



SYSTEMS WITH RELIABILITY, LLP
BROADCAST ANTENNAS AND TRANSMISSION LINE

PATTERN CERTIFICATION

DIRECTIONAL FM ANTENNA WJTA

May 18, 2010

Station	: WJTA
Location	: Glandorf, OH
Frequency	: 88.9 MHz
Channel	: 205A
Antenna Model	: FMEC/3 DA
Maximum Antenna Gain	
Vertical	: 3.227 / 5.088 dB
Horizontal	: 3.227 / 5.088 dB

ANTENNA DESCRIPTION

A custom designed **FMEC/3 DA** antenna was used to produce the required directional azimuth pattern. Each antenna bay consists of a circularly polarized dipole-radiating element with a horizontal and vertical parasitic system. The array is comprised of three bays, that are spaced a full wavelength apart, mounted to a tower pointing **220°** true north.

DESCRIPTION OF TEST PROCEDURE

The test antenna consists of a third-scale model antenna and parasitic system. This antenna was mounted to a pole and then to an exact replicated third-scale 54 1/4-inch wide face model tower with the use of mounting brackets supplied with the finalized antenna. The tower and antenna were placed 20 ft. on a platform. All feed cables were properly grounded during pattern testing. Horizontal and vertical parasitic elements were used to obtain the submitted directional azimuth pattern.

The source antenna, a vertical/horizontal dipole Cavity Back Resonator antenna configuration was mounted approximately 100 feet from the test antenna. The source's height was adjusted to provide a uniform field at the test antenna location. The CBR antenna was operated in the transmit mode at a frequency of 266.7 MHz. The antenna under test was rotated in a clockwise direction. A gain reference was taken using a dipole tuned to 266.7 MHz. Nowhere, does the received signal exceed a maximum to minimum ratio of 15 dB.

TEST RESULTS

The attached calculations verify that the **RMS** value of this antenna is **94.4 %** of the **RMS** value of the pattern authorized in the related construction permit **BMPED-20091125ADA**. The vertical component **RMS** value is **0.704**. The horizontal component **RMS** value is **0.656**. The circular polarized component **RMS** value is **0.715**.

Azimuth and elevation plots and associated tabulations of this antenna are included with this package.

Measured vertical polarized directivity:	2.016 / 3.050 dB
Measured horizontal polarized directivity:	2.320 / 3.660 dB
Measured circular polarized pattern directivity:	1.955 / 2.910 dB

Gain in each polarization was calculated using the following relation:

GAIN = Azimuth Directivity x Elevation Directivity x Power Ratio Between Polarizations

Using this relationship along with ratio measured at our testing facilities:

V-Pol. Gain =	(2.016)(.535)(2.991)	= 3.227 / 5.088 dB
H-Pol. Gain =	(2.320)(.465)(2.991)	= 3.227 / 5.088 dB

INSTALLATION AND MOUNTING

The antenna is to be mounted in accordance with the supplied drawings. The antenna center of radiation is to be **56 meters** (183.73 ft.) above ground level. The antenna aperture is **22.13 feet**. No other antennas are to be mounted within **10 feet** of the antenna. No other obstructions other than those specified by original drawings supplied are to be mounted at the same level as the antenna. The antenna is to be oriented **220°** true north.

The parasitic system is custom designed to shape and direct the antenna pattern as required. The systems orientation and the mounting details are described in the following drawings:

DRAWING NO.	TITLE
1436IDA	ELEVATION AND MOUNTING DETAIL
1436IDB	ANTENNA ORENTATION WITH PARASITICS
1436IDC	PARASITIC MOUNTING AND PLACEMENT
2105A10	TEST RANGE SCHEMATIC

The array shall be mounted according to **DWG. 1436IDA**. The parasitic assembly is shown in **DWG. 1436IDB** and **DWG. 1436IDC**. The antenna elements shall be aligned at the same heading as in **DWG. 1436IDB**. This will ensure that the antenna is oriented properly at **220°** true north.

DOCUMENT EXHIBITS

The following exhibits are included as part of this Certificate of Compliance:

Exhibit 1	Circular Polarized Azimuth Pattern Field Strength Tabulations (Composite)
Exhibit 2	Measured Horizontal Polarized Azimuth Pattern Measured Field Strength Tabulations (Horizontal)
Exhibit 3	Measured Vertical Polarized Azimuth Pattern Measured Field Strength Tabulations (Vertical)
Exhibit 4	Elevation Pattern Elevation Tabulations
Exhibit 5	Antenna Data Sheet
Exhibit 6	RMS Calculations
Exhibit 7	Drawings

TEST EQUIPMENT

Network Analyzer	:	Hewlett Packard Model # 8753C Serial Number: 08753 – 69138 Calibrated 4/28/10, SWR, Inc.
Computer	:	Pentium 3, 450 MHz, Range Program
Printer	:	Hewlett-Packard Laser Jet 6L
Positioner	:	Orbit Positioner Calibrated 1/12/10, SWR, Inc.

Prepared by:

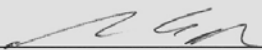


Mark A. Gergely
Electrical Engineer
Systems With Reliability LLP

Surveyor's Declaration

I, Gregory A. Bockrath, subject to the penalties of perjury, do declare
the following:

- 1.) I am a licensed surveyor in the state of Ohio.
- 2.) I have provided professional services to Holy Family Communications Inc.,
permit tee of WJTA-FM, Glandorf, OH, during the installation of the WJTA -FM
directional antenna. FCC File Number BMPED-20091125ADA
- 3.) I certify that the WJTA -FM directional antenna located at 6048 Road 8E,
Leipsic, Ohio has been oriented at 220 degrees (+/- 1 degree tolerance) to true
North azimuth as directed by the engineering personnel responsible for obtaining
construction permits for said antenna.

Sign  Dated: 6-24-10



Engineer's Declaration

I, Gregory J Case, subject to the penalties of perjury, do declare the following:

1.) That I have been employed as a technical consultant with the firm of:

Broadcast Technical Engineering of Fort Wayne, IN

2.) That Broadcast Technical Engineering was retained

By Holy Family Communications, Inc. for the


Purpose of preparing its application for the construction permit of WJTA -FM

Glandorf, Ohio, from which the underlying Construction Permit

(FCC File Number BMPED-20091125ADA) was granted by the Commission.

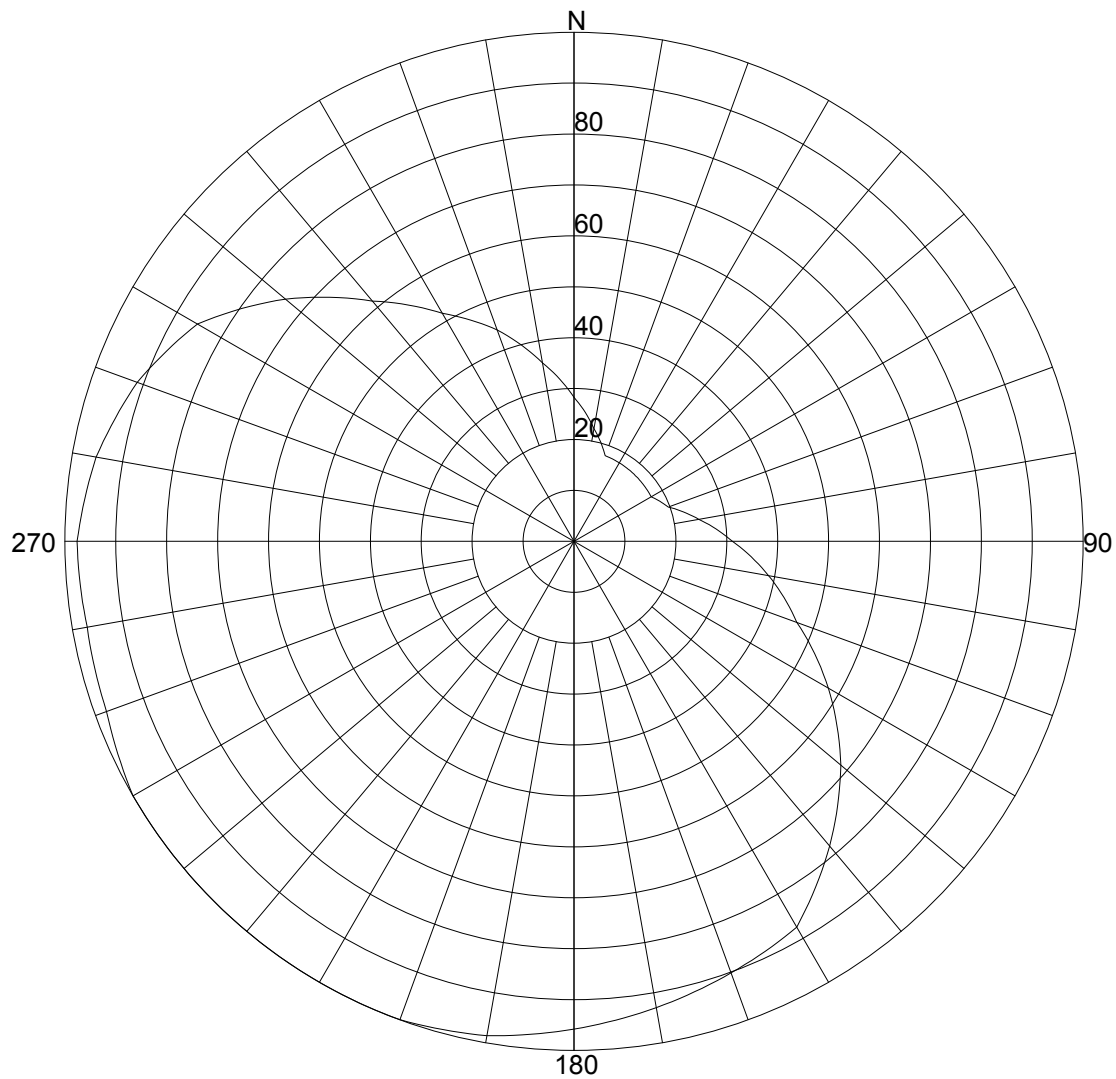
3.) That I am familiar with the terms and conditions of the WJTA -FM Construction Permit.

4.) I hereby certify that I have overseen the installation of the WJTA -FM directional antenna and that the installation was complete to the manufacturer's instructions.

Sign 

Dated: 07/08/2010

Exhibit 1: Circular Polarized Azimuth Pattern



Azimuth Pattern

Systems With Reliability

Scale: Linear

Unit: Relative Field

CLIENT: *WJTA*

Date: 5/7/2010

ANTENNA TYPE: FMEC/3 DA

FREQUENCY: 88.9 MHz

PATTERN POL.: Circular

CIRCULARITY(+/-dB):

AZ. DIRECTIVITY: 1.95514 / 2.91dB

PATTERN RMS: 0.715

Relative Field Tabulation(Azimuth)

Azimuth Heading	Relative Field(dB)	Azimuth Heading	Relative Field(dB)
0	.2830 (-10.93)	180	.9580 (-0.36)
5	.2540 (-11.87)	185	.9720 (-0.24)
10	.2250 (-12.92)	190	.9860 (-0.11)
15	.2020 (-13.85)	195	.9930 (-0.05)
20	.1790 (-14.89)	200	1.0000 (0.01)
25	.1785 (-14.92)	205	1.0000 (0.01)
30	.1780 (-14.94)	210	1.0000 (0.01)
35	.1775 (-14.97)	215	1.0000 (0.01)
40	.1770 (-14.99)	220	1.0000 (0.01)
45	.1765 (-15.02)	225	1.0000 (0.01)
50	.1760 (-15.04)	230	1.0000 (0.01)
55	.1755 (-15.07)	235	1.0000 (0.01)
60	.1750 (-15.09)	240	1.0000 (0.01)
65	.1860 (-14.56)	245	.9885 (-0.09)
70	.1970 (-14.07)	250	.9770 (-0.19)
75	.2230 (-13)	255	.9740 (-0.22)
80	.2490 (-12.04)	260	.9710 (-0.25)
85	.2800 (-11.03)	265	.9735 (-0.22)
90	.3110 (-10.12)	270	.9760 (-0.2)
95	.3495 (-9.11)	275	.9645 (-0.3)
100	.3880 (-8.2)	280	.9530 (-0.41)
105	.4270 (-7.37)	285	.9330 (-0.59)
110	.4660 (-6.61)	290	.9130 (-0.78)
115	.5215 (-5.64)	295	.8835 (-1.07)
120	.5770 (-4.76)	300	.8540 (-1.36)
125	.6305 (-3.99)	305	.7970 (-1.96)
130	.6840 (-3.29)	310	.7400 (-2.6)
135	.7325 (-2.69)	315	.6780 (-3.36)
140	.7810 (-2.14)	320	.6160 (-4.19)
145	.8280 (-1.63)	325	.5665 (-4.92)
150	.8750 (-1.15)	330	.5170 (-5.71)
155	.8885 (-1.02)	335	.4795 (-6.37)
160	.9020 (-0.89)	340	.4420 (-7.07)
165	.9160 (-0.75)	345	.3990 (-7.96)
170	.9300 (-0.62)	350	.3560 (-8.95)
175	.9440 (-0.49)	355	.3195 (-9.88)

Systems With Reliability

CLIENT: *WJTA*

Date: 5/7/2010

ANTENNA TYPE: FMEC/3 DA

FREQUENCY: 88.9 MHz

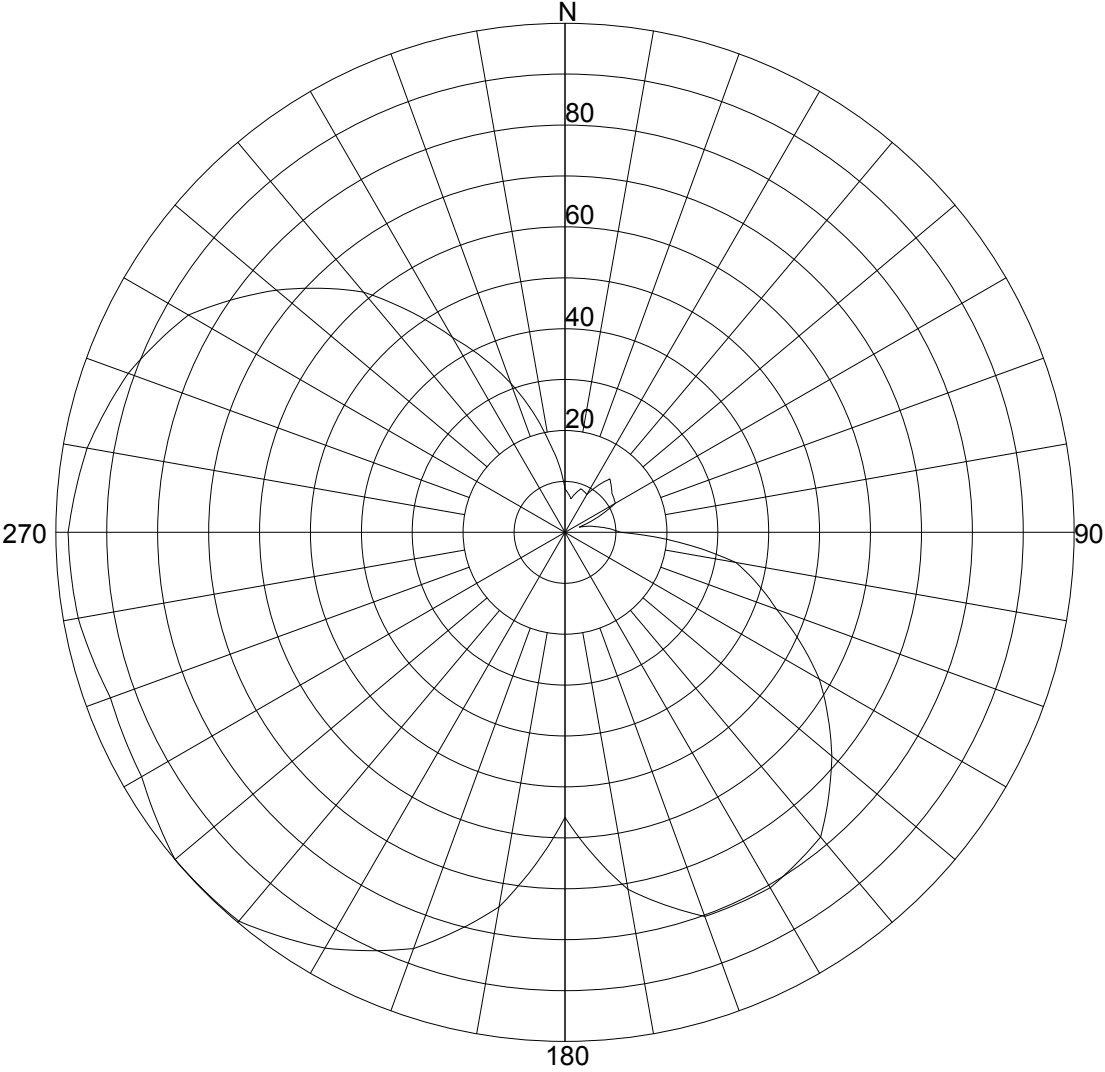
PATTERN POL.: Circular

CIRCULARITY(+/-dB):

AZ. DIRECTIVITY: 1.95514 / 2.91dB

PATTERN RMS: 0.715

Exhibit 2: Measured Horizontal Polarized Azimuth Pattern



Azimuth Pattern

Systems With Reliability

Scale: Linear
Unit: Relative Field

CLIENT: WJTA	Date: 5/17/2010
ANTENNA TYPE: FMEC/3 DA	
FREQUENCY: 88.9 MHz	
PATTERN POL.: Horizontal	CIRCULARITY(+/-dB):
AZ. DIRECTIVITY: 2.32024 / 3.66dB	PATTERN RMS: 0.656

Relative Field Tabulation(Azimuth)

Azimuth Heading	Relative Field(dB)	Azimuth Heading	Relative Field(dB)
0	.0850 (-21.31)	180	.5600 (-5.02)
5	.0760 (-22.27)	185	.6535 (-3.68)
10	.0670 (-23.35)	190	.7470 (-2.52)
15	.0790 (-21.94)	195	.8085 (-1.84)
20	.0910 (-20.72)	200	.8700 (-1.2)
25	.0885 (-20.96)	205	.9065 (-0.84)
30	.0860 (-21.21)	210	.9430 (-0.5)
35	.1115 (-18.98)	215	.9700 (-0.26)
40	.1370 (-17.2)	220	.9970 (-0.02)
45	.1285 (-17.75)	225	.9985 (0)
50	.1200 (-18.34)	230	1.0000 (0.01)
55	.1170 (-18.56)	235	.9800 (-0.17)
60	.1140 (-18.79)	240	.9600 (-0.35)
65	.0720 (-22.73)	245	.9550 (-0.39)
70	.0300 (-30.17)	250	.9500 (-0.44)
75	.0465 (-26.47)	255	.9605 (-0.34)
80	.0630 (-23.88)	260	.9710 (-0.25)
85	.0860 (-21.21)	265	.9735 (-0.22)
90	.1090 (-19.17)	270	.9760 (-0.2)
95	.2250 (-12.92)	275	.9645 (-0.3)
100	.3410 (-9.32)	280	.9530 (-0.41)
105	.3915 (-8.12)	285	.9330 (-0.59)
110	.4420 (-7.07)	290	.9130 (-0.78)
115	.5095 (-5.84)	295	.8835 (-1.07)
120	.5770 (-4.76)	300	.8540 (-1.36)
125	.6305 (-3.99)	305	.7970 (-1.96)
130	.6840 (-3.29)	310	.7400 (-2.6)
135	.7325 (-2.69)	315	.6780 (-3.36)
140	.7810 (-2.14)	320	.6160 (-4.19)
145	.7935 (-2)	325	.5290 (-5.51)
150	.8060 (-1.86)	330	.4420 (-7.07)
155	.8045 (-1.88)	335	.3765 (-8.46)
160	.8030 (-1.89)	340	.3110 (-10.12)
165	.7575 (-2.4)	345	.2455 (-12.16)
170	.7120 (-2.94)	350	.1800 (-14.85)
175	.6360 (-3.92)	355	.1325 (-17.49)

Systems With Reliability

CLIENT: WJTA

Date: 5/17/2010

ANTENNA TYPE: FMEC/3 DA

FREQUENCY: 88.9 MHz

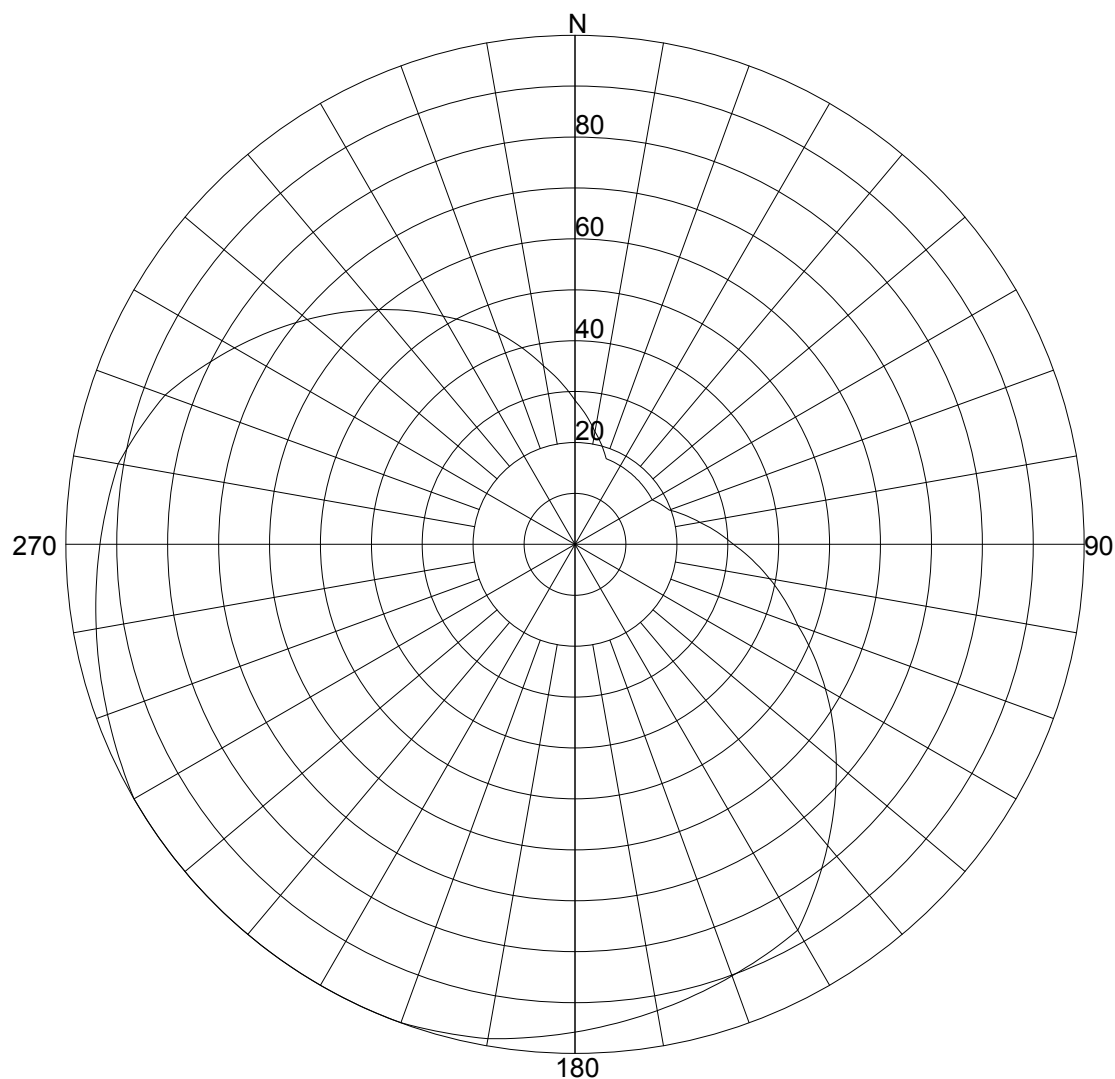
PATTERN POL.: Horizontal

CIRCULARITY(+/-dB):

AZ. DIRECTIVITY: 2.32024 / 3.66dB

PATTERN RMS: 0.656

Exhibit 3: Measured Vertical Polarized Azimuth Pattern



Azimuth Pattern

Scale: Linear

Unit: Relative Field

Systems With Reliability

CLIENT: *WJTA*

Date: 5/7/2010

ANTENNA TYPE: FMEC/3 DA

FREQUENCY: 88.9 MHz

PATTERN POL.: Vertical

CIRCULARITY(+/-dB):

AZ. DIRECTIVITY: 2.01621 / 3.05dB

PATTERN RMS: 0.704

Relative Field Tabulation(Azimuth)

Azimuth Heading	Relative Field(dB)	Azimuth Heading	Relative Field(dB)
0	.2830 (-10.93)	180	.9580 (-0.36)
5	.2540 (-11.87)	185	.9720 (-0.24)
10	.2250 (-12.92)	190	.9860 (-0.11)
15	.2020 (-13.85)	195	.9930 (-0.05)
20	.1790 (-14.89)	200	1.0000 (0.01)
25	.1785 (-14.92)	205	1.0000 (0.01)
30	.1780 (-14.94)	210	1.0000 (0.01)
35	.1775 (-14.97)	215	1.0000 (0.01)
40	.1770 (-14.99)	220	1.0000 (0.01)
45	.1765 (-15.02)	225	1.0000 (0.01)
50	.1760 (-15.04)	230	1.0000 (0.01)
55	.1755 (-15.07)	235	1.0000 (0.01)
60	.1750 (-15.09)	240	1.0000 (0.01)
65	.1860 (-14.56)	245	.9885 (-0.09)
70	.1970 (-14.07)	250	.9770 (-0.19)
75	.2230 (-13)	255	.9660 (-0.29)
80	.2490 (-12.04)	260	.9550 (-0.39)
85	.2800 (-11.03)	265	.9440 (-0.49)
90	.3110 (-10.12)	270	.9330 (-0.59)
95	.3495 (-9.11)	275	.9220 (-0.7)
100	.3880 (-8.2)	280	.9110 (-0.8)
105	.4270 (-7.37)	285	.8840 (-1.06)
110	.4660 (-6.61)	290	.8570 (-1.33)
115	.5170 (-5.71)	295	.8145 (-1.77)
120	.5680 (-4.9)	300	.7720 (-2.24)
125	.6190 (-4.15)	305	.7295 (-2.73)
130	.6700 (-3.47)	310	.6870 (-3.25)
135	.7210 (-2.83)	315	.6445 (-3.8)
140	.7720 (-2.24)	320	.6020 (-4.39)
145	.8235 (-1.68)	325	.5595 (-5.03)
150	.8750 (-1.15)	330	.5170 (-5.71)
155	.8885 (-1.02)	335	.4795 (-6.37)
160	.9020 (-0.89)	340	.4420 (-7.07)
165	.9160 (-0.75)	345	.3990 (-7.96)
170	.9300 (-0.62)	350	.3560 (-8.95)
175	.9440 (-0.49)	355	.3195 (-9.88)

Systems With Reliability

CLIENT: *WJTA*

Date: 5/7/2010

ANTENNA TYPE: FMEC/3 DA

FREQUENCY: 88.9 MHz

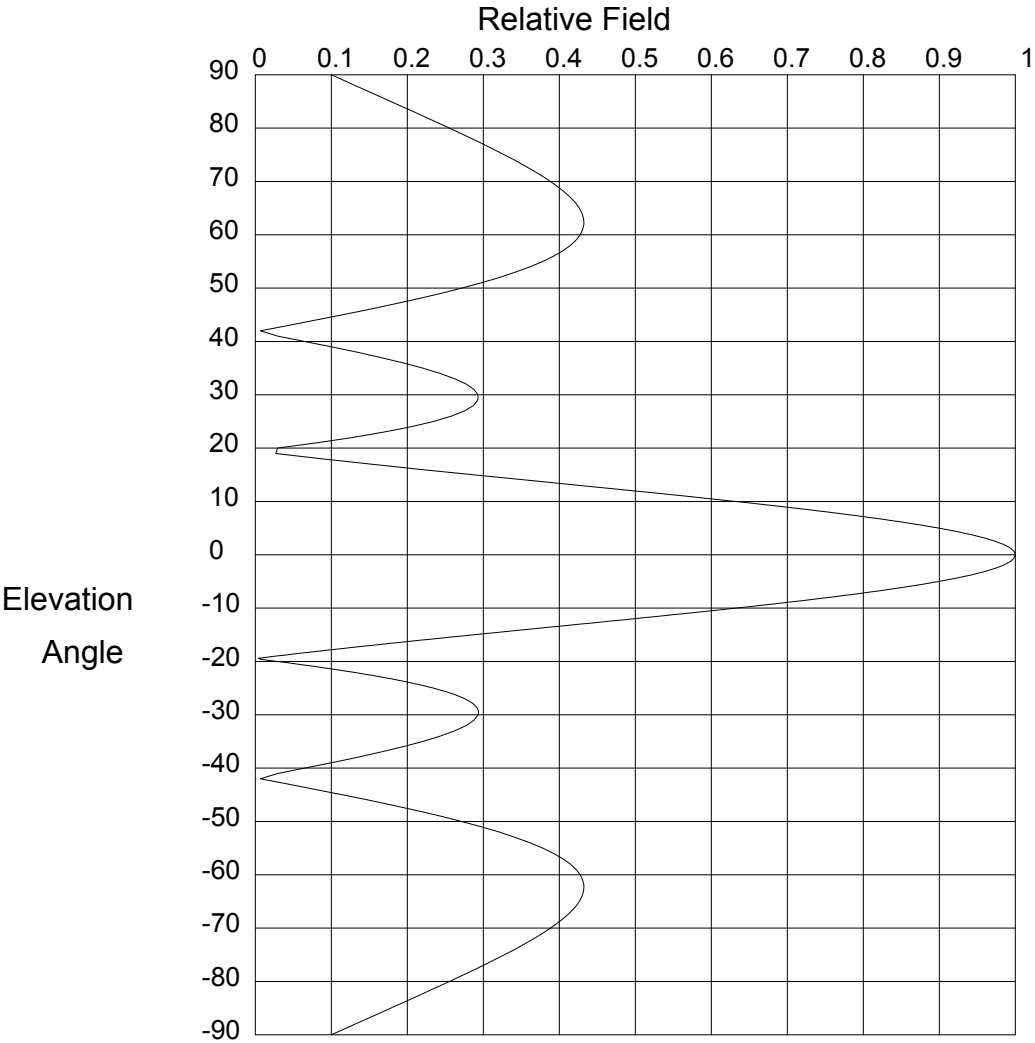
PATTERN POL.: Vertical

CIRCULARITY(+/-dB):

AZ. DIRECTIVITY: 2.01621 / 3.05dB

PATTERN RMS: 0.704

Exhibit 4: Elevation Pattern



Elevation Pattern

Systems With Reliability

Scale: Linear
Units: Field, Relative

CLIENT: <i>WJTA</i>		Date: 5/18/2010
ANTENNA TYPE: FMEC/3 DA		
FREQUENCY: 88.9 MHz		
PATTERN POL.: Circular		
DIRECTIVITY(Peak): 2.991/4.758 dBd	Beam Tilt (Deg.) :	0
DIRECTIVITY(Horiz): 2.991/4.758 dBd	Null Fill(s)(%) :	0, 0, 0

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
90.0	.10 (-20)	52.0	.321 (-9.865)	14.0	.357 (-8.938)
89.0	.116 (-18.733)	51.0	.298 (-10.529)	13.0	.428 (-7.377)
88.0	.131 (-17.628)	50.0	.272 (-11.318)	12.0	.498 (-6.062)
87.0	.147 (-16.648)	49.0	.244 (-12.26)	11.0	.566 (-4.942)
86.0	.163 (-15.769)	48.0	.214 (-13.395)	10.0	.632 (-3.982)
85.0	.178 (-14.972)	47.0	.182 (-14.784)	9.8	.645 (-3.807)
84.0	.194 (-14.244)	46.0	.149 (-16.526)	9.6	.658 (-3.637)
83.0	.21 (-13.575)	45.0	.115 (-18.805)	9.4	.671 (-3.472)
82.0	.225 (-12.957)	44.0	.079 (-22.01)	9.2	.683 (-3.312)
81.0	.24 (-12.385)	43.0	.043 (-27.275)	9.0	.695 (-3.157)
80.0	.256 (-11.852)	42.0	.007 (-43.22)	8.8	.707 (-3.006)
79.0	.271 (-11.356)	41.0	.029 (-30.637)	8.6	.719 (-2.86)
78.0	.285 (-10.893)	40.0	.065 (-23.719)	8.4	.731 (-2.719)
77.0	.30 (-10.462)	39.0	.10 (-19.999)	8.2	.743 (-2.582)
76.0	.314 (-10.06)	38.0	.133 (-17.494)	8.0	.754 (-2.449)
75.0	.328 (-9.686)	37.0	.165 (-15.651)	7.8	.766 (-2.321)
74.0	.341 (-9.339)	36.0	.194 (-14.237)	7.6	.777 (-2.196)
73.0	.354 (-9.018)	35.0	.22 (-13.132)	7.4	.787 (-2.076)
72.0	.366 (-8.724)	34.0	.243 (-12.271)	7.2	.798 (-1.959)
71.0	.378 (-8.455)	33.0	.263 (-11.612)	7.0	.808 (-1.847)
70.0	.389 (-8.211)	32.0	.278 (-11.131)	6.8	.819 (-1.738)
69.0	.398 (-7.995)	31.0	.288 (-10.815)	6.6	.829 (-1.633)
68.0	.407 (-7.804)	30.0	.293 (-10.658)	6.4	.838 (-1.532)
67.0	.415 (-7.642)	29.0	.293 (-10.662)	6.2	.848 (-1.434)
66.0	.421 (-7.507)	28.0	.287 (-10.834)	6.0	.857 (-1.34)
65.0	.426 (-7.403)	27.0	.276 (-11.192)	5.8	.866 (-1.249)
64.0	.43 (-7.329)	26.0	.258 (-11.764)	5.6	.875 (-1.162)
63.0	.432 (-7.287)	25.0	.234 (-12.598)	5.4	.883 (-1.078)
62.0	.432 (-7.281)	24.0	.205 (-13.772)	5.2	.891 (-0.998)
61.0	.431 (-7.31)	23.0	.169 (-15.43)	5.0	.899 (-0.921)
60.0	.428 (-7.38)	22.0	.128 (-17.86)	4.8	.907 (-0.847)
59.0	.422 (-7.491)	21.0	.081 (-21.813)	4.6	.914 (-0.777)
58.0	.415 (-7.648)	20.0	.029 (-30.657)	4.4	.922 (-0.709)
57.0	.405 (-7.856)	19.0	.027 (-31.323)	4.2	.928 (-0.645)
56.0	.393 (-8.119)	18.0	.088 (-21.139)	4.0	.935 (-0.584)
55.0	.378 (-8.442)	17.0	.152 (-16.379)	3.8	.941 (-0.527)
54.0	.362 (-8.835)	16.0	.219 (-13.21)	3.6	.947 (-0.472)
53.0	.343 (-9.305)	15.0	.287 (-10.833)	3.4	.953 (-0.421)

Systems With Reliability

Page 1 of 3

CLIENT: *WJTA*

Date: 5/18/2010

ANTENNA TYPE: FMEC/3 DA

FREQUENCY: 88.9 MHz

PATTERN POL.: Circular

DIRECTIVITY(Peak): 2.991/4.758 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 2.991/4.758 dBd

Null Fill(s)(%) : 0, 0, 0

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
3.2	.958 (-0.372)	-4.4	.922 (-0.709)	-12.0	.498 (-6.062)
3.0	.963 (-0.327)	-4.6	.914 (-0.777)	-12.2	.484 (-6.308)
2.8	.968 (-0.284)	-4.8	.907 (-0.847)	-12.4	.47 (-6.562)
2.6	.972 (-0.245)	-5.0	.899 (-0.921)	-12.6	.456 (-6.825)
2.4	.976 (-0.208)	-5.2	.891 (-0.998)	-12.8	.442 (-7.096)
2.2	.98 (-0.175)	-5.4	.883 (-1.078)	-13.0	.428 (-7.377)
2.0	.983 (-0.145)	-5.6	.875 (-1.162)	-13.2	.414 (-7.667)
1.8	.987 (-0.117)	-5.8	.866 (-1.249)	-13.4	.40 (-7.968)
1.6	.989 (-0.092)	-6.0	.857 (-1.34)	-13.6	.385 (-8.28)
1.4	.992 (-0.071)	-6.2	.848 (-1.434)	-13.8	.371 (-8.603)
1.2	.994 (-0.052)	-6.4	.838 (-1.532)	-14.0	.357 (-8.938)
1.0	.996 (-0.036)	-6.6	.829 (-1.633)	-14.2	.343 (-9.287)
.8	.997 (-0.023)	-6.8	.819 (-1.738)	-14.4	.329 (-9.65)
.6	.999 (-0.013)	-7.0	.808 (-1.847)	-14.6	.315 (-10.027)
.4	.999 (-0.006)	-7.2	.798 (-1.959)	-14.8	.301 (-10.421)
.2	1.00 (-0.001)	-7.4	.787 (-2.076)	-15.0	.287 (-10.833)
.0	1.00 (0)	-7.6	.777 (-2.196)	-15.2	.273 (-11.263)
-.2	1.00 (-0.001)	-7.8	.766 (-2.321)	-15.4	.26 (-11.714)
-.4	.999 (-0.006)	-8.0	.754 (-2.449)	-15.6	.246 (-12.187)
-.6	.999 (-0.013)	-8.2	.743 (-2.582)	-15.8	.232 (-12.685)
-.8	.997 (-0.023)	-8.4	.731 (-2.719)	-16.0	.219 (-13.21)
-1.0	.996 (-0.036)	-8.6	.719 (-2.86)	-16.2	.205 (-13.766)
-1.2	.994 (-0.052)	-8.8	.707 (-3.006)	-16.4	.192 (-14.356)
-1.4	.992 (-0.071)	-9.0	.695 (-3.157)	-16.6	.178 (-14.984)
-1.6	.989 (-0.092)	-9.2	.683 (-3.312)	-16.8	.165 (-15.656)
-1.8	.987 (-0.117)	-9.4	.671 (-3.472)	-17.0	.152 (-16.379)
-2.0	.983 (-0.145)	-9.6	.658 (-3.637)	-17.2	.139 (-17.16)
-2.2	.98 (-0.175)	-9.8	.645 (-3.807)	-17.4	.126 (-18.01)
-2.4	.976 (-0.208)	-10.0	.632 (-3.982)	-17.6	.113 (-18.943)
-2.6	.972 (-0.245)	-10.2	.619 (-4.163)	-17.8	.10 (-19.978)
-2.8	.968 (-0.284)	-10.4	.606 (-4.349)	-18.0	.088 (-21.139)
-3.0	.963 (-0.327)	-10.6	.593 (-4.541)	-18.2	.075 (-22.464)
-3.2	.958 (-0.372)	-10.8	.58 (-4.739)	-18.4	.063 (-24.008)
-3.4	.953 (-0.421)	-11.0	.566 (-4.942)	-18.6	.051 (-25.862)
-3.6	.947 (-0.472)	-11.2	.553 (-5.153)	-18.8	.039 (-28.188)
-3.8	.941 (-0.527)	-11.4	.539 (-5.37)	-19.0	.027 (-31.323)
-4.0	.935 (-0.584)	-11.6	.525 (-5.593)	-19.2	.016 (-36.185)
-4.2	.928 (-0.645)	-11.8	.511 (-5.824)	-19.4	.004 (-47.865)

Systems With Reliability

Page 2 of 3

CLIENT: *WJTA*

Date: 5/18/2010

ANTENNA TYPE: FMEC/3 DA

FREQUENCY: 88.9 MHz

PATTERN POL.: Circular

DIRECTIVITY(Peak): 2.991/4.758 dBd

Beam Tilt (Deg.): 0

DIRECTIVITY(Horiz): 2.991/4.758 dBd

Null Fill(s)(%): 0, 0, 0

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
-19.6	.007 (-42.787)	-27.2	.278 (-11.104)	-54.0	.362 (-8.835)
-19.8	.018 (-34.715)	-27.4	.281 (-11.025)	-55.0	.378 (-8.442)
-20.0	.029 (-30.657)	-27.6	.283 (-10.953)	-56.0	.393 (-8.119)
-20.2	.04 (-27.943)	-27.8	.285 (-10.89)	-57.0	.405 (-7.856)
-20.4	.051 (-25.91)	-28.0	.287 (-10.834)	-58.0	.415 (-7.648)
-20.6	.061 (-24.292)	-28.2	.289 (-10.785)	-59.0	.422 (-7.491)
-20.8	.071 (-22.952)	-28.4	.29 (-10.744)	-60.0	.428 (-7.38)
-21.0	.081 (-21.813)	-28.6	.291 (-10.71)	-61.0	.431 (-7.31)
-21.2	.091 (-20.825)	-28.8	.292 (-10.682)	-62.0	.432 (-7.281)
-21.4	.101 (-19.956)	-29.0	.293 (-10.662)	-63.0	.432 (-7.287)
-21.6	.11 (-19.183)	-29.2	.293 (-10.648)	-64.0	.43 (-7.329)
-21.8	.119 (-18.489)	-29.4	.294 (-10.641)	-65.0	.426 (-7.403)
-22.0	.128 (-17.86)	-29.6	.294 (-10.64)	-66.0	.421 (-7.507)
-22.2	.137 (-17.288)	-29.8	.294 (-10.646)	-67.0	.415 (-7.642)
-22.4	.145 (-16.765)	-30.0	.293 (-10.658)	-68.0	.407 (-7.804)
-22.6	.153 (-16.284)	-31.0	.288 (-10.815)	-69.0	.398 (-7.995)
-22.8	.161 (-15.84)	-32.0	.278 (-11.131)	-70.0	.389 (-8.211)
-23.0	.169 (-15.43)	-33.0	.263 (-11.612)	-71.0	.378 (-8.455)
-23.2	.177 (-15.049)	-34.0	.243 (-12.271)	-72.0	.366 (-8.724)
-23.4	.184 (-14.695)	-35.0	.22 (-13.132)	-73.0	.354 (-9.018)
-23.6	.191 (-14.366)	-36.0	.194 (-14.237)	-74.0	.341 (-9.339)
-23.8	.198 (-14.059)	-37.0	.165 (-15.651)	-75.0	.328 (-9.686)
-24.0	.205 (-13.772)	-38.0	.133 (-17.494)	-76.0	.314 (-10.06)
-24.2	.211 (-13.505)	-39.0	.10 (-19.999)	-77.0	.30 (-10.462)
-24.4	.217 (-13.254)	-40.0	.065 (-23.719)	-78.0	.285 (-10.893)
-24.6	.223 (-13.021)	-41.0	.029 (-30.637)	-79.0	.271 (-11.356)
-24.8	.229 (-12.802)	-42.0	.007 (-43.22)	-80.0	.256 (-11.852)
-25.0	.234 (-12.598)	-43.0	.043 (-27.275)	-81.0	.24 (-12.385)
-25.2	.24 (-12.407)	-44.0	.079 (-22.01)	-82.0	.225 (-12.957)
-25.4	.245 (-12.229)	-45.0	.115 (-18.805)	-83.0	.21 (-13.575)
-25.6	.249 (-12.063)	-46.0	.149 (-16.526)	-84.0	.194 (-14.244)
-25.8	.254 (-11.908)	-47.0	.182 (-14.784)	-85.0	.178 (-14.972)
-26.0	.258 (-11.764)	-48.0	.214 (-13.395)	-86.0	.163 (-15.769)
-26.2	.262 (-11.63)	-49.0	.244 (-12.26)	-87.0	.147 (-16.648)
-26.4	.266 (-11.507)	-50.0	.272 (-11.318)	-88.0	.131 (-17.628)
-26.6	.269 (-11.393)	-51.0	.298 (-10.529)	-89.0	.116 (-18.733)
-26.8	.273 (-11.288)	-52.0	.321 (-9.865)	-90.0	.10 (-20)
-27.0	.276 (-11.192)	-53.0	.343 (-9.305)	90.0	.00 (-50)

Systems With Reliability

Page 3 of 3

CLIENT: *WJTA*

Date: 5/18/2010

ANTENNA TYPE: FMEC/3 DA

FREQUENCY: 88.9 MHz

PATTERN POL.: Circular

DIRECTIVITY(Peak): 2.991/4.758 dBd

Beam Tilt (Deg.) : 0

DIRECTIVITY(Horiz): 2.991/4.758 dBd

Null Fill(s)(%) : 0, 0, 0

Exhibit 5: Antenna Data Sheet



SYSTEMS WITH RELIABILITY, LLP

BROADCAST ANTENNAS AND TRANSMISSION LINE

SYSTEM DATA SHEET

Customer	WJTA
Contact	Greg Case
Location	Glandorf, OH
Antenna Model	FMEC/3
Channel / Frequency	205A / 88.9 MHz

ELECTRICAL SPECIFICATIONS

Antenna Specifications:

	H-POL			V. Pol.	
License ERP (KW)	2	3.010	dB	2	3.010 dB
FCC Limit Pattern Directivity	1.743	2.413	dB	1.743	2.413 dB
Elevation Directivity	2.991	4.758	dB	2.991	4.758 dB
Azimuth Directivity	2.320	3.655	dB	2.016	3.045 dB
Composite Pattern	1.955	2.912	dB	1.955	2.912 dB
Polarization Ratio	0.465	-3.326	dB	0.535	-2.716 dB
RMS Comp./RMS Limit	94.42 %				
Antenna Efficiency %	100	0		100	0
Power Ratio (Pol. Ratio X Efficiency)	0.4649	0		0.5351	0
Antenna Gain	3.227	5.088	dB	3.227	5.088 dB

Antenna Input Power (KW)	0.620 kW	-2.077 (dBK)
---------------------------------	----------	--------------

Feed Line Specifications:

Line Type	1 5/8" Foam	50 Ω
Attenuation Per 100 ft (dB)	0.192	dB
Line Length (ft) AGL + 30' Hor. Run	213.74	ft.
Total Line Attenuation (dB)	0.4104	dB
Line Efficiency	90.98	%
Power Input to the Line (KW)	0.681 kW	-1.667 (dBK)

MECHANICAL SPECIFICATIONS

No. Of Bays	3		
Antenna Aperture	22.13	ft.	6.75 meter
Center of Radiation AGL	183.74	ft.	56.00 meter
Antenna Weight with parasitics	175.00	lbs.	79.55 kg
** Windload (50/33) with parasitics	300.00	lbs.	Windload CaAc 8.60 ft^2

** Does not include mounting pipe

Prepared by:

David K. Edmiston Jr.

David K. Edmiston Jr.
SWR, LLP

Exhibit 6: RMS Calculations



SYSTEMS WITH RELIABILITY, INC.
Broadcast Antennas and Transmission Systems

WJTA Antenna RMS Comparison

PROPOSED ANTENNA

Azimuth Heading	Relative Field
0	0.283
10	0.225
20	0.179
30	0.178
40	0.178
50	0.178
60	0.180
70	0.197
80	0.249
90	0.311
100	0.389
110	0.487
120	0.610
130	0.764
140	0.958
150	1.000
160	1.000
170	1.000
180	1.000
190	1.000
200	1.000
210	1.000
220	1.000
230	1.000
240	1.000
250	1.000
260	1.000
270	1.000
280	1.000
290	1.000
300	1.000
310	0.890
320	0.708
330	0.563
340	0.448
350	0.356

DESIGNED ANTENNA

Azimuth Heading	Relative Field
0	0.283
10	0.225
20	0.179
30	0.178
40	0.177
50	0.176
60	0.175
70	0.197
80	0.249
90	0.311
100	0.388
110	0.466
120	0.577
130	0.684
140	0.781
150	0.875
160	0.902
170	0.930
180	0.958
190	0.986
200	1.000
210	1.000
220	1.000
230	1.000
240	1.000
250	0.977
260	0.971
270	0.976
280	0.953
290	0.913
300	0.854
310	0.740
320	0.616
330	0.517
340	0.442
350	0.356

Sum of Relative Field Squared : 20.688
Sum Divided by 36 (Readings) : 0.575
Square Root : 0.758

Sum of Relative Field Squared : 18.435
Sum Divided by 36 (Readings) : 0.512
Square Root : 0.716

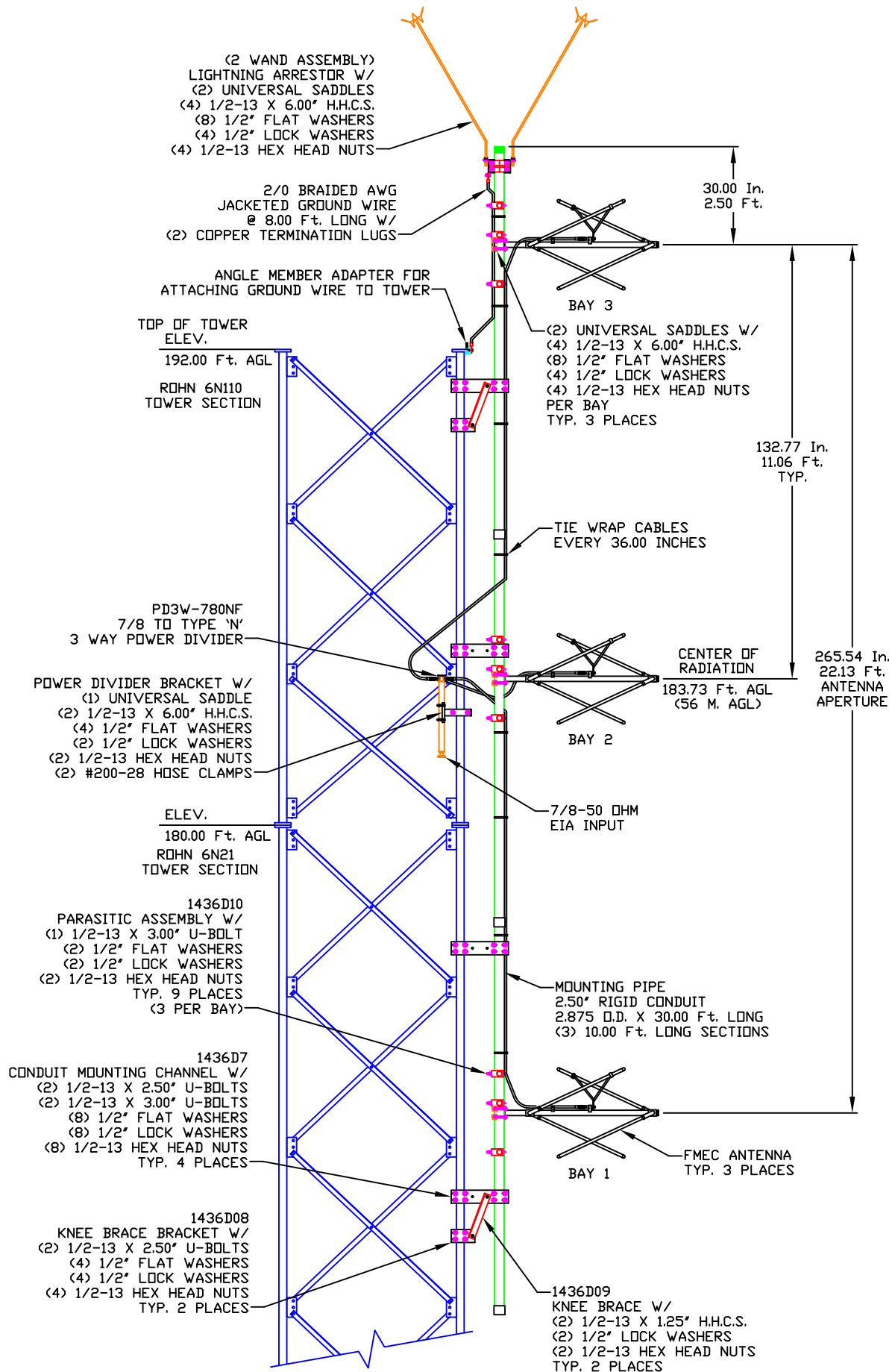
Percentage of Construction Permit Antenna Filled : **94.4%**

NOTES:

1. REFERENCE DWG. 1436IDB FOR ANTENNA ORIENTATION.
2. REFERENCE DWG. 1436IDC FOR PARASITIC PLACEMENT.

Exhibit 7: Drawings

DRAWING NUMBER: 1436IDA



SYSTEMS WITH RELIABILITY, INC.
619 INDUSTRIAL PARK ROAD
EBensburg, PENNSYLVANIA 15931

TITLE: FMEC/3-DA, FREQ. 88.9
WJTA, GLANDORF, OH

SIZE
C

REV
1
2
3

APPR. DATE

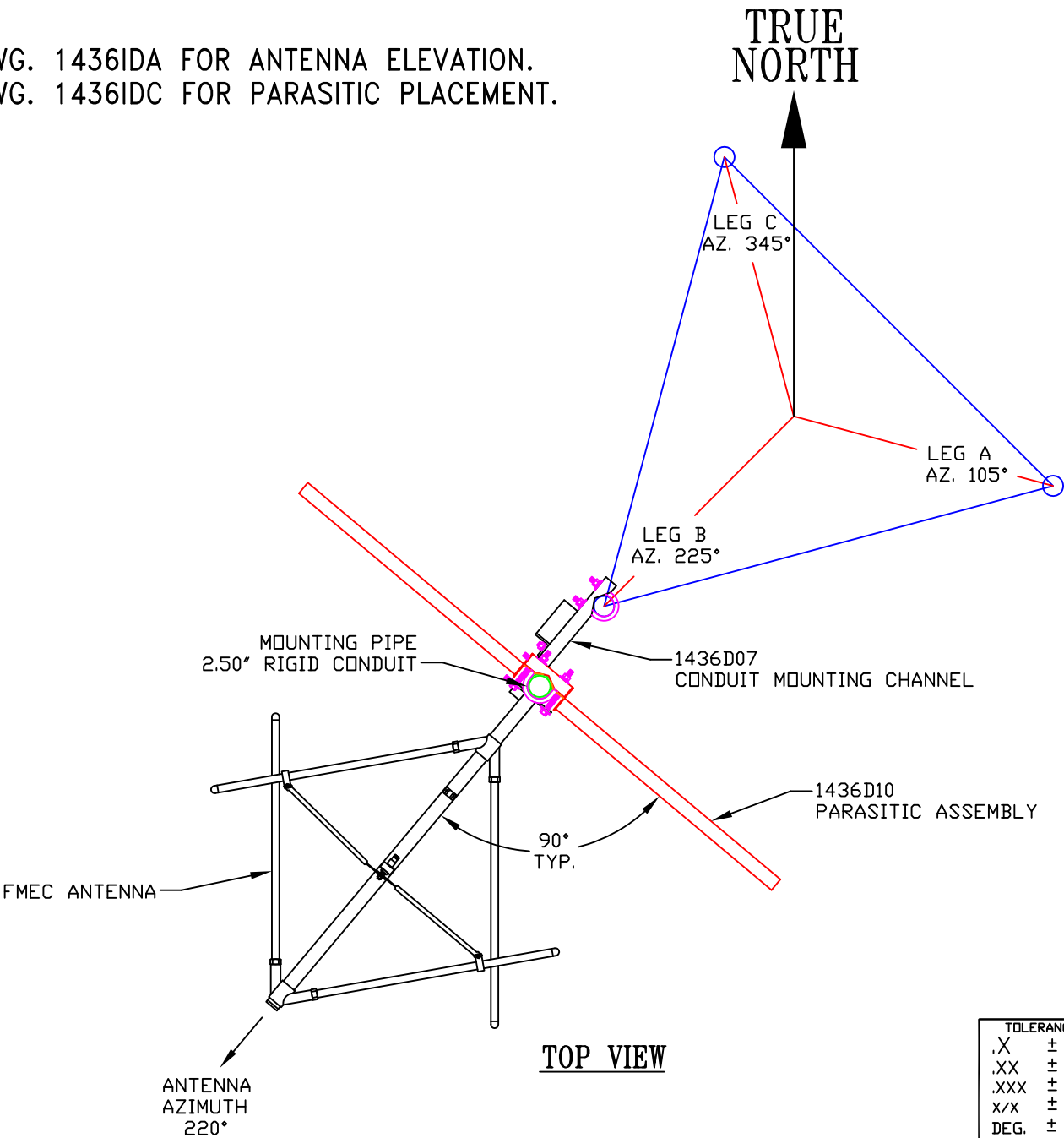
ENGINEER:
SCALE: NTS NAME: RAC DATE: 5/13/10 SHEET 1 OF 1

DRAWING NUMBER: 1436IDA

NOTE:


- 1. REFERENCE DWG. 1436IDA FOR ANTENNA ELEVATION.
- 2. REFERENCE DWG. 1436IDC FOR PARASITIC PLACEMENT.

DRAWING
NUMBER: 1436IDB



TOLERANCES	
.X	± .015
.XX	± .005
.XXX	± .002
X/X	± 1/32
DEG.	± 1/2
UNLESS OTHERWISE SPECIFIED	

REVISION RECORD		
REV	APPROVAL	DATE



SYSTEMS WITH RELIABILITY, INC
619 INDUSTRIAL PARK ROAD
EBensburg, PENNSYLVANIA 15931

TITLE: FMEC/3-DA, FREQ. 88.9
WJTA, GLANDORF, OH

MATERIAL: ANTENNA ORIENTATION
FROM TRUE NORTH

SIZE
A

PARTS MADE BY THIS DRAWING

SCALE: NTS NAME: RAC DATE: 5/13/10

DRAWING
NUMBER: 1436IDB

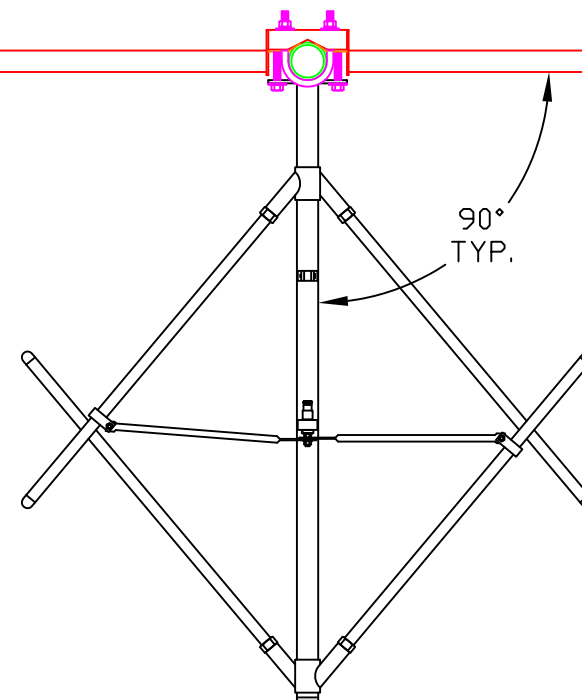
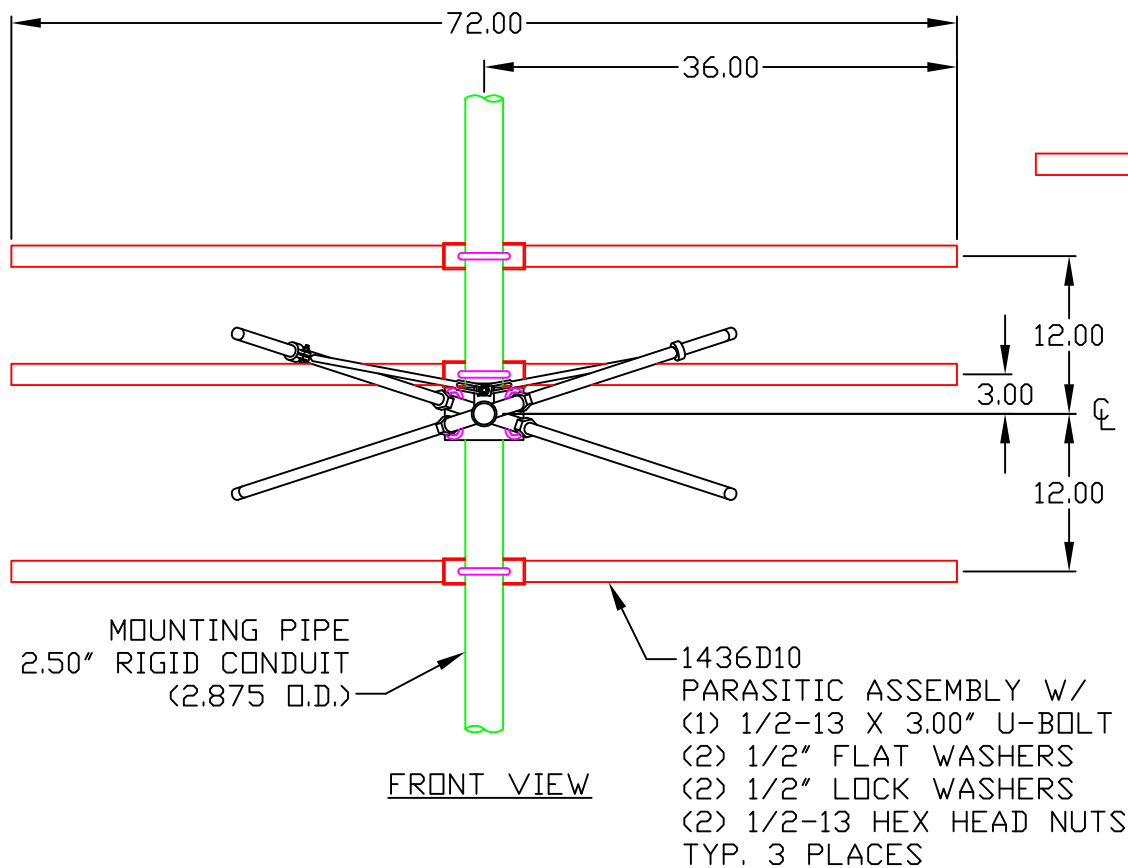
SHEET 1 OF 1

NOTE:

THIS INSTALLATION TYPICAL FOR ALL 3 BAYS.

DRAWING
NUMBER:

1436IDC



TOP VIEW



SYSTEMS WITH RELIABILITY, INC
619 INDUSTRIAL PARK ROAD
EBENSBURG, PENNSYLVANIA 15931

TITLE:

FMEC/3-DA, FREQ. 88.9
WJTA, GLANDORF, OH

MATERIAL:

PARASITIC
PLACEMENT

SIZE

A

PARTS MADE BY THIS DRAWING

SCALE: NTS

NAME: RAC

DATE: 5/13/10

SHEET 1 OF 1

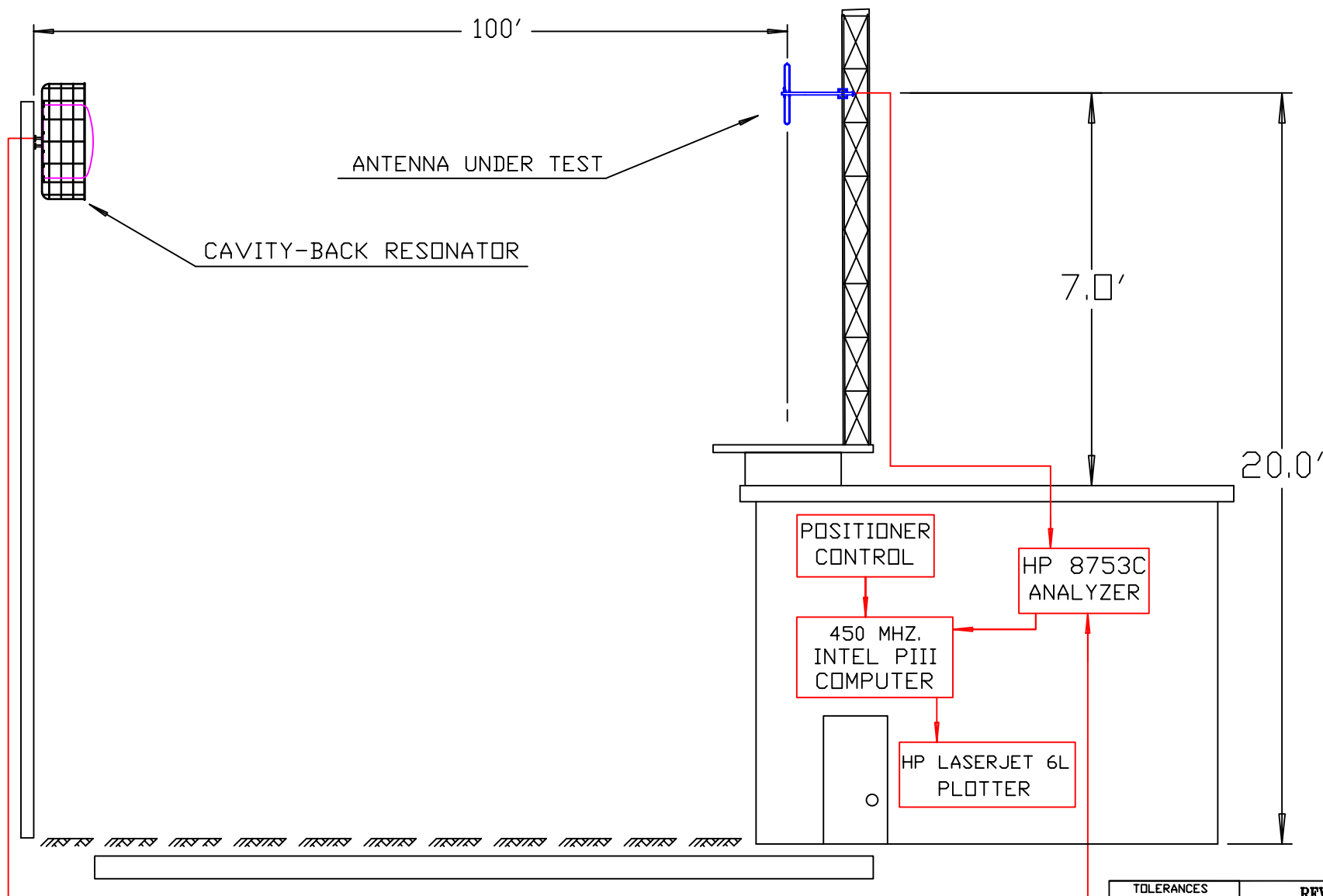
TOLERANCES	
.X	± .015
.XX	± .005
.XXX	± .002
X/X	± 1/32
DEG.	± 1/2
UNLESS OTHERWISE SPECIFIED	

REVISION RECORD

REV	APPROVAL	DATE

NOTE:

DRAWING
NUMBER: 2105A10



TOLERANCES	
.X	± .015
.XX	± .005
.XXX	± .002
X/X	± 1/32
DEG.	± 1/2
UNLESS OTHERWISE SPECIFIED	

REVISION RECORD		
REV	APPROVAL	DATE
2		10/7/05
1		4/30/02



SYSTEMS WITH RELIABILITY, INC
619 INDUSTRIAL PARK ROAD
EBENSBURG, PENNSYLVANIA 15931

TITLE: TEST RANGE SCHEMATIC

MATERIAL:

SIZE

A

PARTS MADE BY THIS DRAWING

SCALE: NTS

NAME: JRM

DATE: 11/1/98

SHEET 1 OF 1

DRAWING
NUMBER: 2105A10