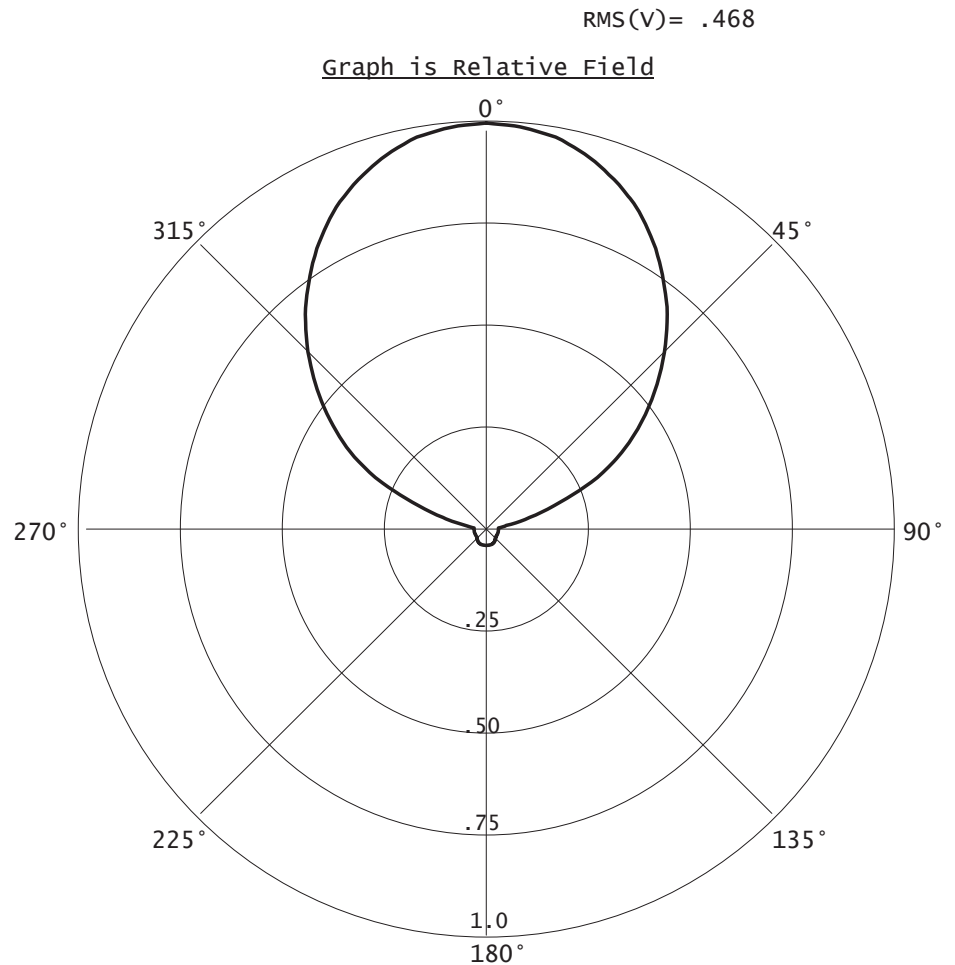
Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	10.90	12.30	45	0.116	-18.74	-7.84	0.16
1	0.994	-0.05	10.85	12.15	46	0.106	-19.51	-8.61	0.14
2	0.983	-0.15	10.75	11.89	47	0.096	-20.39	-9.49	0.11
3	0.968	-0.28	10.62	11.53	48	0.085	-21.37	-10.47	0.09
4	0.949	-0.46	10.44	11.08	49	0.075	-22.47	-11.57	0.07
5	0.926	-0.67	10.23	10.54	50	0.065	-23.69	-12.79	0.05
6	0.897	-0.95	9.95	9.89	51	0.057	-24.94	-14.04	0.04
7	0.864	-1.26	9.64	9.19	52	0.048	-26.34	-15.44	0.03
8	0.829	-1.63	9.27	8.45	53	0.040	-27.90	-17.00	0.02
9	0.791	-2.04	8.86	7.69	54	0.033	-29.66	-18.76	0.01
10	0.750	-2.50	8.40	6.91	55	0.026	-31.66	-20.76	0.01
11	0.703	-3.07	7.83	6.07	56	0.021	-33.64	-22.74	0.01
12	0.654	-3.69	7.21	5.26	57	0.016	-35.91	-25.01	0.00
13	0.605	-4.37	6.53	4.50	58	0.012	-38.57	-27.67	0.00
14	0.554	-5.13	5.77	3.78	59	0.010	-40.00	-29.10	0.00
15	0.504	-5.96	4.94	3.12	60	0.010	-40.00	-29.10	0.00
16	0.451	-6.92	3.98	2.50	61	0.010	-40.00	-29.10	0.00
17	0.399	-7.98	2.92	1.96	62	0.010	-40.00	-29.10	0.00
18	0.348	-9.16	1.74	1.49	63	0.010	-40.00	-29.10	0.00
19	0.299	-10.49	0.41	1.10	64	0.010	-40.00	-29.10	0.00
20	0.251	-12.01	-1.11	0.78	65	0.010	-40.00	-29.10	0.00
21	0.205	-13.78	-2.88	0.52	66	0.010	-40.00	-29.10	0.00
22	0.161	-15.88	-4.98	0.32	67	0.010	-40.00	-29.10	0.00
23	0.119	-18.46	-7.56	0.18	68	0.010	-40.00	-29.10	0.00
24	0.081	-21.86	-10.96	0.08	69	0.010	-40.00	-29.10	0.00
25	0.045	-26.96	-16.06	0.02	70	0.010	-40.00	-29.10	0.00
26	0.012	-38.44	-27.54	0.00	71	0.010	-40.00	-29.10	0.00
27	0.018	-34.95	-24.05	0.00	72	0.010	-40.00	-29.10	0.00
28	0.045	-27.00	-16.10	0.02	73	0.010	-40.00	-29.10	0.00
29	0.068	-23.30	-12.40	0.06	74	0.010	-40.00	-29.10	0.00
30	0.089	-21.01	-10.11	0.10	75	0.010	-40.00	-29.10	0.00
31	0.107	-19.41	-8.51	0.14	76	0.010	-40.00	-29.10	0.00
32	0.122	-18.26	-7.36	0.18	77	0.010	-40.00	-29.10	0.00
33	0.135	-17.42	-6.52	0.22	78	0.010	-40.00	-29.10	0.00
34	0.145	-16.80	-5.90	0.26	79	0.010	-40.00	-29.10	0.00
35	0.152	-16.36	-5.46	0.28	80	0.010	-40.00	-29.10	0.00
36	0.157	-16.11	-5.21	0.30	81	0.010	-40.00	-29.10	0.00
37	0.159	-15.98	-5.08	0.31	82	0.010	-40.00	-29.10	0.00
38	0.159	-15.96	-5.06	0.31	83	0.010	-40.00	-29.10	0.00
39	0.158	-16.04	-5.14	0.31	84	0.010	-40.00	-29.10	0.00
40	0.155	-16.21	-5.31	0.29	85	0.010	-40.00	-29.10	0.00
41	0.149	-16.54	-5.64	0.27	86	0.010	-40.00	-29.10	0.00
42	0.142	-16.96	-6.06	0.25	87	0.010	-40.00	-29.10	0.00
43	0.134	-17.46	-6.56	0.22	88	0.010	-40.00	-29.10	0.00
44	0.125	-18.05	-7.15	0.19	89	0.010	-40.00	-29.10	0.00
					90	0.010	-40.00	-29.10	0.00

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM(SI ant-45) COMPOSITE PATTERN

Azi	Field	dBk
000	1.000	00.000
010	0.980	-00.175
020	0.916	-00.762
030	0.817	-01.756
040	0.690	-03.223
050	0.544	-05.288
060	0.390	-08.179
070	0.190	-14.425
080	0.050	-26.021
090	0.030	-30.458
100	0.030	-30.458
110	0.030	-30.458
120	0.030	-30.458
130	0.030	-30.458
140	0.034	-29.370
150	0.038	-28.404
160	0.040	-27.959
170	0.040	-27.959
180	0.040	-27.959
190	0.040	-27.959
200	0.040	-27.959
210	0.038	-28.404
220	0.034	-29.370
230	0.030	-30.458
240	0.030	-30.458
250	0.030	-30.458
260	0.030	-30.458
270	0.030	-30.458
280	0.050	-26.021
290	0.190	-14.425
300	0.390	-08.179
310	0.544	-05.288
320	0.690	-03.223
330	0.817	-01.756
340	0.916	-00.762
350	0.980	-00.175



The directional antenna pattern will be produced by means of a Scala Log Periodic CL-FM broadcast element mounted at a 45° (degree) slant orientation to achieve horizontal and vertical polarization. The CL-FM(SIant-45) Directional Pattern is therefore a maximum composite pattern of the current CL-FM(Horizontal) and CL-FM(Vertical) broadcast patterns as notified by the Scala Division (Kathrein-Scala) of Kathrein, Inc.

The maximum antenna gain for a single CL-FM(SIant-45) element will be 4.0 dBd or the common Horizontal or Vertical maximum antenna gain of 7.0 dBd adjusted by 3 dBd for dual broadcast in the Horizontal and Vertical planes (4.0 dBd = 7.0 dBd - 3.0 dBd). The maximum gain for multiple bay options of the Scala CL-FM(SIant-45) antenna would therefore also be adjusted by -3 dBd to account for operation in the Horizontal and Vertical planes.

The antenna proposed in this application will be mounted in accordance with specific instructions provided by the antenna manufacturer. The directional antenna will be mounted on the tower which is of uniform cross section. No other antennas of any type are or will be mounted on the same tower level as the directional antenna.

No antenna is or will be mounted within any vertical or horizontal distance specified by the antenna manufacturer as being necessary for proper operation of the directional antenna. In addition, the antenna will be assembled under the supervision of a qualified engineer and installed pursuant to the manufacturer's instructions and manufacturer specified antenna orientation.

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM FM LOG-PERIODIC ANTENNA 7 dBd gain 88–108 MHz

The Kathrein Scala Division CL-FM is a ruggedly built log-periodic antenna, designed for professional FM transmit and receive applications.

Like all Kathrein Scala Division antennas, the CL-FM is made of the finest materials using state of the art electrical and mechanical designs, resulting in superior performance and long service life.

The CL-FM may be used stand-alone or in stacked arrays for higher gain, increased side-lobe suppression, or custom azimuth patterns.

Specifications:

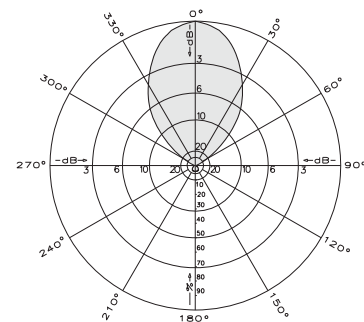
Frequency range	88–108 MHz (broadband)
Gain	7 dBd
Impedance	50 or 75 ohms
VSWR	< 1.5:1
Polarization	Horizontal or vertical
Front-to-back ratio	>25 dB
Maximum input power	250 watts, type "N" 75 ohm connector 500 watts, type "N" 50 ohm connector
Azimuth pattern	52 degrees (half-power) horizontal polarization
Elevation pattern	78 degrees (half-power) horizontal polarization
Connector	Female 50Ω or 75Ω N
Weight	45 lb (20.4 kg)
Dimensions	104 x 67.9 inches (2642 x 1724 mm)
Equivalent flat plate area	
CL-FM/HCM	5.31 ft ² (0.494 m ²)
CL-FM/HRM	5.86 ft ² (0.544 m ²)
CL-FM/VRM	5.86 ft ² (0.544 m ²)
Wind survival rating*	120 mph (200 kph)
Shipping dimensions	116 x 14.5 x 6 inches (2946 x 369 x 153 mm)
Shipping weight	56 lb (25.4 kg)
Mounting	For masts of 2.375 inches (60 mm) OD.
CL-FM/HCM	Horizontal polarization center-mount
CL-FM/HRM	Horizontal polarization rear-mount
CL-FM/VRM	Vertical polarization rear-mount

See reverse for order information.

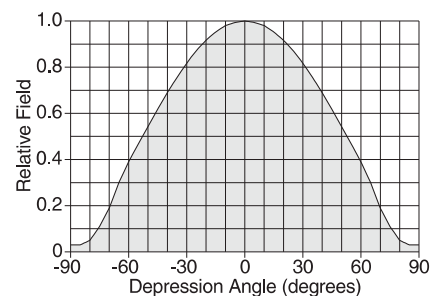
* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.



10492-D



Azimuth pattern (E-plane)

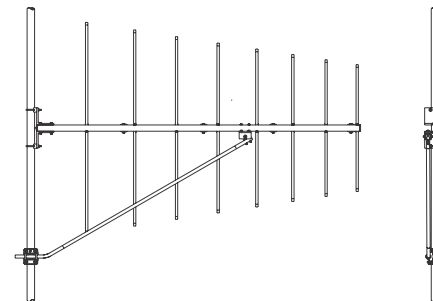
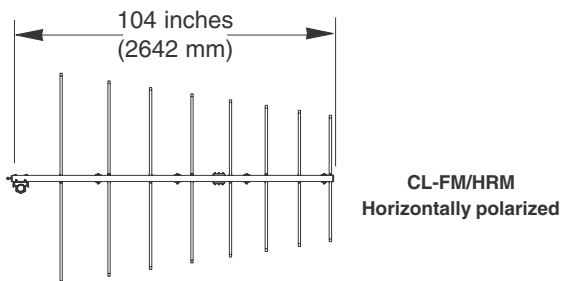
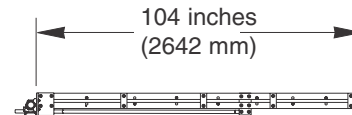
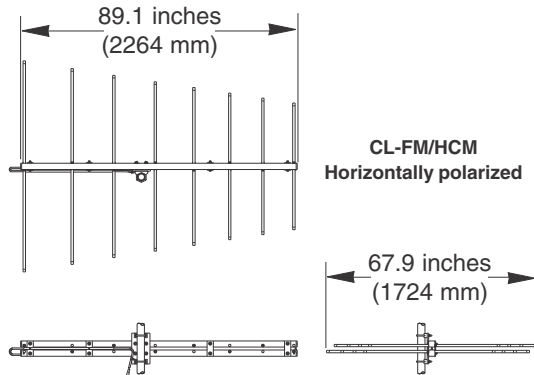


Elevation pattern (H-plane)

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)

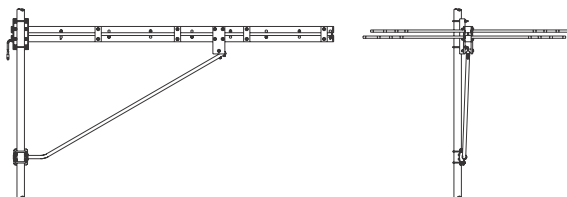


CL-FM FM LOG-PERIODIC ANTENNA 7 dBd gain 88–108 MHz



CL-FM/VRM
Vertically polarized

Vertically polarized antennas require lateral stabilization (not supplied) to prevent the antenna from turning on the mounting pipe.



Order Information:

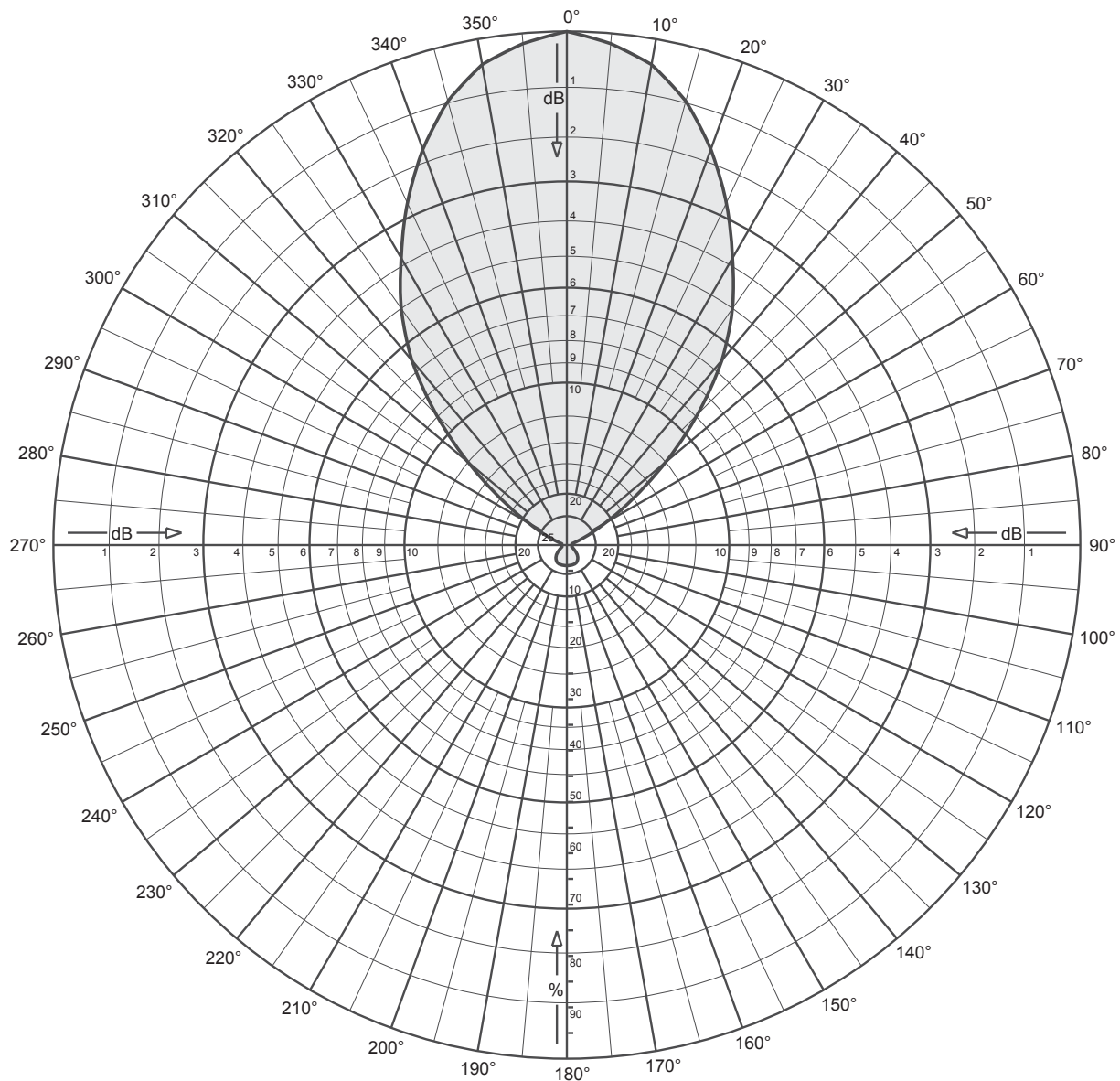
Model	Description
CL-FM/HCM/50N	Antenna with 50Ω N connector Horizontal polarization center-mount
CL-FM/HCM/75N	Antenna with 75Ω N connector Horizontal polarization center-mount
CL-FM/HRM/50N	Antenna with 50Ω N connector Horizontal polarization rear-mount

Order Information:

Model	Description
CL-FM/HRM/75N	Antenna with 75Ω N connector Horizontal polarization rear-mount
CL-FM/VRM/50N	Antenna with 50Ω N connector Vertical polarization rear-mount
CL-FM/VRM/75N	Antenna with 75Ω N connector Vertical polarization rear-mount

All specifications are subject to change without notice

**Exhibit 13.9 - Copy of Manufacturer's
Directional Antenna Pattern Data
(Actual Pattern Rotated to 090.0°T)**



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt



Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	7.00	5.01	45	0.360	-8.87	-1.87	0.65
1	0.996	-0.03	6.97	4.97	46	0.338	-9.42	-2.42	0.57
2	0.992	-0.07	6.93	4.93	47	0.316	-10.01	-3.01	0.50
3	0.988	-0.10	6.90	4.89	48	0.294	-10.63	-3.63	0.43
4	0.984	-0.14	6.86	4.85	49	0.272	-11.31	-4.31	0.37
5	0.980	-0.18	6.82	4.81	50	0.250	-12.04	-5.04	0.31
6	0.974	-0.23	6.77	4.75	51	0.231	-12.73	-5.73	0.27
7	0.968	-0.28	6.72	4.70	52	0.212	-13.47	-6.47	0.23
8	0.962	-0.34	6.66	4.64	53	0.193	-14.29	-7.29	0.19
9	0.956	-0.39	6.61	4.58	54	0.174	-15.19	-8.19	0.15
10	0.950	-0.45	6.55	4.52	55	0.155	-16.19	-9.19	0.12
11	0.939	-0.55	6.45	4.42	56	0.141	-17.02	-10.02	0.10
12	0.928	-0.65	6.35	4.32	57	0.127	-17.92	-10.92	0.08
13	0.917	-0.75	6.25	4.21	58	0.113	-18.94	-11.94	0.06
14	0.906	-0.86	6.14	4.11	59	0.099	-20.09	-13.09	0.05
15	0.895	-0.96	6.04	4.01	60	0.085	-21.41	-14.41	0.04
16	0.880	-1.11	5.89	3.88	61	0.077	-22.27	-15.27	0.03
17	0.865	-1.26	5.74	3.75	62	0.069	-23.22	-16.22	0.02
18	0.850	-1.41	5.59	3.62	63	0.061	-24.29	-17.29	0.02
19	0.835	-1.57	5.43	3.49	64	0.053	-25.51	-18.51	0.01
20	0.820	-1.72	5.28	3.37	65	0.045	-26.94	-19.94	0.01
21	0.803	-1.91	5.09	3.23	66	0.040	-27.96	-20.96	0.01
22	0.786	-2.09	4.91	3.10	67	0.035	-29.12	-22.12	0.01
23	0.769	-2.28	4.72	2.96	68	0.030	-30.46	-23.46	0.00
24	0.752	-2.48	4.52	2.83	69	0.025	-32.04	-25.04	0.00
25	0.735	-2.67	4.33	2.71	70	0.020	-33.98	-26.98	0.00
26	0.717	-2.89	4.11	2.58	71	0.018	-34.89	-27.89	0.00
27	0.699	-3.11	3.89	2.45	72	0.016	-35.92	-28.92	0.00
28	0.681	-3.34	3.66	2.32	73	0.014	-37.08	-30.08	0.00
29	0.663	-3.57	3.43	2.20	74	0.012	-38.42	-31.42	0.00
30	0.645	-3.81	3.19	2.09	75	0.010	-40.00	-33.00	0.00
31	0.628	-4.03	2.97	1.98	76	0.010	-40.00	-33.00	0.00
32	0.612	-4.26	2.74	1.88	77	0.010	-40.00	-33.00	0.00
33	0.595	-4.50	2.50	1.78	78	0.010	-40.00	-33.00	0.00
34	0.579	-4.75	2.25	1.68	79	0.010	-40.00	-33.00	0.00
35	0.562	-5.00	2.00	1.59	80	0.010	-40.00	-33.00	0.00
36	0.544	-5.29	1.71	1.48	81	0.010	-40.00	-33.00	0.00
37	0.525	-5.59	1.41	1.38	82	0.010	-40.00	-33.00	0.00
38	0.507	-5.90	1.10	1.29	83	0.010	-40.00	-33.00	0.00
39	0.488	-6.22	0.78	1.20	84	0.010	-40.00	-33.00	0.00
40	0.470	-6.56	0.44	1.11	85	0.010	-40.00	-33.00	0.00
41	0.448	-6.97	0.03	1.01	86	0.010	-40.00	-33.00	0.00
42	0.426	-7.41	-0.41	0.91	87	0.010	-40.00	-33.00	0.00
43	0.404	-7.87	-0.87	0.82	88	0.010	-40.00	-33.00	0.00
44	0.382	-8.36	-1.36	0.73	89	0.010	-40.00	-33.00	0.00

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
90	0.010	-40.00	-33.00	0.00	135	0.029	-30.75	-23.75	0.00
91	0.010	-40.00	-33.00	0.00	136	0.030	-30.49	-23.49	0.00
92	0.010	-40.00	-33.00	0.00	137	0.031	-30.23	-23.23	0.00
93	0.010	-40.00	-33.00	0.00	138	0.032	-29.98	-22.98	0.01
94	0.010	-40.00	-33.00	0.00	139	0.033	-29.74	-22.74	0.01
95	0.010	-40.00	-33.00	0.00	140	0.034	-29.50	-22.50	0.01
96	0.010	-40.00	-33.00	0.00	141	0.034	-29.37	-22.37	0.01
97	0.010	-40.00	-33.00	0.00	142	0.034	-29.24	-22.24	0.01
98	0.010	-40.00	-33.00	0.00	143	0.035	-29.12	-22.12	0.01
99	0.010	-40.00	-33.00	0.00	144	0.036	-29.00	-22.00	0.01
100	0.010	-40.00	-33.00	0.00	145	0.036	-28.87	-21.87	0.01
101	0.010	-40.00	-33.00	0.00	146	0.036	-28.75	-21.75	0.01
102	0.010	-40.00	-33.00	0.00	147	0.037	-28.64	-21.64	0.01
103	0.010	-40.00	-33.00	0.00	148	0.038	-28.52	-21.52	0.01
104	0.010	-40.00	-33.00	0.00	149	0.038	-28.40	-21.40	0.01
105	0.010	-40.00	-33.00	0.00	150	0.038	-28.29	-21.29	0.01
106	0.010	-40.00	-33.00	0.00	151	0.039	-28.25	-21.25	0.01
107	0.010	-40.00	-33.00	0.00	152	0.039	-28.20	-21.20	0.01
108	0.010	-40.00	-33.00	0.00	153	0.039	-28.16	-21.16	0.01
109	0.010	-40.00	-33.00	0.00	154	0.039	-28.11	-21.11	0.01
110	0.010	-40.00	-33.00	0.00	155	0.039	-28.07	-21.07	0.01
111	0.010	-39.58	-32.58	0.00	156	0.040	-28.05	-21.05	0.01
112	0.011	-39.17	-32.17	0.00	157	0.040	-28.02	-21.02	0.01
113	0.012	-38.79	-31.79	0.00	158	0.040	-28.00	-21.00	0.01
114	0.012	-38.42	-31.42	0.00	159	0.040	-27.98	-20.98	0.01
115	0.012	-38.06	-31.06	0.00	160	0.040	-27.96	-20.96	0.01
116	0.013	-37.72	-30.72	0.00	161	0.040	-27.96	-20.96	0.01
117	0.013	-37.39	-30.39	0.00	162	0.040	-27.96	-20.96	0.01
118	0.014	-37.08	-30.08	0.00	163	0.040	-27.96	-20.96	0.01
119	0.014	-36.77	-29.77	0.00	164	0.040	-27.96	-20.96	0.01
120	0.015	-36.48	-29.48	0.00	165	0.040	-27.96	-20.96	0.01
121	0.016	-35.92	-28.92	0.00	166	0.040	-27.96	-20.96	0.01
122	0.017	-35.39	-28.39	0.00	167	0.040	-27.96	-20.96	0.01
123	0.018	-34.89	-27.89	0.00	168	0.040	-27.96	-20.96	0.01
124	0.019	-34.42	-27.42	0.00	169	0.040	-27.96	-20.96	0.01
125	0.020	-33.98	-26.98	0.00	170	0.040	-27.96	-20.96	0.01
126	0.021	-33.56	-26.56	0.00	171	0.040	-27.96	-20.96	0.01
127	0.022	-33.15	-26.15	0.00	172	0.040	-27.96	-20.96	0.01
128	0.023	-32.77	-25.77	0.00	173	0.040	-27.96	-20.96	0.01
129	0.024	-32.40	-25.40	0.00	174	0.040	-27.96	-20.96	0.01
130	0.025	-32.04	-25.04	0.00	175	0.040	-27.96	-20.96	0.01
131	0.026	-31.77	-24.77	0.00	176	0.040	-27.96	-20.96	0.01
132	0.027	-31.50	-24.50	0.00	177	0.040	-27.96	-20.96	0.01
133	0.027	-31.24	-24.24	0.00	178	0.040	-27.96	-20.96	0.01
134	0.028	-31.00	-24.00	0.00	179	0.040	-27.96	-20.96	0.01

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
180	0.040	-27.96	-20.96	0.01	225	0.029	-30.75	-23.75	0.00
181	0.040	-27.96	-20.96	0.01	226	0.028	-31.00	-24.00	0.00
182	0.040	-27.96	-20.96	0.01	227	0.027	-31.24	-24.24	0.00
183	0.040	-27.96	-20.96	0.01	228	0.027	-31.50	-24.50	0.00
184	0.040	-27.96	-20.96	0.01	229	0.026	-31.77	-24.77	0.00
185	0.040	-27.96	-20.96	0.01	230	0.025	-32.04	-25.04	0.00
186	0.040	-27.96	-20.96	0.01	231	0.024	-32.40	-25.40	0.00
187	0.040	-27.96	-20.96	0.01	232	0.023	-32.77	-25.77	0.00
188	0.040	-27.96	-20.96	0.01	233	0.022	-33.15	-26.15	0.00
189	0.040	-27.96	-20.96	0.01	234	0.021	-33.56	-26.56	0.00
190	0.040	-27.96	-20.96	0.01	235	0.020	-33.98	-26.98	0.00
191	0.040	-27.96	-20.96	0.01	236	0.019	-34.42	-27.42	0.00
192	0.040	-27.96	-20.96	0.01	237	0.018	-34.89	-27.89	0.00
193	0.040	-27.96	-20.96	0.01	238	0.017	-35.39	-28.39	0.00
194	0.040	-27.96	-20.96	0.01	239	0.016	-35.92	-28.92	0.00
195	0.040	-27.96	-20.96	0.01	240	0.015	-36.48	-29.48	0.00
196	0.040	-27.96	-20.96	0.01	241	0.014	-36.77	-29.77	0.00
197	0.040	-27.96	-20.96	0.01	242	0.014	-37.08	-30.08	0.00
198	0.040	-27.96	-20.96	0.01	243	0.013	-37.39	-30.39	0.00
199	0.040	-27.96	-20.96	0.01	244	0.013	-37.72	-30.72	0.00
200	0.040	-27.96	-20.96	0.01	245	0.012	-38.06	-31.06	0.00
201	0.040	-27.98	-20.98	0.01	246	0.012	-38.42	-31.42	0.00
202	0.040	-28.00	-21.00	0.01	247	0.012	-38.79	-31.79	0.00
203	0.040	-28.02	-21.02	0.01	248	0.011	-39.17	-32.17	0.00
204	0.040	-28.05	-21.05	0.01	249	0.010	-39.58	-32.58	0.00
205	0.039	-28.07	-21.07	0.01	250	0.010	-40.00	-33.00	0.00
206	0.039	-28.11	-21.11	0.01	251	0.010	-40.00	-33.00	0.00
207	0.039	-28.16	-21.16	0.01	252	0.010	-40.00	-33.00	0.00
208	0.039	-28.20	-21.20	0.01	253	0.010	-40.00	-33.00	0.00
209	0.039	-28.25	-21.25	0.01	254	0.010	-40.00	-33.00	0.00
210	0.038	-28.29	-21.29	0.01	255	0.010	-40.00	-33.00	0.00
211	0.038	-28.40	-21.40	0.01	256	0.010	-40.00	-33.00	0.00
212	0.038	-28.52	-21.52	0.01	257	0.010	-40.00	-33.00	0.00
213	0.037	-28.64	-21.64	0.01	258	0.010	-40.00	-33.00	0.00
214	0.036	-28.75	-21.75	0.01	259	0.010	-40.00	-33.00	0.00
215	0.036	-28.87	-21.87	0.01	260	0.010	-40.00	-33.00	0.00
216	0.036	-29.00	-22.00	0.01	261	0.010	-40.00	-33.00	0.00
217	0.035	-29.12	-22.12	0.01	262	0.010	-40.00	-33.00	0.00
218	0.034	-29.24	-22.24	0.01	263	0.010	-40.00	-33.00	0.00
219	0.034	-29.37	-22.37	0.01	264	0.010	-40.00	-33.00	0.00
220	0.034	-29.50	-22.50	0.01	265	0.010	-40.00	-33.00	0.00
221	0.033	-29.74	-22.74	0.01	266	0.010	-40.00	-33.00	0.00
222	0.032	-29.98	-22.98	0.01	267	0.010	-40.00	-33.00	0.00
223	0.031	-30.23	-23.23	0.00	268	0.010	-40.00	-33.00	0.00
224	0.030	-30.49	-23.49	0.00	269	0.010	-40.00	-33.00	0.00

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

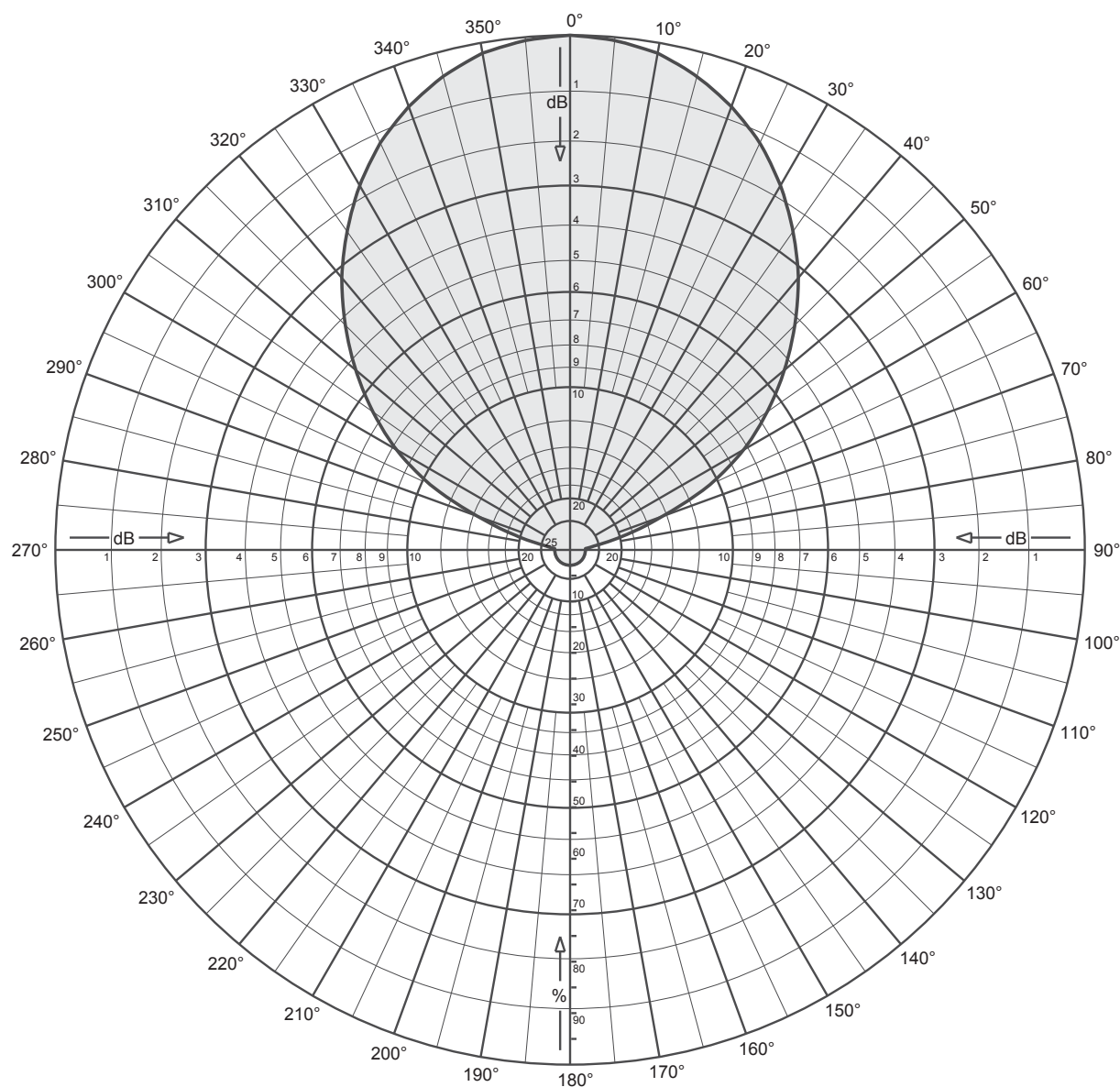
Horizontal polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
270	0.010	-40.00	-33.00	0.00	315	0.360	-8.87	-1.87	0.65
271	0.010	-40.00	-33.00	0.00	316	0.382	-8.36	-1.36	0.73
272	0.010	-40.00	-33.00	0.00	317	0.404	-7.87	-0.87	0.82
273	0.010	-40.00	-33.00	0.00	318	0.426	-7.41	-0.41	0.91
274	0.010	-40.00	-33.00	0.00	319	0.448	-6.97	0.03	1.01
275	0.010	-40.00	-33.00	0.00	320	0.470	-6.56	0.44	1.11
276	0.010	-40.00	-33.00	0.00	321	0.488	-6.22	0.78	1.20
277	0.010	-40.00	-33.00	0.00	322	0.507	-5.90	1.10	1.29
278	0.010	-40.00	-33.00	0.00	323	0.525	-5.59	1.41	1.38
279	0.010	-40.00	-33.00	0.00	324	0.544	-5.29	1.71	1.48
280	0.010	-40.00	-33.00	0.00	325	0.562	-5.00	2.00	1.59
281	0.010	-40.00	-33.00	0.00	326	0.579	-4.75	2.25	1.68
282	0.010	-40.00	-33.00	0.00	327	0.595	-4.50	2.50	1.78
283	0.010	-40.00	-33.00	0.00	328	0.612	-4.26	2.74	1.88
284	0.010	-40.00	-33.00	0.00	329	0.628	-4.03	2.97	1.98
285	0.010	-40.00	-33.00	0.00	330	0.645	-3.81	3.19	2.09
286	0.012	-38.42	-31.42	0.00	331	0.663	-3.57	3.43	2.20
287	0.014	-37.08	-30.08	0.00	332	0.681	-3.34	3.66	2.32
288	0.016	-35.92	-28.92	0.00	333	0.699	-3.11	3.89	2.45
289	0.018	-34.89	-27.89	0.00	334	0.717	-2.89	4.11	2.58
290	0.020	-33.98	-26.98	0.00	335	0.735	-2.67	4.33	2.71
291	0.025	-32.04	-25.04	0.00	336	0.752	-2.48	4.52	2.83
292	0.030	-30.46	-23.46	0.00	337	0.769	-2.28	4.72	2.96
293	0.035	-29.12	-22.12	0.01	338	0.786	-2.09	4.91	3.10
294	0.040	-27.96	-20.96	0.01	339	0.803	-1.91	5.09	3.23
295	0.045	-26.94	-19.94	0.01	340	0.820	-1.72	5.28	3.37
296	0.053	-25.51	-18.51	0.01	341	0.835	-1.57	5.43	3.49
297	0.061	-24.29	-17.29	0.02	342	0.850	-1.41	5.59	3.62
298	0.069	-23.22	-16.22	0.02	343	0.865	-1.26	5.74	3.75
299	0.077	-22.27	-15.27	0.03	344	0.880	-1.11	5.89	3.88
300	0.085	-21.41	-14.41	0.04	345	0.895	-0.96	6.04	4.01
301	0.099	-20.09	-13.09	0.05	346	0.906	-0.86	6.14	4.11
302	0.113	-18.94	-11.94	0.06	347	0.917	-0.75	6.25	4.21
303	0.127	-17.92	-10.92	0.08	348	0.928	-0.65	6.35	4.32
304	0.141	-17.02	-10.02	0.10	349	0.939	-0.55	6.45	4.42
305	0.155	-16.19	-9.19	0.12	350	0.950	-0.45	6.55	4.52
306	0.174	-15.19	-8.19	0.15	351	0.956	-0.39	6.61	4.58
307	0.193	-14.29	-7.29	0.19	352	0.962	-0.34	6.66	4.64
308	0.212	-13.47	-6.47	0.23	353	0.968	-0.28	6.72	4.70
309	0.231	-12.73	-5.73	0.27	354	0.974	-0.23	6.77	4.75
310	0.250	-12.04	-5.04	0.31	355	0.980	-0.18	6.82	4.81
311	0.272	-11.31	-4.31	0.37	356	0.984	-0.14	6.86	4.85
312	0.294	-10.63	-3.63	0.43	357	0.988	-0.10	6.90	4.89
313	0.316	-10.01	-3.01	0.50	358	0.992	-0.07	6.93	4.93
314	0.338	-9.42	-2.42	0.57	359	0.996	-0.03	6.97	4.97

**Exhibit 13.9 - Copy of Manufacturer's
Directional Antenna Pattern Data
(Actual Pattern Rotated to 090.0°T)**



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt



Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
0	1.000	0.00	7.00	5.01	45	0.618	-4.19	2.81	1.91
1	0.998	-0.01	6.99	5.00	46	0.602	-4.40	2.60	1.82
2	0.997	-0.02	6.98	4.99	47	0.588	-4.61	2.39	1.73
3	0.996	-0.03	6.97	4.97	48	0.573	-4.84	2.16	1.65
4	0.995	-0.04	6.96	4.96	49	0.558	-5.06	1.94	1.56
5	0.993	-0.06	6.94	4.95	50	0.544	-5.30	1.70	1.48
6	0.991	-0.08	6.92	4.92	51	0.528	-5.54	1.46	1.40
7	0.988	-0.10	6.90	4.89	52	0.513	-5.80	1.20	1.32
8	0.985	-0.13	6.87	4.87	53	0.498	-6.06	0.94	1.24
9	0.982	-0.15	6.85	4.84	54	0.483	-6.33	0.67	1.17
10	0.980	-0.18	6.82	4.81	55	0.467	-6.60	0.40	1.10
11	0.975	-0.22	6.78	4.76	56	0.452	-6.90	0.10	1.02
12	0.969	-0.27	6.73	4.71	57	0.436	-7.20	-0.20	0.95
13	0.964	-0.32	6.68	4.65	58	0.421	-7.51	-0.51	0.89
14	0.958	-0.37	6.63	4.60	59	0.405	-7.84	-0.84	0.82
15	0.952	-0.42	6.58	4.55	60	0.390	-8.18	-1.18	0.76
16	0.946	-0.49	6.51	4.48	61	0.372	-8.59	-1.59	0.69
17	0.938	-0.56	6.44	4.41	62	0.354	-9.02	-2.02	0.63
18	0.931	-0.62	6.38	4.34	63	0.336	-9.47	-2.47	0.57
19	0.923	-0.69	6.31	4.27	64	0.318	-9.95	-2.95	0.51
20	0.916	-0.76	6.24	4.21	65	0.300	-10.46	-3.46	0.45
21	0.908	-0.84	6.16	4.13	66	0.278	-11.12	-4.12	0.39
22	0.899	-0.92	6.08	4.05	67	0.256	-11.84	-4.84	0.33
23	0.890	-1.01	5.99	3.97	68	0.234	-12.62	-5.62	0.27
24	0.882	-1.10	5.90	3.89	69	0.212	-13.47	-6.47	0.23
25	0.873	-1.18	5.82	3.82	70	0.190	-14.42	-7.42	0.18
26	0.862	-1.29	5.71	3.72	71	0.174	-15.19	-8.19	0.15
27	0.851	-1.41	5.59	3.63	72	0.158	-16.03	-9.03	0.13
28	0.840	-1.52	5.48	3.53	73	0.142	-16.95	-9.95	0.10
29	0.829	-1.63	5.37	3.44	74	0.126	-17.99	-10.99	0.08
30	0.817	-1.75	5.25	3.35	75	0.110	-19.17	-12.17	0.06
31	0.806	-1.88	5.12	3.25	76	0.098	-20.18	-13.18	0.05
32	0.793	-2.02	4.98	3.15	77	0.086	-21.31	-14.31	0.04
33	0.781	-2.15	4.85	3.05	78	0.074	-22.62	-15.62	0.03
34	0.767	-2.30	4.70	2.95	79	0.062	-24.15	-17.15	0.02
35	0.756	-2.44	4.56	2.86	80	0.050	-26.02	-19.02	0.01
36	0.742	-2.59	4.41	2.76	81	0.046	-26.74	-19.74	0.01
37	0.729	-2.74	4.26	2.67	82	0.042	-27.54	-20.54	0.01
38	0.716	-2.90	4.10	2.57	83	0.038	-28.40	-21.40	0.01
39	0.704	-3.05	3.95	2.48	84	0.034	-29.37	-22.37	0.01
40	0.690	-3.22	3.78	2.39	85	0.030	-30.46	-23.46	0.00
41	0.675	-3.41	3.59	2.29	86	0.030	-30.46	-23.46	0.00
42	0.661	-3.60	3.40	2.19	87	0.030	-30.46	-23.46	0.00
43	0.646	-3.79	3.21	2.09	88	0.030	-30.46	-23.46	0.00
44	0.632	-3.99	3.01	2.00	89	0.030	-30.46	-23.46	0.00

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM

Horizontal radiation pattern

FM

0 degree electrical downtilt

Maximum gain: 7.0 dBd

Vertical polarization Component

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
90	0.030	-30.46	-23.46	0.00	135	0.030	-30.46	-23.46	0.00
91	0.030	-30.46	-23.46	0.00	136	0.030	-30.46	-23.46	0.00
92	0.030	-30.46	-23.46	0.00	137	0.030	-30.46	-23.46	0.00
93	0.030	-30.46	-23.46	0.00	138	0.030	-30.46	-23.46	0.00
94	0.030	-30.46	-23.46	0.00	139	0.030	-30.46	-23.46	0.00
95	0.030	-30.46	-23.46	0.00	140	0.030	-30.46	-23.46	0.00
96	0.030	-30.46	-23.46	0.00	141	0.030	-30.46	-23.46	0.00
97	0.030	-30.46	-23.46	0.00	142	0.030	-30.46	-23.46	0.00
98	0.030	-30.46	-23.46	0.00	143	0.030	-30.46	-23.46	0.00
99	0.030	-30.46	-23.46	0.00	144	0.030	-30.46	-23.46	0.00
100	0.030	-30.46	-23.46	0.00	145	0.030	-30.46	-23.46	0.00
101	0.030	-30.46	-23.46	0.00	146	0.030	-30.46	-23.46	0.00
102	0.030	-30.46	-23.46	0.00	147	0.030	-30.46	-23.46	0.00
103	0.030	-30.46	-23.46	0.00	148	0.030	-30.46	-23.46	0.00
104	0.030	-30.46	-23.46	0.00	149	0.030	-30.46	-23.46	0.00
105	0.030	-30.46	-23.46	0.00	150	0.030	-30.46	-23.46	0.00
106	0.030	-30.46	-23.46	0.00	151	0.030	-30.46	-23.46	0.00
107	0.030	-30.46	-23.46	0.00	152	0.030	-30.46	-23.46	0.00
108	0.030	-30.46	-23.46	0.00	153	0.030	-30.46	-23.46	0.00
109	0.030	-30.46	-23.46	0.00	154	0.030	-30.46	-23.46	0.00
110	0.030	-30.46	-23.46	0.00	155	0.030	-30.46	-23.46	0.00
111	0.030	-30.46	-23.46	0.00	156	0.030	-30.46	-23.46	0.00
112	0.030	-30.46	-23.46	0.00	157	0.030	-30.46	-23.46	0.00
113	0.030	-30.46	-23.46	0.00	158	0.030	-30.46	-23.46	0.00
114	0.030	-30.46	-23.46	0.00	159	0.030	-30.46	-23.46	0.00
115	0.030	-30.46	-23.46	0.00	160	0.030	-30.46	-23.46	0.00
116	0.030	-30.46	-23.46	0.00	161	0.030	-30.46	-23.46	0.00
117	0.030	-30.46	-23.46	0.00	162	0.030	-30.46	-23.46	0.00
118	0.030	-30.46	-23.46	0.00	163	0.030	-30.46	-23.46	0.00
119	0.030	-30.46	-23.46	0.00	164	0.030	-30.46	-23.46	0.00
120	0.030	-30.46	-23.46	0.00	165	0.030	-30.46	-23.46	0.00
121	0.030	-30.46	-23.46	0.00	166	0.030	-30.46	-23.46	0.00
122	0.030	-30.46	-23.46	0.00	167	0.030	-30.46	-23.46	0.00
123	0.030	-30.46	-23.46	0.00	168	0.030	-30.46	-23.46	0.00
124	0.030	-30.46	-23.46	0.00	169	0.030	-30.46	-23.46	0.00
125	0.030	-30.46	-23.46	0.00	170	0.030	-30.46	-23.46	0.00
126	0.030	-30.46	-23.46	0.00	171	0.030	-30.46	-23.46	0.00
127	0.030	-30.46	-23.46	0.00	172	0.030	-30.46	-23.46	0.00
128	0.030	-30.46	-23.46	0.00	173	0.030	-30.46	-23.46	0.00
129	0.030	-30.46	-23.46	0.00	174	0.030	-30.46	-23.46	0.00
130	0.030	-30.46	-23.46	0.00	175	0.030	-30.46	-23.46	0.00
131	0.030	-30.46	-23.46	0.00	176	0.030	-30.46	-23.46	0.00
132	0.030	-30.46	-23.46	0.00	177	0.030	-30.46	-23.46	0.00
133	0.030	-30.46	-23.46	0.00	178	0.030	-30.46	-23.46	0.00
134	0.030	-30.46	-23.46	0.00	179	0.030	-30.46	-23.46	0.00

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
180	0.030	-30.46	-23.46	0.00	225	0.030	-30.46	-23.46	0.00
181	0.030	-30.46	-23.46	0.00	226	0.030	-30.46	-23.46	0.00
182	0.030	-30.46	-23.46	0.00	227	0.030	-30.46	-23.46	0.00
183	0.030	-30.46	-23.46	0.00	228	0.030	-30.46	-23.46	0.00
184	0.030	-30.46	-23.46	0.00	229	0.030	-30.46	-23.46	0.00
185	0.030	-30.46	-23.46	0.00	230	0.030	-30.46	-23.46	0.00
186	0.030	-30.46	-23.46	0.00	231	0.030	-30.46	-23.46	0.00
187	0.030	-30.46	-23.46	0.00	232	0.030	-30.46	-23.46	0.00
188	0.030	-30.46	-23.46	0.00	233	0.030	-30.46	-23.46	0.00
189	0.030	-30.46	-23.46	0.00	234	0.030	-30.46	-23.46	0.00
190	0.030	-30.46	-23.46	0.00	235	0.030	-30.46	-23.46	0.00
191	0.030	-30.46	-23.46	0.00	236	0.030	-30.46	-23.46	0.00
192	0.030	-30.46	-23.46	0.00	237	0.030	-30.46	-23.46	0.00
193	0.030	-30.46	-23.46	0.00	238	0.030	-30.46	-23.46	0.00
194	0.030	-30.46	-23.46	0.00	239	0.030	-30.46	-23.46	0.00
195	0.030	-30.46	-23.46	0.00	240	0.030	-30.46	-23.46	0.00
196	0.030	-30.46	-23.46	0.00	241	0.030	-30.46	-23.46	0.00
197	0.030	-30.46	-23.46	0.00	242	0.030	-30.46	-23.46	0.00
198	0.030	-30.46	-23.46	0.00	243	0.030	-30.46	-23.46	0.00
199	0.030	-30.46	-23.46	0.00	244	0.030	-30.46	-23.46	0.00
200	0.030	-30.46	-23.46	0.00	245	0.030	-30.46	-23.46	0.00
201	0.030	-30.46	-23.46	0.00	246	0.030	-30.46	-23.46	0.00
202	0.030	-30.46	-23.46	0.00	247	0.030	-30.46	-23.46	0.00
203	0.030	-30.46	-23.46	0.00	248	0.030	-30.46	-23.46	0.00
204	0.030	-30.46	-23.46	0.00	249	0.030	-30.46	-23.46	0.00
205	0.030	-30.46	-23.46	0.00	250	0.030	-30.46	-23.46	0.00
206	0.030	-30.46	-23.46	0.00	251	0.030	-30.46	-23.46	0.00
207	0.030	-30.46	-23.46	0.00	252	0.030	-30.46	-23.46	0.00
208	0.030	-30.46	-23.46	0.00	253	0.030	-30.46	-23.46	0.00
209	0.030	-30.46	-23.46	0.00	254	0.030	-30.46	-23.46	0.00
210	0.030	-30.46	-23.46	0.00	255	0.030	-30.46	-23.46	0.00
211	0.030	-30.46	-23.46	0.00	256	0.030	-30.46	-23.46	0.00
212	0.030	-30.46	-23.46	0.00	257	0.030	-30.46	-23.46	0.00
213	0.030	-30.46	-23.46	0.00	258	0.030	-30.46	-23.46	0.00
214	0.030	-30.46	-23.46	0.00	259	0.030	-30.46	-23.46	0.00
215	0.030	-30.46	-23.46	0.00	260	0.030	-30.46	-23.46	0.00
216	0.030	-30.46	-23.46	0.00	261	0.030	-30.46	-23.46	0.00
217	0.030	-30.46	-23.46	0.00	262	0.030	-30.46	-23.46	0.00
218	0.030	-30.46	-23.46	0.00	263	0.030	-30.46	-23.46	0.00
219	0.030	-30.46	-23.46	0.00	264	0.030	-30.46	-23.46	0.00
220	0.030	-30.46	-23.46	0.00	265	0.030	-30.46	-23.46	0.00
221	0.030	-30.46	-23.46	0.00	266	0.030	-30.46	-23.46	0.00
222	0.030	-30.46	-23.46	0.00	267	0.030	-30.46	-23.46	0.00
223	0.030	-30.46	-23.46	0.00	268	0.030	-30.46	-23.46	0.00
224	0.030	-30.46	-23.46	0.00	269	0.030	-30.46	-23.46	0.00

Exhibit 13.9 - Copy of Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 090.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization Component

Horizontal radiation pattern

0 degree electrical downtilt

Angle	Field	Rel.dB	dBd	PwrMult	Angle	Field	Rel.dB	dBd	PwrMult
270	0.030	-30.46	-23.46	0.00	315	0.618	-4.19	2.81	1.91
271	0.030	-30.46	-23.46	0.00	316	0.632	-3.99	3.01	2.00
272	0.030	-30.46	-23.46	0.00	317	0.646	-3.79	3.21	2.09
273	0.030	-30.46	-23.46	0.00	318	0.661	-3.60	3.40	2.19
274	0.030	-30.46	-23.46	0.00	319	0.675	-3.41	3.59	2.29
275	0.030	-30.46	-23.46	0.00	320	0.690	-3.22	3.78	2.39
276	0.034	-29.37	-22.37	0.01	321	0.704	-3.05	3.95	2.48
277	0.038	-28.40	-21.40	0.01	322	0.716	-2.90	4.10	2.57
278	0.042	-27.54	-20.54	0.01	323	0.729	-2.74	4.26	2.67
279	0.046	-26.74	-19.74	0.01	324	0.742	-2.59	4.41	2.76
280	0.050	-26.02	-19.02	0.01	325	0.756	-2.44	4.56	2.86
281	0.062	-24.15	-17.15	0.02	326	0.767	-2.30	4.70	2.95
282	0.074	-22.62	-15.62	0.03	327	0.781	-2.15	4.85	3.05
283	0.086	-21.31	-14.31	0.04	328	0.793	-2.02	4.98	3.15
284	0.098	-20.18	-13.18	0.05	329	0.806	-1.88	5.12	3.25
285	0.110	-19.17	-12.17	0.06	330	0.817	-1.75	5.25	3.35
286	0.126	-17.99	-10.99	0.08	331	0.829	-1.63	5.37	3.44
287	0.142	-16.95	-9.95	0.10	332	0.840	-1.52	5.48	3.53
288	0.158	-16.03	-9.03	0.13	333	0.851	-1.41	5.59	3.63
289	0.174	-15.19	-8.19	0.15	334	0.862	-1.29	5.71	3.72
290	0.190	-14.42	-7.42	0.18	335	0.873	-1.18	5.82	3.82
291	0.212	-13.47	-6.47	0.23	336	0.882	-1.10	5.90	3.89
292	0.234	-12.62	-5.62	0.27	337	0.890	-1.01	5.99	3.97
293	0.256	-11.84	-4.84	0.33	338	0.899	-0.92	6.08	4.05
294	0.278	-11.12	-4.12	0.39	339	0.908	-0.84	6.16	4.13
295	0.300	-10.46	-3.46	0.45	340	0.916	-0.76	6.24	4.21
296	0.318	-9.95	-2.95	0.51	341	0.923	-0.69	6.31	4.27
297	0.336	-9.47	-2.47	0.57	342	0.931	-0.62	6.38	4.34
298	0.354	-9.02	-2.02	0.63	343	0.938	-0.56	6.44	4.41
299	0.372	-8.59	-1.59	0.69	344	0.946	-0.49	6.51	4.48
300	0.390	-8.18	-1.18	0.76	345	0.952	-0.42	6.58	4.55
301	0.405	-7.84	-0.84	0.82	346	0.958	-0.37	6.63	4.60
302	0.421	-7.51	-0.51	0.89	347	0.964	-0.32	6.68	4.65
303	0.436	-7.20	-0.20	0.95	348	0.969	-0.27	6.73	4.71
304	0.452	-6.90	0.10	1.02	349	0.975	-0.22	6.78	4.76
305	0.467	-6.60	0.40	1.10	350	0.980	-0.18	6.82	4.81
306	0.483	-6.33	0.67	1.17	351	0.982	-0.15	6.85	4.84
307	0.498	-6.06	0.94	1.24	352	0.985	-0.13	6.87	4.87
308	0.513	-5.80	1.20	1.32	353	0.988	-0.10	6.90	4.89
309	0.528	-5.54	1.46	1.40	354	0.991	-0.08	6.92	4.92
310	0.544	-5.30	1.70	1.48	355	0.993	-0.06	6.94	4.95
311	0.558	-5.06	1.94	1.56	356	0.995	-0.04	6.96	4.96
312	0.573	-4.84	2.16	1.65	357	0.996	-0.03	6.97	4.97
313	0.588	-4.61	2.39	1.73	358	0.997	-0.02	6.98	4.99
314	0.602	-4.40	2.60	1.82	359	0.998	-0.01	6.99	5.00