

Exhibit 13.1 - Copy of Existing Antenna Structure Registration



Registration Detail

Reg Number	1015412	Status	Constructed
File Number	A0814993	Constructed	07/25/2008
EMI	No	Dismantled	
NEPA	No		

Antenna Structure

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

Location (in NAD83 Coordinates)

Lat/Long	37-59-06.4 N 078-28-47.4 W	Address	1840 Carters Mountain Trail (090228)
City, State	CHARLOTTESVILLE , VA		
Zip	22902	County	ALBEMARLE
Center of AM Array		Position of Tower in Array	

Heights (meters)

Elevation of Site Above Mean Sea Level	Overall Height Above Ground (AGL)
433.7	92.3
Overall Height Above Mean Sea Level	Overall Height Above Ground w/o Appurtenances
526.0	83.5

Painting and Lighting Specifications

FAA Chapters 4, 8, 12
Paint and Light in Accordance with FAA Circular Number 70/7460-1K

FAA Notification

FAA Study	2008-AEA-1656-OE	FAA Issue Date	07/25/2008
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Owner & Contact Information

FRN	0011498342	Owner Entity Type	Limited Liability Company
Assignor FRN	0005884689	Assignor ID	L00008376

Owner

American Towers, LLC
Attention To: Regulatory Compliance FAA FCC
10 Presidential Way
Woburn , MA 01801

P: (678)265-6730
F:
E: faa-fcc@americantower.com

Contact

Attention To: FAA FCC
10 Presidential Way
Woburn , MA 01801

P: (678)265-6730
F:
E: faa-fcc@americantower.com

Last Action Status

Status	Constructed	Received	01/15/2013
Purpose	Change Owner	Entered	01/15/2013
Mode	Interactive		

Related Applications

01/15/2013	A0814993	- Change Owner (OC)
12/15/2011	A0744722	- Admin Update (AU)
08/14/2009	A0646964	- Admin Update (AU)
Related applications (20)		

Output from NADCON for station ASR 1015412

North American Datum Conversion

NAD 83 to NAD 27

NADCON Program Version 2.11

Comments

Comments

None

History

Date

01/16/2013
01/16/2013
01/15/2013
All History (40)

Event

Registration Printed
Change of Ownership Letter Sent
Change of Ownership Received

Transformation #: 1 Region: Conus

Latitude Longitude

NAD 27 datum values:	37 59 5.89398	78 28 48.35907
NAD 83 datum values:	37 59 6.40000	78 28 47.40000
NAD 27 - NAD 83 shift values:	-0.50602	0.95907 (secs.)
	-15.602	23.404 (meters)
Magnitude of total shift:	28.128 (meters)	

Automated Letters

01/16/2013	Authorization, Reference
01/16/2013	Ownership Change, Reference 741836
08/15/2009	Authorization, Reference
All letters (19)	

Exhibit 13.2 Copy of USGS Photographic Topographic Map

Proposed Site

	Latitude (D M S)	Longitude (D M S)
NAD 27 datum values:	37 59 5.89398	78 28 48.35907
NAD 83 datum values:	37 59 6.40000	78 28 47.40000

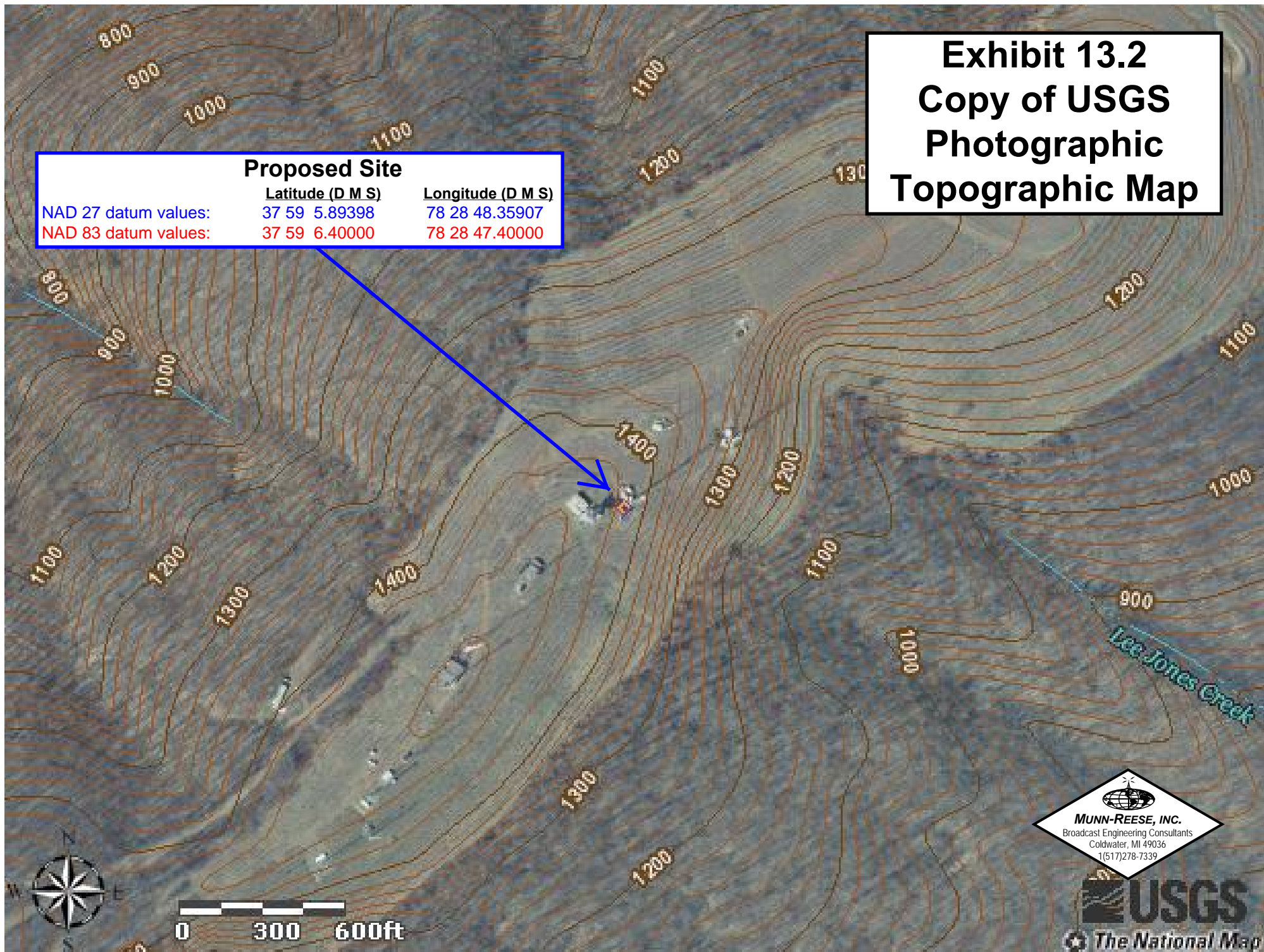
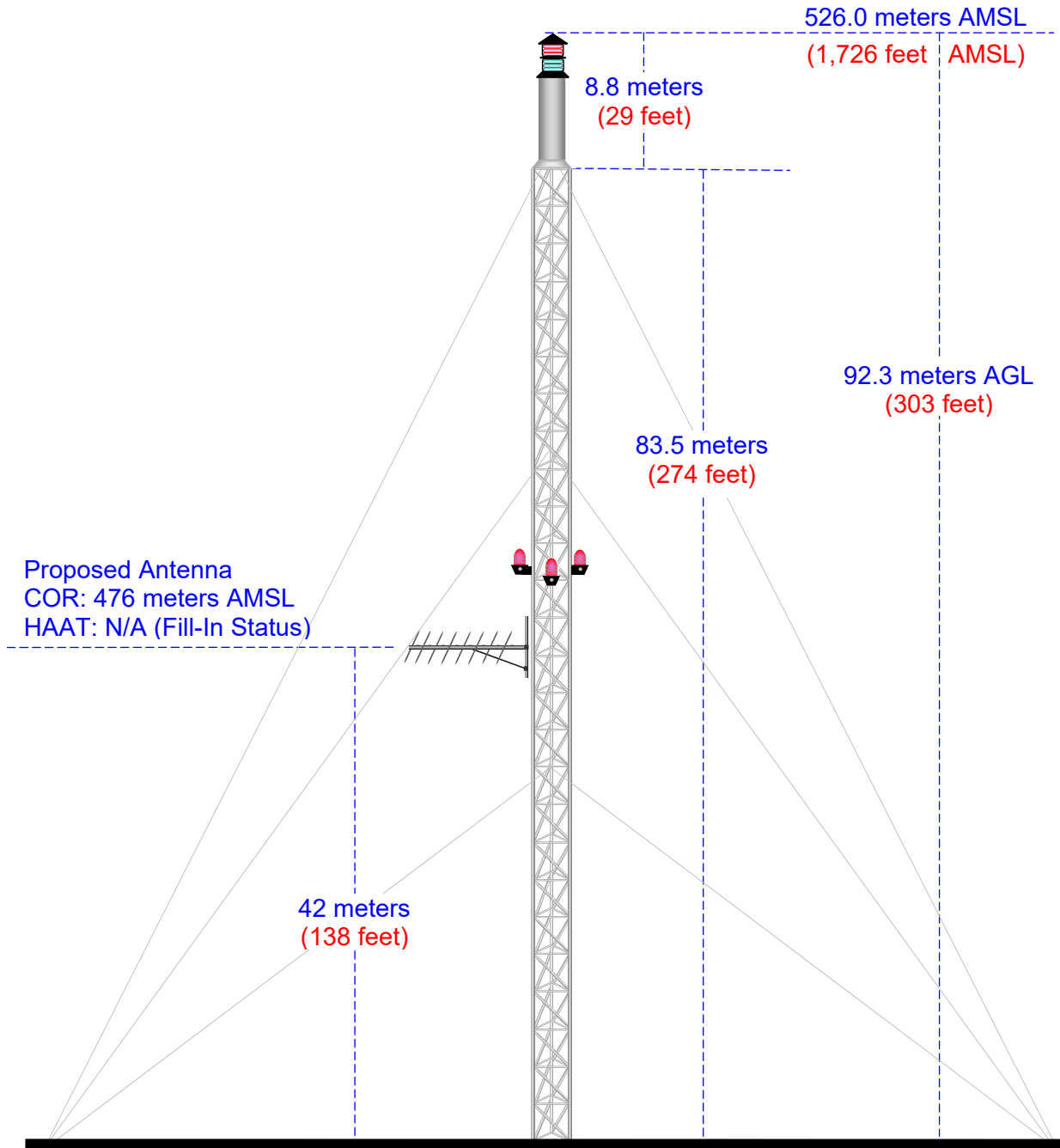


Exhibit 13.3

Vertical Plan of Antenna System

The site is located at 1840 Carters Mountain Trail;
the city of Charlottesville; Albemarle County; Virginia.

Antenna Structure Registration No.		<u>Latitude (D M S)</u>	<u>Longitude (D M S)</u>
1015412	NAD 27 datum values:	37 59 5.89398	78 28 48.35907
	NAD 83 datum values:	37 59 6.40000	78 28 47.40000



Ground Elevation = 433.7 m AMSL (1,423 feet)

Drawing is not to Scale

MUNN-REESE, INC.

Broadcast Engineering Consultants
Coldwater, MI 49036

NED 03 SEC Terrain Database
US Census 2010 PL Database

Exhibit 13.4 Proposed Service Contour Map

Licensee 60 dBμ F(50:50) Contour

Proposed 60 dBμ F(50:50) Contour

CH275D.P
Charlottesville, VA
Proposed Operation
Facility ID: 141162
Latitude: 37-59-06 N
Longitude: 078-28-48 W
ERP: 0.084 kW
Channel: 275D (102.9 MHz)
AMSL Height: 476.0 m
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour
Total Population: 92,276
Coverage Area: 286.2 sq. km

W276DA.L
Charlottesville, VA
BLFT20160527AAO
Facility ID: 141162
Latitude: 37-59-06 N
Longitude: 078-28-48 W
ERP: 0.10 kW
Channel: 276D (103.1 MHz)
AMSL Height: 479.0 m
Horiz. Pattern: Directional

60 dBμ F(50:50) Contour
Total Population: 101,219
Coverage Area: 306 sq. km

**CH275D.P
+
W276DA.L**

Terrain
70 953 m

Scale 1:145,000
0 2 4 6 km

V-Soft Communications LLC ©



Exhibit 13.5 Proposed vs. Primary Contour Showing

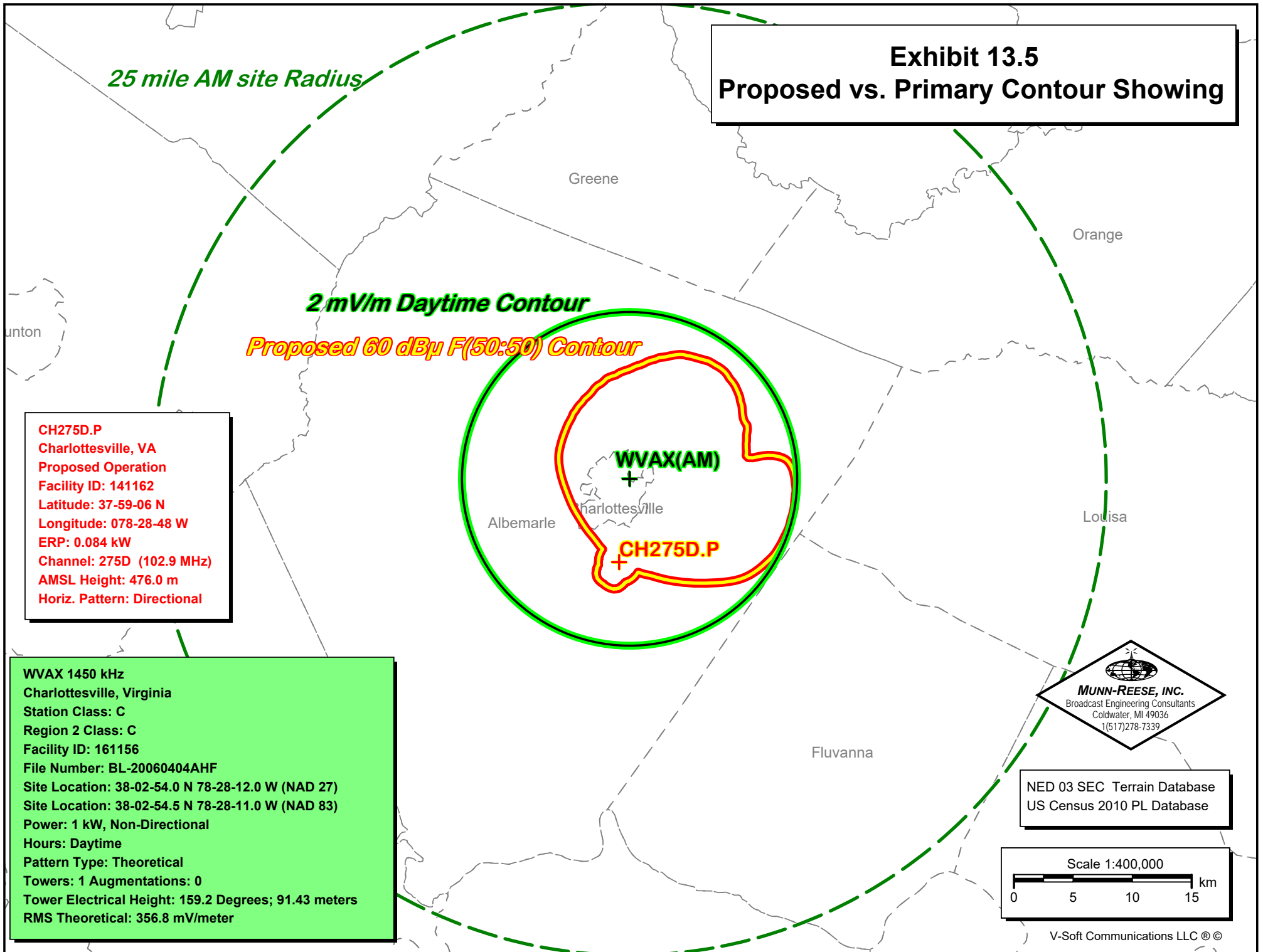


Exhibit 13.6

Tabulation of Proposed Allocation

REFERENCE 37 59 06.0 N. 78 28 48.0 W.		CH# 275D - 102.9 MHz, Pwr= 0.084 kW DA, HAAT= 321.4 M, COR= 476 M Average Protected F(50-50)= 17.85 km Standard Directional								DISPLAY DATES DATA 07-11-16 SEARCH 07-13-16	
CH CITY	CALL	TYPE STATE	ANT	AZI <--	DIST FILE #	LAT LNG	PWR(kW) HAAT(M)	INT(km) COR(M)	PRO(km) LICENSEE	*IN* (Overlap in km)	*OUT*
276D Charlottesville	W276DA	LIC DC_ VA		0.0 0.0	0.00 BLFT20160527AA0	37 59 06.0 78 28 48.0	0.100 299	27.0 479	18.2 Saga Communications Of Cha	-43.0*<	-42.0*<
274C1 Appomattox	WJJX	RSV-A VA	___N	201.0 20.9	77.74	37 19 55.0 78 47 45.0	100.000 299	103.2 511	70.8 Capstar Tx, LIc	-27.8*<	2.9
275A New Market	WLTK	LIC CX VA		332.1 151.9	78.49 BLH20120614ABT	38 36 30.0 78 54 09.0	2.050 169	91.2 670	34.1 Massanutten Broadcasting C	-23.4*<	8.5
272A Crozet	WZGN	LIC CN VA		294.9 114.8	25.04 BLH19900816KC	38 04 47.0 78 44 22.0	4.900 108	3.7 470	41.5 Monticello Media LIc	19.6	-16.5*<
278A Crozet	WMRY	LIC CN VA		260.1 80.0	22.19 BLED19950524KC	37 57 02.0 78 43 46.0	0.280 446	1.2 732	29.6 James Madison University B	19.2	-7.4*<
Commercial channel operating educational											
274B Appomattox	WJJX	LIC CN VA		219.1 38.8	73.80 BLH19890602KC	37 28 07.0 79 00 27.0	22.000 227	77.6 439	65.5 Capstar Tx, LIc	-6.0*<	2.1
To amend to channel 274C1 Per D91-8											
276A Culpeper	WJMA	LIC ZCX VA		37.5 217.8	70.13 BLH20090826AAF	38 29 04.0 77 59 22.0	6.000 86	37.2 210	24.4 Piedmont Communications, I	16.0	20.6
275D Ashland	W275BQ	LIC C_ VA		106.8 287.4	90.39 BLFT20110525AAL	37 44 46.0 77 29 44.0	0.250 97	38.2 150	11.2 Fifth Estate Broadcasting,	45.9	55.6
277D Harrisonburg	W277CY	LIC C_ VA		324.2 143.9	63.58 BLFT20160421AES	38 26 52.3 78 54 27.3	0.010	0.2 436	3.5 Positive Alternative Radio	55.5	59.9
273B Winchester	WUSQ-FM	LIC CN VA		8.0 188.1	133.86 BLH19880405KB	39 10 38.0 78 15 53.0	32.000 192	6.4 482	68.4 Capstar Tx, LIc	110.5	64.3
Grandfathered at 32kw ERP & 192m HAAT											
274L1 Fredericksburg	WLMP-LP	LIC VA		67.9 248.5	98.05 BLL20101201AHB	38 18 46.0 77 26 20.0	0.014 79	125	76.0 Calvary Chapel Of Frederic	69.8	
275A California	WKIK-FM	LIC C_ MD		74.8 256.0	168.43 BLH19941212KC	38 22 03.0 76 36 55.0	4.000 120	81.3 140	26.5 Somar Communications, Inc.	72.0	91.3
276D Midlothian	W276BZ	LIC C_ VA		124.0 304.5	93.41 BLFT20090610AEC	37 30 45.0 77 36 05.0	0.010 134	9.4 200	6.7 Stucomm, Inc	82.2	83.5
273D Richmond	W273BB	LIC C_ VA		115.6 296.2	94.21 BLFT20140203APM	37 36 52.0 77 30 56.0	0.099 117	0.7 175	10.2 Positive Alternative Radio	90.9	84.0
275B Norfolk	WOWI	LIC CX VA		125.8 307.1	230.08 BLH20131212ATB	36 45 19.3 76 23 07.1	50.000 150	137.2 152	64.6 Cc Licenses, LIc	91.1	151.2

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.
< = Contour Overlap

Green Text denotes the facility to be modified by this proposal. This facility need not be protected.

Blue Highlighted Text denotes supplemental contour protection studies toward select facilities as included in **Exhibit(s) 13.7(a-b)**.

Yellow Highlighted Text denotes a §74.1204(d) Second/Third Adjacent Channel Given Interference Waiver Request as noted in **Exhibit(s) 13.8**. Full protection will be afforded all allocation concerns as the worst case calculated interference area is void of any housing, buildings or major roads as noted in the attached USGS Aerial Photograph. The applicant would like to note the existence of multiple dedicated transmitter buildings and agricultural related structures located at the remote mountain top site. However, structures of this nature have been exempt as a matter of FCC Policy.

Exhibit 13.7a

Contour Protection Studies Toward Select Stations

FMCommander Single Allocation Study - 07-13-2016 - NED 03 SEC
CH275D.P's Overlaps (In= -23.44 km, Out= 8.52 km)

CH275D.P CH 275 D DA
Lat= 37 59 06.0, Lng= 78 28 48.0
0.084 kW 321.4 m HAAT, 476 m COR
Prot.= 60 dBu, Intef.= 40 dBu

WLTK CH 275 A BLH20120614ABT
Lat= 38 36 30.0, Lng= 78 54 09.0
2.05 kW 169 m HAAT, 670 m COR
Prot.= 60 dBu, Intef.= 40 dBu

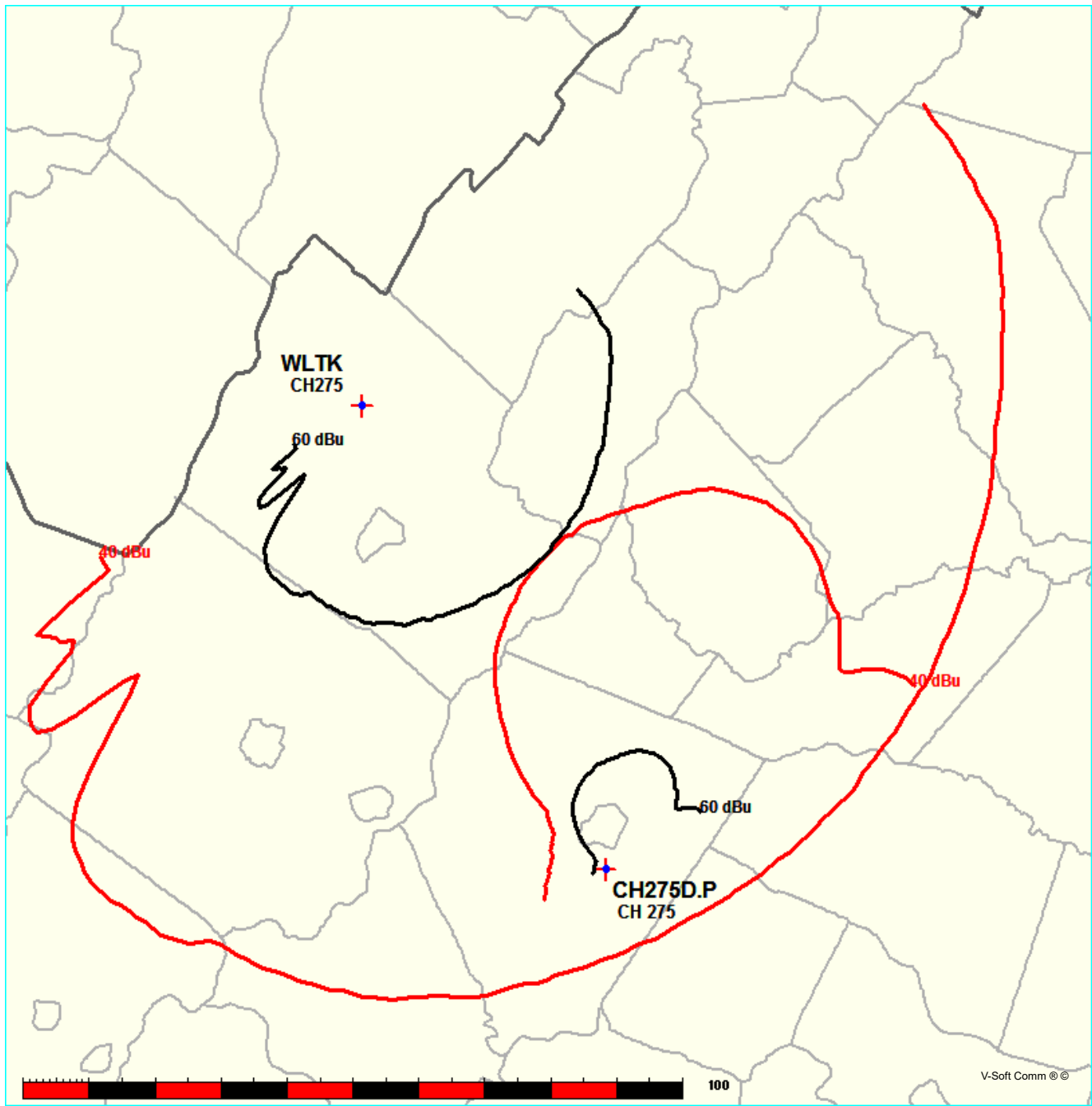


Exhibit 13.7a

Contour Protection Studies Toward Select Stations

07-13-2016

Terrain Data: NED 03 SEC

FMOver Analysis

CH275D.P

WLTk BLH20120614ABT

Channel = 275D
Max ERP = 0.084 kW
RCAMSL = 476 m
N. Lat. 37 59 06.0
W. Lng. 78 28 48.0
Protected
60 dBu

Channel = 275A
Max ERP = 2.05 kW
RCAMSL = 670 m
N. Lat. 38 36 30.0
W. Lng. 78 54 09.0
Interfering
40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
290.0	000.0001	0267.9	001.8	152.7	002.0500	0252.2	077.2	44.45*	13.85
291.0	000.0001	0267.5	001.8	152.7	002.0500	0252.2	077.2	44.46*	13.87
292.0	000.0001	0268.5	001.8	152.7	002.0500	0252.2	077.2	44.47*	13.89
293.0	000.0001	0268.8	001.8	152.7	002.0500	0252.2	077.1	44.48*	13.91
294.0	000.0001	0271.8	001.8	152.7	002.0500	0252.3	077.1	44.48*	13.93
295.0	000.0001	0278.6	001.8	152.6	002.0500	0252.3	077.1	44.49*	13.96
296.0	000.0001	0281.3	001.8	152.6	002.0500	0252.3	077.1	44.50*	13.98
297.0	000.0001	0280.8	001.8	152.6	002.0500	0252.3	077.1	44.50*	14.00
298.0	000.0001	0279.8	001.8	152.6	002.0500	0252.3	077.0	44.51*	14.02
299.0	000.0001	0283.9	001.8	152.6	002.0500	0252.4	077.0	44.52*	14.04
300.0	000.0001	0290.1	001.8	152.6	002.0500	0252.4	077.0	44.52*	14.06
301.0	000.0001	0292.6	001.8	152.5	002.0500	0252.4	077.0	44.53*	14.08
302.0	000.0001	0292.4	001.8	152.5	002.0500	0252.4	077.0	44.54*	14.10
303.0	000.0001	0297.3	001.8	152.5	002.0500	0252.5	077.0	44.54*	14.12
304.0	000.0001	0296.8	001.9	152.5	002.0500	0252.4	076.8	44.58*	14.23
305.0	000.0001	0296.6	002.0	152.5	002.0500	0252.4	076.7	44.61*	14.33
306.0	000.0001	0299.5	002.1	152.5	002.0500	0252.4	076.6	44.65*	14.44
307.0	000.0001	0297.9	002.2	152.6	002.0500	0252.4	076.5	44.69*	14.55
308.0	000.0001	0300.4	002.3	152.6	002.0500	0252.4	076.4	44.72*	14.65
309.0	000.0001	0298.5	002.4	152.6	002.0500	0252.4	076.3	44.75*	14.75
310.0	000.0002	0295.6	002.5	152.6	002.0500	0252.4	076.2	44.78*	14.85
311.0	000.0002	0300.7	002.6	152.6	002.0500	0252.4	076.1	44.82*	14.95
312.0	000.0002	0303.9	002.7	152.5	002.0500	0252.4	076.0	44.85*	15.06
313.0	000.0002	0305.2	002.7	152.5	002.0500	0252.4	075.9	44.89*	15.16
314.0	000.0003	0307.9	003.3	152.6	002.0500	0252.3	075.3	45.08*	15.73
315.0	000.0005	0313.6	003.9	152.7	002.0500	0252.2	074.8	45.26*	16.29
316.0	000.0007	0311.2	004.4	152.8	002.0500	0252.2	074.3	45.43*	16.79
317.0	000.0009	0308.5	004.9	152.9	002.0500	0252.1	073.8	45.59*	17.28
318.0	000.0012	0308.5	005.4	152.9	002.0500	0252.1	073.3	45.75*	17.74
319.0	000.0015	0310.7	005.8	152.9	002.0500	0252.1	072.8	45.90*	18.19
320.0	000.0018	0312.8	006.2	152.9	002.0500	0252.1	072.4	46.04*	18.62
321.0	000.0022	0311.2	006.6	152.9	002.0500	0252.1	072.0	46.17*	19.01
322.0	000.0026	0310.8	007.0	152.8	002.0500	0252.1	071.7	46.30*	19.39

MUNN-REESE, INC.

Broadcast Engineering Consultants
COLDWATER, MI 49036

Exhibit 13.7a

Contour Protection Studies Toward Select Stations

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	
323.0	000.0030	0309.0	007.3	152.8	002.0500	0252.2	071.3	46.42*	19.74
324.0	000.0037	0309.9	007.8	152.7	002.0500	0252.2	070.8	46.59*	20.23
325.0	000.0044	0308.6	008.2	152.7	002.0500	0252.2	070.4	46.74*	20.68
326.0	000.0052	0306.2	008.6	152.6	002.0500	0252.3	070.0	46.88*	21.08
327.0	000.0061	0306.8	009.0	152.5	002.0500	0252.4	069.6	47.02*	21.50
328.0	000.0071	0309.7	009.4	152.4	002.0500	0252.6	069.2	47.17*	21.94
329.0	000.0081	0312.0	009.7	152.3	002.0500	0252.8	068.8	47.31*	22.34
330.0	000.0091	0312.8	010.1	152.2	002.0500	0253.1	068.4	47.44*	22.72
331.0	000.0103	0313.3	010.4	152.0	002.0500	0253.3	068.1	47.56*	23.07
332.0	000.0115	0313.0	010.7	151.9	002.0500	0253.7	067.8	47.67*	23.41
333.0	000.0128	0309.9	010.9	151.7	002.0500	0254.4	067.6	47.78*	23.71
334.0	000.0138	0311.0	011.2	151.5	002.0500	0255.0	067.3	47.88*	23.99
335.0	000.0149	0311.4	011.4	151.4	002.0500	0255.4	067.1	47.96*	24.24
336.0	000.0160	0311.6	011.6	151.2	002.0500	0255.7	066.9	48.04*	24.46
337.0	000.0172	0312.9	011.8	151.0	002.0500	0255.8	066.7	48.11*	24.68
338.0	000.0183	0315.0	012.1	150.8	002.0500	0255.9	066.5	48.19*	24.89
339.0	000.0195	0315.2	012.2	150.6	002.0500	0256.0	066.4	48.25*	25.07
340.0	000.0208	0317.5	012.5	150.4	002.0500	0256.3	066.2	48.33*	25.30
341.0	000.0221	0317.9	012.7	150.2	002.0500	0256.6	066.0	48.39*	25.48
342.0	000.0235	0319.6	012.9	149.9	002.0500	0256.8	065.8	48.46*	25.67
343.0	000.0249	0324.1	013.2	149.7	002.0500	0256.6	065.6	48.53*	25.87
344.0	000.0262	0323.3	013.3	149.5	002.0500	0256.7	065.5	48.56*	25.97
345.0	000.0276	0326.2	013.5	149.2	002.0500	0256.9	065.4	48.62*	26.14
346.0	000.0290	0325.7	013.7	149.0	002.0500	0256.5	065.3	48.64*	26.19
347.0	000.0304	0325.6	013.8	148.7	002.0500	0255.7	065.2	48.64*	26.19
348.0	000.0320	0327.7	014.1	148.5	002.0500	0254.9	065.1	48.66*	26.23
349.0	000.0336	0326.7	014.2	148.2	002.0500	0254.9	065.0	48.67*	26.28
350.0	000.0351	0327.0	014.4	148.0	002.0500	0254.7	065.0	48.69*	26.32
351.0	000.0367	0328.4	014.6	147.7	002.0500	0254.3	064.9	48.70*	26.36
352.0	000.0383	0333.4	014.8	147.4	002.0500	0254.5	064.8	48.76*	26.52
353.0	000.0400	0334.2	015.0	147.1	002.0500	0255.8	064.7	48.82*	26.71
354.0	000.0415	0332.2	015.1	146.9	002.0500	0257.0	064.7	48.85*	26.80
355.0	000.0429	0333.9	015.3	146.6	002.0500	0258.1	064.7	48.90*	26.94
356.0	000.0445	0338.1	015.5	146.3	002.0500	0259.0	064.6	48.96*	27.11
357.0	000.0461	0336.8	015.6	146.0	002.0500	0259.3	064.7	48.96*	27.10
358.0	000.0476	0334.0	015.7	145.8	002.0500	0259.8	064.7	48.94*	27.06
359.0	000.0493	0332.0	015.8	145.5	002.0500	0260.3	064.8	48.94*	27.04
000.0	000.0510	0333.1	015.9	145.3	002.0500	0260.7	064.8	48.94*	27.06
001.0	000.0527	0332.7	016.1	145.0	002.0500	0261.2	064.9	48.94*	27.06
002.0	000.0543	0331.6	016.2	144.7	002.0500	0261.6	065.0	48.93*	27.01
003.0	000.0561	0331.2	016.3	144.5	002.0500	0262.2	065.0	48.92*	27.00
004.0	000.0575	0331.7	016.4	144.2	002.0500	0262.3	065.1	48.90*	26.93
005.0	000.0588	0334.2	016.6	143.9	002.0500	0262.4	065.2	48.88*	26.87
006.0	000.0603	0333.6	016.7	143.7	002.0500	0262.3	065.3	48.83*	26.75
007.0	000.0617	0335.4	016.8	143.4	002.0500	0262.5	065.4	48.81*	26.68

Exhibit 13.7a

Contour Protection Studies Toward Select Stations

07-13-2016

Terrain Data: NED 03 SEC

FMOver Analysis

WLTK BLH20120614ABT

CH275D.P

Channel = 275A

Max ERP = 2.05 kW

RCAMSL = 670 m

N. Lat. 38 36 30.0

W. Lng. 78 54 09.0

Protected

60 dBu

Channel = 275D

Max ERP = 0.084 kW

RCAMSL = 476 m

N. Lat. 37 59 06.0

W. Lng. 78 28 48.0

Interfering

40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
107.0	002.0500	0295.3	036.5	358.2	000.0480	0333.5	058.6	37.45	
108.0	002.0500	0295.1	036.5	358.0	000.0476	0334.0	058.0	37.66	
109.0	002.0500	0294.9	036.5	357.8	000.0473	0334.7	057.4	37.87	
110.0	002.0500	0294.4	036.5	357.5	000.0469	0335.7	056.8	38.09	
111.0	002.0500	0293.0	036.4	357.2	000.0464	0336.7	056.3	38.29	
112.0	002.0500	0292.1	036.3	356.8	000.0459	0336.9	055.7	38.46	
113.0	002.0500	0292.0	036.3	356.6	000.0454	0336.8	055.1	38.63	
114.0	002.0500	0292.9	036.4	356.3	000.0450	0337.4	054.5	38.83	
115.0	002.0500	0293.0	036.4	356.0	000.0445	0338.1	054.0	39.02	
116.0	002.0500	0291.1	036.3	355.5	000.0438	0337.1	053.5	39.11	
117.0	002.0500	0288.8	036.2	355.1	000.0430	0334.4	053.0	39.13	
118.0	002.0500	0288.0	036.1	354.7	000.0424	0332.2	052.5	39.19	
119.0	002.0500	0286.4	036.0	354.2	000.0418	0332.0	052.0	39.30	
120.0	002.0500	0286.3	036.0	353.8	000.0412	0332.4	051.5	39.44	
121.0	002.0500	0286.8	036.0	353.4	000.0405	0333.2	051.0	39.60	
122.0	002.0500	0285.1	036.0	352.8	000.0397	0334.5	050.6	39.72	
123.0	002.0500	0282.7	035.8	352.3	000.0387	0334.9	050.2	39.77	
124.0	002.0500	0281.4	035.7	351.7	000.0378	0331.6	049.8	39.73	
125.0	002.0500	0279.4	035.6	351.1	000.0369	0329.0	049.4	39.68	
126.0	002.0500	0280.2	035.7	350.7	000.0361	0328.0	048.9	39.75	
127.0	002.0500	0282.5	035.8	350.2	000.0354	0327.1	048.4	39.84	
128.0	002.0500	0282.7	035.8	349.7	000.0346	0327.1	048.0	39.90	
129.0	002.0500	0280.5	035.7	349.0	000.0336	0326.7	047.7	39.88	
130.0	002.0500	0278.9	035.6	348.4	000.0326	0327.0	047.3	39.89	
131.0	002.0500	0276.5	035.5	347.7	000.0315	0326.7	047.1	39.83	
132.0	002.0500	0275.4	035.4	347.0	000.0305	0325.6	046.8	39.78	
133.0	002.0500	0275.0	035.4	346.4	000.0296	0324.7	046.5	39.75	
134.0	002.0500	0274.0	035.3	345.7	000.0286	0326.2	046.2	39.76	
135.0	002.0500	0273.8	035.3	345.0	000.0276	0326.2	045.9	39.74	

Exhibit 13.7a

Contour Protection Studies Toward Select Stations

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
136.0	002.0500	0273.3	035.3	344.3	000.0267	0324.0	045.6	39.63
137.0	002.0500	0269.9	035.1	343.5	000.0256	0323.5	045.5	39.47
138.0	002.0500	0268.5	035.0	342.8	000.0246	0323.6	045.3	39.38
139.0	002.0500	0270.0	035.1	342.1	000.0237	0320.0	045.0	39.24
140.0	002.0500	0267.6	034.9	341.3	000.0226	0318.1	044.9	39.01
141.0	002.0500	0265.7	034.8	340.5	000.0215	0317.4	044.8	38.83
142.0	002.0500	0263.3	034.7	339.7	000.0205	0316.9	044.7	38.63
143.0	002.0500	0263.3	034.7	339.0	000.0195	0315.2	044.6	38.44
144.0	002.0500	0262.4	034.6	338.2	000.0186	0315.1	044.5	38.27
145.0	002.0500	0261.2	034.6	337.5	000.0177	0313.8	044.4	38.04
146.0	002.0500	0259.3	034.4	336.7	000.0168	0312.2	044.4	37.75
147.0	002.0500	0256.4	034.3	335.9	000.0158	0311.7	044.5	37.46
148.0	002.0500	0254.8	034.2	335.1	000.0150	0311.4	044.5	37.20
149.0	002.0500	0256.6	034.3	334.3	000.0141	0311.8	044.3	37.04
150.0	002.0500	0256.8	034.3	333.6	000.0133	0309.6	044.2	36.74
151.0	002.0500	0255.8	034.2	332.8	000.0125	0310.5	044.3	36.47
152.0	002.0500	0253.4	034.1	332.0	000.0115	0313.0	044.4	36.13
153.0	002.0500	0252.0	034.0	331.2	000.0106	0313.2	044.5	35.73
154.0	002.0500	0251.6	034.0	330.5	000.0097	0313.2	044.6	35.33
155.0	002.0500	0251.4	034.0	329.7	000.0089	0312.6	044.6	34.89
156.0	002.0500	0250.0	033.9	329.0	000.0081	0311.9	044.8	34.40
157.0	002.0500	0248.7	033.8	328.3	000.0073	0310.1	045.0	33.85
158.0	002.0500	0248.4	033.8	327.5	000.0066	0308.6	045.1	33.31
159.0	002.0500	0248.2	033.8	326.8	000.0059	0306.4	045.2	32.73
160.0	002.0500	0245.6	033.6	326.1	000.0053	0306.2	045.5	32.15
161.0	002.0500	0244.9	033.5	325.4	000.0048	0307.0	045.7	31.60
162.0	002.0500	0248.6	033.8	324.6	000.0042	0309.4	045.6	31.10
163.0	002.0500	0246.5	033.6	324.0	000.0037	0309.8	045.9	30.47
164.0	002.0500	0241.8	033.3	323.4	000.0033	0308.6	046.4	29.76
165.0	002.0500	0242.7	033.4	322.7	000.0029	0308.6	046.6	29.14
166.0	002.0500	0242.9	033.4	322.1	000.0026	0310.5	046.8	28.66
167.0	002.0500	0244.5	033.5	321.4	000.0024	0311.2	047.0	28.13
168.0	002.0500	0245.1	033.6	320.7	000.0021	0311.3	047.2	27.55
169.0	002.0500	0245.1	033.6	320.1	000.0019	0312.6	047.5	26.99
170.0	002.0500	0242.6	033.4	319.6	000.0017	0313.2	047.9	26.41
171.0	002.0500	0239.1	033.2	319.1	000.0016	0311.3	048.4	25.76
172.0	002.0500	0236.0	033.0	318.7	000.0014	0309.8	048.9	25.12
173.0	002.0500	0234.4	032.9	318.2	000.0013	0308.7	049.3	24.46
174.0	002.0500	0233.4	032.8	317.7	000.0011	0308.5	049.7	23.80
175.0	002.0500	0232.9	032.7	317.2	000.0010	0308.3	050.1	23.11
176.0	002.0500	0233.6	032.8	316.7	000.0009	0309.0	050.4	22.38
177.0	002.0500	0234.4	032.9	316.1	000.0007	0310.9	050.7	21.64
178.0	002.0500	0232.9	032.7	315.7	000.0007	0312.0	051.2	20.96
179.0	002.0500	0230.4	032.6	315.4	000.0006	0313.2	051.7	20.33
180.0	002.0500	0229.1	032.5	315.0	000.0005	0313.6	052.2	19.60

MUNN-REESE, INC.

Broadcast Engineering Consultants
COLDWATER, MI 49036

Exhibit 13.7b

Contour Protection Studies Toward Select Stations

FMCommander Single Allocation Study - 07-13-2016 - NED 03 SEC
CH275D.P's Overlaps (In= -6.04 km, Out= 2.12 km)

CH275D.P CH 275 D DA
Lat= 37 59 06.0, Lng= 78 28 48.0
0.084 kW 321.4 m HAAT, 476 m COR
Prot.= 60 dBu, Intef.= 48 dBu

WJJX CH 274 B BLH19890602KC
Lat= 37 28 07.0, Lng= 79 00 27.0
22.0 kW 227 m HAAT, 439 m COR
Prot.= 54 dBu, Intef.= 54 dBu

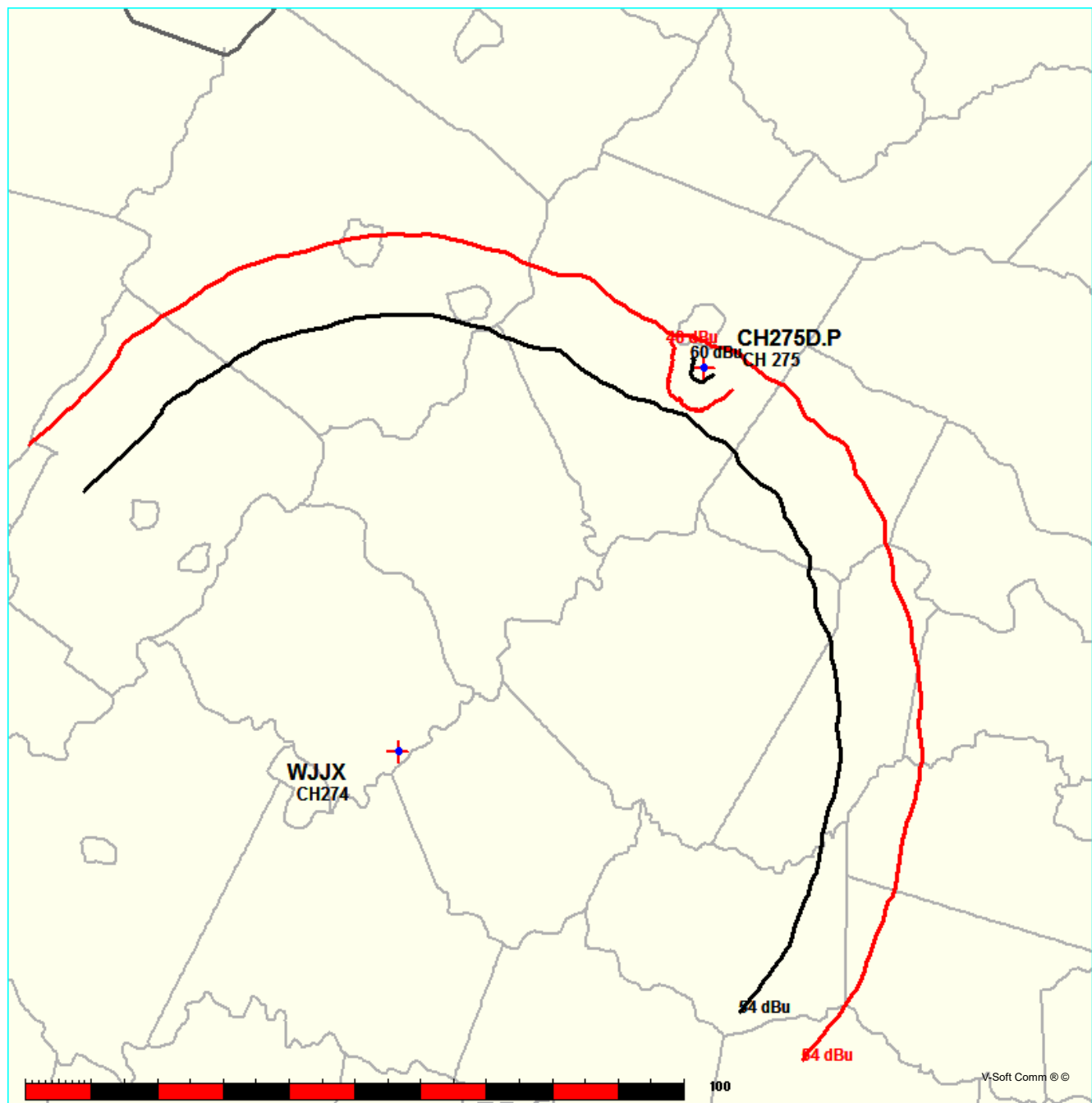


Exhibit 13.7b

Contour Protection Studies Toward Select Stations

07-13-2016

Terrain Data: NED 03 SEC

FMOver Analysis

CH275D.P

WLTk BLH20120614ABT

Channel = 275D
Max ERP = 0.084 kW
RCAMSL = 476 m
N. Lat. 37 59 06.0
W. Lng. 78 28 48.0
Protected
60 dBu

Channel = 275A
Max ERP = 2.05 kW
RCAMSL = 670 m
N. Lat. 38 36 30.0
W. Lng. 78 54 09.0
Interfering
40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
290.0	000.0001	0267.9	001.8	152.7	002.0500	0252.2	077.2	44.45*	13.85
291.0	000.0001	0267.5	001.8	152.7	002.0500	0252.2	077.2	44.46*	13.87
292.0	000.0001	0268.5	001.8	152.7	002.0500	0252.2	077.2	44.47*	13.89
293.0	000.0001	0268.8	001.8	152.7	002.0500	0252.2	077.1	44.48*	13.91
294.0	000.0001	0271.8	001.8	152.7	002.0500	0252.3	077.1	44.48*	13.93
295.0	000.0001	0278.6	001.8	152.6	002.0500	0252.3	077.1	44.49*	13.96
296.0	000.0001	0281.3	001.8	152.6	002.0500	0252.3	077.1	44.50*	13.98
297.0	000.0001	0280.8	001.8	152.6	002.0500	0252.3	077.1	44.50*	14.00
298.0	000.0001	0279.8	001.8	152.6	002.0500	0252.3	077.0	44.51*	14.02
299.0	000.0001	0283.9	001.8	152.6	002.0500	0252.4	077.0	44.52*	14.04
300.0	000.0001	0290.1	001.8	152.6	002.0500	0252.4	077.0	44.52*	14.06
301.0	000.0001	0292.6	001.8	152.5	002.0500	0252.4	077.0	44.53*	14.08
302.0	000.0001	0292.4	001.8	152.5	002.0500	0252.4	077.0	44.54*	14.10
303.0	000.0001	0297.3	001.8	152.5	002.0500	0252.5	077.0	44.54*	14.12
304.0	000.0001	0296.8	001.9	152.5	002.0500	0252.4	076.8	44.58*	14.23
305.0	000.0001	0296.6	002.0	152.5	002.0500	0252.4	076.7	44.61*	14.33
306.0	000.0001	0299.5	002.1	152.5	002.0500	0252.4	076.6	44.65*	14.44
307.0	000.0001	0297.9	002.2	152.6	002.0500	0252.4	076.5	44.69*	14.55
308.0	000.0001	0300.4	002.3	152.6	002.0500	0252.4	076.4	44.72*	14.65
309.0	000.0001	0298.5	002.4	152.6	002.0500	0252.4	076.3	44.75*	14.75
310.0	000.0002	0295.6	002.5	152.6	002.0500	0252.4	076.2	44.78*	14.85
311.0	000.0002	0300.7	002.6	152.6	002.0500	0252.4	076.1	44.82*	14.95
312.0	000.0002	0303.9	002.7	152.5	002.0500	0252.4	076.0	44.85*	15.06
313.0	000.0002	0305.2	002.7	152.5	002.0500	0252.4	075.9	44.89*	15.16
314.0	000.0003	0307.9	003.3	152.6	002.0500	0252.3	075.3	45.08*	15.73
315.0	000.0005	0313.6	003.9	152.7	002.0500	0252.2	074.8	45.26*	16.29
316.0	000.0007	0311.2	004.4	152.8	002.0500	0252.2	074.3	45.43*	16.79
317.0	000.0009	0308.5	004.9	152.9	002.0500	0252.1	073.8	45.59*	17.28
318.0	000.0012	0308.5	005.4	152.9	002.0500	0252.1	073.3	45.75*	17.74
319.0	000.0015	0310.7	005.8	152.9	002.0500	0252.1	072.8	45.90*	18.19
320.0	000.0018	0312.8	006.2	152.9	002.0500	0252.1	072.4	46.04*	18.62
321.0	000.0022	0311.2	006.6	152.9	002.0500	0252.1	072.0	46.17*	19.01
322.0	000.0026	0310.8	007.0	152.8	002.0500	0252.1	071.7	46.30*	19.39

Exhibit 13.7b

Contour Protection Studies Toward Select Stations

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
323.0	000.0030	0309.0	007.3	152.8	002.0500	0252.2	071.3	46.42* 19.74
324.0	000.0037	0309.9	007.8	152.7	002.0500	0252.2	070.8	46.59* 20.23
325.0	000.0044	0308.6	008.2	152.7	002.0500	0252.2	070.4	46.74* 20.68
326.0	000.0052	0306.2	008.6	152.6	002.0500	0252.3	070.0	46.88* 21.08
327.0	000.0061	0306.8	009.0	152.5	002.0500	0252.4	069.6	47.02* 21.50
328.0	000.0071	0309.7	009.4	152.4	002.0500	0252.6	069.2	47.17* 21.94
329.0	000.0081	0312.0	009.7	152.3	002.0500	0252.8	068.8	47.31* 22.34
330.0	000.0091	0312.8	010.1	152.2	002.0500	0253.1	068.4	47.44* 22.72
331.0	000.0103	0313.3	010.4	152.0	002.0500	0253.3	068.1	47.56* 23.07
332.0	000.0115	0313.0	010.7	151.9	002.0500	0253.7	067.8	47.67* 23.41
333.0	000.0128	0309.9	010.9	151.7	002.0500	0254.4	067.6	47.78* 23.71
334.0	000.0138	0311.0	011.2	151.5	002.0500	0255.0	067.3	47.88* 23.99
335.0	000.0149	0311.4	011.4	151.4	002.0500	0255.4	067.1	47.96* 24.24
336.0	000.0160	0311.6	011.6	151.2	002.0500	0255.7	066.9	48.04* 24.46
337.0	000.0172	0312.9	011.8	151.0	002.0500	0255.8	066.7	48.11* 24.68
338.0	000.0183	0315.0	012.1	150.8	002.0500	0255.9	066.5	48.19* 24.89
339.0	000.0195	0315.2	012.2	150.6	002.0500	0256.0	066.4	48.25* 25.07
340.0	000.0208	0317.5	012.5	150.4	002.0500	0256.3	066.2	48.33* 25.30
341.0	000.0221	0317.9	012.7	150.2	002.0500	0256.6	066.0	48.39* 25.48
342.0	000.0235	0319.6	012.9	149.9	002.0500	0256.8	065.8	48.46* 25.67
343.0	000.0249	0324.1	013.2	149.7	002.0500	0256.6	065.6	48.53* 25.87
344.0	000.0262	0323.3	013.3	149.5	002.0500	0256.7	065.5	48.56* 25.97
345.0	000.0276	0326.2	013.5	149.2	002.0500	0256.9	065.4	48.62* 26.14
346.0	000.0290	0325.7	013.7	149.0	002.0500	0256.5	065.3	48.64* 26.19
347.0	000.0304	0325.6	013.8	148.7	002.0500	0255.7	065.2	48.64* 26.19
348.0	000.0320	0327.7	014.1	148.5	002.0500	0254.9	065.1	48.66* 26.23
349.0	000.0336	0326.7	014.2	148.2	002.0500	0254.9	065.0	48.67* 26.28
350.0	000.0351	0327.0	014.4	148.0	002.0500	0254.7	065.0	48.69* 26.32
351.0	000.0367	0328.4	014.6	147.7	002.0500	0254.3	064.9	48.70* 26.36
352.0	000.0383	0333.4	014.8	147.4	002.0500	0254.5	064.8	48.76* 26.52
353.0	000.0400	0334.2	015.0	147.1	002.0500	0255.8	064.7	48.82* 26.71
354.0	000.0415	0332.2	015.1	146.9	002.0500	0257.0	064.7	48.85* 26.80
355.0	000.0429	0333.9	015.3	146.6	002.0500	0258.1	064.7	48.90* 26.94
356.0	000.0445	0338.1	015.5	146.3	002.0500	0259.0	064.6	48.96* 27.11
357.0	000.0461	0336.8	015.6	146.0	002.0500	0259.3	064.7	48.96* 27.10
358.0	000.0476	0334.0	015.7	145.8	002.0500	0259.8	064.7	48.94* 27.06
359.0	000.0493	0332.0	015.8	145.5	002.0500	0260.3	064.8	48.94* 27.04
000.0	000.0510	0333.1	015.9	145.3	002.0500	0260.7	064.8	48.94* 27.06
001.0	000.0527	0332.7	016.1	145.0	002.0500	0261.2	064.9	48.94* 27.06
002.0	000.0543	0331.6	016.2	144.7	002.0500	0261.6	065.0	48.93* 27.01
003.0	000.0561	0331.2	016.3	144.5	002.0500	0262.2	065.0	48.92* 27.00
004.0	000.0575	0331.7	016.4	144.2	002.0500	0262.3	065.1	48.90* 26.93
005.0	000.0588	0334.2	016.6	143.9	002.0500	0262.4	065.2	48.88* 26.87
006.0	000.0603	0333.6	016.7	143.7	002.0500	0262.3	065.3	48.83* 26.75
007.0	000.0617	0335.4	016.8	143.4	002.0500	0262.5	065.4	48.81* 26.68

Exhibit 13.7b

Contour Protection Studies Toward Select Stations

07-13-2016

Terrain Data: NED 03 SEC

FMOver Analysis

WLTk BLH20120614ABT

CH275D.P

Channel = 275A

Max ERP = 2.05 kW

RCAMSL = 670 m

N. Lat. 38 36 30.0

W. Lng. 78 54 09.0

Protected

60 dBu

Channel = 275D

Max ERP = 0.084 kW

RCAMSL = 476 m

N. Lat. 37 59 06.0

W. Lng. 78 28 48.0

Interfering

40 dBu

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)	IX (km)
107.0	002.0500	0295.3	036.5	358.2	000.0480	0333.5	058.6	37.45	
108.0	002.0500	0295.1	036.5	358.0	000.0476	0334.0	058.0	37.66	
109.0	002.0500	0294.9	036.5	357.8	000.0473	0334.7	057.4	37.87	
110.0	002.0500	0294.4	036.5	357.5	000.0469	0335.7	056.8	38.09	
111.0	002.0500	0293.0	036.4	357.2	000.0464	0336.7	056.3	38.29	
112.0	002.0500	0292.1	036.3	356.8	000.0459	0336.9	055.7	38.46	
113.0	002.0500	0292.0	036.3	356.6	000.0454	0336.8	055.1	38.63	
114.0	002.0500	0292.9	036.4	356.3	000.0450	0337.4	054.5	38.83	
115.0	002.0500	0293.0	036.4	356.0	000.0445	0338.1	054.0	39.02	
116.0	002.0500	0291.1	036.3	355.5	000.0438	0337.1	053.5	39.11	
117.0	002.0500	0288.8	036.2	355.1	000.0430	0334.4	053.0	39.13	
118.0	002.0500	0288.0	036.1	354.7	000.0424	0332.2	052.5	39.19	
119.0	002.0500	0286.4	036.0	354.2	000.0418	0332.0	052.0	39.30	
120.0	002.0500	0286.3	036.0	353.8	000.0412	0332.4	051.5	39.44	
121.0	002.0500	0286.8	036.0	353.4	000.0405	0333.2	051.0	39.60	
122.0	002.0500	0285.1	036.0	352.8	000.0397	0334.5	050.6	39.72	
123.0	002.0500	0282.7	035.8	352.3	000.0387	0334.9	050.2	39.77	
124.0	002.0500	0281.4	035.7	351.7	000.0378	0331.6	049.8	39.73	
125.0	002.0500	0279.4	035.6	351.1	000.0369	0329.0	049.4	39.68	
126.0	002.0500	0280.2	035.7	350.7	000.0361	0328.0	048.9	39.75	
127.0	002.0500	0282.5	035.8	350.2	000.0354	0327.1	048.4	39.84	
128.0	002.0500	0282.7	035.8	349.7	000.0346	0327.1	048.0	39.90	
129.0	002.0500	0280.5	035.7	349.0	000.0336	0326.7	047.7	39.88	
130.0	002.0500	0278.9	035.6	348.4	000.0326	0327.0	047.3	39.89	
131.0	002.0500	0276.5	035.5	347.7	000.0315	0326.7	047.1	39.83	
132.0	002.0500	0275.4	035.4	347.0	000.0305	0325.6	046.8	39.78	
133.0	002.0500	0275.0	035.4	346.4	000.0296	0324.7	046.5	39.75	
134.0	002.0500	0274.0	035.3	345.7	000.0286	0326.2	046.2	39.76	
135.0	002.0500	0273.8	035.3	345.0	000.0276	0326.2	045.9	39.74	

MUNN-REESE, INC.

Broadcast Engineering Consultants
COLDWATER, MI 49036

Exhibit 13.7b

Contour Protection Studies Toward Select Stations

Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Azimuth (degrees)	ERP (kW)	HAAT (m)	Dist (km)	Actual (dBu)
136.0	002.0500	0273.3	035.3	344.3	000.0267	0324.0	045.6	39.63
137.0	002.0500	0269.9	035.1	343.5	000.0256	0323.5	045.5	39.47
138.0	002.0500	0268.5	035.0	342.8	000.0246	0323.6	045.3	39.38
139.0	002.0500	0270.0	035.1	342.1	000.0237	0320.0	045.0	39.24
140.0	002.0500	0267.6	034.9	341.3	000.0226	0318.1	044.9	39.01
141.0	002.0500	0265.7	034.8	340.5	000.0215	0317.4	044.8	38.83
142.0	002.0500	0263.3	034.7	339.7	000.0205	0316.9	044.7	38.63
143.0	002.0500	0263.3	034.7	339.0	000.0195	0315.2	044.6	38.44
144.0	002.0500	0262.4	034.6	338.2	000.0186	0315.1	044.5	38.27
145.0	002.0500	0261.2	034.6	337.5	000.0177	0313.8	044.4	38.04
146.0	002.0500	0259.3	034.4	336.7	000.0168	0312.2	044.4	37.75
147.0	002.0500	0256.4	034.3	335.9	000.0158	0311.7	044.5	37.46
148.0	002.0500	0254.8	034.2	335.1	000.0150	0311.4	044.5	37.20
149.0	002.0500	0256.6	034.3	334.3	000.0141	0311.8	044.3	37.04
150.0	002.0500	0256.8	034.3	333.6	000.0133	0309.6	044.2	36.74
151.0	002.0500	0255.8	034.2	332.8	000.0125	0310.5	044.3	36.47
152.0	002.0500	0253.4	034.1	332.0	000.0115	0313.0	044.4	36.13
153.0	002.0500	0252.0	034.0	331.2	000.0106	0313.2	044.5	35.73
154.0	002.0500	0251.6	034.0	330.5	000.0097	0313.2	044.6	35.33
155.0	002.0500	0251.4	034.0	329.7	000.0089	0312.6	044.6	34.89
156.0	002.0500	0250.0	033.9	329.0	000.0081	0311.9	044.8	34.40
157.0	002.0500	0248.7	033.8	328.3	000.0073	0310.1	045.0	33.85
158.0	002.0500	0248.4	033.8	327.5	000.0066	0308.6	045.1	33.31
159.0	002.0500	0248.2	033.8	326.8	000.0059	0306.4	045.2	32.73
160.0	002.0500	0245.6	033.6	326.1	000.0053	0306.2	045.5	32.15
161.0	002.0500	0244.9	033.5	325.4	000.0048	0307.0	045.7	31.60
162.0	002.0500	0248.6	033.8	324.6	000.0042	0309.4	045.6	31.10
163.0	002.0500	0246.5	033.6	324.0	000.0037	0309.8	045.9	30.47
164.0	002.0500	0241.8	033.3	323.4	000.0033	0308.6	046.4	29.76
165.0	002.0500	0242.7	033.4	322.7	000.0029	0308.6	046.6	29.14
166.0	002.0500	0242.9	033.4	322.1	000.0026	0310.5	046.8	28.66
167.0	002.0500	0244.5	033.5	321.4	000.0024	0311.2	047.0	28.13
168.0	002.0500	0245.1	033.6	320.7	000.0021	0311.3	047.2	27.55
169.0	002.0500	0245.1	033.6	320.1	000.0019	0312.6	047.5	26.99
170.0	002.0500	0242.6	033.4	319.6	000.0017	0313.2	047.9	26.41
171.0	002.0500	0239.1	033.2	319.1	000.0016	0311.3	048.4	25.76
172.0	002.0500	0236.0	033.0	318.7	000.0014	0309.8	048.9	25.12
173.0	002.0500	0234.4	032.9	318.2	000.0013	0308.7	049.3	24.46
174.0	002.0500	0233.4	032.8	317.7	000.0011	0308.5	049.7	23.80
175.0	002.0500	0232.9	032.7	317.2	000.0010	0308.3	050.1	23.11
176.0	002.0500	0233.6	032.8	316.7	000.0009	0309.0	050.4	22.38
177.0	002.0500	0234.4	032.9	316.1	000.0007	0310.9	050.7	21.64
178.0	002.0500	0232.9	032.7	315.7	000.0007	0312.0	051.2	20.96
179.0	002.0500	0230.4	032.6	315.4	000.0006	0313.2	051.7	20.33
180.0	002.0500	0229.1	032.5	315.0	000.0005	0313.6	052.2	19.60
181.0	002.0500	0224.5	032.1	314.9	000.0005	0313.2	052.8	19.09

105.2 dBμ F(50:10) Interference Contour

Exhibit 13.8 §74.1204(d) 2nd/3rd Adjacent Channel Given Interference Waiver Request with WZGN(FM).L - Crozet, VA (CH272A) WMRY(FM).L - Crozet, VA (CH278A)

The Interference Contour at the proposed Translator site has been calculated to be no less than the 105.2 dBμ F(50:10) interference contour corresponding to the worst case protected contour at the Translator site. This represents the proposed interference contour which falls wholly within the 40:1 dBu ratio. As seen in this USGS Aerial Photograph, there is a lack of population, housing, buildings or major roads within this interference contour. The applicant would like to note the existence of multiple dedicated transmitter buildings and agricultural related structures located at the remote mountain top site. However, structures of this nature have been exempt as a matter of FCC Policy.

Proposed Site

	Latitude (D M S)	Longitude (D M S)
NAD 27 datum:	37 59 5.89398	78 28 48.35907
NAD 83 datum:	37 59 6.40000	78 28 47.40000

Multiple orchard picking crates and dedicated orchard storage shed. Structures of this nature have been exempt as a matter of FCC Policy.

Multiple dedicated transmitter buildings. Structures of this nature have been exempt as a matter of FCC Policy.



0 200 400ft

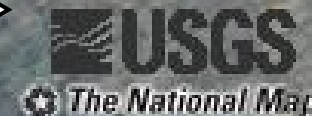


Exhibit 13.9 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°T)

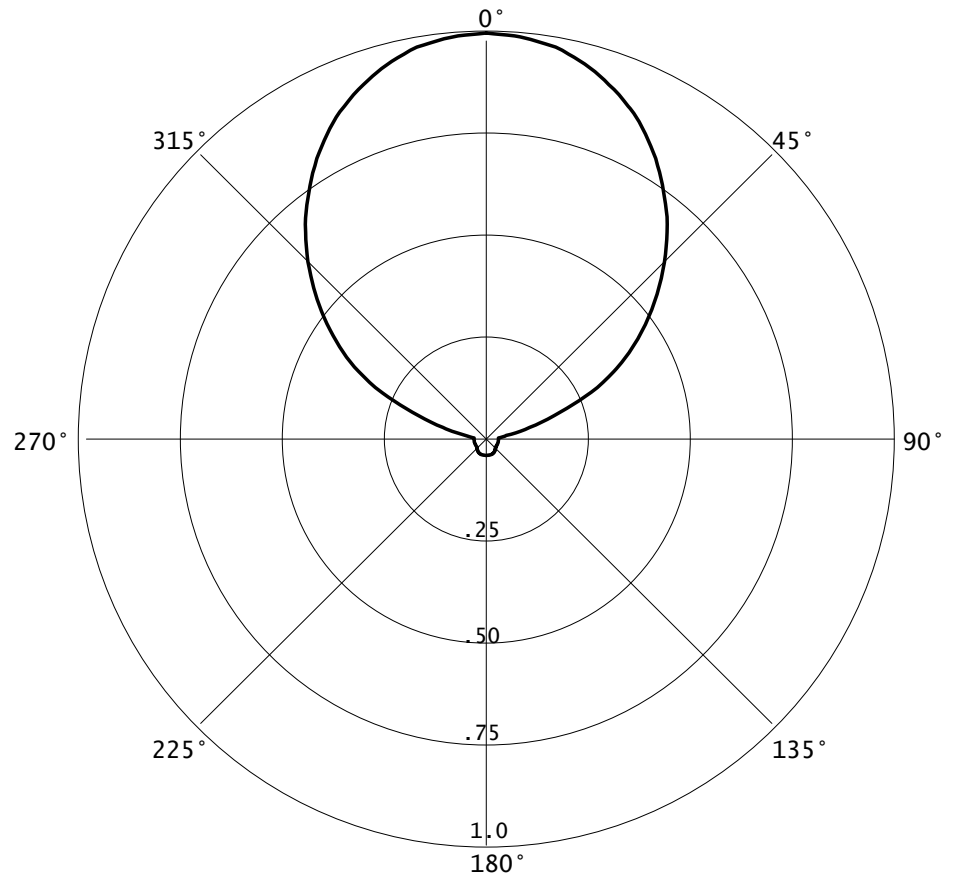


CL-FM(SI ant-45) COMPOSITE PATTERN

RMS(V)= .468

Graph is Relative Field

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(Slant-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(Slant-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(Slant-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 - Manufacturer's Directional Antenna Pattern Data

(Actual Pattern Rotated to 033.0°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:

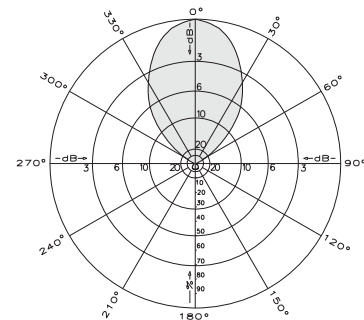
Frequency range	88–108 MHz (broadband)
Gain	7 dBd
Impedance	50 or 75 ohms
VSWR	< 1.5:1
Polarization	Horizontal or vertical
Front-to-back ratio	>25 dB
Maximum input power	250 watts, type "N" 75 ohm connector 500 watts, type "N" 50 ohm connector
Azimuth pattern	52 degrees (half-power) horizontal polarization
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.

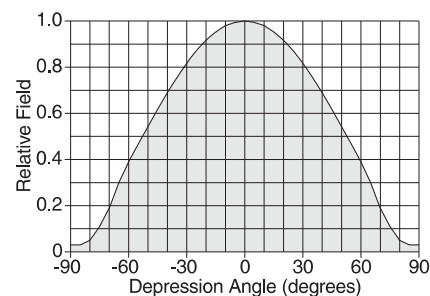
* Mechanical design is based on environmental conditions as stipulated in EIA-222-F (June 1996) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.



10492-D



Azimuth pattern (E-plane)

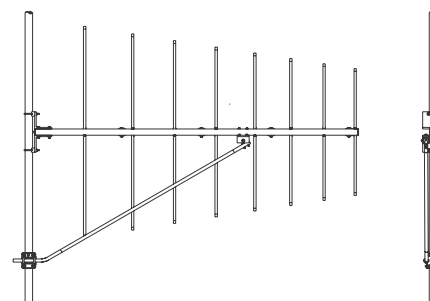
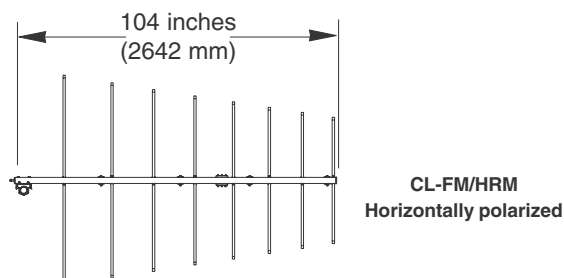
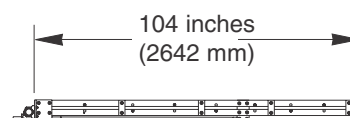
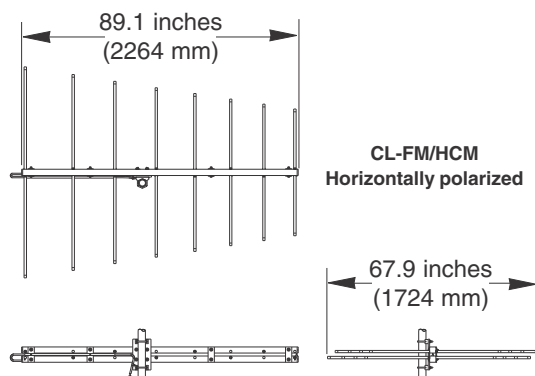


Elevation pattern (H-plane)

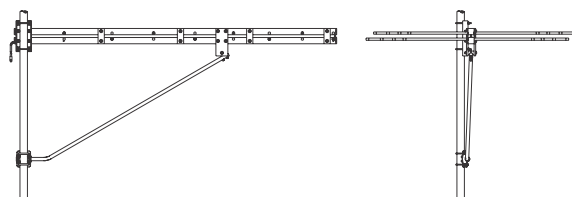
Exhibit 13.9 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°T)



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



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



Order Information:

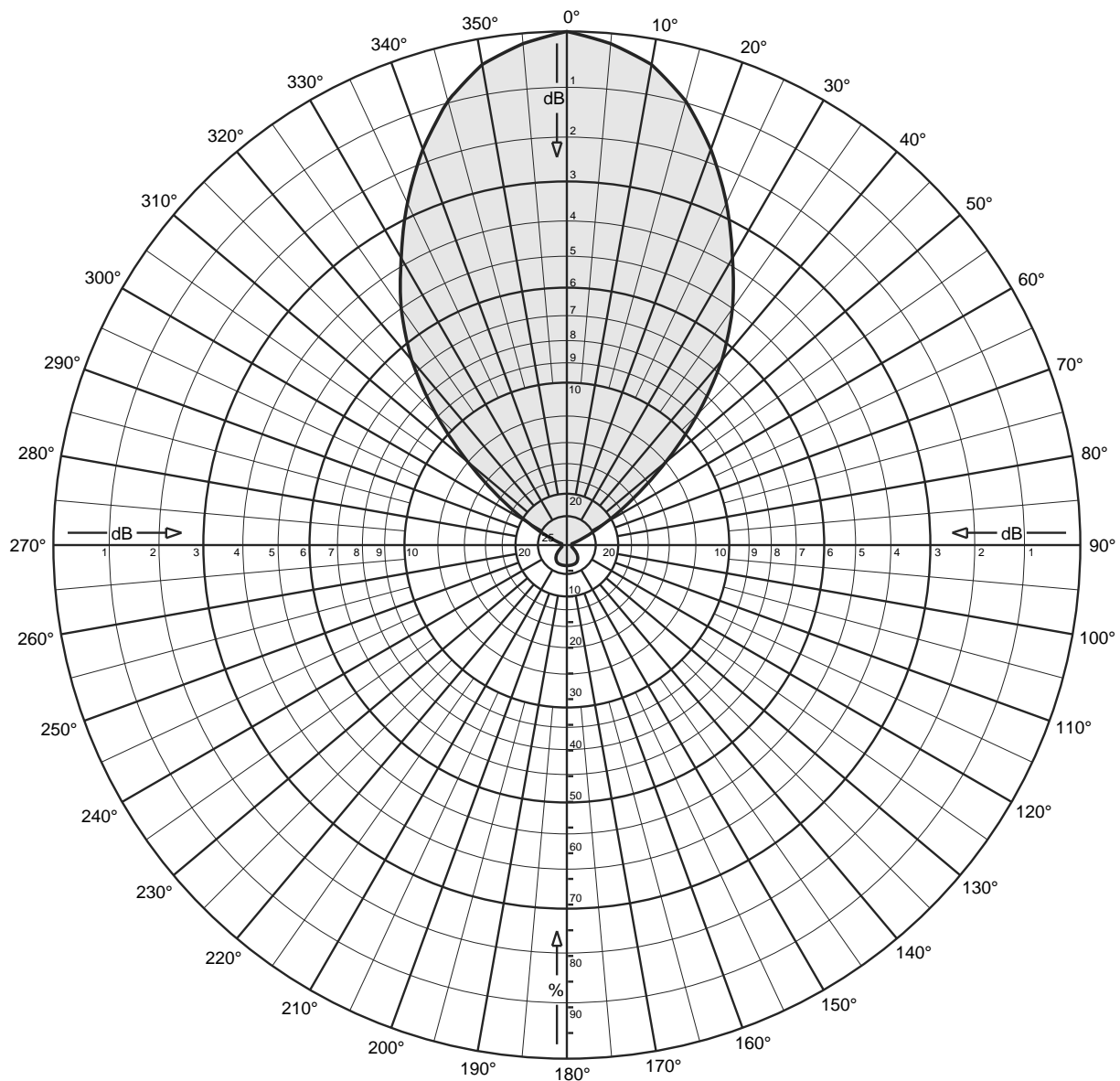
Model	Description
CL-FM/HCM/50N	Antenna with 50Ω N connector Horizontal polarization center-mount
CL-FM/HCM/75N	Antenna with 75Ω N connector Horizontal polarization center-mount
CL-FM/HRM/50N	Antenna with 50Ω N connector Horizontal polarization rear-mount

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 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

Horizontal polarization

Horizontal radiation pattern

0 degree electrical downtilt



Exhibit 13.9 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°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 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°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 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°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 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

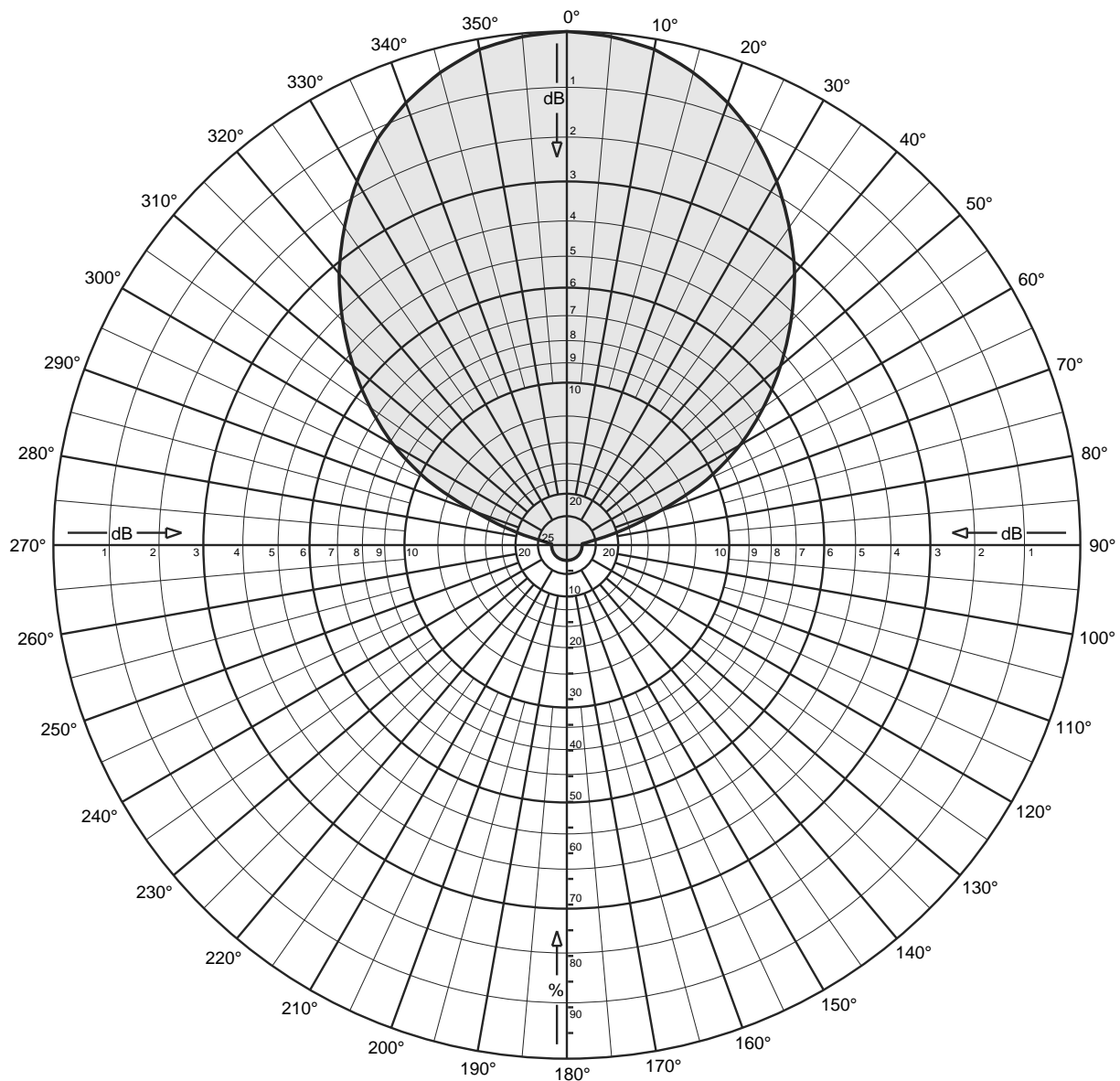
Horizontal polarization Component

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 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°T)



CL-FM

FM

Maximum gain: 7.0 dBd

Vertical polarization

Horizontal radiation pattern

0 degree electrical downtilt



Exhibit 13.9 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°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 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°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 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°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 - Manufacturer's Directional Antenna Pattern Data (Actual Pattern Rotated to 033.0°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